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MASTERING TRANSVERSAL COMPETENCES IN A HIGHER EDUCATION ENVIRONMENT: THROUGH PROCESSES OF CRITICAL THINKING AND REFLECTION

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Contents

List of abbreviations

CPS – collaborative problem solving

CRA – critical reflection analysis

CT – critical thinking

DMIL – digital, media and information literacy

HEI – higher education institution

LLCL – learning to learn and continuing to learn

SDA – sustainability and diversity awareness

TC – transversal competences

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Preface

Higher education institutions are increasingly stressing the importance of transversal competences, which are crucial for succeeding in dynamic, innovation driven and diverse environments. On the other hand, there is a lack of literature which presents transversal competences in their complexity and would also offer in-depth understanding of how those competences can be enhanced and why their development should be a systematic process at every higher education institution.

Thus, the main thesis of this monograph is that critical thinking is a key element of every transversal competence. At the same time, the process of reflection is presented as a prerequisite for the innovative teaching and learning strategies used in the process of transversal competence development.

The main intention of this volume is to show why it is important for the current higher education institutions to pay more intensive attention to equipping their students with transversal competences. By mastering transversal competences, we do not simply mean skills training. The ambition of this book is incomparably greater than to offer some methodological how-to training or know-how practical advice leading to forming some isolated competences.

Although mastering transversal competences includes practical competence-based actions, "it does not mean it is 'theory-free ... Competences form a kind of bridge or hinge between theory and practice. In a sense, they could be said to be manifestations of applied theory" (Nissilä et al, 2015, p. 290).

Based on our long-term focus on researching the content of transversal competences, and at the same time changing the forms of education so that they lead to the development of these competences, our primary objective is to design a new framework for mastering transversal competences in a higher education environment. Our approach to transversal competences is proposed as a feasible way to the enhancement of these competences through key processes of critical thinking and reflection.

The book also aims to address the following questions:

1. Which transversal competences reflect the current era of digitalization and innovation?
2. What is the interconnectivity between the development of critical and reflective thinking skills and transversal competences?
3. How can transversal competences be fostered in the higher education environment?

The designed research philosophy and strategy has been formed through reflection, assessment, and evaluation of the specific standards of critical thinking within the context of developing transversal competences. This approach has been implemented as an experimental research methodology in several stages by using an innovative method called 'Critical Reflection Analysis' which is presented in detail in Part 2 in this book. This method has already been presented and tested in several research papers conducted in both environments - academic and praxis (Theodoulides and Jahn, 2013, Theodoulides, 2018, Theodoulides, Kormancova and Cole, 2019, Theodoulides et al., 2020).

The research findings underline the interdisciplinary scope of the competences' framework, overlapping various disciplines such as behavioral and social sciences, philosophy, economics and information technology and explaining the relations among them. The research philosophy and strategy has been formulated within the challenges which the current era is facing.

In this book, a complex view on transversal competences is proposed and a process-oriented approach to enhance, assess and evaluate these competences. The two key processes related to

teaching and learning at the higher education environment have been identified as the core of each transversal competence, i.e., process of developing the various sets of critical thinking skills and the process of reflection.

The scientific uniqueness of this book lies in the proposed systemic approach to developing the transversal competences in higher education. It has resulted from the completion of several research activities and participation in local and international projects focused on the above-mentioned areas since 2018. The continuous cooperation with various organizations from praxis has also confirmed the societal need to synthetize a lengthy experience and research findings in order to introduce such a framework for transversal competences. Since success in the higher education environment and the practical world rests upon close interrelatedness of efforts in mastering these competences, we believe that this book will be a relevant and useful contribution in that endeavor.

This publication is one of the outcomes of VEGA No. 1/0396/20 project *Influence of electronic media on the behavior and development of cross-cutting capabilities in the Z generation*, and partially also of KEGA 008UMB-4/2022 project *University education as a gateway to thinking: integration of reading, academic and critical skills as a precondition to intellectual capital of universities and internationalization of education*.

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Dana Hanesová & Lenka Theodoulides (the authors), 2022

Introduction

The title of this book, as well as its structure, addresses the focus of the study: the interconnection between the transversal competences and the critical thinking skills and reflection, and their complex and systemic implementation in a higher education environment.

The study, on which this monograph is based, forms a significant part of its authors' research on transversal competences. The research was shaped by their motivation to introduce a new framework of transversal competences to be developed through university teaching and learning. From it, a systemic approach to mastering transversal competences has emerged, which reflects the urgent needs of the current era of digitalization combined with social and global uncertainty.

The book offers these main topics for further consideration:

- Combining the processes of critical thinking and reflection with the concept of transversal competences
- Defining the complexity of the transversal competences and their interrelatedness
- A systemic approach towards the development of the transversal competences at the HEI

PART 1 focuses on defining the characteristics of the transversal competences and introduces the key concepts and approaches which were studied in relation to the context of the transversal competences which should be focused on by higher education. Our goal is to analyze the most influential concepts related to critical thinking and reflection which cover philosophical, psychological, behavioral, and brain science approach.

A comprehensive review of the terminology and typology related to competence is presented in **Chapter 1** is concerned with the theoretical analysis of the transversal competences and examines further their implementation in higher education. The current era of digitalization and global challenges requires a different approach in teaching and learning in any higher education institution and a new form of relationships within and outside its education system. While the topic of transversal competences is present in many universities, professional organizations and broadly discussed within international institutions, i.e., OECD and European Union, their development, and methods to assess its progress among students continue to challenge scholars and practitioners. The last part of this chapter introduces the four broad transversal competences which go beyond the traditional teaching and learning at the HEI. These are: digital information and media literacy, collaborative problem – solving, sustainability and diversity awareness and the last one, learning to learn and continuing to learn. So, the first chapter offers an initial reflection and a view of the key starting points supporting the necessity of dealing with transversal competences in HEIs.

Chapter 2 explores philosophy which, no matter that it started thousand years B.C., still offers meaningful answers and lessons to be learned for our learning and developing new competences which help us to cope with the complexity of the world. Socrates, Plato, and Aristotle introduced a path towards wellbeing called 'eudaimonia' which can be explained as a meaningful human life and prosperity. The chapter shows the overlap between the ancient theories and philosophies presented in the current work of Waterman (2001) and Ennis (1989). It continues to examine cognitive, behavioral, and psychological concepts which help to understand the individual process of learning, rationality in thinking and making decisions. By referring to the respected work of Mercier and Sperberg (2017), Kahneman and Tversky (2019), and based upon Halpern's work (1985 & ff) and many others, this chapter describes how all these concepts can influence our ways of learning and behaving. The last part of Chapter 2 explains the core concepts and approaches related to critical thinking and reflection that have been chosen as the methodological base for our research (in Part 2). Critical thinking is described here as a teaching and learning philosophy. We refer to the approaches of Richard Paul and Linda Elder, who define intellectual standards as

the inevitable ground for understanding why critical thinking as a life philosophy should be our starting point for developing transversal competences.

PART 2 of this volume aims to introduce an innovative research strategy and methodology based upon two processes of critical thinking and reflection as well as to discuss the key findings. Therefore **Chapter 3** focuses on the research methodology using the Critical Reflection Analysis in which 8 key standards are proposed with regards to the content of transversal competences. The concept put forward by Stephen Brookfield set out the foundational knowledge for teachers to reach their true potential. It also turns our attention to teaching and learning to make the educational process at HEI more reflective towards the global and societal challenges.

In **Chapter 4** research findings on each transversal competence are presented. In particular, a deeper analysis of our proposed four transversal competences is presented and it leads towards a better understanding of specific implementation, how they can be performed and what standards of each competence can be set up in order to assess and evaluate them. Moreover, multiple perspectives of their conceptualization in the process of teaching and learning in a higher education environment is provided here. Finally, it continues to synthetize the conceptualization presented in previous chapters and results in a proposed transversal competences framework which reflects societal and educational challenges. Designing such a systemic framework aims to provide an answer what and why transversal competences need to be a key focus and interest of higher education. It also intends to offer a solution as to how transversal competences can be developed at any educational environment.

Part 1

Transversal competences in higher education: A theoretical overview of concepts and approaches

The competences required for the 21st century have been examined extensively on the basis of several definitions provided by large number of scholars, institutions and have been presented in global studies and reports. The interest and necessity to develop transversal competences have increased because of the current global challenges and societal changes, for instance, the enhancement of information and communication technologies, qualities of new generation of young people entering the labor market, the impact of digitalization on behavior of the youth, and structural changes of industries.

The first two chapters of the monograph are focused on a deeper analysis of several theoretical approaches that justify the current need for the development of transversal competences.

The view of the authors is directed to the philosophical starting points presented by Socrates which no matter that it existed thousand years B.C. it still offers meaningful answers and lessons to be learned for our learning and developing new competences which also helps us to cope with the world complexity. It continues by analyzing more recent studies of several scholars particularly interested in philosophy, psychology, and neuroscience, for example Ennis, Waterman, Kahneman, and Dweck.

Part 1 ends by defying the new four broader competence groups called as (1) digital, media and information literacy; (2) collaborative problem–solving; (3) learning to learn and continuing to learn and (4) sustainability and diversity awareness.

Since this monograph is written by non-native authors in a country where English is as a foreign language, they sometimes used a professionally translated Slovak edition available to them instead of the original text in English, which means that the exact quotations used (with quotation marks) are translated from Slovak into English (in order to comply with publication ethics) and the page numbering in the citation refers to the language version that we had at our disposal (which will always be noted).

Chapter 1

Transversal competences in an era of digitalization and of societal, political and global uncertainty

1

The urgent need to focus on transversal competences is clearly apparent in a world where organizations, workforces and individuals are continuously subject to unprecedentedly complex change: rapid and radical technological advancements, the transformational forces and challenges of globalization, environmental sustainability, demographic shifts and migration, and political uncertainty (Whittemore, 2018). The first chapter is a theoretical overview which begins with a terminological explanation of the term 'competence' and of various synonymous adjectives used in connection with competences by researchers, educators, and practitioners. Various classifications of competences have been presented, but there is little agreement amongst scholars and practitioners as to which ones are most important for understanding the world's complexity and which should be developed through teaching and learning in higher education.

The debate between researchers and practitioners around the world has focused on various kinds of key competences or transferable, trans-sectional, global, 21st century, and transversal competences. The authors point to the current acute need for higher education institutions to develop, in addition to professional competences, particular transversal competences of their students.

The last part represents the theoretical background of newly defined four specific transversal competences: digital, media and information literacy, collaborative problem-solving, sustainability and diversity awareness and learning to learn and lifelong learning competences which have been proposed to be developed in higher education environment. These competences will be the object of our experimental teaching and conducted action research further described in Part 2 of this book.

1.1 Higher education facing the societal need for transversally competent citizens

The world has been changing dramatically due to rapid technological innovation, globalization, socio-economic changes and the environmental and climate crisis. A complex and complicated world increases the importance of the ability to operate with clarity, responsibility and good judgment and to make difficult decisions despite the maelstrom of uncertainty, ambiguity and volatility that surrounds us. Higher education systems play a critical role in addressing these challenges by providing outcomes relevant to the demands and expectations of their stakeholders (Purg et al, 2018). For organizations, the workforce and citizens, learning to adapt to these major changes that are simultaneously creating an unprecedented impact on humanity (e.g., globalization and artificial intelligence) represents a significant challenge, but it is essential that these changes are not marginalized. Nowadays organizations, workforces and individuals are constantly subject to unprecedented complex changes - rapid and radical technological advances, the transformative forces and challenges of globalization, environmental sustainability, demographic change and migration, and political uncertainty.

So, in this context it is not an exaggeration to say that the last 20 years can be characterized as a period of radical paradigmatic changes in society (Kosová et al. (2019) which can be assumed to have various positive and negative consequences for the world of work and the world of people, including changing demands on higher education institutions and scientific research. Thanks to technological innovation, changes in social processes are faster than ever before; they are confronting humanity with a number of completely new issues. According to Bauman (2004), we are amid an ontological 'metachange', where the world is constantly changing, and the way in which it is changing is shifting too.

These changes are already visible in the world of work, as evidenced by the World Economic Forum's 2016 and 2018 *Reports* on the future of jobs. The 2016 *Report* stated that, based on unprecedented changes in technological trends and intelligent systems, approximately 65% of children entering

schools will work in professions that do not yet exist, with up to 1/3 of key competences and skills being competences that we do not yet emphasize (WEF, 2016). According to *The Future Jobs Report* (2016, p. 3), "in many industries and countries, the most in-demand occupations or specialties did not exist ten or even five years ago, and the pace of change is set to accelerate". According to these documents, professions that significantly affect people and human skills are expected to grow, such as human resources specialists, education and development specialists, organizational development specialists, personnel, cultural and consulting specialists, service and problem-solving staff and designers, e-commerce and social media specialists, experts in creating and managing innovations that are based on the ability to present data, negotiate and persuade, or the ability to teach or lead others. Global employers' requirements are based on efforts to realize and use the full potential of technological progress and the full potential of humans, who, for example, require the establishment of systems and positions that give meaning to the unprecedented flood of data we already generate and store in databases today, and which is growing exponentially. As a result, even positions marked as stable (e.g., researcher, teacher) will not remain unchanged - they will all be based on the cooperation between man and technology. The authors of both reports criticize most education systems today for providing 'dead' education. They point out that the system of acquiring traditional formal qualifications, focusing on 'heavy' professional competences that educate ready-made employees and specialists in one field, is already outdated, and hinders future advancement:

> *"People need to become more than specialists capable of solving only certain kinds of problems; they need to be able to take into account all related and arising contexts. Inter-disciplinarily prepared employees are required, with emphasis placed not on their factual knowledge, because data and theories will be 'delivered' mainly by machines, but substantially on transversal skills, which will become the core of most occupations" (WEF, 2018, p. 22, 32).*

In general, in the future most employees will have to be able to solve certain problems taking into account all related and emerging contexts.

The complex and complicated world strengthens the urgent need for the ability to operate with clarity, accountability and good judgement, and to make difficult decisions, despite the vortex of uncertainty, ambiguity and volatility that surrounds us. Organizations, the workforce and citizens, are learning to adapt to these momentous changes. This creates an unprecedented impact on humanity (e.g., globalization and artificial intelligence) and a significant challenge for higher education.

To survive and to thrive in this competitive, hyper-connected, technology-driven global economy, organizations, workers and citizens have to develop and deploy a core set of transversal competences that are the cornerstone of all their endeavors. Global challenges highlight the critical role of transversal competences for mindful participation in 21st century work and life. Any education call to action should evidence the pressing need for focused attention of organizations and individuals on continuous learning and development of these competences.

At present, it is often discussed in professional and public circles that education, and especially higher education, is insufficiently preparing its graduates for the labor market. The *European Parliament resolution of 19 January 2016 on skills policies to combat youth unemployment* emphasizes the need to provide young people with an education that prepares them for successful employment. The importance of developing teamwork skills, the ability to take responsibility,

analyze situations, etc. is often also emphasized. These skills are equally important for the further development of a professional career. In addition to the demands and needs of the labor market, the need to equip individuals with transversal competences to become active and responsible citizens is also mentioned (EP, 2016).

Unsurprisingly, several international organizations have presented a number of their surveys and reports over the past decades and have supported education-related initiatives and challenges to develop 21st century skills. To initiate this effort, there must be a fundamental shift in formal education, as well as a fulfilment of the essential need for collaboration between all stakeholders within the educational ecosystem. In addition to social needs, we are still faced with the complex question of what students at universities have to learn in terms of formal academic knowledge, including transversal competences that lead to personal, social, and professional outcomes.

It is precisely for these reasons that higher education institutions have to face the current need to educate transversally competent experts. They should not only put emphasis on pure factual knowledge, even in technical and natural sciences, where data will primarily be 'supplied' by machines, but also on a significant part of the training for transversal skills within the study programs. The role of higher education institutions is to create new knowledge as well as to contribute to the development of competences that reflect societal and global challenges and are relevant for future-oriented higher education. These institutions have recently raised questions which competences are most relevant in today's rapidly changing environment and should therefore be systematically developed. The debate of researchers and practitioners around the world has been focusing on various kinds of key competences or transferable, trans-sectional, global, 21st century, and transversal competences. In the worldwide higher education setting, there is little agreement about which specific competences have to be developed during the education process, so that individuals can be equipped to handle future tasks, jobs and any other roles in society.

At the same time, these skills and competences are not just a supplement to obtaining a job, but the main core of their professional training. Higher education should be oriented to the needs of students - to enable them to cultivate their personality and profile according to their abilities and strengths, develop talents and get the most out of their studies for a future meaningful professional and personal life. This was investigated over a lengthy period (2013-2019) and confirmed by several local surveys as well as internationally published findings. In 2013, a survey was conducted in Slovakia, in which 2,453 university graduates and a sample of employer organizations participated. In the case of employers, the survey focused, among other things, on the evaluation of graduates in terms of the acquisition of professional, implementation, communication, and managerial competences. The perception of the graduates' implementation competence was evaluated negatively, e.g., application of theoretical knowledge in practice, ability to work independently, orientation and leading a discussion. The worst preparedness is reported by employers in management skills, especially in the evaluation of their decision-making, acceptance of responsibility and ability to think strategically. Dissatisfaction also prevails in the evaluation of their communication skills, - compared to similar research from 2008, there was a significant deterioration in this area (Vančo et al, 2016, p. 11).

According to another survey *'Graduate 2014'* (an essential part of the national project *'Universities as engines of the development of a knowledge-based society'*, 2014), which covered a wide range of competences, the greatest discrepancy between the requirements of practice and the level provided by the school, communication and negotiation skills have been found in eight fields of study along with the ability to take responsibility, identify and solve problems. Table 1 shows the results linking ISCED fields that the graduates had studied and the discrepancies between the expectations of practice and the achieved level of competence of the graduate.

Table 1 The gap between study program and missing competence

Study program	**Biggest discrepancy in skills and abilities**
Education sciences	*economic,* ***communication*** *and* ***negotiation***
Humanity and art	*computer skills, economic,* ***communication*** *and* ***negotiation***
Social science, business and law	***communication*** *and computer skills,* ***identifying and solving problems, taking responsibility****, active approach, thinking creatively and flexibly, making decisions independently*
Natural science, mathematics and informatics	*language skills in foreign language,* ***communication,*** *working in an intercultural / international environment*
Engineering, manufacturing, and construction	*language skills in a foreign language,* ***communication****, working in an intercultural / international environment,* ***identifying and solving problems and taking responsibility***
Agriculture and veterinary	***Communication*** *and* ***negotiation****,* ***taking responsibility***
Health and social care	*Economic, computer skills,* ***communication*** *and* ***negotiation***
Services	*foreign languages,* ***communication*** *and* ***negotiation,*** *working in an intercultural / international environment,* ***taking responsibility, identifying and solving problems***

Source: authors' elaboration based upon material Horny, Durina, CVTI

It can be summarized that the biggest difference between actual and expected transversal competences are the abilities:

- related to a broader and quite general set of the communication skills (to communicate in a foreign language, communication with people and negotiation),
- to identify problems and provide solutions, and
- to take responsibility.

The CVTI survey among employers in Slovakia (in the section 2015 entitled *Evaluation of the readiness of university graduates for practice in selected competencies,* p. 27-32), in which a total of 2,671 business entities participated, showed an unfavorable perception of graduates' implementation competence, their application of theoretical knowledge into practice, the ability to work independently, orientate and discuss. Employers reported the worst preparedness in their management skills, decision-making, acceptance of responsibility and strategic thinking (Janková, 2015, p. 27-32).

INEKO, in cooperation with the Business Alliance of Slovakia, conducted a questionnaire survey on a selection of 81 public figures (activists, non-profit organizations, entrepreneurs, economic analysts, academics, journalists, officials and politicians) (INEKO, 2017). According to the experts

interviewed, it is necessary to reform the content of education and educate teachers to develop students' critical thinking, which they also emphasized during a round table discussion.

The results of this research clearly demonstrate the need to change in the way of teaching at universities. Previous methods have proven to be inadequate. They have been focused mainly on memorization, they are less interactive, and they insufficiently motivate students to take responsibility for their education, which ultimately results in the employers' dissatisfaction - university graduates do not have a sufficiently developed ability to take responsibility for their actions and work. The failure of graduates to successfully identify and solve problems is related to their insufficient ability to perceive reality, also to their low level of critical thinking, which can affect their wrong decisions (the ability of university graduates to know how to make decisions is negatively perceived in research results).

To mutually address today's uncertain environment and to jointly support the younger generation to cope with this uncertainty there is the need for close cooperation between the world of practice and the academic world. There seem to be different perspectives, expectations and demands in these two disconnected worlds. Qualitative research carried out in 10 countries of Central and Eastern Europe, and in the Republic of South Africa, too, tried to find out the reasons behind and also the answers to this key question. The world of practice believes that one of the reasons is that there is no common starting point from which the two worlds can build relationships; that universities do not sufficiently reflect the needs and trends of the labor market and do not adapt their curricula to meet these needs. There should be more integration of theory and practice. Incorporating practice into the classroom would enable the creation of new knowledge that is needed to thrive in today's rapidly changing environment (Purg et al, 2018).

In 2016, the World Economic Forum set out three terms - Competences, Foundational Literacies and Character Qualities - that are essential in 21st century education and they are presented in Table 2.

Table 2 New Vision for Education

Foundational Literacies	**Competences**	**Character Qualities**
1. Literacy	7. Critical thinking/problem solving	11. Curiosity
2. Numeracy	8. Creativity	12. Initiative
3. Scientific literacy	9. Communication	13. Persistence/grit
4. ICT literacy	10. Collaboration	14. Adaptability
5. Financial literacy		15. Leadership
6. Cultural and civic literacy		16. Social and cultural awareness

Source: World Economic Forum, 2016

The discussion about competences prompted debate about the importance of the competence approach in higher education. In the European education, competence-based education has been recommended for more than 20 years – starting with *the Bologna Declaration* (MC EHEA, 1999; Adam, 2004; Davis, 2017). Emphasis was placed on the importance, not only of specific

professional knowledge, skills and competences, but also on the achievement of generic skills and competences that relate "to any and all disciplines e.g., written, oral, problem-solving, information technology, and teamworking skills" (Adam, 2004, p.5). Later, the EC paid attention to this basic educational requirement in other important documents, such as *A New Skills Agenda for Europe* (2016) and the *ESCO Strategic Framework: European Skills, Competences, Qualifications and Occupations* – a multilingual classification system for European skills, competences, qualifications, and occupations (2016).

New and new prognoses are being made about which competences will become most important in the future, e.g., Pearson's study predicts that in 2030 social skills will become more highly valued than artificial intelligence and machines perform a wider range of tasks. The researchers conclude that the future will be about humans and machines together rather than humans versus machines. This will require a focused effort to develop transversal competences (Pearson, 2017). Another document by the OECD (Learning Compass called *Learning for 2030,* 2019) mentions *transformative competences* needed for lifelong learning and life on this planet in general in the next decade (OECD, 2019). They will help the students "to be empowered and feel that they can aspire to shape a world where well-being and sustainability – for themselves, for others, and for the planet – is achievable". Mastering them empowers new generations to "contribute to and thrive in our world and shape a better future".

Higher education is expected to provide graduates with the latest knowledge and skills relevant to the needs and demands of the labor market and to develop active and responsible citizens who can recognize and enact changes in their community, society and in their personal lives. Based on an analysis of future automation processes, there is not only a need for competences in new technologies (digital, information and media literacy), but also key 'human' skills such as creativity, originality and initiative, critical thinking, persuasion and negotiation or comprehensive problem solving.

> *"Students today are likely to have several careers in their lifetime. They have to develop strong critical thinking and interpersonal communication skills in order to be successful in an increasingly fluid, interconnected, and complex world" (Terzieva et al, 2015, p. 25-26)*

1.2 The complex nature of competences

Before we start discussing which transversal competences have to be developed within higher education institutions, it is necessary to define what we mean by 'competency' or 'competence'. Among experts, the difference between these two terms is still unclear. Some authors present them as interchangeable synonyms, even within a single document, and some point to the difference between them due to their variable usage in the context of human resources and personnel.

Let us give some examples. Naydenova (2004, in Tsankov, 2017) focuses on clarifying the relationship between competence and competency. According to her, 'competence' is a broader term that is associated with a quality of personality, a basic feature of individuality and a result of an action or activity. 'Competency' is tied to the operationalization of subjective expression and is

a complex of properties necessary for functioning in a specific field of activity (Hutorskoy, 2003). Competency is integrated into a specific situation and context of knowledge and skills and has a pragmatic aspect rather than "practical realization of competence" (Tsankov, 2017, p. 131).

Slovak authors (Kosová et al, 2019, p. 127) point out that in some linguistic systems, such as in Slovak, the term 'competency' occurs more within the legal-economic jargon, denoting a certain level of authority, qualification, or performance of a profession. From this reason - in the context of the overall higher education - she suggests using either 'competence' or its synonym 'capability', and not 'competency'.

What and how specific competence is formed may be considered through several conceptual approaches to competences. The first is the behavioral approach (Porvazník et al, 2013) that approaches competences as a value concept of current behavior. This approach places emphasis on effective professional behavior. Competences perceived in this way are acquired through training/ education and development. The characteristic features of this approach are behavior demonstration, observation, and assessment, which are the traits of an individual that are associated with a high-quality professional performance. The second is the generic approach which seeks to identify abilities and features that explain variation in performance and results in overall performance that is appropriate for a specific context. Thirdly, the cognitive approach is concerned with identifying shared abilities that explain variation in behavior. These competences are associated with a set of cognitive prerequisites that individuals are to have for high-quality behavior in a given field (author). Porvarzník et al (2013) add two more, namely the standard-based approach that sets outputs for activities, and the situational approach, which tries to find a connection between selected situational factors and required competences. The emphasis is on culture and values.

This multidimensional view of competence is reflected in the definitions used by multinational organizations, such as the OECD and the European Parliament.

The OECD uses competence as a multifaceted term, meaning "more than just knowledge and skills. It involves the ability to meet complex demands, by drawing on and mobilizing psychosocial resources (including skills and attitudes) in a particular context" (OECD, 2005, p. 4). Rychen and Salganik (2003), the authors of this definition, see competence as holistic in nature, including both cognitive and non-cognitive aspects, since: (i) there is a direct link between competence and performance, insofar as competence relates to the successful fulfilment of challenges and requirements; (ii) competence presupposes not one but a large set of cognitive and non-cognitive abilities; and (iii) competence refers to an 'orchestration'. that is, to the ability to use various abilities in a deliberate way.

Similarly, the EU, in its *Recommendation of the European Parliament on key competences for lifelong learning* (EP, 2006), considers competence a complex construct. According to this document, 'competence' is a "combination of knowledge, skills and attitudes appropriate to the context" where **knowledge** includes data, facts, ideas, or theoretical concepts (linked to a practical field or scientific discipline); **skills** (practical or cognitive) are the abilities to apply knowledge and use it in various contexts in order to achieve results; and **attitudes** is the disposition and mind-set to act on or react to ideas, persons or situations (by EU in *European Qualification Framework* (CoEU, 2018).

In line with this wider view of competence, Kubeš had already, in 2004, referred to competence as a combination of motives, human characteristics (e.g. temperament), self-perception, knowledge and capabilities to perform physical or mental activities. Rieckmann (2012) adds the individual disposition to self-organization, which includes cognitive, affective, volitional and motivational elements that influence each other.

From all these different perspectives, it is clear that the concept of competence is very broad, and it can be summarized that it is a set of behavioral skills, professional or technical capabilities, but

also personal value settings, understanding of what is happening in our environment and the attitude which is taken towards those challenges. The dynamism, complexity and diversity of the world which we live in now, means that competence in general should be viewed as a complex construct, consisting of a whole system of specific competences structured in a particular way which integrates knowledge, skills and the attitude of individuals to themselves, to others and to the activity and its results.

In general, there are two basic categories of skills and competences: (a) specific skills and competences associated with a specific field or profession; and (b) more general, non-professionally oriented, non-field-specific, cross-sectional competences, sometimes called *generic competences,* as they are important for work, education, and life *in general*, applicable in various occupations (Kosová et al., 2019). They are "the cornerstone for the personal development of a person's self-esteem and self-management, motivation, sense of responsibility, flexibility (personal development); making decisions, empathy, leadership, sociability (social development), and time management (learning to learn)" (Project ToVET).

Since the 1980s, and especially since the beginning of the 21st century, various types of competences necessary to become "effective workers and citizens" have been explored (Ananiadou & Claro, 2009, p. 8). They have been defined in multiple ways, with various emphases, depending on the context in which they are used. But "regardless of the variety of skill classifications, all of them include learning-to-learn, innovation, communication, collaboration, creativity, critical thinking, problem-solving, personal and social skills ..., decentralized decision making, information sharing, teamwork, and innovation ..." (Luka & Seniut, 2019, p. 5). Most of them are overlapping synonyms (Terzieva et al, 2015; Economou, 2016).

Probably the earliest term used for 'general' human–working and life–skills and competences was the term ***key competences***, needed for everyone's personal fulfilment and development, employability, social inclusion, a sustainable lifestyle, a successful life in peaceful societies, health-conscious life management and active citizenship. The EU framework of key competences published in 2006 as *The Recommendation for Key Competences for Lifelong Learning* defines key competences as "those which all individuals need for personal fulfilment and development, active citizenship, social inclusion and employment" (EP, 2006, p. 3). The *Recommendation* lists eight key competences for lifelong learning: communication in the mother tongue; communication in foreign languages; competences in mathematics, science and technology; digital competence; learning to learn; interpersonal, intercultural and social competences and civic competence; entrepreneurship; and cultural expression (EP, 2006). Tsankov (2017) defines the key competences as a "*system of knowledge, skills, attitudes and relationships that helps learners and job seekers to achieve personal realization by enhancing their choices, increasing their adaptability to the dynamics of living and working conditions by making people more social, mobile, competitive and motivated*" (p. 133). Both of these older terms (generic or key competences) relate to the implementation of the acquired education at work or in the professions, and therefore have rather strong political-economic contexts, such as employment development and economic growth.

OECD, in its Program for International Student Assessment, and later in its project *Schooling for Tomorrow* and *the OECD' Definition and Selection of Competences (DeSeCO) model* (OECD, 2005, p. 3), distinguished the following groups of key competences important for sustainable development and social cohesion of society in the 21st century:

- competences to use tools interactively: to use language, symbols and texts interactively; use knowledge and information interactively; use technology interactively;
- competences to interact in heterogeneous groups: to relate well to others; co-operate, work in teams; manage and resolve conflicts;

- competences to act autonomously: to act within the big picture; prepare and carry out life plans and personal projects; defend and assert rights, interests, limits and needs

The first OECD documents mentioned several specific skills and competences necessary for higher education to develop, such as the ability to learn, including motivation to learn, self-organization; the ability to learn with and from others (especially teamwork); the ability to network; information and communication skills; critical thinking and problem solving; human and social competences, and language and communication skills (including intercultural competence).

One of the most recent lists of global competences was published by OECD (2018), including creativity or innovation, critical thinking, problem solving, decision making, communication skills, collaboration, information literacy, research and inquiry, media literacy, digital citizenship, ICT operations and concepts, flexibility and adaptability, initiative and self-direction, and productivity, leadership and responsibility.

The framework of key competences issued by the European Parliament in 2006 listed eight key competences for lifelong learning (EP, 2006): communication in the mother tongue; communication in foreign languages; competences in mathematics, science and technology; digital competence; learning to learn; interpersonal, intercultural and social competences and civic competence; entrepreneurship; and cultural expression.

The OECD (2017b) defined the current societal expectations from key competences as follows. They should be:

1. multidimensional, involving different processes and intellectual abilities - analytical, critical, communicative, etc.;
2. multifunctional, the mastery of which allows students to solve various problems in everyday, professional and private life;
3. *cross-disciplinary and interdisciplinary*, which are applicable in different situations within and outside the school context;
4. *competences* related to *overall development*: abstract thinking, self-reflection, ability to stand up for oneself, critical thinking, etc. Their very nature, as described above, requires a search for methodological approaches to the design of the educational environment which guarantees their formation and development in school education.

There have been other synonyms of key competences in use since 2000. One of the narrower synonyms of key competences which is often used is *soft skills* that include "the required interpersonal and intra-personal skills necessary to be effective in the workplace" or "a set of intangible personal characteristics, traits, attributes, habits and attitudes that can be used in many different types of occupations" (UNESCO, 2013). Other authors define them as "a broad set of skills, behaviors, and personal qualities that enable people to effectively navigate their environment, relate with others, perform well, and achieve their goals" (Gates et al 2016; Care et al, 2017).

The term 'soft skill' has not only been used in Europe, but also in other continents (North and Central America and Africa). However, Kosová et al. 2019 say that the etymological connotations of skills with the adjective 'soft' might underestimate the significance of these competences, so a more precise term should be used, e.g., transversal competences. In the current American higher education context, if speaking about "essential learning outcomes", these skills are often referred to as *cross-sectional, cross-sectoral,* or *cross-cutting skills* (Andrade, 2020, p. 166).

Skills and competences that are acquired "through training or through work experience" in one context, e.g., in education, that can be effectively used and further developed in another context e.g., in employment, or in business, are sometimes called *transferable skills and competences* (Scholz et al., 2009). The emphasis is on their transferability within individual careers.

More current concepts, as used for example by the OECD, are *21st century skills and competences* or *global competences*. The former indicates "a broad set of knowledge, skills, work habits …. that are believed to be critically important to succeed in today's world, particularly in collegiate programs and contemporary careers and workplaces" (Luka & Seniut, 2019, p. 4; Ananiadou & Claro, 2009). The latter emphasizes competences required in various intercultural situations and in dealing with global issues, potentially affecting people anywhere in the world and influencing „current and future generations" (OECD, 2018).

In 2020, after the outbreak of the COVID-19 pandemic, the European Union reacted to the newly increased need for specific work and life competences. In the document *European Skills Agenda* (July 2020), the EU proposed twelve actions in order for Europe to be able to recover from the losses due to the pandemic, among them the development of ***skills for life*** ("media literacy, civic competences, and financial, environmental and health literacy") and ***transversal skills*** ("cooperation and critical thinking") (EC, 2020). So, what does the synonym *transversal* point to?

Transversal skills and competences is yet another, relatively new synonym for soft skills, key competences, ***21st century skills, and global competences***. The transversality of competences emphasizes cross-sectionalism in terms of the content, not a specific task/role/discipline, but usability in various contexts. They may include an emphasis on humanity and the holistic development of the personality of learners (UNESCO, 2013), based on collaboration, self-discipline, resourcefulness, and respect for the environment. These are skills that all types of education, work and careers have in common and can serve as a bridge between education and work, and between different careers and personal lives (Scholz et al., 2009; Kosová et al., 2019). It was the developmental or educational component, emphasized by UNESCO, as well as the newest trends in EU terminology, that led the authors of this book to the decision to use the synonym *transversal competences* predominantly throughout this book. However, this does not change the fact that there are other synonymous adjectives mentioned already, and therefore we sometimes use them interchangeably.

Referring to all previous definitions and views, it can be summarized that ***transversal competences*** can be characterized in the following way:

- They are transferrable across domains, geographies, professions, and life contexts;
- They are developed through social and interpersonal relations and interactions;
- They are cross-sectoral, cross-functional and cross-curricular in formal, non-formal and informal education;
- Communication is the key element in manifesting and evidencing transversal competences if not communicated explicitly, they can remain undervalued or unrecognized;
- They are essential tools in any context associated with change;
- They can be observed, assessed, and developed, but it is a long-term process;
- They are learnt through experience, reflection and practice that require highly interactive learning processes; and
- In their development, they are closely linked with self-reflection, self-awareness and self-assessment.

Development of key/transversal/global or 21st century skills and competences has been examined and described in numerous research studies and documents, e.g., in the Report done by UNESCO (2015), e.g., studies by Wilson-Ahlstrom et al, 2014; Kautz et al, 2014; Terzieva et al, 2015, Whittemore, 2018. Quite a few models and competence frameworks, including their assessment scales, have been elaborated. In his review study, Economou (2016) mentions the following: *DeSeCo model* by OECD (1997), *enGauge 21st Century Skills* (2002, *The Key Competences for Lifelong Learning – A European Framework* (2006 & 2018), *The Partnership for 21st Century Skills* (P21) (2007), *The ISTE Standards for Students* (2008), the *KSAVE model* (2012), *Assessment and Teaching of 21st Century Skills* (ATC21S) (2016), *The Technology and Engineering Literacy Framework* (2014), or *The Key Skills of Junior Cycle Framework* (2015). The UNESCO's expectations for equipping students with transversal skills and competences were described in the document *Rethinking Education: Towards a global common good?* (2015). Its authors reflect on and underline the importance of the original (1996) four types of competences, especially the preservation and deepening of the humanistic approach. At the same time, they were expanded in order to include competences related to the sustainability of life on earth and a new perception of education for the common good: "The four pillars of learning are fundamentally under threat in the context of current societal challenges, and particularly the pillars of learning to be and to live together" (UNESCO, 2015, p. 40).

The research team involved in the project *the Assessment of Transversal Skills 2020 – ATS2020* (Economou, 2016), co-founded by the European Union, provided a diachronic and synchronic overview of some existing transversal skill frameworks, bringing together evidence about a large volume of research into skills and competence development (Economou, 2016).

In 2018, the Council of the European Union gave a further description of the recommended *key competences*, underlining the "awareness of all learners and educational staff of the importance of the acquisition of key competences and their relation to society" (CoEU, 2018, p. 4): learning to learn, life management, STEM competences (in sciences, technology, engineering and mathematics), entrepreneurship; digital, linguistic and citizenship competences.

According to the Council of EU, these key competences consist of various skills, such as problem solving and decision making, teamwork, critical thinking, risk assessment, constructive management of emotions, communication and negotiation skills, analytical skills, creativity and intercultural skills (Economou, 2016; EU – VISKA, 2018; CoEU, 2018).

To assess which competences are important to organizations today and will become even more important in the future, the AMA (American Management Association) surveyed 2,115 managers, executives and customer companies. The results show that an overwhelming majority of respondents believe it requires employees to demonstrate competency in the 'four Cs': critical thinking/problem solving, communication, collaboration, and creativity (AMA, 2019).

If transversal competences are to become one of the main goals of university studies, it is obvious that a relevant tool for measuring their achievement will also need to be adopted. According to VISKA project by the EU (EC, 2018), competence assessment should be holistic, consisting of (a) precisely defined "learning outcomes and levels of their achievement"; (b) "validation of the learning outcomes … procedures … of prior learning against curricula or specific jobs"; (c) "assessment of the achievement of learning outcomes" using various assessment procedures and techniques ("competence portfolio, self-assessment, dialogue with guidance professionals, peers (through group work) and assessment interviews (based on dialogue, examples and cases").

An internationally widespread model, built on previous models and experience in the development of transversal skills via teacher education, is the *Assessment of Transversal Skills - ATS2020* (Economou, 2016). It is a complex learning model which includes both the teacher's role in the process of development of transversal skills (coaching, assessment) and the students' involvement in their

own learning. It consists of several procedural constituents, such as prior knowledge, setting of the goals, choosing appropriate tools and strategies, evidence and self-evaluation.

1.3 The challenge to develop transversal competences at higher education institutions

The need to develop transversal competences at higher education institutions is directly reflected in the learning objectives and the profile of a level 8 graduate in the *European Qualifications Framework* (EC, 2018) and the *Dublin descriptors* which set requirements for the level of knowledge, research skills, thinking, communication and professional self-development. In addition to the high level of knowledge of the field studied and of the borderline disciplines, these European documents require the development of analytical, synthetic, critical and creative (innovative) thinking, diverse research skills, but also scientific ethics, integrity, responsibility, flexible communication or support for, and even management of, future progress.

The basis for the development of transversal competences is the constructivist paradigm. It exploits the potential to induce cognitive situations designed for the purposeful and systematic application of methods that facilitate the development of students' cognitive experiences, knowledge and their ability to apply them. The essence of the constructivist theory of learning can be summarized as follows: knowledge is constructed, not transmitted; new knowledge is built on the basis of previous knowledge; the initial idea is local rather than global; building knowledge as a set of structures requires targeted activities. Thus, constructivism is focused on the process of searching for knowledge and its construction. Knowledge is not received as a ready-made product but is created in learners by the process of self-discovery and transformation of information based on their experience and prior knowledge. Thus, the conceptual core of constructivist learning is the activity of students to learn through interaction with each other, interaction with the teacher and through 'doing', discovery and inquiry (Tafrova-Grigorova, 2016, p. 76). The constructivist paradigm is related to the opinion that the "learning process is based on the personality of the instructor, his uniqueness, excellence and individuality" (Ivanov, 2004, p. 32).

The theory of constructivism, which is perceived in teaching as a reflected educational activity – active reconstruction and construction of the student's internal knowledge system – focuses on the promotion of active understanding. It is not about accepting 'ready-made' knowledge, passed on by teachers or textbooks, but updating the previous, active role of the learner, focusing attention on activities inducing thought operations or situations that support the development of critical and creative thinking, emphasis on social and cultural context in acquiring and understanding new information, and construction of schemes and models (Kozárová, Gunišová 2020).

Student-centered learning, in which the student is an active participant, is the basis of constructivist strategies whereby learners independently discover and transform new information, by continuously verifying it against old, familiar rules, which are subject to revision in the light of the cognitive situation. They are not passive objects of the higher education curriculum, but cognitively active subjects, who realize their potential and abilities. According to the constructivist learning theory, students have to construct knowledge in their own consciousness so as to internalize and absorb it and this requires subject-oriented learning directed primarily towards developing the personality of the students, their ability to solve tasks, as well as their cognitive autonomy, motivation and actions in real situations and conditions. Such situations require not only integrative knowledge, but also relevant competences.

For the constructivist learning process, the following requirements have to be met (Dimova, 2013, p. 26):

- Learning, regardless of the area in which it arises (cognitive, affective or psychomotor), always involves the process of individual transformation. People learn by 'embedding', integrating new knowledge and experience into existing cognitive structures.
- Learning and the context of learning are deeply interrelated. The knowledge and their meaning imparted from the outside are internalized through their refraction through the prism of individual experience in a practical context.
- Learning is always dialogical, whether it is done directly (by interacting with others) or by interacting with products created by others.
- Social interactions are an essential component of cognitive personality development.
- The construction of metacognitive abilities (reflection on one's own way of thinking) should be incorporated as an essential and irrevocable part of the learning process. This implies the use of learning methods that direct students' attention to the process of their own learning through reflection and analysis.

The educational process for the formation and development of transversal competences becomes functional for the personality when the following are present: motivation (accepting and justifying the activity of systematic and purposeful formation and development of transversal competences); the ability to respond to external influences and internal impulses of behavior or to see the hidden contradictions of reality; constructive criticism and reflection of external values and norms leading to the construction of one's own system of meanings; forming a personal image of the world; ensuring the autonomy of behavior and the creative nature of any individually significant activity; self-realization, self-reflection and a level of functioning that is appropriate to personal preferences and values. Living with other people and nature requires the cultivation of transsubjective values - deep respect for life, responsibility, moderation and modesty. Higher education has to aim at the greatest possible connection between the development of the cognitive, affective and psychomotor side of the personality.

However, even the most elaborated learning theories and taxonomies of competences will become useless unless specific higher education institutions start implementing them in practice. Finnish university teachers that have been developing the concept of competence based higher education in their country (namely Nissilä et al, 2015), emphasize its 'real-life context'. They define it as "the integration of knowledge, skills, attitudes and interactivity as the intended outcomes of learning. It makes use of lifelong learning and lifelike tasks in realistic settings and requires the cooperation of teachers" (p.13).

Complex problems of real life represent a call for innovative, "creative, flexible, and often unusual and not (totally) approved treatments that draw on a broad understanding of the system and holistic thinking. Most criticism [in the past] was aimed at the monotony, one-sidedness, lack of independence, lack of application and experience, lack of personal responsibility and flexibility, and inappropriate learning environments that characterized traditional education ... Complex problems call for transdisciplinarity and interdisciplinarity" (Steiner & Laws, 2006, p. 323).

If higher education institutions are really to help fulfill the aforementioned social needs of globally competent citizens, the development of transversal competences cannot remain only at the level of idea, dreams or goals. These goals have to be operationalized, laid out in concrete steps, their progress measured and evaluated. The second part of this monograph shows they might also serve as an aid for this.

By observing and reflecting on the higher education context in Slovakia during many years of work in this sphere and comparing several research studies, we noted the absence of a systematic

approach to the development of cross-cutting skills in higher education in Slovakia. Therefore, on our own initiative, we decided to start developing and applying critical thinking and reflection to our university teaching. We proposed the following set of four cross-cutting competencies that would respond to current societal expectations of higher education and enable our higher education students and graduates to understand complex social changes and engage as change agents, to become innovators and responsible citizens, rather than just passengers:

- ***digital, media, and information literacy,***
- ***collaborative problem-solving,***
- ***sustainability and diversity awareness,***
- ***learning to learn and continuing to learn.***

These competences are based on each of the four basic pillars of lifelong learning (originally by Delors's *The Treasure Within,* 1996): (1) 'learning to know' - as they reflect requirements for the skills of a lifelong learning based on reliable sources, (2) 'learning to be' - the reflective ability to learn independently and responsibly, (3) 'learning to live together' and make decisions with others, and (4) ‚learning to do' and to act sustainably.

At the same time, this set of four transversal competences covers acute competences from all groups of key skills outlined by the OECD (2005): (a) competences to interactively use tools (texts, information and computer technologies), (b) competences to interact in groups (collaborative problem solving, especially taking account of the diversity of the group), (c) as well as the autonomous competences of regulating one's own learning.

Also, compared to the key competences defined by the CoEU (2018), the four competences outlined by us cover - apart from entrepreneurship - all the transversal competences (i.e., not STEM and specific language competences): learning to learn, through self-learning - to some extent life management, digital, linguistic (in the sense of communication within the group) and citizenship competences.

It is clear from each part of this book that there are many other competences needed for different segments or professions. We decided to focus our intention on these four competences, as they can be considered an essential basis for a university-educated person as well as for a responsible citizen in the current challenging era. The second part of this book describes the real story of our developing students' transversal competences at Matej Bel University in Slovakia. As can be seen from the following record of our action research, the beginnings of the development of these four transversal competences derive from our previous experiences with the implementation of learning focused on critical thinking and reflection.

Digital, media, and information literacy

Since the beginning of this century, academic literature on digital literacy has grown significantly. Originally, the concept referred to the gap between those who had and those who did not have access to information technology. Digital technologies consist of a group of powerful, affordable, and potentially game-changing technologies in which social, mobile, cloud, analytics, Internet, cognitive computing, and biometrics can be included (Kane, 2019**).**

However, over the past 10 years, the focus has shifted from access to information technology to the skills and abilities to use it (Van Dijk, 2006). The skills, knowledge, and abilities of an individual or a social group needed to interact using digital technologies are referred to as digital literacy, which goes beyond the traditional perception of literacy (Stordy, 2015).

The complexity of these abilities has led to a shift where scholars are now studying the changes in communication brought about by virtual environments.

Today's young generation receives information mainly through social networks and other information and communication technologies (ICT) and communicates with the world mainly using the above-mentioned means. This decreases these people's ability to analyze content more deeply; they think in a kind of shorthand, which is also transferred to the way they express themselves.

Now let us have a closer look at the key concepts of this literacy.

The term 'literacy' is most often associated with the ability to read and write. Literacy empowers people to get access to information. There are many other types of literacy - financial, cultural and social literacy. Digital, information and media literacy is a multiple type of literacy (Buckingham, 2015, p. 22), consisting of at least three sub-competences.

There are various approaches and explanations of this literacy. Most often it is possible to find various separate definitions for information literacy, computer and digital literacy and another one for media literacy as well as for their combinations. In the context of our research, we consider them intertwined and jointly developable, and thus will be examined simultaneously as one combined set of competences.

The concept of **information literacy** has been changing and developing since 1974, when Paul Zurkowski (then president of the Information Industry Association) defined "*information literate people* as those who are ready to use information resources at work … who have learned to use a wide range of information techniques and tools equally, as well as primary sources" (Dombrovská, 2004, p. 8).

Most of the existing definitions of information literacy agree on the main skills that fall under this competence. As summarized on the website of University Libraries, information literacy enables learning people "to recognize when they need information, how to competently locate it from appropriate sources and evaluate its use and potential". Information literate people are able to effectively use the following skills to

- "recognize the need for information and determine the nature and extent of the information needed;
- find needed information effectively and efficiently;
- critically evaluate information and the information seeking process;
- manage information collected or generated;
- apply prior and new information to construct new concepts or create new understanding;
- use information with understanding and acknowledge cultural, ethical, economic, legal, and social issues surrounding the use of information" (https://guides.library.unt.edu/medialiteracy/information-literacy-defined).

In the 1980s, the term **computer literacy** started to be used. It was some time before it was theoretically analyzed and defined, so it simply described the ability to use the computers and computer programs.

Later on, the concept of **digital literacy** emerged. In 2004 Eshet-Alkalali argued that "digital literacy involves more than the mere ability to use software or operate a digital device; it includes a large variety of complex cognitive, motor, sociological, and emotional skills, which users need in order to function effectively in digital environments" (2004, p. 93).

The American Library Association, on its digital literacy webpage, emphasizes that digital literacy is the "ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills" (ALA, 2017). It covers the

critical consumption of new digital media and also "the ability to communicate or find information on digital platforms" as well as the ability to create content for them.

According to Pasiar (2020), digital literacy is a set of many rather comprehensive skills: using various digital tools meaningfully for personal needs, building knowledge, self-expression, and complex personal development. It is also the ability to effectively solve tasks and problems in a digital environment, competently choose and know how to use appropriate digital technology to find, process, use, disseminate, or create information, critically evaluate and analyze knowledge obtained from digital sources, and understand the social consequences (including security, privacy, and ethics) that arise in the digital world.

According to the authors of the *Assessment of computer and information literacy*, **computer and information literacy** (CIL) refers to an "ability to use computers to investigate, create, and communicate in order to participate effectively at home, at school, in the workplace, and in the community" (Fraillon et al., 2013, p. 17-18). "The CIL construct was conceptualized around two strands that framed skills and knowledge addressed by the CIL instruments." The following developable skills can be identified within both strands (Fraillon et al., 2013, p. 17-18):

- "*collecting and managing information, focused on the receptive and organizational elements of information processing and management;*
- *producing and exchanging information, focused on using computers as productive tools for thinking, creating, and communicating*".

The term digital literacy is intertwined with the term **media literacy**, which he defines as "the knowledge, skills and competences that are required in order to use and interpret media" (Buckingham 2003, p. 137). In his essay *The State of Media Literacy* (2010), Potter summarizes over 20 definitions of media literacy. He introduces the idea of media literacy as a set of perspectives that facilitates interpretation of meaning of various mass media messages. According to Daley, media literacy parallels traditional literacy in terms of the ability to read and write text. "Those who are truly literate in the twenty-first century will be those who learn to both read and write the multimedia language of the screen" (Daley, 2003, p.37).

Due to the expansion and growth of the vast information sources provided by ICT, media and information literacy has started to be recognized as an integral part of digital literacy as a set of attitudes, understanding, and skills to effectively handle, search, verify, create, and transmit information or knowledge and communicate it in different media (Bawden, 2008). Media literacy enables assessment of the importance, credibility, and informative value that social media offer. It is not only the ability to search, evaluate, and understand information while orienting oneself in the media; what is most important is being able to critically evaluate the content (Nutil, 2018).

As stated by Mičienka & Jirak (2007, p. 9), media literacy is made up of "knowledge that, on the one hand, is necessary for obtaining a critical distance from the media, while on the other hand, allows us to make maximum use of their potential as a source of information, quality entertainment, and active fulfillment of free time".

This multiple **digital, media, and information literacy** includes everything from finding required information to being able to communicate using digital media. Thus, it does not mean only to be able to use information technologies, but to be able "to process, evaluate, and retrieve information... participate in social networks to create and share knowledge, and to use and produce digital media" (Care & Kim, 2018, p. 31-32).

Some of the studies define media, information, and digital literacy as general digital competence. This term describes someone who is technically savvy as well as knowledgeable about the use

and evaluation of the Internet, social media platforms, smartphones, computer hardware, and software for accessing and disseminating information. These versatile and intuitive skills are constantly being adapted as technologies are refreshed with new releases. The five areas of digital competence identified by the DigiComp project are information, communication, security, content development, and problem solving (Periáñez Cañadillas, 2019).

In relation to the development and strategic planning of digital, information and media competence in the European Union, an important document, the *European Digital Competence Framework for Citizens* (DigComp), was published in 2017 that allows the creation of plans for the development of this combined competence (EU, 2017). DigiComp is divided into five areas of digital competence that indicate the basis for the digital literacy of individuals at different levels of control and independence:

Information and data literacy, covering the following skills:

- browsing, searching and filtering data, information and digital content;
- evaluation of data, information and digital content;
- management of data, information and digital content.

Communication and cooperation, covering the following skills:

- interaction through digital technologies;
- sharing through digital technologies;
- involvement in citizenship through digital technologies;
- cooperation through digital technologies;
- etiquette on the Internet;
- digital identity management.

Creation of digital content

- design, creation and development of digital content;
- integration and processing of digital content;
- copyrights and licenses;
- programming.

Problem solving

- solving technical problems;
- identification of needs and technological solutions;
- creative use of digital technologies;
- identification of gaps in digital competence.

Security

- device protection;
- protection of personal data and privacy;
- protection of health and well-being;
- protection of the environment.

So, to sum up, a digital, informational and media literate person is ready to face the challenges of social networks and understands their algorithms and the social dilemma associated with them, can detect their threats and risks, such as cyberbullying, violence, predatory behavior, misinformation (including older generations) and manipulation. The person is able to use an appropriate Antimalware system, Antivirus system, Updated system (OS), appropriate passwords (knows what is a safe password, password tester, storage programs are, and avoids using Flash; he or she can distinguish spams, hoaxes, phishing, pharming or identity theft).

It is clear from what is happening in society that the importance of digital, information and media literate citizens will increase greatly in the future. The development of this competence becomes an essential part of the graduate profile of every school. That is one of the reasons why, within the framework of the national program IT Academy *Education for the 21st Century*, a draft of the *Program of Digital Transformation of Education in Slovakia* was prepared in 2020 and then the *Action Plan for the period of informatization and digital transformation of education in Slovakia in the years 2021-2024* was published (website of the Ministry of Education – MŠVVaŠ, 2022). It was based on the current state of digital transformation in Slovakia in the context of global trends. The proposal stated that all projects, initiatives, and concepts implemented so far remained without an initial and final long-term impact and sustainability analysis. The low efficiency of IT education and the development of digital literacy, permanently keeps Slovak pupils and teachers at beginners' level. The output of the new program is to suggest action plans for the digital transformation of education at schools and at national level in the Slovak Republic.

On an international scale, the European Commission presented its vision and way to achieve the digital transformation of Europe by 2030. The Commission proposes a *Digital Compass for the EU Digital Decade*. One of its main points is adequate skills. The ambition of EC (2021) is for "80% of all adults to have basic digital skills".

With the development of students' digital skills and competences, it is also necessary to increase the requirements for the level of digital competences of teachers, who should prepare students for life and work in a digital society. Therefore, in addition to the competences contained in DigComp, the teacher should also master other specific digital competences that support the cognitive process of their students. In 2017, the JRC (Joint Research Centre) prepared a specific *European framework of 22 digital competences for educators DigCompEdu* in the field of the use of digital technologies, divided into 6 areas (EU, 2017):

- professional involvement – to use digital technologies for work interaction with other teachers, students, or students and their parents;
- digital resources – to determine which resources are effective and best suited to educational goals and students;
- teaching – to plan and implement the effective use of digital technologies in the teaching process;
- digital assessment – to use digital technologies to improve assessment strategies and introduce new procedures;
- student support – to use digital technologies to support student-oriented teaching-learning procedures;
- support of pupils' digital competences – to build and develop pupils' digital competences.

The significance of **digital, media, and information literacy** has increased recently not only due to enormous expansion of technological inventions, but mainly due to the COVID-19 pandemic in 2020-2022.Daily social routines changed completely – interpersonal communication and education moved mainly into the online environment. Teachers, as well as pupils and students, were forced to adapt to changed conditions and quickly learn to work with new technologies. According to the results of the survey by the Institute of Educational Policy in Slovakia (Ostertágová & Čokyna, 2020, p. 2), when the pandemic started in 2020, most schools started the transition to distance education within one week and were generally able to provide at least a partial online replacement of regular education for most of their students. Assignments were sent by email. Up to 7.5% of the population was not involved in distance education and almost 18.5% of the population did not learn via the Internet.

The range of pandemic Covid-19 measures, including lockdowns, social distancing measures, government-led border closures and quarantines, have forced many firms to adapt their business models to the pandemic limitations at short notice and increase the use of digital technologies.

For example, in 2020 up to "37% of dependent employment in the EU" was teleworkable (Sostero et al, 2020). In the field of business, COVID-19 is even considered to be "the great accelerator in fast-tracking the existing global trend towards embracing modern emerging technologies, ushering in transformations in lifestyle, work patterns and business strategies". Thus, COVID-19 has evolved to be a kind of 'catalyst' for the adoption and increasing use of "digitalization in work organization and the office, alongside presenting foreseen and unforeseen opportunities, challenges, and costs–leading to negative and positive feedback loops" (Amankwah-Amoah et al, 2021, p. 602).

However, many technological visionaries expect that this was not the last change humanity will face. In the future, it is likely that most work and leisure meetings will take place in the *Metaverse* environment, e.g., through the offer of personal digital assistants and avatars. It allows people to automate the exchange of information, manage tasks and deadlines, and make learning more fun, interactive, and therefore more interesting. Young people between the ages of 18 and 25 (Generation Z) are more inclined towards their digital self and are more comfortable interacting virtually than in real life. From a world of dissatisfaction with physical appearance, but also a lot of complex problems and an 'uninteresting' life, they escape to the virtual world, where there are no restrictions and laws, where everything is allowed, more beautiful, more perfect, or entertaining. There is nothing easier than putting on virtual reality glasses and escaping from the problems of our planet into a world of endless possibilities or contacting people via social networks. And this underlines the necessity of developing digital, information and media literate people in higher education.

Reasoning abilities are an essential part of digital and media competence. The content of reasoning can be explained though the work of Paul and Elder (1997, 2008). It is a rather complex way of thinking and to execute this requires a very skilled lecturer.

- All reasoning has a purpose.
- All reasoning is an attempt to figure something out, to settle some question, to solve some problem.
- All reasoning is based on assumptions.
- All reasoning is done from some point of view.
- All reasoning is based on data, information, and evidence.
- All reasoning is expressed through, and shaped by, concepts and ideas.
- All reasoning contains inferences or interpretations by which we draw conclusions and give meaning to data.
- All reasoning leads somewhere or has implications and consequences (2008, pp 20-24).

It can be summarized that digital, media and information literacy as a complex transversal competence will be built in higher education when students are be able to:

- ***Distinguish relevant and reliable sources of information which contribute to good reasoning, responsible decision – making and problem solving;***
- ***Critically evaluate information, the source of information and the information seeking process;***
- ***Apply prior and new information to construct new concepts or create new understanding;***
- ***Develop skills in contextualization, rapid information analysis and synthesis, sensemaking and critical thinking and thus help to orient in virtual space;***
- ***Use information with understanding and acknowledge cultural, ethical, economic, legal, and social issues surrounding the use of information.***

Collaborative problem-solving

Contemporary society, healthcare, the economy, labor market, etc., increasingly require joint effort to solve problems by entire work teams. Collaborative problem-solving is a relatively new construct (Krkovic et al, 2018, p. 67), defined by):

> *"Collaborative problem-solving competency is the capacity of an individual to effectively engage in a process whereby two or more agents attempt to solve a problem by sharing the understanding and effort required to come to a solution and pooling their knowledge, skills and efforts to reach that solution". (OECD, 2017c, p. 6)*

Collaborative problem-solving is another multiple competence, or "a skillset that has been identified as of interest as a 21st century skill", e.g., by the *Assessment and Teaching 21st century Skills* (ATCS21) project team. Care and Griffin (2014) describes it as "a complex skill requiring both social and cognitive competences" that "arises from the links between critical thinking, problem solving, decision making and collaboration" (p. 371). Problem-solving is "a critical and necessary skill used in education and in the workforce" (OECD, 2017). It is an essential component of human learning. It is obvious in situations when there is no pre-prepared algorithm of thinking in existence. Collaborative problem-solving brings the added value of solving problems in teams/groups of people who invest their time, effort and work together.

In case of this multiple competence, it is important to describe the measurable skill components - first problem-solving and then collaborative problem-solving. Problem solving in real life is a complex competence that requires a whole set of thinking processes, including predicting, modeling, identifying causes and effects etc. Problem solving is predominantly a cognitive process, strongly dependent on the ability to find information, or to acquire adequate knowledge. That is why the assessment of this competence requires the state of pre-knowledge to be measured.

On the other hand, the process of developing problem-solving competence has to assess the impact of various non-cognitive factors that affect it (e.g., negative feelings, previous frustrations, feelings of inferiority, personality features, motivation etc.). Although there has not been sufficient research into this subtle issue so far, it seems that a negative emotional filter triggers a more critical, analytic approach to problems, whereas a positive attitude encourages creative problem-solving processes (Funke et al, 2018) which are important when working in teams. So, a problem-solving competent learner should be able to integrate various cognitive and non-cognitive resources that enter into his or her problem-solving thinking process.

Research to date shows that this competence can be well developed via education and training (Funke et al, 2018, p. 45). Problem solving as a developable human competency has been in the center of attention of OECD PISA measurements since 2003. In its PISA 2003 *Assessment Framework: Mathematics, Reading, Science and Problem Solving Knowledge and Skills* (OECD, 2004), OECD defined problem-solving competences as "an individual's capacity to use cognitive processes to confront and resolve real, cross-disciplinary situations where the solution path is not immediately obvious and where the content areas or curricular areas that might be applicable are not within a single subject area of mathematics, science or reading". Problem-solving is "a central objective within the educational programs of many countries" (OECD, 2010).

Here are several goals on which problem-solving should focus, the most crucial being: a) construct an extensive and flexible knowledge base, b) develop effective problem-solving skills, c) develop

self-directed, life-long learning skills, d) become effective collaborators, and e) become intrinsically motivated to learn (Pyper, 2021).

Compared to the problem-solving competence, which can be seen as unidimensional, cognitive skills, collaborative problem-solving is a complex skillset consisting of cognitive problem solving combined with various social skills (Care & Kim, 2018, p. 2018), e.g., communications skills and collaboration skills (*The Partnership for 21st-Century Skills' framework* in Fadel and Trilling, 2009). The proof that a collaborative problem-solving process has taken place can be found in successful negotiation, in the effective application of acquired knowledge to make predictions and solve the problem by the group participants, in the interaction about tasks in complex changing situations or even in reaching a desired goal. These problem-solving processes take place in dynamic, complex environments which require flexibility and an attitude of adaptation, and where it is important to search for information, integrate it and structure in a meaningful way (Care & Kim, 2018, p. 28-29).

OECD started measuring the collaborative problem-solving competence in PISA 2015 via an assessment matrix measuring its subskills (OECD, 2017). It resulted from the analysis of previous experience, research studies and theories. One of them. which is of a particular importance for the later work of OECD, was the *Assessment and Teaching of Twenty-First Century Skills Project* (ATC21S) that was launched at the Learning and Technology World Forum in London in 2009, funded by three of the world's major technology companies (Cisco, Intel and Microsoft) from Australia, Finland, Portugal, Singapore, England and the U.S. (Griffin et al, 2012). The members of ATC21S "called for action that would challenge the educators and educational policy makers to implement faster changes in schools due to fast changes in [information] technology". They decided to measure two specific skills – collaborative problem-solving and learning through a digital network.

According to the ATC21S assessment scheme, collaborative problem-solving consists of 5 partial skills - 3 social skills - participation, perspective taking and social regulation and 2 cognitive skills - task regulation and knowledge building (Griffin at all, 2012, p. 8; Care & Kim, 2018, p. 30). Collaborative problem-solving competence offers many specific advantages for students and graduates and their employability in the labor market, for example enhanced creativity, multiplied points of view, effectivity in working among people in a group, etc.

Among the strongest arguments for emphasizing the need to develop collaborative problem-solving skills at higher education institutions has been the documented analysis of the needs of employers, for instance in the *Q42009 Forrester Report* (2009). These survey data confirmed that 94% from 921 North American and European enterprises were functioning using "some form of collaboration technologies, including e-mail, web conferencing, team workspaces" (OECD, 2017, p. 4). Functional collaborative problem-solving is considered a success factor for any enterprise.

Collaboration has distinct advantages over individual problem solving because it allows for a) "an effective division of labor", b) "the incorporation of information from multiple perspectives, experiences and sources of knowledge", and c) "enhanced creativity and quality of solutions stimulated by the ideas of other group members" (OECD, 2017, p. 3). Problem-solving competence is necessary in any problem situation regardless of the problem context and nature of the problem (static or interactive, well-defined or ill-defined).

According to this study, in the Table 3 the collaborative problem-solving competence consists of three major sub-competences, i.e., establishing and maintaining shared understanding, taking appropriate action to solve the problem, and establishing and maintaining team organization. It also includes four major individual problem-solving processes: "exploring and understanding; representing and formulating; planning and executing; and monitoring and reflecting" (OECD, 2017, pp. 9 -12).

Table 3 Matrix of collaborative problem-solving skills

	(1) Establishing and maintaining shared understanding	(2) Taking appropriate action to solve the problem	(3) Establishing and maintaining team organization
(A) Exploring and understanding	(A1) Discovering perspectives and abilities of team members	(A2) Discovering the type of collaborative interaction to solve the problem, along with goals	(A3) Understanding roles to solve the problem
(B) Representing and formulating	(B1) Building a shared representation and negotiating the meaning of the problem (common ground)	(B2) Identifying and describing tasks to be completed	(B3) Describe roles and team organization (communication protocol/rules of engagement)
(C) Planning and executing	(C1) Communicating with team members about the actions to be/ being performed	(C2) Enacting plans	(C3) Following rules of engagement (e.g. prompting other team members to perform their tasks)
(D) Monitoring and reflecting	(D1) Monitoring and repairing the shared understanding	(D2) Monitoring results of actions and evaluating success in solving the problem	(D3) Monitoring, providing feedback and adapting the team organization and roles

Source: OECD, 2017

In the U.S.A., a different collaborative problem-solving measurement produced by ACT has been used by secondary school leaving students, schools, job applicants and employers. ACT (American Colleague Testing Program) is a mission-driven, nonprofit organization dedicated to helping people achieve education and workplace success. Grounded in more than 60 years of research, ACT is a trusted leader in college and career readiness. In case of the university applicants, it measures their academic readiness for university. "Collaborative problem-solving skills enable individuals to effectively communicate and contribute to problem-solving processes when serving as members of a group or team." According to ACT, collaborative problem solving is a broader, composite "construct of collaboration and group work in order to identify specific cognitive skills and strategies that can improve performance. For example, the ability to monitor group progress (or lack of progress) toward resolving a problem is vital to the success of the group." So, it consists of three skills – problem solving, communication, and behavior. "Such a composite construct truly reflects the nature of group work, where one must not only possess the individual ability and drive to solve a challenging problem, but also be able and willing to productively leverage the knowledge and skills of other group members" (ACT website on Collaborative Problem Solving, 2022).

If collaborative problem-solving takes place within a certain fixed group of people, it is necessary to be aware of the risk of the influence of group dynamics on cognitive processes, especially the emerging pressure of conformity, which can lead to distortions of reality and wrong decisions.

About problem solving in real life and about collaborative problem-solving practice there is ample material in the publications of Aalborg university (eg. Karjalainen & Nissilä 2011).

According to Ruisel (2004, pp. 138-139), in cooperative problem-solving it is important to understand two social phenomena: group polarization and group thinking. It often happens that it is precisely due to a joint group discussion on problems extreme positions might emerge. This phenomenon is called *group polarization*. It occurs in particular when the discussants learn further arguments in favor of their initial position. Another reason is that they seek group consent in a group and are therefore motivated to hold opinions that are positive in that group. The phenomenon, called group thinking, occurs especially in stressful conditions, where the discussants seek agreement in the group at the expense of limiting their critical thinking. This happens when the group has a high degree of cohesion or isolation from the rest of the community, there is also a lack of methodological procedures for finding solutions, and great stress or directive management in the group. This kind of thinking might be actively prevented if the group leader, for example the teacher, actively encourages and rewards the critical thinking of the discussants as well as the possibility of disagreement between them.

To measure the development of the problem-solving skill, the authors of the ATC21 project tried to implement various aspects of this multi-dimensional skill into their assessing tool (Care & Griffin, 2014). The way how the increased level of this skill is assessed is that the students have to put their collaborative effort into problem-solving. Their simulation tasks resemble real-life situations having various resources and technological tools at their disposal (Care & Kim, 2018, p. 26). In the future research it is necessary to discover complexity of the processes involved in collaborative problem-solving. So far there have only been limited attempts how to assess it. "Only by fully understanding these processes and skills, their measurement, and students' performance levels the researchers will be able to provide a plan to facilitate" the development of these skills (Krkovic et al, 2018, p. 72).

To summarize, it can be concluded that collaborative problem-solving as a transversal competence will be developed in the university environment when students are given space to be involved in:

- ***Creating a shared space enabling their group to search for information that should lead to problem solving;***
- ***Communication, i.e., sharing and mutual negotiation of the essence of the problem and setting the tasks associated with its solution;***
- ***Joint communication regarding the planning of the implementation of a specific solution to the problem;***
- ***Mutual monitoring and reflecting on the appropriateness of the solution, or proposal of an amended solution.***

Sustainability and diversity awareness

We live in a globalized, diverse, and connected world where individuals have realized that there are different possibilities to experience and that they can function effectively across geographical and cultural boundaries.

In the past, the concept of diversity was mainly associated with multicultural competence but recently a diversity-competent person is considered someone who has a kind of global competence which includes broad knowledge, curiosity, and openness concerning different social groups, is able to understand their own values and habits, and take other groups perspectives (Murray, 2016). In a multicultural environment, gender, race, ethnicity, sexual orientation, disability, class, and region are well-accepted and important dimensions of diversity (Smith, 2014). As Chun and Evans (2016) suggested, it is more appropriate for HEIs to foster the diversity competence rather than just 'cultural competence.' They define it as the awareness, knowledge, and skills needed to engage with others who are different from oneself and treat them with respect and acceptance (Braun, Spexard, Nowakowski, Hannover, 2020).

Globalization, as a complex and multidimensional phenomenon, is socially constructed to address today's most challenging issues, for instance those related to sustainability, technological innovation, democracy, migration, gender issues, inequalities, diversity, and many more polarizing topics that are often polarizing.

In tandem with an increasing emphasis on the globalization of organizations, technologies, products and services, there is a critical need for fostering a competence that will expand into people's understanding of inter–related topics within the diverse world. For example, to acknowledge the contrast between the regions through historical, social, culture, economic and demographic factors (Syed & Oybilgin, 2015).

According to the OECD, as presented in PISA document (2018), global competences have been characterized as a capacity a) to examine local, global, and intercultural issues, b) to engage in open, appropriate, and effective interactions with people from different cultures, c) understand and appreciate the perspectives and world perspectives of others and d) to act for collective well-being and sustainable development.

Global education is focused on addressing these challenges. It aims to motivate and equip students with the knowledge, skills or attitudes required to positively address global issues such as peacekeeping, security of individuals, nations and states, environmental conservation, mineral depletion, disease treatment, human rights, population explosions in developing countries, drug addiction, racial, ethnic, and religious conflicts, and terrorism (Turek, 2008).

Brozmanová Gregorová et al. (2020) state that global education emphasizes learning in a global context that raises awareness of global issues affecting the world or communities as well as everyone.

The concept of global education is very broad and is expected to be part of educational programs and subjects that deal exclusively with international and intercultural topics. At the same time, there is no unequivocal agreement on what specifically should be learned and, particularly, how this competence can be recognized.

However, it has turned our attention to reflecting the world in more complex and interconnected way. In today's rather uncertain world, almost all problems and challenges are very complex, difficult to understand from only one point of view and even the proposed solutions seem to be contradictory and carrying high level of risk due to rapidly changing landscapes and other conditions. Therefore, we argue that the growing interest to study the relationship between human behavior and its impact on environment with all kinds of resources (tangible and also intangible) should be based on the premise that people's decisions have more influence than they are originally able to understand.

It should lead to the development of value patterns and of social behavior in connection with understanding of what constitutes across several sectors of human life, society, and activities. The overall goal of any education is to prepare students/responsible professionals and citizens for life

in the 21st century where they are aware of the issues and processes taking place in the closer or broader environment (on a national or international level), reflects on them in a certain way, constructs the acquired knowledge and actively combines information into context.

Nowadays, humanity is facing a range of global, social, economic, cultural, and ecological changes which, in the long term, threaten the survival of the human species (Harris, 2007). Performing and satisfying our needs without compromising the ability of the future generations to meet their needs shifts the focus on sustainability. Hence, our emphasis is not examining all challenges to sustainability or sustainability in education or describing education for sustainability. In developing the transversal competence 'sustainability and diversity awareness' at higher education we focus on the approach which prompts the students' understanding beyond short – term decisions towards understanding of their long – term impact on the world. Such education is transformative in nature by aiming to develop students' learning that motivates behavioral change in favor of sustainability and the environment (Ostrow-Michal, 2020). It also motivates students to become sustainably engaged and responsible citizens (Blewitt, 2010; Winter & Cotton, 2010; Leal Filho et al, 2016).

Traditional, conventional education strategies are failing to address inequality and societal unfairness. A new direction of education and change of its perspective towards societal transformations, in terms of sustainable development and being engage more deeply with sustainability related issues, is needed.

The fundamental reorientations and transformations in terms of sustainable development require far-reaching change in the awareness of individuals and thus the development of competences to contribute to a more sustainable future. This can only be brought about by learning, in which sustainable development has to be understood as a learning process (Vare & Scott, 2007).

Linda Elder's statements from Critical Thinking Foundations fit best to highlight the importance and purpose of the SDA competence within education. It can be synthesized that

> *"…if we are to create a world that advances justice for most people across the globe, we must become citizens of the world. We must: a) denounce nationalism, ethnocentrism, bias, and prejudice in all forms; b) think within a global, rather than national, view; c) make a long-term view; d) begin to relegate the interests of any given country, including our own, to that of one of many; e) consider ourselves no more worthy of the world's resources than anyone else on the planet; f) see the lives of people in other countries as no less precious than the lives of people in our own country; g) see all skin colors, shapes, sizes, and ages of people as equally worthy; h) oppose the pursuit of narrow selfish or group interests; i) come to consider integrity and justice as more important to us than national or group advantage and power"* (https://community.criticalthinking.org/ accessed November, 23, 2021).

Unfortunately, in a mono-cultural country like Slovakia, diverse groups and workforces can cause some stereotypical behavior based upon prejudice or biases. Moreover, arguments related to the deeper understanding of the social inequalities, racism, and equal approach towards ethnic minorities (Roma) and communities (LGBT) are often neglected, not only in general discussions within society, but in the HE environment.

How is diversity related to sustainability? Global sustainability encompasses advancing equity and justice as well as ensuring that future generations in all world regions can meet their needs and realize their aspirations (Koehn, Uitto, 2014).

Present and emerging challenges to sustainability can be seen as challenges to be overcome by human effort to use all resources mindfully. It means they are used in such a way that they do not follow the interests of only one group of people, region, or selfish gain, but that they will be for the long-term benefit of the environment of the whole planet. This view has been brought into the debates regarding the operations of multinational corporations and their contribution to economies in various regions, when discussing migration due to climate changes, as well as critical evaluation of any innovation.

There is a great need to discuss the collective impact of our individual and community actions and activities on our ability to sustain and improve current living standards, economic growth, and development through the continuous innovation and use of technology, while conserving resources for the future and decreasing depletion rates, in Higher Education, business and science (McFarlane & Ogazon, 2011).

Sustainability also means dynamism in which global ecological and social systems are not systematically undercut and people everywhere are able to live a decent life. An example is increasing immigration in well-developed countries, particularly immigrant populations from the less developed world (former colonies) and now regions mostly affected by climate crisis. The understanding of diversity is crucial for proposing a multidisciplinary and cross-sectoral competence, which will develop knowledge, skills, attitude, and behavior through the students' commitment to the environment, and reflection about interaction of social justice, morale and ethics, wellbeing (eudaimonia) and sustainable economic factors.

The study of diversity has a long history, encompassing a variety of perspectives, philosophical assumptions and prescriptions (Kyriakidou, in Syed and Ozbilgin, 2015). There is a variety in the wider understanding of diversity: accepting the demographic differences (McGrath et al, 1995); cultural awareness (Wrench, 2002); and technical, biological, cognitive differences etc. Similarly, Loden & Rosener (1991) define the primary dimensions of diversity in relation to age, ethnicity, sexual orientation, and physical abilities, together with secondary dimensions which are associated with educational background, income, marital status and beliefs. In Slovakia, unfortunately, studies and understanding of diversity do not attract much interest from scholars.

Theodoulides, Kormancova and Cole (2019, p. 175) began to study the different understanding of diversity depending on the context within the EU states. The authors underlined the most common concepts of diversity. There are as follows:

- inclusion, tolerance, nondiscrimination and equivalent to 'plurality';
- association with disadvantaged groups who are at higher risk of discrimination, i.e., immigrants, elderly people, ethnic minorities, women, sexual minorities;
- related to multiculturism or racial/ethnic diversity
- equivalent to 'cosmopolitanism' and tolerance toward others e.g., religion or national traditions.

The existence of different social understandings and meanings of diversity can create certain ambiguities, cause some difficulties in how this concept is operationalized in different contexts and thus can be abused by populists and extremists.

Therefore, teaching and learning towards sustainability in every related subject, form and activity aims to provide knowledge, skills and build an attitude that will enable individuals to participate responsibly and thereby lead society towards a sustainable and long-term acceptable future. It identifies sustainability as a competence-oriented concept and focuses on building the ability to think critically, investigate and reflect on whether each idea corresponds to sustainable living. This reflective approach supports our argument that the emphasis on sustainability is more than global

or environmental education. It develops closer links and interconnections between environmental quality, human and democratic rights and economic growth and political decisions.

The desired outcome of fostering sustainability and diversity awareness as one of the transversal competences is to challenge students to ask philosophically deep questions to penetrate the core of their most fundamental beliefs, to critically assess even polarizing views, and to be open to learn more about such interdisciplinary concepts. In return, such deep thinking and curious discussions can improve critical thinking skills and reflection.

The results of the research in the Delphi study defined 19 core competences that are crucial for sustainable development. According to the experts' opinion, the most important among the competences is the competence for systemic thinking and managing complexity, competence for anticipatory thinking, competence for critical thinking, acting fairly and ecologically and cooperation in heterogeneous groups (Rieckmann, 2012).

These results show that complexity, open-mindedness, system and critical thinking in particular are seen as challenges in today's uncertain and highly unpredictable world and are therefore necessary and relevant as transversal competences. Therefore, the role of higher education is extremely important to realize its responsibility and take a proactive approach to reflect future effects and build a new culture of education. The discourse on how to become a higher education institution that is aware of sustainability and diversity provides some guidance on what strategies and educational leadership can be used and what measures could be put in place in the education system to ensure that universities can face these challenges.

Both topics, sustainability and diversity, are rather neglected among scholars in Slovakia and there is still much to do about it. We do not aim to examine these two areas deeply or to theorize how they should be covered in a study curriculum.

We argue that scholars and teachers need to pay attention to sustainability and diversity while educating critically reflective students. At the same time, we believe that students are not sufficiently guided to be aware of several contexts. Complexity rather than simplification is our aim, as much as change rather than stability should be the strategy to develop this competence.

The sustainability and diversity awareness in higher education can be described in relation to constructive abilities and interactions within these contexts:

- ***The capacity to understand issues and situations of local, global and cultural significance, for instance poverty, economic interdependence, multiculturalism, migration, inequality, climate crisis and environmental risks and geopolitical conflicts;***
- ***Ability to recognize own's biases, prejudice and stereotypes concerning the race, gender or any other system of advantage and disadvantage socially constructed in own's culture;***
- ***The capacity, disposition, and initiative to take constructive action toward sustainable development and collective well-being;***
- ***The ability to accept and establish positive interactions with people of different culture, ethnic, religious, social, or national backgrounds or gender and being able to work within in heterogenous teams;***
- ***The understanding and awareness of world's complexity and appreciation of the benefits of the sustainability and diversity from the different perspectives***.

Learning to learn and continuing to learn

'Learning to learn' is one of the main competences, one of the four main pillars of education for 21st century as defined by UNESCO in *Learning: The treasure within, Delors Report (*1996). Rethinking this competence 20 years later, UNESCO in 2015 emphasizes: "... it is perhaps the most important skill of all: the ability to access and critically process information. Learning to learn has never been as important as it is today" (p. 41).

Learning to learn is one of the eight Key Competences for Lifelong Learning, as stated in the *European Reference Framework* in the *Recommendation of the European Parliament and of the Council of Europe* (2006). Their definition gives an even more detailed idea of what it means – it is "the ability to pursue and persist in learning, to organize one's own learning, including through effective management of time and information, both individually and in groups". It also „includes awareness of one's learning process and needs, identifying available opportunities, and the ability to overcome obstacles in order to learn successfully". The competent learner can acquire and reflectively process new information and turn it into new knowledge and skills and decision-making process (p. 8).

Čepić et al. (2015) defines it as 'meta-learning' since it contains elements from metacognitive aspects such as knowledge about cognition and self-regulating mechanisms, i.e., what to do next and formulation of learning outcomes (McCornick, 2006). Pintrich (2004) and Zimmerman (1996) see it as self-regulating learning, i.e., learning styles and strategies. But it has a broader context which includes a complex set of motivational and personal variables such as self-esteem and other abilities to use learning strategies in a suitable way (Frederikson, Hoskins, 2008).

Also, the OECD considers learning to learn to be the vital metacognitive capability of 'thinking about thinking' that opens up space for effective learning (OECD, 2019, p. 6). Applied in educational practice, it means reflective thinking about one's own learning processes. There is an evident bridge between this human metacognitive capability (or skill) and critical thinking skills.

Besides of its metacognitive dimension, learning to learn also involves the ability to self-regulate, i.e., taking responsibility for one's own learning process, as well as motivation, persistence in learning, effective learning management – management of time and of information individually and in a group, identification of learning opportunities, overcoming obstacles to successful learning, ability to use advice and use it properly, etc.

What do we learn and why do we need to modify or even change the way that we learn if we want to develop the transversal competence learning to learn? To start looking for an answer, the current understanding of the learning process, which Turek (2008) defines as a "the process during which and as a result of which a person changes his or her body of knowledge about the world, changes his or her forms of behavior and ways of activity, attitudes, personal personalities and self-image towards its own's development", shifts existing views on learning towards an emerging and more appropriate understanding what learning we need at the present time.

External pressure in recent decades has greatly emphasized the importance of transforming the learning process. The traditional **formal learning path** of "going to school, acquiring the knowledge and skills needed after graduation to enter a career that requires little or no further education" is no longer appropriate or sufficient. Probably the most common view of learning is that most of us learn in a physical space that might look like a classroom. It can be argued that there are several other opportunities and forms of learning, closed or open virtual environments or outdoors in open air environments. Whichever way they have in mind, most people think of learning as something that is planned, with the formulation of specific learning goals and outcomes that serve the anticipated needs of learners and their expectations.

On the other hand, the concept of lifelong learning is interpreted as an intentional and mainly **non-formal learning** which is planned and accomplished via courses, training, webinars, individually or collectively attended self-taught courses. Regardless of whether it is formal or non-formal learning, we are learning all the time; it is important to observe what causes us to learn and under what circumstances. That shifts our focus onto informal learning, learning outside any of the deliberately planned and structured contexts which have specific learning goals, often with the intent that competences will be developed, and its assessment and evaluation will be conducted (Visser, 2012).

Form the extensive literature related to the concept of learning as a lifelong process, it is worth explaining the value of learning to learn and continuing to learn in the way that knowledge is created and transferred in the educational process. The learning process is a social and reflective process (Theodoulides et al, 2020, Theodoulides & Jahn, 2013) where the transfer of knowledge is essential. But the acquisition of knowledge or information do not constitute learning until the information is actively contextualized by the learner, within his or her social, personal, or professional milieu (Muller, 2012, referred to in Eriksson et al., 2011). The key overlapping result of the vast theories and concepts related to learning is that knowledge is not absorbed passively.

Learning outside of any formal and non-formal settings may be more important and valuable to a learner. The trend towards informal learning has increased significantly recently and also appears in the discussion in relation to transversal competences.

A further difference between the current era and earlier times has to do with how we learn and how flexible we are to cope with frequent changes. Our brain has 'plasticity' and is therefore capable of continuous change and development. As a person acquires a new skill, millions of new connections are made between different neurons in the brain to deal with new information. We can say that learning takes place when we understand something and can explain, teach, or demonstrate it to others. We have to adapt to new ideas, information, situations, and emotions based on curiosity, the desire to know. We also learn better if we build on previous learning as a basis for understanding new information (Cottrell, 2005).

The desired shift from dominant approaches in existing learning processes towards developing a 'culture of learning' that is expected to happen in every higher education institution is presented in Table 4.

Table 4 Present and emerging views of learning at HEI

Common views about learning	**Desired views of learning**
Learning is expected to happen automatically.	Conscious focus on learning and reflecting on the learning process.
Learning, mainly formal, conducted in schools and through instructions	We learn all the time, everywhere, all the time, as a wider learning context and environment
Linked to a particular age group	Learning as lifelong disposition
Acquisition paradigm	Participation paradigm
Linked to one particular subject, activity and/or discipline	Multidisciplined and obtained via interrelated activities, transdisciplinary
Seen as an individual activity	Seen as individual, collective and social activity
Reaction to change	Constructive participation in change
Preparation for life, career and/or specific profession	Part of human life, life philosophy, never-ending
Activates/Involves a limited slice/segment of the intelligence spectrum (seen as fixed)	Addresses multiple intelligences that are seen as able to develop
Knowledge-centered	Participants–centered and their progress-centered
Favoring only certain learning styles	Accommodating different learning styles
Extrinsically motivated	Intrinsically motivated (through dialogue, continuous feedback and reflection)

Source: author's elaboration based upon work of Visser (2001, 2012), Theodoulides and Jahn (2013), Theodoulides et al (2020).

Wenger (1998) understands the importance of learning through practice – by doing. He explains its social nature with the notion of community of practice. He argued that a community of practice offered newcomers the experience of professional competence and an environment in which to practice and strengthen their professional identity.

The conclusion is that learning is a social process and learning strategies can be based on different types of learning. Further explanation of learning as a social process as well as of learning strategies and different types of learning, i.e., Wenger's participative learning, Activity bases learning and Kolb's experiential learning cycle, will be explained in Chapter Three that serves as a theoretical base for our research strategy.

It can be summarized that the transversal competence of learning to learn and continuing to learn can be developed when students experience:

- ***Various learning strategies and learning styles are used which are necessary to encourage curiosity, open-mindedness, new ideas and experimentation;***
- ***Own engagement and personal initiative to participate in the educational eco-system together with other stakeholders/partners, either through the individual's context or within/across the heterogenous groups/or teams and institutions' boundaries;***
- ***No fear of failure or expressing different views, or punishment for making mistakes, but balancing and explaining that obtaining new knowledge, learning by doing and correcting actions is an important path for personal development;***
- ***Reflecting the diversity and pluralism in society are key components of present world.***

The rapid pace of technological innovation, demographic expansion, the earth's limited resources and the climate are creating new sets of problems for which we need new solutions. There is an urgent need for invention and reflection that consists of sovereignty and complexity of thought, solidarity between human beings, a sense of belonging and the ability to understand the world in which man interacts and wants to live. This requires learning at a more intellectual and complex level than is present in most traditional formal higher education environments. This way of learning allows us to cope with uncertainty and an unpredictable future. It is structured around challenges that are often seen as problems that involve whole human beings and are multidisciplinary. The transdisciplinary content of most contemporary problems requires cooperation, a good learning environment responsive to the challenges of our time, which has to lead people to constantly develop their awareness and ability to respond to new situations (Visser, 2001).

Chapter 2

The most influential concepts and approaches relevant to critical thinking and reflection in education

2

Chapter 2 explores the philosophy that, regardless that it existed thousand years B.C. still offers meaningful answers and lessons relevant to contemporary higher education, particularly in terms of its goals and processes such as critical thinking and reflection. Socrates, Plato, Aristotle introduced the path towards wellbeing, which is called 'eudaimonia' and can be explained as a meaningful human life and prosperity. And since the essence of higher education is to contribute to the fulfillment of the ultimate needs of humanity, then also the higher education teachers should familiarize themselves with the essence of eudaimonia and how to move towards it. This applies also to Socrates' s ``0maieutics` - a dialogic way of philosophizing with people to help them in self-discovery has been an inherent stimulus for the simultaneous development of critical thinking and transversal competences. The chapter shows the overlaps between ancient theories and later philosophers and philosophers of education, especially the contemporary work of A. S. Waterman and R. H. Ennis.

Since transversal competences themselves represent complex constructs, we present at least a taste of some of their key philosophical and psychological background theories necessary for understanding their substance and the way of their effective development that we consider useful. By referring to reputable work of Mercier and Sperberg, Kahneman and Tversky, Dweck, and also based upon Halpern's and other educational specialists, this chapter describes how cognitive biases could influence our way of learning and behaving.

The last part of Chapter 2 summarizes the theoretical background of the contemporary concept of critical thinking and reflection.

2.1 Philosophical concepts relevant to critical thinking in education throughout history

What are the most influential philosophical concepts and approaches relevant to current higher education? To answer this question, it is necessary to turn to philosophy that emerged almost 2.5 millennia ago. Why? Because philosophy – which is commonly referred to as – the 'mother of all sciences' provides overall reflection on the concept of humanity, human life, the meaning of human existence, the concept of the current world, the theory of knowledge, etc. Philosophy formulates the ideal of a full-fledged personality, requirements for its authenticity and identity, freedom, ethical qualities, humane values. It also models a complex theory of the development of society, reflects the nature of contemporary social phenomena and shows the perspectives of humanity, happiness, and the meaning of life. It illuminates the changing situation of people, their roles, and responsibilities in the world they have created and purposefully manage.

In other words, philosophy serves as a theoretical base for all purposeful human action. If in this book we want to discuss the development of transversal competences in higher education, we also need philosophical viewpoints, for several reasons: the need to understand human learning, development, flourishment through education as a whole, to express its essence and meaning in the world and in human life; the need to understand the transcendental, the elusive sides of life; the need to look at educational phenomena from various angles; the need to scientifically justify the future, which affects the aims of education sciences endeavor; and the need to scientifically justify purposeful, targeted and therefore regulated educational action, which is one of the ways to develop transversal competences (Kosová, 2013, p. 14). At the same time, philosophy sets the highest goal of education and provides a basic worldview orientation for education theory and practice. The solution to the basic philosophical question has an impact on the content of education, on the choice of subject matter in individual teaching subjects (Kovačiková & Sámelová, 2016).

The determination of the content of educational goals, the content of education, the organization of the HE curriculum and the resulting application of principles also affect the implementation of the educational process. It also influences the choice of suitable methods, organizational forms and means by which we convey the content of education.

The close specific relations between philosophy and higher education result from the social conditioning of education. People are educable and can influence the development of society by their activities, and so transform the world around them. Society in turn affects the further development of a person. Based on the acquired knowledge, new knowledge is created, which adults pass on to the next generation. Institutional education, similarly, to informal training and formation, is a social phenomenon that changes and develops with society and has to be explained from the philosophical point of view. On the other hand, every educational theory must respect a specific social situation. Philosophy thus helps teachers to orient themselves on the most general questions of social life and makes it possible to apply educational goals in an appropriate way to everyday activities. Philosophical theories help higher education to take a correct position on educational problems, to reveal the essence and goals of educational activity, to correctly evaluate the tasks of education, and thus influence the development and results of pedagogical thinking, which in turn leads to the improvement of conditions in society.

Our argument is that the need for a philosophical view at the core of educational activities should also be applied to the question about how to develop and master transversal competences in higher education settings.

> *"Merely practicing or watching other people's actions is not enough. Individuals don't necessarily learn by doing – they learn by understanding what happened based on their actions (or the actions of others). Usually, the two happen together. It is through the process of understanding that insights frequently occur. Unfortunately, this step into understanding is rarely taken, so insights are formed sporadically at best ... The old way of learning skills is typically „focused mostly on skill training, less on Value skills and only a small amount on the core abilities" (Vaughan, 2013, p. 55, 45).*

Based on neurological research and his own professional experience, Vaughan draws our attention to a new understanding of the learning pyramid .The new way of learning should focus "predominantly on the core abilities and value skills ... Soft skills, such as planning, delegating, negotiating, motivating others, resolving conflict, implementing change, driving results, creating engagement ... truly find their roots in the value skills and core abilities" (Vaughan, 2013, p. 45). Feedback is specific to core abilities and value skills. This learning model is not complete without considering their roots - human mental models, i.e., previous experiences, expectations of what should happen, assumptions of the current situation (p. 59).

So, one thing that can lead to a real change in teaching and mastering transversal competences in higher education is philosophical reflection on why and what kind of basis they can be developed. Such anchoring of education in a theoretical and philosophical background and feedback is essential to help both higher education teachers and students understand how their actions contribute to their mastering of transversal competences. As a critical thinker is characterized by respect for the intellectual heritage left to humanity by previous generations, regardless of the field of practice or scientific field in which he or she works, we will go back to the history of ancient Greece and its thinkers, especially Socrates, Plato, and Aristotle.

Starting with Socrates, Plato, Aristotle

Throughout history, humans have been characterized by their search for happiness, which Greeks in ancient times called *eudaimonia. Eudaimonia* was an important concept in Greek philosophy. The word *eudaimonia* consists of two parts: *eu* – good or well, and *daemon* - literally meaning spirit, divine power, fate or god. In ancient times *eudaimonia* meant "having a good guardian [or attendant] spirit: that is, the state of having an objectively desirable life, universally agreed by ancient philosophical theory and popular thought to be the supreme human good" (Taylor, 2021).

Various philosophers have differed in their understanding the content of *good* - whether it consists in pleasure, in the possession of external goods, in virtue or in knowledge or whether it is a gift from gods or the fruit of one's own efforts. Socrates and Plato emphasized the role and importance of virtue as "a form of knowledge, specifically, a knowledge of good and evil".

Socrates (470–399 BC) viewed this knowledge as an ultimate goal, required for us as humans to achieve the 'ultimate good' (Brugger 1994, p. 78, Moore, 2019). In fact, he believed it was both a means and an end to human happiness. In the search for good, a person is helped by a *daemonion* - a kind of inner voice of reason with divine origin. Socrates was convinced that there are certain values in the sphere of morality that a person should discover and follow in self-knowledge. For Socrates the whole concept of knowledge has a moral dimension, it relates to good. Whoever commits evil is ignorant – he or she acts out of ignorance, and therefore involuntarily (Brozmanova-Gregorova et al, 2019). Socrates' "rigorously methodological dialectical approach was based on a clearly defined ontology of man…" and, so "an anthropological turn in scientific thinking took place, which redirected the entire subsequent philosophy to man and human things" (Rajský, 2010, p. 39).

For Socrates philosophy was an educational meta-method. Its essential feature was its dialogic structure aiming at helping others and guiding their efforts towards perfection. He "encouraged people to ask themselves, and others, what was 'good' for our souls" (Cooper, 1996 in Moore, 2019). He considered himself "mainly as a listener and an educator" who is aware that, as he rejects his students' favorite 'phantasms', he might lose his popularity (Rajský, 2021, p. 136 & 53). Socrates knew that self-education is a demanding and painful process, similar to childbirth which is worthwhile in the end. That is why Socrates called his way of philosophizing leading people to self-discovery *maieutics* – the art of midwifery considering himself 'a midwife' who helps to bring new life into the world.

Socrates' dialogue was of dialectical nature - he asked people questions, analyzed their answers with further questions, until he finally led them to recognize the incorrectness of their previous statements. He used significant irony in the conversation, leading the interlocutors to self-criticism and to realize what they do not yet know, to get rid of false self-confidence and find real truths. The purpose of philosophical education was real inner change, after being addressed in dialogue. After meeting another person, his mystery and value, one becomes aware of his own dignity (Rajský, 2021, p. 53).

For **Plato** (428/427 or 424/423 – 348/347 BC) – as well as for Aristotle - eudaimonia was "the foundational concept of ethics ... It is what all people desire" and its importance "necessitates attention to virtue, for to be virtuous is to be properly oriented forward and motivated by what will make us 'eudaimôn'" (Jones, 2013). Unlike the Greek immoralists, Plato considered morality to be necessary for eudaimonia (Taylor, 2021). Plato considered that the idea of a perfect person is "an implicit or explicit object of every human endeavor. Caring for the soul does not represent education in the sense of acquiring knowledge, but internal turn, rebuilding, authenticating".

Although Plato never explicitly referred to the term 'eudaimonia', his ideas on "the nature of success" can be deduced from his work, especially from *Republic*, which describes what a 'just' republic would look like (Brown, 2012, p. 1). According to Plato, the treatment of the human good varies in the different dialogues, so that readers find themselves confronted with the problem of what to make of the discrepancies in Plato's different works" (Frede, 2017). Plato argued that the essence of a perfect state is based on the idea that a state is only as good as it is well governed. For Plato, the state is a moral personality just like a person. His *Constitution* must have character and style (Krsková, 2003). His main concern was to establish the criteria of good government and to determine how rulers should be educated (Krsková, 2003). According to Plato, the goal of education and training is the preparation of good and moral citizens who will responsibly and successfully fulfill their civic and social duties (Brozmanová – Gregorová et al., 2019).

The conceptual definition of eudaimonia was presented by Plato's student - **Aristotle** (384-322 B.C.). He defines eudaimonia as "pursuit of virtue, excellence, and the best within us" (Huta & Waterman, 2014, 1426), to live in accordance with "complete virtue and be sufficiently equipped with external goods, not for some chance period but throughout a complete life" (Aristotle, *Nichomacean Ethics, Book* I, Chapter 8 & 10). Aristotle's eudaimonia was a moral concept of happiness, a rational activity aimed at pursuing 'what is worthwhile in life' (Moore, 2019). He believed that it is not sufficient for eudaimonia to act virtuously, but there must be also intent to be virtuous. Pleasure and joy are only echoes of perfection achieved through knowing the truth. So in Greek philosophy "happiness in the form of eudaimonia was contrasted with the more traditional understanding of happiness as hedonia or pleasure" (Waterman et al, 2010, p. 41). Plato's ideal human being is a perfect part of the collective of a republic as we know it in antiquity.

So it can be said that "since the appearance of Socrates on the stage of human history, the task of philosophy has been inseparably bound to the task of education" (Zovko, 2013).

Further periods of philosophy and their impact on contemporary higher education

The quest for the good, moral, and dignified human life continued in various forms in the subsequent periods of philosophy. From other historical periods, we will selectively point out some philosophers where we can trace the crucial influence of philosophy on education – those that might lead us to the answer to the question: To what extent has philosophy influenced the current approach to learning and acquiring life competences?

In the Hellenistic period of Greek antiquity (323-31 BC) other philosophers, such as **Epicureans** and Stoics, focused almost exclusively on the investigation of 'human affairs', thinking about the good life at the expense of speculation about the universe and the character of reality as a whole. According to Epicurus, "all human efforts should be aimed at surviving the 'present moment' as best as possible", and this does not explicitly mean some naturalistic physical hedonism, but "a result that a person can reach after a long educational effort" (Rajský, 2010, p. 43). According to the Stoics and their emphasis on ethical values, the main aim of education was not how to think of the world, but how to live in the world. "The greatest good for man is to act in harmony with nature [*physis* - the Greek viewed as the whole reality] … Reaching 'stoic peace', the rational harmony of inner freedom with the necessities of nature, is possible only through education, based on ascetic non-admission of passions and on rational coherence with the natural determinations of man" (p. 43).

In the Middle Ages, the **first universities** (*universitas* – from *universalis – belonging to 'the whole')* in the world came into being as corporations of teachers or assemblages of colleges for teaching the higher branches of learning. They were originally connected with cathedral schools (starting with

the University of Bologna in 1088). Despite being under the control of the Church, they sowed the seeds of self-government and democracy allowing academics discussion. Among the academics who significantly contributed to the development of academic education was **T. Aquinas** (1225-1274). It is important to notice his scholastic method that quotes several opinions 'pro' and several opinions 'contra' his subsequent conclusion that he reached on the basis of his chosen authority, usually the Bible (e.g., in *Summa theologiae*). So, education did not mean just memorizing ready-made truths but discussing all important possibilities. According to him man's existence has a capacity to improve, and the process of perfection is the task of education which has to focus people on the inner goal of life.

In the 15th century, a new idea of man and his education was taking shape. One of the signs of the transition from the Middle Ages to the **Renaissance** at the universities was the rising tension between university professors and the 'reborn' Renaissance philosophers. The philosophers – the representatives of **humanism** - were carried away by humanistic ideas, ancient rhetoric, e.g., M. T. Cicero's *Orationes*. They appreciated the practicality of Stoic advice for life and admired the antique quality of art. In contrast, university professors dealt with more weighty metaphysical questions. The philosophers distinguished themselves from the professors, thinking of themselves as of people wanting to get to *know* in order to affect things, not in order to know them … They underlined the necessity "to establish a new beginning of the process of knowing here and now" (Rajský, 2010, p. 52).

Philosophers from **the Enlightenment** period (17th-18th centuries) introduced the modern tension between knowledge as the system of assured ideas (rationalistically oriented, e.g., **R. Descartes** 1596-1650, **B. Spinoza** 1632-1677, **G. W. Leibniz** 1646-1716) and knowledge as the system of experiences (empirically oriented, e.g., **J. Locke** 1632-1704, **D. Hume** 1711-1776). This can be seen in the modern debate between various branches of sciences. Although some influential philosophers did not speak directly about the way of man's development via education, they caused a breakthrough in subsequent pedagogical thinking with their own philosophical views, for example Bacon's method of empiric research, Descartes' method of critical analysis (emphasis on rational knowledge), Kant's categorical imperative in ethics and the dignity of human being pointing out that a person must never be used as a means to something. Philosophical anthropology, the foundations of which were laid by I. Kant's formulation of the basic question: *What is man*, is drawing more and more attention to man (**I. Kant** 1724-1804). G. **W. F. Hegel** (1770-1831) is one of the last philosophers who created a complete philosophical system with metaphysics, ethics, and a system of values. In his anti-Hegelian reaction, Kierkegaard emphasized existence, personality, emotionality, and human choice and thereby influenced subsequent concepts oriented towards personalism, freedom, experiencing and creating oneself (Kosová, 2013, p. 11).

Individual nations formulated philosophies of education that were adjusted to their practical needs. This is still evident in the difference between Anglo-American and European continental education.

Within European continental education, two important names have to be mentioned - **J. A. Comenius** (1592-1670) and **J. J. Rousseau** (1712-1778). They both worked out methods of education, the former from strongly Christian point of view, seeing humanity in need to being humanized; and the latter from a Enlightenment point view criticizing rationalism for overvaluing reason and neglected feeling. Comenius' *Pampaedia* (universal education) was a vision of education available for all and by every means, so that all might gain the wisdom to understand everything and every idea, and to be able to "distinguish the essential from the secondary, the harmless from the harmful" (Comenius, 1992, p. 807; Hanesová, 2022, p. 78).

The 19th and especially 20th centuries witnessed a boom in anthropocentric philosophy, with man as the center of everything. Unfortunately, an accompanying phenomenon developed, so in addition to the elevation of man, bringing a belief in the unlimited possibilities of human progress, which must be realized even at the expense of nature or societies. Therefore, this Western ideology began to be criticized not only by ecologists, but also by philosophers. In the East, Soviet ideology stressed the importance of the collective at the expense of the individual.

Since the first half of the 20th century, because of previous developments in philosophy, the so-called personalistic educational paradigm with its focus on the person and the basic human personality came to fore. Its basic argument was that the aim of education is free, responsible and socially engaged development of the human person. It is an optimistic philosophy of education. Philosophical thinking relates to pedagogical thinking, which can also be seen in the examples of several French and Italian personalist philosophers (according to Rajský 2021, p. 176-249): **E. Monier** (1905-1950) considered education to be help and support in the process of personalization of a person. According to **J. Maritain** (1882-1973) education helps man in becoming a person. He defines five innate dispositions of a person, which should be developed educationally: 1) ignite love for the truth, 2) liberate the potential for good, 3) support a positive attitude towards life, 4) lead to honest work and 5) direct the person's intentionality towards others. **L. Stefanini** (1891-1956) considers maieutic dialogue to be the basis of the educational relationship. Thus, like Socrates, he perceived "dialogue as an arduous and transformative process. Education then, in his understanding, represents the place of becoming a person. The school of dialogue is not only a method, but a system in which all participants in education are included" (Rajský, 2021, p. 223).

J. Dewey (1859-1952) an American philosopher, a representative of the Chicago school of pragmatism and a representative of reform pedagogy, based his philosophy of education on the behaviorism of J.B. Watson. In his reconstructed idea of education, he paid attention to experience and reflection, democracy, and community and to environments for learning (Steiner & Laws, 2006, p. 323). He advocated the idea of connecting philosophical research with practical activity, but also connecting school with life. In his work *Democracy and Education*, he shows that learning is a social process (Porubský, 2012). He introduced the term 'critical thinking' as an educational goal, which he identified with a scientific attitude of mind. More commonly, he called the goal 'reflective thought', 'reflective thinking', 'reflection', or just 'thought' or 'thinking'. In 1933 Dewey issued a revised edition of his *How We Think* (Dewey, 1910), with the sub-title "A restatement of the relation of reflective thinking to the educative process". There he substituted the previous edition's uses of the words 'critical' and 'uncritical' with the words 'reflection' or 'reflective thinking' (Hitchcock, 2018).

In the second half of the 20th century, the extreme need for cooperation in order to overcome human and ecological crises has led to a new anthropological theory focused on a holistic (comprehensive) 'turn' to man. Humanization of social reality and responsible - not only creative - self-realization of man is required. Philosophical anthropology thus comes into a closer relationship with ethics and axiology. A new anthropological discipline is emerging - humanistic anthropology - a philosophical direction with the central doctrine of the refinement of man as an individual and humanity as a whole (Kosová, 2013, p. 30).

Contemporary philosophical concepts relevant to critical thinking and the goal of education

What is the current philosophical view of the human learning process? Although this complex question cannot be answered in one chapter or in one book, we will give at least a few examples that will direct us back to the topic: Which philosophical concepts are crucial for us to understand if we want to teach well in higher education and to fulfil societal needs?

Ancient philosophy has had a truly remarkable influence on the subsequent development of humanhood, even on our contemporary understanding of well-being and what it means to be a comprehensively developed personality, in harmony with oneself, with other people and in general with all of life and the world.

As we saw in the historical overview, according to ancient thought tradition, humans were considered *animal rationale* – animal thinkers. Humans separated themselves from the world, gained distance and were able to recognize it, subject it to reflection and understand it. According to Aristotle, man is a rational being, gifted with the ability to perceive and understand the order of the world to find the truth. At the same time, man is a social being, he (and she) is a person only in a community, in a village, whose laws enable them to live well. In Plato's view, education is caring for the soul, with the aim of awakening it and bringing a person to who he (or she) is (Kosová, 2013, p. 32)

Since ancient times the philosophical views of human beings and their general needs and needs for education have undergone several transformations, from human beings representing the image of God (*imago dei)*, to humans representing the conscious ego or the thinking subject at the beginning of the modern ages (*ego cogito*), humans as existence (*existentia*), humans as historical beings (*homo historicus)* and humans as producing beings (*homo faber)* in the 19-20th centuries.

According to Kosová's analysis (2013, p. 36-38), contemporary philosophies, including postmodernism, view people also as:

- Communicating beings (*homo dialogalis*) – human dialogue is a fundamental relationality, which presupposes the clarification of one's own identity and the acceptance of the opinions of others without giving up one's own opinions and values. Education is understood as growth in dialogue. It gives an opportunity for freedom in order to achieve the emancipation of humans. Intersubjectivity – the concept of
- *Intersubjective co-beings* with everything, relating to the whole (phenomenological and holistic perspective). Education is defined as caring for the soul or as a relationship in which a living space is created so that he/she can become him- and herself, find the meaning of their own being. Being a person as a co-being, sharing the world together, by its very nature requires responsibility not only for oneself, but also for the whole - living and non-living, for everything else that is in the world.
- Playing beings (*homo ludens*) – playing is considered an essential part of our being in the world. The whole world cannot be fully experienced by an individual, he/she cannot have it as a part of existence, so he/she can only point to it symbolically (in the play). Playing is a person's own way of experiencing the world, in a social sense a way of human reciprocity and cooperation, and in a personal sense a way of achieving happiness. It is the free action of a person for the sheer joy of the play without any external purpose and almost no responsibility except to follow the rules. Because of these properties, playing can turn from a culturally positive factor causing destructive events. It controls a person with its independence and freedom and so creates the illusion that it can permanently maintain its gaming addiction. Such a corrupt person is able to turn games into a form of violence. It is also necessary to note that the possibilities to play differ radically depending on the place and time where people live and what are their actual life needs.

At this point we are going to return once again to two ideas that were discussed in the ancient beginnings of philosophy to confirm the thesis that we have stated above, i.e., that the philosophical views on humans, especially the ancient ones, represent the starting point of contemporary education, as long as we understand it not only as a collection of skills, but as an inseparable

unity of philosophy, science and the art of teaching (Ries, 2011, p. 7). From this point of view, we also perceive critical thinking and transversal competences as educational goals, the successful development of which is anchored in the understanding of what they are supposed to contribute to and why they need to be developed in the higher education context.

Contemporary concept of eudaimonia as the goal of education

First, let us look again at the current concept of human search for all human well-being as the ultimate societal goal of contemporary education. Despite the millennia time gap, the teachings of Socrates, Plato, and Aristotle continue to shape how psychologists and philosophers study happiness (subjective approach) or flourishing and well-being (objective understanding of eudaimonia). Modern conceptions of eudaimonic well-being are shaped by literature reviews, critical analyses, and empirical examinations of their texts. It seems that nowadays the concept of eudaimonia is "about individual happiness" (Moore, 2019) which, however, does not have to "imply egoism ... or consequentialism" (Taylor, 2021). Deci & Ryan (2006) associate the concept of eudaimonia with the concept of wellbeing which is more than a feeling happy or psychologically well, but "living well or actualizing one's potential ... well-being is not so much an outcome or end state as it is a process of fulfilling or realizing one's daimon or true nature—that is, of fulfilling one's virtuous potentials and living as one was inherently intended to live" (p. 2). Today most people commonly associate eudaimonia more with subjectively experienced satisfaction with life, 'happiness' or 'welfare' (Taylor, 2021).

Let us give one example of the current idea of eudaimonic well-being as described by its proponent **A. S. Waterman** (Waterman, 1990, 1993, 2008). His understanding of eudaimonia is based on robust research evidence on the concept. Waterman and his team (2010) use the concept **'eudaimonic well-being'** as "quality of life derived from the development of a person's best potentials and their application in the fulfillment of personally expressive, self-concordant goals" (p. 41).

Waterman strived to apply the philosophical concept of eudaimonia to "developing psychological theory and research on well-being" (2010, p. 41) via constructing "instruments that accurately reflect philosophical understandings of eudaimonia and that can be demonstrated to add to our understanding of quality of life beyond what can be explained by well-being constructs already widely studied" (2010, p. 42). One of such instruments is the *Questionnaire for Eudaimonic Well-Being*. It measures the following aspects of eudaimonic well-being (2010, p. 41 & 44-45):

- Self-discovery – "*I believe I have discovered who I really am*."
- Perceived development of one's own potential – *"I believe I know what my best potentials are and I try to develop them whenever possible."*
- A sense of purpose and meaning in life – *"I can say I have found my purpose for life."*
- Investment of significant effort in pursuit of excellence. – *"I feel best when I am doing something worth investing a great deal of effort in."*
- Intense involvement in activities – *"I find I get intensely involved in many of the things I do each day."*.
- Enjoyment of activities as personally expressive – "*It is more important that I really enjoy it*."

The concept of eudaimonic well-being is meant as a complementary – and contrast - to subjective well-being which can be "defined as the quality of an individual's life with regard to both the presence and relative frequency of positive and negative emotions over time, and one's overall level of life-satisfaction" (Waterman et al, 2010, p. 41-42). As subjective well-being does not make distinctions based on the sources of well-being, it is associated more with overall happiness, hedonia or state of satisfaction, and it "does not distinguish between hedonic and eudaimonic forms of happiness"

(p. 42). Hedonia (happiness) is typically subjective experiences of pleasure regardless of its source, e.g., having success, positive relationships, self-esteem, authenticity, effective decision-making styles, or – negatively expressed – risking worry, anxiety, and depression. Aristotle's concept of eudaimonia did not mean this subjective state of hedonia, but a whole set of qualities describing how a person should live, such as virtue, excellence, self-realization. They are essential to live true to one's potential abilities, strength, and weaknesses, only via them a person is able to choose such meaningful goals. Similarly, according to Waterman et al., the subjective feelings are a byproduct of eudaimonia, not a human goal in life. "The motive for eudaimonic activity is the value of the activity itself" (2010, p. 43). In Waterman's view, the concept of eudaimonia – well-being – "incorporates both subjective and objective elements. The subjective elements are experiences of eudaimonia/feelings of personal expressiveness. The objective elements include those behaviors involved in the pursuit of eudaimonic goals such as self-realization entailing the identification and development of personal potentials and their utilization in ways that give purpose and meaning to life" (Waterman, 2010, p. 43).

Critical thinking in the views of contemporary philosophers

The second idea that we are going to turn our attention to is the *maieutical* way to *eudaimonia* as, which is actually the starting point of educational strategies focused on critical thinking and reflection.

Socrates and his dialectic method of awakening people has been an inspiration to designers of educational curricula and teaching strategies and teachers all over the world. It was emphasized, as already mentioned, "by the pragmatic philosopher Dewey (1910) and endorsed by analytic philosopher Max Black (1946)" (Ennis, 2015, p. 31). One example has been the continuous use of Socratic questioning as a specific teaching model, called the Philosophy for Children (and teenagers and adolescents), designed by **M. Lipman** (1923-2010). The motivation for him was that in the 1960s he was disturbed as he found out the low quality of argumentation skills "by presumably well-educated citizens discussing the Vietnam war and society's ills in general" (Pritchard, 2022). His idea of critical thinking is that of "thinking that (1) facilitates judgment because it (2) relies on criteria, (3) is self-correcting, and (4) is sensitive to context." (Lipman 1991, p. 116).

As with other philosophers, Lipman's concept has also had its critics, especially **E. De Bono** (1933-2021) - a physician and a psychologist but also a philosopher, the originator of the lateral thinking theory (1967) and proponent of teaching thinking in schools. In his study *From Socrates to Lipman* (2005), Burgh explains Lipman's idea, and he also does it in response to De Bono's arguments. De Bono criticized the popular approach to using the Socratic Method because, in his opinion, „it is fashioned upon 'dichotomies and opposites in order to force a judgement choice". He argued that "whilst it has its place, the Socratic Method ... was not designed to deal with the kind of radical change that is a feature of the modern (or postmodern) world... The increasing complexity of contemporary societies requires more than the search for truth. What is needed for modern life is a creative and more effective approach to problem solving" (Burgh, 2005, p. 26). De Bono introduced his approach in the form of parallel or lateral thinking which enables cooperative thinking. Burgh comes up with the following proposed way of using the positive aspects of both critical thinking approaches: "In comparing the views of Lipman and de Bono, it can be argued that de Bono emphasizes the teaching of skillful thinking, especially in relation to practical decision-making, whereas Lipman points at questioning strategies and improving student's reasoning abilities and judgment by having them think about thinking through the discussion of concepts of importance to the students themselves. Not unlike Lipman, de Bono is also concerned with improving the value judgments of students, but his approach seems to stress efficiency and economy, whereas Lipman is more concerned with building democratic or moral character" (Burgh, 2005, p. 28).

Another philosopher who paid attention to the need to focus on the development of critical thinking was **R. H. Ennis** (1928-2022). He built his philosophy of critical thinking on two general points: 1) "examining the traditions of good thinking in existing successful disciplines of inquiry, and 2) seeing how we go wrong when we attempt to decide what to believe or do". Ennis contributed to philosophical scholarship on the concept of critical thinking with the study *„A concept of critical thinking: A proposed basis for research in the teaching and evaluation of critical thinking ability"* (1962).

According to Ennis, "critical thinking is reasonable and reflective thinking focused on deciding what to believe or do" (Ennis, 2011, p.1; Ennis, 2015, p. 45). In deciding what to believe or do, we are helped by the employment of a set of critical thinking dispositions and abilities. Actually, they may "serve as a set of comprehensive goals for a critical thinking curriculum and its assessment". He also considered other concepts of critical thinking, including the correct assessment of statements and a skill to "engage in an activity with reflective skepticism" (Ennis, 1989, p. 4).

In 2011 Ennis presented critical thinking as consisting of three main critical thinking dispositions covering 15 critical thinking abilities of ideal critical thinkers: (1) care that their beliefs be true, and that their decisions be justified; that is, care to 'get it right' to the extent possible; including; (2) to take care to understand and present a position honestly and clearly, theirs as well as others'; (3) care about every person, which is an auxiliary, not constitutive, disposition. In his latest list in 2015 (part of *The Palgrave Handbook of Critical Thinking in Higher Education*), he modified the organization of this list into 12 critical thinking dispositions and 18 abilities.

In his earlier studies (e.g.1989), Ennis put much effort into clarifying whether critical thinking is subject specific. In a theoretical way, he analyzed differences among three versions of subject specificity: domain, epistemological, and conceptual subject specificity. In his later philosophy of critical thinking (2011, 2015) he described all options where critical thinking could and should be applied in school education, saying that in any teaching situation for which critical thinking is a goal, whether it be a separate critical thinking course or module, or one in which the critical thinking content is infused in (making critical thinking principles explicit) or immersed in (not making critical thinking principles explicit) standard subject-matter content, or some mixture of these; all of the dispositions, as well as the suppositional and integrational abilities ... and auxiliary abilities ... are applicable all the time and should permeate the instruction to the extent that time and student ability permit". In other words, he suggested that what needs to be done is to "develop critical thinking across curriculum" (Ennis, 2015, p. 45). Hereby the work of Ennis has significantly influenced our understanding of critical thinking and its implementation in higher education.

2.2 Psychological and neuroscientific concepts and approaches to critical thinking

In the previous part 2.1, we have looked at development of the idea of critical thinking as a way to achieving the ultimate goal of education from the point of view of philosophy. In this next section, we will supplement the philosophical overview with the perspectives of other humanities and social sciences. We will mention several scholars and their theories that represent different alternative approaches to understanding how education can contribute to the well-being of society, if it pays attention to the development of critical thinking and freedom from prejudice. We will proceed chronologically – by the date of the first edition of their key studies, from which the main relevant ideas will be summarized here.

To demonstrate different perspectives on critical thinking and the possibilities of acquiring transversal competences in higher education, we have chosen nine different approaches/theories - some are partially and refer to each other, some not and even distancing themselves from the given point of view. Since in most cases these are complex concepts and their textual sources are extensive, for the purposes of this book we will filter their ideas through the prism of critical thinking and the possibility of cognitive biases, as well as proposals for their elimination.

What do we mean by cognitive biases? Cognitive biases are systematic deviations of judgement from the norm or rationality. They are usually the subject of psychological research which investigates: Why or how do biases come into existence?

Eric Berne (1910-1970) – a psychiatrist and psychologist – is the author of a psychoanalytical theory called 'transactional analysis'. In his publication ***Games People Play*** **(1964**) (Slovak translation used) he explained the theoretical as well as practical side of the psychology of social interactions and human relationships, helping to sort out distorted relationships by resolving cognitive biases.

It is a well-known fact that humans 'are hungry' not only in a biological way – they need food, but also in psychological and social way – they need relationships. This hunger involves the need for incentives, some structure and recognition by other people, in order to avoid sensual and emotional deprivation or boredom.

As Berne's structural analysis shows, our ego can be in any of three possible states – phenomenologically coherent systems of emotions and, operationally, systems of coherent models of behavior:

- The state of ego called 'Parent' that reflects the states of ego of our parents;
- The state of ego called 'Child' – although we might be adult in age, there is some residual from our past, fixed in our early childhood;
- The state of ego called 'Adult' that is independent from both previous states and is trying to make an objective evaluation of reality.

Berne warns that people use various kinds of maneuvering behavior to get rid or avoid this social hunger 'for any price'. We, humans play various games all the time - in our relationships, e.g., in our behavior toward our boss or in competing with our friends. Our motives for playing games might differ, from avoiding to confronting reality through hiding our intrinsic motives, or rationalization of our activities, to avoidance of participation in an activity. Berne reveals the nature of these games and the ways to deal with them. Not all these games are destructive - some are important and desirable.

His method of transactional analysis provides a new way to combat the destructive games by approaching the relational inconsistency or deformations with our adult ego, by analyzing ours and others' behavior, revealing relational games, and using this information to start honest communication to limit their influence on our lives. Berne presents his technique of transactional analysis to show how we can achieve order amid various relationships.

Berne's theory of transactional analysis characterizes what transactional stimulus and transactional reaction are. Games are substitutes for real experience of genuine intimate relationships. They represent "a continuous sequence of secondary supplementary transactions that lead to a clearly defined, pre-known result ... a changing system of often repeated, seemingly rational transactions with a hidden motivation, or simply a series of moves with various traps or tricks" (p. 60).

If there isn't an intervention, the games will be passed from generation on generation (p.183) It is very important to know that we, humans, usually choose such friends that play similar games as ourselves.

It is crucial to become self-aware and gain autonomy – to realize what we feel, where we are, so that we are free to decide how to express our emotions and to choose Parental, Adult of Childish. That helps us be set free from various compulsions to play games and have only those feelings to which we were led (p. 192), to create intimacy that is natural, as well as game-free sincerity (p. 193). Intimacy is loving, caring and affectionate.

Our parents play a crucial role in building our life, our habits etc. It is not easy to limit these influences. It is only possible if a person begins to live as an autonomous, independent being, a person able to be attentive, spontaneous, and intimate, and that has some freedom about how much to accept from their parents' influence. According to Berne, if a person wants to be free from playing destructive games, he/she must get rid of the family tradition and from the influence of the wider social and cultural background. It is not easy because it demands sacrificing all the advantages that such basal interactional context has been offering, and giving up all the benefits of previous negative roles, too. (p. 194). Only if the person can make a choice according to his or her will, is he or she prepared for relationships without 'games' and develop personal autonomous abilities.

From the point of view of the topic of this book, Berne's theory is therefore a useful starting point for understanding the origin of various biases, if one is not equipped with sufficient critical thinking skills. One way that biases are created is the lack of transparency and authenticity in basic human relationships. A person is influenced by his or her parents and their wider social and cultural background. The solution is to gain self-awareness, thanks to transactional analysis, space for free decision-making, getting rid of learned patterns of behavior, reevaluating them and choosing authentic, intimate, game-free relationships.

Diane F. Halpern's book ***Thought and Knowledge: An Introduction to Critical Thinking***, first published in **1985** by Lawrence Erlbaum Associates (the 5th English edition in 2014 used here), has been repeatedly referred to not only by experts of psychology and other scientists, but especially by curriculum designers and teachers of all levels of schools. For the purposes of this book, Halpern explains several kinds of biases and their origins.

In 2003 Halpern prepared a **model for developing critical thinking,** which can be implemented in any school course (2003). It includes development of not only skills and methods of critical thinking, but also of an attitude, inclination, or willingness to apply these skills, the ability to identify appropriate opportunities for critical thinking and the ability to monitor progress and quality of thinking (Halpern, 1998). In order to develop unbiased cognition and skills, the person has to be willing to get involved not just in straightforward thinking and acting impulsively, but also in a reasonable process of plan preparation, has to be flexible and open-minded, willing to "abandon nonproductive strategies in an attempt to self-correct"; and aware "of the social realities that need to be overcome" (Halpern, 1998, 452 & Halpern, 2014, p. 24).

In her four-part model *Learning to Think Critically* (Halpern, 2014, p. 18-27), Halpern presented a systematic approach to training critical thinking, and so to be able to recognize and get rid of cognitive biases:

- First, it is necessary that students are informed about the better way of learning and thinking and understand critical thinking skills.
- The students have to be willing and decide to invest their own effort to "develop an attitude of a critical thinker": "Good thinkers are motivated and willing to exert the conscious effort needed to work in a planful manner, to check for accuracy, to gather information, and to persist when the solution is not obvious or requires several steps" (p. 20). This attitude of 'a good thinker' includes the habit of good planning as a sign of self-regulation, of open-mindedness

and cognitive flexibility, diligent persistence, willingness to self-correct, admit errors and change one's mind when the evidence changes, being mindful and consensus-seeking

- It is important that students will be able to transfer their learnt skills– to recall them and apply in a novel situation. To transfer skills, Halpern argues that students must move past "the domain-specific surface characteristics" to identify the "structural aspects of the problem or argument" that „trigger the recall of the thinking skill" (25).
- Good thinkers are able to use metacognition to monitor their thinking process and to use various learning strategies.

According to Halpern (2014, p. 19), one of the characteristics of a critical thinker, is that he/she can "recognize semantic slanting and guilt by association". She considers that critical thinking is a way to avoid cognitive biases and its development results in cognitive skills or strategies that increase the probability of a desirable outcome. Transferring her characteristics of critical thinking to unbiased thinking, we can say that unbiased thinking is "purposeful, reasoned…goal-directed" and "involved in solving problems, formulating inferences, calculating likelihoods, and making decisions" (Halpern, 2014).

As we have already seen in 2.1, Greeks used the term *eudaimonia* - the human state of having an objectively desirable, good life and well-being in connection with the pursuit of knowledge or virtue, and with some effort, in case of Socrates' meaning of self-discovery (maietics), even a somewhat painful process of recognizing any biases or incorrectness in their thinking. In his concept of *flow,* the cognitive psychologist **Mihaly Csikszentmihalyi** (1934-2021) came with a similar emphasis on the necessity of active work of our brains during thinking as a condition for a 'happy life'. *Flow* represents a key aspect of eudaimonia, self-actualization and is important in creativity and well-being (Oppland, 2016). The book ***Flow: The Psychology of Optimal Experience*** was first published in **1990** (the Slovak edition used here). It does not happen in times of passive relaxation but in moments of being completely involved or immersed in an activity following a challenging but doable task. The best moments in our lives are not the passive, receptive or relaxing times. But the best moments usually occur if a person's body or mind is stretched to its limits in a voluntary effort to accomplish something difficult and worthwhile. Flow is a state in which people are so involved in an activity that nothing else seems to matter; the experience is so enjoyable that people will continue to do it even at great cost, for the sheer sake of doing it. Although the person is completely concentrated on the task, the activity seems effortless and easy, and there is a balance between challenges and skills and a feeling of control over the task.

People have differing capacity to experience flow. According to Csikszentmihalyi, so-called autotelic personalities, people who have intrinsic motivation, work on a task with internal enthusiasm, from internal conviction and interest, and do not need external pressures or external extrinsic reward. They have developed certain meta-skills, especially persistence and low self-centeredness. The internal state of flow was also investigated from a neuropsychological point of view (Dietrich, 2003) and is related to temporary inactivation of the prefrontal cortex of the brain, which is responsible for the conscious state of mind. Flow is a state of loss of inner critic and self-consciousness.

Happiness is actually a state that each person must prepare, cultivate, and personally protect. Optimal living is something we strive to achieve. Gaining control over life is never easy and sometimes can be very painful. Optimum survival depends on the ability to be in control of what is happening in one's consciousness at every moment. Each person must achieve it based on one's own individual effort and creativity (Csikszenthmihalyi**,** 2015, p. 14-19). The optimal state of inner experience is one in which there is order in consciousness. It occurs when psychic energy, attention, is invested in realistic goals and when abilities are aligned with opportunities for action.

It is important to apply it in our relationships, activities, study, and employment - to transform these into activities that create flow. The most important step in freeing yourself from social control is to find rewards in the events of every moment. Control over consciousness is not just a cognitive ability. It's not enough to know how to do it, you must do it consistently. Control over consciousness cannot be institutionalized because routine will quickly replace it.

Csikszenthmihalyi makes an explicit application of his *flow* theory to the challenge of lifelong learning (p. 189-190). It is not only physical activities, but also mental activities, such as thinking, reading, and solving puzzles that can bring us joy. Many people stop their education after finishing school - because their school years of externally motivated education are a source of unpleasant memories for them. "But a person who renounces the use of his or her symbolic abilities is never truly free. Their thinking will be guided by the opinions of their neighbors, newspaper editorials and the action of television. They will be at the mercy of the 'experts'. In an ideal case, the end of externally ordered education should be the beginning of an internally motivated education" (p. 189). The learner's goal for studying is to understand what is happening around him or her and to develop a personally meaningful sense of what his or her experience is about. "To discover the flow of the mind brings a deep tribute of joy" (p. 190). *Flow* theory applies to meta-skills, cognitive effort and the motivation for lifelong learning and learning to learn.

Among other authors that explain how various misconceptions and biases emerge in our thinking, let us introduce the work of **Daniel Kahneman**, the Nobel prize winner in economic science (2002). In his book, ***Thinking, Fast and Slow*** (published first in **1994** (the Slovak edition used here) Kahneman explains his theory – developed through decades in cooperation with A. Tversky – on human thinking, describing the most common thinking errors based on human hermeneutics and biases. The main principle of the theory is that humans think using two different systems. Kahneman explained the difference between our two systems of thinking.

System 1, which performs 98% of human thinking, is fast, intuitive, automatic, uses associations, emotions and metaphors. It minimizes our effort and does not work with self-awareness. It can, for example, detect hostility in a voice. System 1 thinking is largely in an unconscious mode. This all too often results in various misconceptions, biases and systematic thinking mistakes (p. 33).

System 2 is rather slow. It is logical, rational, analytical, controlled, and deliberate. It requires human effort to concentrate and strive for inner consistency to reason about the world. System 2 mobilizes itself to focus attention on something and to do it. On the other hand, System 2 is not an exemplary model of rationality because its abilities and knowledge are limited.

So it can get tired easily and can be seen as lazy. For example, it is too lazy to investigate what System 1 offers, and so it accepts easy solutions or unreliable story. According to Halpern, the kind of critical thinking that she described in her theory can be explained as Kahneman's System 2 thinking (2014, p. 35). System 2 functions as the remembering 'ego'. It evaluates episodes and experiences and makes decisions. However, System 1 does not offer System 2 reliable information from memory, e.g., it remembers the most intensive moment from an experience and neglects the passing of time or duration, and thus may not correspond to the values of System 2 (p. 427). By routinely preferring a short time of intense joy to a long period of mild happiness (p. 427), the perspective of the remembering ego in System 2 may not be correct.

Kahneman invested a lot of effort into investigating the origin of human irrationality. At the beginning of this investigation Kahneman, together with Tversky, revealed about twenty cognitive biases, e.g., "the 'anchoring effect': our tendency to be influenced by irrelevant numbers that we happen to be exposed to"... later they focused on people's "making decisions under uncertain conditions" and their not "maximizing utility" (Holt, 2011). And finally, the developed a coherent

'prospect theory' of human decision making. It was based on several characteristics observed in and effort to our cognitive activity (p. 113).

After the death of his co-researcher Tversky, Kahneman became more interested in 'hedonic psychology' focusing on the science of happiness. Kahneman distinguishes "between happiness – a momentary experience „what I experience here and now" and a long-term feeling of being satisfied with life, e.g., based on satisfaction from achieving some goals and reaching the kind of life that a person wanted" (Livni, 2018). "A theory of happiness that ignores what people want will not hold up. However, a theory that ignores what really happens in people's lives and focuses only on what they think about their lives is also not sustainable" (p. 428). It is necessary to accept the complexity of a hybrid view of happiness - one that "takes into account both our systems … An exclusive focus on the experienced sense of happiness is not defensible" (p. 419).

Kahmeman's research has shown that ordinary people cannot be characterized as behaving rationally (p. 429), so they need help to make more accurate judgments and better decisions, and in some cases "politics and institutions can provide that help" (p. 429). We consider that this a challenge which must be applied to higher education institutions. They must focus intentionally on assisting students to develop their higher thinking skills, to be able to make more accurate judgements and solutions. "Ordinary people need help in making good decisions, and there are informed and non-intrusive ways to provide that help" (p. 433).

Kahneman offers a theory of thinking and practical assistance in showing when we can trust our intuition, how to make decisions, how to resist mental glitches and avoid biases, etc. So the question is - which of these two 'egos' matters more? Kahneman gives advice on how to deal with biases and how to improve one's judgement. The basic principle is that this is not possible without a significant investment of effort (p. 435). We should start by learning how to better recognize situations when mistakes are more likely. Usually, we are developing better skills in recognizing the faults of others than recognizing our own.

To sum up avoiding mistakes resulting from System 1, let us use Kahneman's simple advice (p. 435): We must realize that System 1 poses a potential danger for our thinking outcomes and that is why we have to slow down and activate System 2. It requires a lot of effort, especially at the beginning of the development of these skills, because it is easier to give in to the easily recognizable intuition than to overcome it by reasoning (p. 435).

The good news for organizations – including higher education institutions - is that they have a greater chance of avoiding mistakes because "they naturally think more slowly and have the power to dictate disciplined procedures ... At least in part, by establishing a certain vocabulary, organizations can foster a culture that allows people to watch for the minefields [coming from System 1]" (p. 236). They must be consistent in applying all phases necessary to make decisions, to search for relevant information enabling them to move to a decision, and then to reflect on it and test it. One simple way to help the students to avoid biases, is to teach about them and the skill of constructive criticism explicitly. Kahneman stressed that we pay attention to our tendency to bias when making judgments.

People are not guided by rational arguments and precise rules when making judgments, but rather heuristics. They are simplifying judgment rules, allowing for quick judgments to be made, often accompanied by a subjective belief in their correctness. These are cognitive biases. The extensive list of various types of cognitive biases accounts for around 180 different cognitive distortions.

Kahneman's theories give strong support for higher education to focus on informing students about how their thinking works, that they have the option of either letting intuitions and superficial, distorted thinking run free, or investing effort and time in self-reflection and development of

thinking skills, leading to rationally and contextually based decision-making and to a life focused on current, but also long-term sustainable self-development and the fulfillment of meaningful goals.

We now turn our attention to the next author, chosen because of emphasizing the importance of a personally engaged attitude to the development of thinking abilities and skills. **Carol. S. Dweck,** an expert in personality, social psychology, and developmental psychology, contributed to the concept of personal development. Based on research into human personality Dweck, in her well-known bestseller ***Mindset – The new Psychology of Success*** (first published in 2006) (the Slovak edition used here), introduced the concept of mindset, specifically the concept of its growth. Dweck's main thesis is that people's mindset - opinion of themselves, of their talents and abilities - permeates all areas of their life and affects whether they will be able to achieve their potential. In general, people can have either a fixed mindset or a growth mindset.

As Dweck describes in her study, research has shown that people with a fixed mindset think that their abilities are fixed. It results in limiting opportunities to achieve success and in being filled with disturbing thoughts, unpleasant effort, starting to use less valuable learning methods, negative labeling, stereotypes, and problems with too much trust in other people's opinions. This type of mindset is especially important to be able to process personal failures; a fixed mindset is often associated with danger avoidance, cheating, blaming and depression. People with a fixed mindset are following their compulsion to constantly reassure themselves and they must prove themselves (p. 16). Research has shown that, in comparison with people with a growth mindset, people with a fixed mindset are not able to accurately estimate their own performance and abilities (p. 23). This fact is of particular importance in higher education as it shows the way that teachers should nurture people to flourish and be prepared for a successful, fulfilled personal or professional life.

People with a growth mindset believe that their abilities can be developed and cultivated through their efforts, practice, and experience (p. 17). They are eager to learn and therefore do not refuse challenges, are not deterred by obstacles, and persevere despite setbacks. Instead of ignoring criticism, they see it as a source of further development. Dweck suggests that teachers should have a growth mindset, not demanding perfect performance, but full commitment and maximum effort. Teachers can offer constructive criticism to help students to understand what should and could be changed and developed.

In the later editions of *Mindset* (Dweck, 2016), Dweck warns that it is possible for people to have a false growth mindset – believing that they have a growth mindset, but they do not have it or they do not understand what a growth mindset is. A false growth mindset emerges because of praising students' effort to learn, their learning process – although ineffective - or as a result of giving promises to students or just encouraging them "You can do anything" without a proper methodology how to help them to learn. Praising our students' intelligence and abilities does not boost their self-confidence or lead to positive outcomes but can prevent them from achieving success. "It is the educator's task to create a growth mindset classroom. In the safety of their classrooms, students can begin to leave behind their fixed mindset and try out the idea that they can develop their abilities", and adopt a deeper growth mindset (Dweck, 2016).

The andragogical view of development of critical thinking skills, enabling the higher education students "to question their assumptions", was presented in the book ***Teaching for Critical Thinking*** (2012) by **Stephen D. Brookfield**. For him critical thinking is a crucial capacity of a world citizen and of a successful employee as well. Thus, higher education institutions must teach students how to think critically. Critical thinking must be implemented across study disciplines, into their institutional missions, course curricula and their goals.

Brookfield describes the basic process of critical thinking in the following way (p. 13-14):

- "realizing and identifying the assumptions that frame our thinking and determine our actions, trying to find out what these assumptions are;
- checking whether assumptions are as accurate as we think they are;
- seeing things from different viewpoints;
- taking informed action."

So, he defines critical thinking as "the habit of making sure our assumptions are accurate and that our actions have the results we want them to have" (p. 14). A part of critical thinking is making sure that the behavior that flows from our assumptions is justifiable according to some concept of goodness or desirability. Actually, critical thinking "cannot be considered separately from values and commitments" (p. 17). The question is - what kind of assumptions do we have to think critically about? He proposes:

- paradigmatic assumptions – through which we order the world into basic categories. They frame how we view the world.
- prescriptive assumptions – what we think should be happening in a particular situation,
- causes – why things happened the way they did. "The most difficult assumptions to identify and question are those embedded in dominant ideologies" (p. 24).

At higher education institutions, critical thinking should be developed across disciplines with one common objective of "helping students become aware of the ways that knowledge in those disciplines became regarded as legitimate" (p. 51). Critical thinking will empower the students to recognize when they are manipulated and to achieve the desired outcomes of their studies.

Brookfield is an expert on the methodology of teaching in adult education. He advocates learning critical thinking as a social process, i.e., students must learn via discussion in *small groups*. His advice is to give careful attention to how the groups are structured, and to the rules, e.g., that the students must listen carefully to each other and ask questions. He also emphasizes ... that teachers should model critical thinking to the students, focusing especially on modeling critical thinking in online environments, using critical theory, saying that "the clearest way a critical theory informs informational or digital literacy is to explore the degree to which online information reproduces dominant ideology" (p. 250).

In the last two decades, there has been a boom in interest from many experts and educational theorists, whether for children or adults, in the fascinating data from neuroscientific brain research. One of the most influential books in this area, offering in a 'teacher-friendly' format both neuroscientic brain theory and research results with detailed practical instructions, is ***How the Brain Learns*** (2006, first published in 1994) by **David A. Sousa**. He realizes that it is important to implement new brain research within teaching and learning:

- Neuroplasticity of the brain – it reorganizes based on input (Sousa, 2006, p. 5)
- Multi-media environment – e.g. several parallel messages and pictures on the screen - divide the attention of the learners' brain, we have learn to pay attention to several stimuli at once, but none to the expected depth (ibid., p. 30)

Sousa paid special attention to our past experiences. They function as a filter in acquiring new knowledge and shape our self-concept. Our cognitive belief system – our view of what is happening around us, making sense of events, recognizing cause and effect, producing decisions about ´goodness, truth... - is formed by all the content of our long-term storage in our brain (ibid.,p. 52). The "sensory register and temporary memory systems use past experiences as the guide for determining the importance of incoming stimuli to the individual" (ibid.,p. 53). Our self-control determines how we "will respond to almost any new learning situations" (ibid., p. 54).

Cognitive skills, including problem solving, can be developed by training, and then performed automatically, as they rely on procedural, implicit memory. Their development at school should thus differ from building new cognitive concepts which rely on declarative – or conscious – memory (ibid., p. 82).

It might sound like a cliché, but neuroscientists emphasize that time plays an important role in education. If students in higher education do not get enough time to think over their tasks, they will slide into rote learning, maybe memorizing facts, and fail to understand the concepts they are learning, to be able to use the knowledge in different settings or to think critically by discovering relationships or making associations. "They continue to believe that learning is merely the recalling of information as learned rather than its value for generating new ideas, concepts, and solutions" (ibid., p. 87).

How are biases and misconceptions formed? Let us give just one example, used by Sousa, about their origin associated with our long-term memory and the retrieval processes.

It is important to notice that retrieving more complex concepts is more demanding than recalling information obtained by rote learning. "It requires signaling multiple storage sites through elaborate, cluttered pathways for intermedia consolidation and ultimate decoding into working memory. It is less accurate. ... Most of us do not retain 100% of elaborate experiences... When retrieving such an experience, the long-term memory may not be able to locate all the events being requested ... Older memories can be modified or distorted by the acquisition of newer information. During the retrieval process, memory can unconsciously fabricate the missing or incomplete information by selecting the next closest item it can recall. This process is called confabulation... Our brain fabricates information and experiences that we believe to be true" (ibid., p. 115).

According to Sousa, the most powerful principle of learning is transfer – either transfer during learning (the effect of past learning on the current learning process) or transfer of learning (the application of new learning on the future). "Transfer is the core of problem solving, creative thinking ... inventions... It is also one of the ultimate goals of teaching and learning ... Past learning always influences the acquisition of new learning" (ibid., p. 135-138). This transfer process is under the influence of many factors, especially "the quality of the original learning, similarity of the situations in which learning happens, critical attributes (identifying the difference among concepts) and associations" (Hunter, 2004 in Sousa, 2006, p. 141). Teachers must pay special attention to planning lessons using transfer in teaching. Transfer is a typical feature of a constructivist approach to learning.

Neurological research indicates that human brains are capable of complex thinking, either critical thinking, creative thinking, or metacognition. The reason why so many students still, do not think critically, even when studying at university, might be that the teachers "have not exposed them consistently to models or situations in school that require them to do so" (ibid., p. 247). Sousa recommends the training of higher thinking skills as defined in Bloom's taxonomy (ibid., p. 259, Bloom, 1956 & Anderson et al, 2001).

Therefore, based on neuroscientific research, it can be recommended that teachers in higher education, for their students to construct their knowledge instead of rote learning of the given facts, follow this advice:

- "Student responses to alter their instructional strategies and content;
- Foster student dialogue;
- Question student understanding before sharing their own;
- Encourage students to elaborate on their initial response;
- Allow students time to construct relationships and create metaphors" (ibid., p. 148).

One of the experts who provided an insight into thinking skills development, is **Michael Vaughan**. In his book ***The Thinking Effect: Rethinking Thinking to Create Great leaders and the New Value Worker*** (2013), he presented a user-friendly methodology for using research data from cognitive science, behavioral science, computer science and cognitive neuroscience and applying them in modern education science. We mentioned his pyramid of thinking in 2.1.

His main message is to encourage and advise leaders, including teachers in higher education, to refocus from *what* to think to *how* to think. "If we think on what to think, we are unprepared to act amid complexity" (Vaughan, 2013, p. 16). The real world consists of many interdependent elements, so to get to know it, teaching methods must change. Teaching cannot consist of simple skills training, it requires the use of the core abilities, that equip the students to assess the situation, and the value skills that enable them to act (ibid., p. 43), which are based on everybody's mental models (ibid., p. 59).

In his methodological explanation of how to form potentially successful leaders and employees, Vaughan makes use of data from neuroscience to support his thesis, especially concerning the formation of neural pathways for creating habits in the brain (ibd., p. 113 & p. 121). He applies data on the brain's ability to adapt its structural and functional organization from neuroplasticity studies, to show how to create conditions necessary for workers to generate their own insights and to get rid of common internal barriers, including fear, and other techniques for exposing and rewriting our limiting beliefs. To activate core abilities, he suggests that teachers create an environment where learners have to activate their visual searching, working memory and long-term memory to make decisions, through which more synapses are created. He also applies Kahneman's theory of two Systems thinking to show how to form core abilities (System 2).

In the first part of the book Vaughan shows two ways of learning in a form of a pyramid of a) the old way of learning (where skills get the most attention, value skills less and core the least), and comparing it to b) the new way of learning (core abilities are the first to be well-embedded in students' personalities and need the greatest attention, on which the values skills have to be built and last, but not least, the other skills) (ibid., p. 45). Then, throughout the book, he goes even deeper and explains the necessity to take into consideration learners' mental modes and finally (ibid., p. 178-179) the whole thinking effect. "The Thinking Effect describes the underlying changes that occur to mental models because of the virtuous cycle created by the application of the core abilities and value skills. It is this effect that improves the application of all other skills." That means that, just to provide "constant training exercises is impractical…", Learners need to have intrinsic motivation to improve, and this comes "from their ability to assess gaps and limitations and their willingness to address these deficiencies. It comes from their understanding of the Thinking Effect" (ibid., p. 178).

To apply the thinking effect in teaching would prompt students to develop ideas about how to improve the system, instead of just applying quick fixes to surrounding issues. In Vaughan's words, "to solve today's complex problems often involve a collaborative effort in decision making" (ibid., p. 49) but collaborate, don't just communicate – more dialogue, less talking.

So far, we have presented several theories and methodologies to describe and develop human thinking skills and learning abilities, including the ways that biases emerge. The human mind seems to be able to reason, and thus of being a source of knowledge and wisdom. But if reason is that reliable, why do we produce so much thoroughly reasoned nonsense? If reason is so useful, why didn't it also evolve in other animals? These two questions became the impetus for the creation of one of the latest theories of human understanding - the interactionist theory **Hugo Mercier** and **Dan Sperber** described in their ***Enigma of Reason*** (2017) (the Slovak edition used here).

Instead of the traditional definition of reason as the ability to enable better independent thinking, Mercier and Sperber emphasize its importance in interactions with other people. They claim that

reason is not some kind of human superpower, but that it fits in with other human cognitive abilities. One of them is human ability to draw inferences. They do not agree with Kahneman's contrast between intuition and reasoning, as if they were two different forms of inference (i.e., System 1 and System 2). They hold the opinion that thinking about us is a kind of intuitive inference (p. 15). People are aware of some of their own inferences in the form of intuitions. Between intuitions in the general sense and reasoning, there is yet another category – a category of intuitions about representations, intuitions about abstract ideas. These intuitions about representations allow us to understand each other, communicate and share opinions and values. One category of these representations are reasons, and Mercier and Sperber argue that reason is a mechanism to produce reasons (p. 16).

Mercier and Sperber reject the usual way in which reason is opposed to intuition. They understand that both the study of reason (mental ability) and the study of reasons (justification or reasoning) are one and the same, even though philosophy and psychology still approach these categories as two completely different topics (p. 16). While reason is usually perceived as a higher ability that enables better independent thinking, Mercier and Sperber believe that it finds its use primarily in interactions with other people. They claim that reason has two roles: a) to produce reasons to justify our mistakes and actions to others, and b) to convince others that they should think and act as we suggest. In addition, we use reason not so much to evaluate our own thoughts as to evaluate the reasons that others present to justify themselves or to convince us (p. 16). So, reason does not only help us as individuals – to make our own decisions - but it helps us to justify what we believe and do to other people. Reason develops in a social environment; it is not perfect but evolves and has its strengths and weaknesses.

The first function of reason is to provide the tools for the diverse and versatile coordination that human cooperation requires. Reason helps us to share what we have learnt in everyday life. Normally we rely on the experience and wisdom that was passed on to us from other people. But on the other hand, despite all these benefits, we are vulnerable to misinformation. When listening to others, we would always like them to tell us information that is true. But in our sharing with others, we often mislead them, "perhaps not immediately with a straightforward lie, but by twisting, omitting and exaggerating information in order to better influence them in their opinions and actions" (p. 17). And the second function of reason is achieving the maximum effectiveness of communication via reasoning and argumentation – and that even in a situation where the speaker lacks sufficient credibility amongst the listeners. "Reason produces reasons that people use as arguments to convince a reticent audience" (p. 18).

Mercier and Sperber are persuaded that our reason is biased, and so is its production of reasons, in most cases it finds explanations and arguments supporting our own point of view) and lazy (it hardly ever tries to assess the value of the explanations and arguments it produces itself). Reason is more effective in evaluating good arguments by other people than in producing them so it may lead to overconfidence. What we need is a dialogic environment in which reasoning could take place with the involvement of the thinking listener. Otherwise, it could lead to epistemic distortions and wrong decisions. especially if we start reasoning with a strong intuition – reason itself can lead us to distortions. If I reason alone, my thinking will be lazy and biased. Interaction via arguments with others is important for revealing our distortion, especially our confirmation bias. "As long as people are discussing … there is no social idleness or interruptions in the cognitive process. The dialogical context strengthens their motivation. They react to the arguments of others and build on them ... Argumentation helps people arrive at better solutions" (p. 289).

How to learn to argue better? Mercier and Sperber advice to a) get familiar with the "local knowledge relevant to the audience's beliefs", and b) "learn to anticipate counter-arguments by exposed learners to a greater possibility of counter-arguments and push them to argue more"

(p. 321). Through argumentation we become better thinkers. When evaluating arguments, we should be demanding and objective (p. 361).

It is important to see that Mercier and Sperber highlighted collaborative or group problem solving. They believe that the problem-solving performance of a group is usually higher than the average individual performance of its individual members. They think that when people get together to find a solution, they can find one even though none of them could find it individually (p. 363). But on the other hand, Mercier and Sperber warn that group discussions are not necessarily always beneficial. If people have similar opinions discussion can lead to polarization. Or if they have conflicting opinions and contradictory goals, discussion may lead to deepening of their differences. The best group discussion is when participants "have different opinions and a common goal" (p. 363).

If we were to summarize what we have learned from the mentioned 9 sources, we could say that learning (also within higher education) should be understood as a complex human activity, which represents a complex synergy of internal decision and determination not to be subject to biases, but to grow and learn throughout the whole of life, utilizing efforts and planning activities consistent with the information we have about our brain. This kind of learning should take place not only in subject knowledge, but it has to be balanced with a positive growth attitude and deeper skills development – i.e., holistically, transversally, through the consistent application of a critical thinking approach. And finally, all this should be accomplished in the context of interpersonal relationships and interactions, and not only interpersonal - but also sustainably aware about the needs of nature, the value of other inanimate resources and the opportunities of information technologies.

2.3 Contemporary concepts of critical thinking and reflection

The purpose of the previous two overview chapters 2.1 and 2.2, presenting the opinions of researchers from various disciplines (philosophy, psychology, sociology, neurosciences), was to support the main thesis of this book, namely that if education is to lead to personal and social well-being, it must be unconditionally focused not only on learning facts but learning to think critically and reflection of one's learning.

Critical thinking - a set of skills as well as a complex mental process

Human beings live inside their own perceptions and cannot understand all the information around them and cannot spend the time to consider all of the possibilities and perspectives. As Chatfield (2018, p. 199) claims, our conscious awareness is highly selective and we often:

- prefer speed and simplicity to slowness and complexity,
- are influenced by the immediate and the local,
- tend to see things in terms of patterns and narratives which reflect us and what we already know,
- extend these patterns into our accounts of the past and the future, and
- are highly selective about how and what information we notice.

According to psychological theory, these shortcuts are known as heuristics – emotional reactions or mental shortcuts or rules of thumb allowing for quick decision making and judgment. When

there is a particular situation in which mental heuristics introduce a predictable distortion into our assessment of the situation, resulting in a flawed judgment, it is called cognitive bias (Chatfield, 2018). Chatfield describes the tendency towards stereotyping, which is defined as a commonly held, simplified, and idealized view of someone or something of a particular type. Stereotyping leads towards social biases, which affect our judgments about other people, groups of people, or social and cultural institutions (Chatfield, 2018, p. 206).

Markoš (2019) also mentions several limitations of our rationality (cognitive biases) and argues that they cannot be completely removed. We have merged several types of defined biases presented by Chatfield (2018) and Markoš (2019) and divided them into three categories which are described as follows:

***Biases based on how things are presented and observed**:*

a) peak-end bias - we evaluate past events according to their end and according to the most significant positive or negative experience,
b) survivorship bias – the tendency to put greater importance on successful outcomes and ignore unsuccessful outcomes,
c) framing effects - (originating from the Prospect theory - an observation-based description of how people choose between different degrees of known risk, and between different potential losses and gains) the way in which presenting the same scenario in different ways can affect judgment and alter preference, based on perceptions of loss and gain, positive and negative.

Biases based upon over-simplification

a) Confirmation bias - the tendency to pay attention only to things that confirm our pre-existing ideas and to ignore or seek to explain away evidence that contradicts them. Two examples are the clustering illusion or the sharpshooter fallacy - the tendency to see a pattern where none exists (on social networks).
b) Contrast bias - the human mind uses comparisons and contrasts (it is used, for example, by populist politicians) in perception and evaluation.
c) Just-world hypothesis - the belief that everything balances out in the end and that the world is fundamentally arranged in a way that is fair.
d) Coherence effect - the tendency to judge information not by its accuracy or likelihood, but by the internal coherence of the story or worldview it embodies.
e) Sunk cost fallacy - the tendency to continue expending energy on something you are emotionally invested in beyond the point at which it makes sense to abandon it.

Biases born from a lack of insight:

a) Dunning-Kruger effect - the tendency of people with little or no ability in an area to greatly overestimate their ability, resulting in ignorance, breeding unwarranted confidence,
b) overconfidence effect - the strong tendency for most people – and especially experts outside their domain of expertise – to have extensive faith in their judgments and abilities.

Halpern mentions various kinds of biases and errors in thinking that emerge when using "strategies that we use to reduce the effort of thinking and remembering" (p. 91) such as biased memories (p. 89), belief bias ("interference of one's personal beliefs with the ability to reason logically") p. 228, confirmation bias "to seek out and prefer information that is consistent with our beliefs" (p. 105), thinking of prototypes when thinking "about an example of a category" (p. 170), "one-sided bias, rationalization - using "information that favors a preferred conclusion" (p. 262), and media bias (providing information that sells).

As Butler, Halpern's PhD student, mentions in her study on assessment of critical skills according to the Halpern Critical Thinking Assessment, "critical thinking is not the same contract as intelligence or cognitive ability." In their research, they found that although some biases were moderately related to cognitive ability, there was a whole group of critical thinking biases that were unrelated to cognitive ability, e.g., "outcome bias, base-rate neglect, 'less is more' effects, affect bias, omission bias, my-side bias" (Butler, 2012).

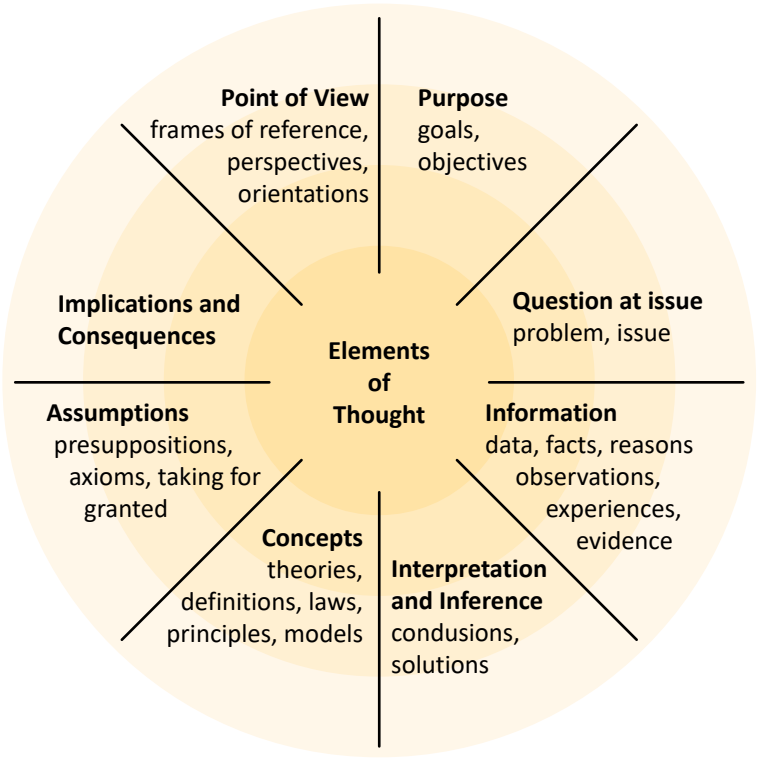
That means that higher education aiming at developing knowledge and cognitive skills is insufficient to avoid biased thinking. To overcome bias in thinking, it is necessary to train critical thinking skills, e.g., practice at generating non-typical examples, using reasoning instead of rationalization, asking if authors of a media report or book are biased, etc. Halpern's theory suggests that assessment instruments and practical instructions on how to do it might be of massive assistance to higher education teachers.

Some theories of critical thinking are based on a set of skills, such as analysis, inference, interpretation, explanation, logical, criterial, etc. (Ennis,1962; Facione, 2006). Others, e.g., Natale and Ricci (2006), argue that the ability to understand detailed and complex views can be provided by the critical thinking process and therefore critical thinking is not just a set of skills. It consists of several mental activities. Those are described as a complex process which involves a range of skills and attitudes, as follows:

- Identifying other people's positions, arguments and conclusions,
- Evaluating the evidence for alternative points of view,
- Weighing up opposing arguments and evidence fairly,
- Being able to read between lines, seeing beneath the surface, and identifying false or unjustified assumptions,
- Recognizing techniques used to make certain positions more appealing than others, such as false logic and persuasive devices,
- Reflecting on issues in a structured way, bringing logic and insight to bear,
- Drawing conclusions about whether arguments are valid and justifiable, based on good evidence and sensible assumptions,
- Presenting a point of view in a structured, clear, well-reasoned way that convinces others (In: Cottrell, 2005)

R. Paul (1984, cited in Paul & Elder, 2008) one of creators of the Foundation for Critical Thinking, defines critical thinking (Fig 1) as "unique and purposeful thinking in which the thinker systematically and habitually imposes criteria and intellectual standards upon the thinking, taking charge of the construction of thinking, guiding the construction of thinking according to CT standards and assessing the effectiveness of the thinking according to the purpose, criteria and standards".

Figure 1 The standards of the critical thinking by R. Paul



Source: Paul (1984, cited in Paul & Elder, 2008, p. 22)

According to Cottrell (2005), the focus on critical thinking is often referred to as the ability to formulate an argument. The argument can be thought of as the message that is being conveyed, whether through speech, writing, performance, or other media.

Chatfield (2018) defines argument as an attempt to persuade someone through reasoning that they should agree with a particular conclusion. Therefore, the reasoning and conclusion are closely interrelated. It may sound simple, but sometimes when we are asked why we believe that something is true, it becomes obvious to us that we haven't thought more deeply about whether what we have seen or heard is the whole story or just a small piece of it.

Critical thinking skills include the ability to work with primary and secondary literary sources appropriate to their nature. Primary sources derive directly from the subject, period, or phenomenon under investigation; secondary sources are the product of someone else's work about a particular subject, period, or phenomenon. To use good primary and secondary sources, different questions are suggested to be asked. When it comes to primary sources, we face questions as follows: *How can you be sure that this evidence is authentic? How was this evidence created (e.g. the methodology of the research), and what impact might this process have had? To what extent is this evidence representative and accurate? How relevant is this evidence to the claim (research question, hypothesis) or argument you are interested in?*

Secondary sources of evidence can share some of these questions, but it is also important to judge the expertise and limitations of the creators of the secondary data. According to Chatfield (2018), essential questions have to be raised: To what extent is this secondary source reliable and reputable? What biases and limitations might this particular source have? What is the context – how does this source fit in with other secondary sources? Is it up to date? Have its findings been

replicated elsewhere? What are the authoritative or seminal works in this area? (Chatfield, 2018, as cited in Theodoulides et al., 2020).

Grix and Watkins (2010) simplify the process of resource evaluation by offering Kipling's so-called 'six honest serving-men' who ask the questions: Who, What, Where, When, Why, and How.

In a feedback survey at the end of the semester, all students (100 percent) stated that they can recognize unreliable sources of information (hoaxes, fake news, alternative media).

Identifying the range of resources available and knowing how to locate them (while knowing a few useful rules about how to evaluate what has been found) should be the most essential skills to be learned at HEIs.

Evaluation of resources is a crucial topic to be covered in every subject as the higher education environment is designed to teach the ability to sift and select sound sources and not simply amass as much information as possible or the take the first information which has been found (Grix, Watkins, 2010, p. 78).

Hans Rosling et al (2018) present ten instincts that distort our perspective and understanding of data. This can cause serious misinterpretations and finally wrong conclusions. Those that most frequently happen in our analysis are as follows:

- *Abyss instinct* to compare based on averages and extremes that distort the view from above.
- *The instinct of negativity* - for example in the year 1999, 29% of the population lived in extreme poverty. Today, only 9% do. Why are we so sad? Gradual improvement is not interesting. More news does not mean there is more suffering.
- *Straight instinct* - infinite linear growth is just our assumption; in reality there are curves that have different shapes (S, jumps, slides, etc.). Sustainability - the world population has been growing, but the population growth rate for children under 15 years has not kept up with the growth rate for adults, for example due to ever-increasing life expectancies.
- *Fear Instinct* - Fear vs. reality. Regulations are often made of fear, not based on research, studies, or facts. Bude & Spengler in their book *Society of Fear* (2019) show that fear or anxieties do not arise from having oppositions, but rather from the endless number of facts and information that we have to face, process, and choose from (according to Theodoulides et al., 2020).
- *Size instinct* - The 80:20 principle, calculation of proportions expressed by number of items per head. The ethical dilemma of resource scarcity: focusing more on community support and awareness rather than investing in more resources to equip patients.
- *Generalization instinct* - Question categories. Let us look for differences in groups, similarities, and differences between groups. Beware of most. Do not treat other people as fools.
- *Fate Instinct* - Many things (including people, countries, religions, and cultures) seem unchanged because they change slowly. It is important to follow slow improvements, update your knowledge, and collect examples of cultural transformation.
- *One-sided perspective Instinct* – to avoid it, it is important to test one's ideas, let people disagree. The numbers are important, but not everything, so it is necessary to accept complexity, combine ideas, find compromise, be aware of simple ideas and simple solutions.
- *Blame instinct* - Instead of looking for a 'scapegoat' – some bad guys or heroes, we have to learn to look for causes and systems. The illusion of urgency – although it seems that we have to make an immediate decision, this is not true. Insist on data and consider drastic actions with caution.

Critically thinking people can see the *"bigger picture"* - the network interrelations among the various actors and how they influence the people's actions. This metaphor used by Theodoulides et

al (2018, 2019) and it can be also implemented in the deeper understanding of any complex topic or problem. The original concept of the 'big picture' can be described as a complex organizational ecosystem. It examines all related players and factors to have a clear understanding of what their tasks, roles, and contributions within the system (inside and outside the organization) are. The big picture concept of an ecosystem consists of these main elements:

- *Structure, use of power, role, and interests of different stakeholders* - a network of formal and informal interconnections between stakeholders.
- *Resources, processes, and infrastructure*, which include all used tangible and intangible resources, core technology, tasks, primary logistics for the venture, vital elements of operations, value chain, and supply chain.
- *Culture*, the subsystem including relations, values, behavior, standards, procedures, and strategies.
- *People*, their feelings, expectations, skills, and attitudes.
- *Overall performance and its assessment, and evaluation of outputs,* a set of agreed goals and measures, strategies, and plans.

In order not to slip into - criticizing instead of thinking critically, critical thinking processes must include the ability to question one's own and others' views and to develop group/team relations, i.e., to show interest in forming relationships throughout raising open and causative questions which enhance interactions in debate. Relations are based on trust, respect, and equivalence. Humor is used sensitively with no signal towards undermining someone. It also measures an ability to reflect their own view and also a willingness to change or modify their previous opinion, which might lead towards better team results.

The atmosphere in class becomes an important element for open discussions. From a survey conducted in 2019, 45.7% of students stated they are afraid to say something inappropriate in front of their classmates which might be embarrassing. Additionally, 32.8% of them find that if their group is too big, they are not confident to say something relevant (Theodoulides et al., 2020).

Creating a pleasant atmosphere and building good relations can be challenging for students as well as teachers in online discussions. During the almost two years of education being conducted online, there were various trainings and workshops offered for free to advise teachers how to organize and manage fruitful discussions in a virtual environment.

In higher education, teachers and students work with data and figures obtained from secondary sources. Statistics are a good example of a resource which is widely available online but must be used carefully and meaningfully. Teachers often raise a key question to their students: *How should we understand graphs and how do we interpret figures?*

Statistics are a key source for research in many disciplines and need to be used with extra care and thought. Collecting, analyzing, and making good judgments upon the statistics takes a lot of time and effort. The fundamental questions need to be asked: *Who collected the data? Why and/or for whom are they collected? When were the data collected? What methodology was implemented?*

As Tim Harford (2020) tries to convince us in his book *How to Make the World Add Up*, statistics and data are helping us make the right decision, though reality often surprises us, negatively. In everyday life, we take accurate and systematically collected numbers for granted. However, statistical cynicism, which can be used in the spreading of various lies, for example during the COVID-19 pandemic, has proved to be very dangerous (Harford, 2020, p. 19).

In many circumstances, the statistics, online or not, are commercial information, and that must be considered for other purposes. This can be even more difficult when working with international data. As Grix and Watkins (2010) stated, who is collecting the data is usually clear, but the matter of

why they are doing it can often lead to all sorts of questions about politics, hidden governmental agendas, and/or any number of biases.

Several authors defining critical thinking are concerned with achieving this kind of thinking among scholars. It is true that development of critical thinking in the education environment has become highly researched and discussed. The study of critical thinking continues to stimulate interest among academics and researchers, also within the organizational environment.

Some authors underline the evaluating and assessing functions of critical thinking as a crucial component of any mental process (Petress, 1984; Cottrell, 2005). Critical thinking calls for a persistent effort to examine any belief or supposed form of knowledge in the light of the evidence that supports it and the further conclusions to which it tends. It also generally requires an ability to recognize problems, to find workable means for meeting those problems, to gather and marshal pertinent information, to recognize unstated assumptions and values, to comprehend and use language with accuracy, clarity, and discrimination, to interpret data, to appraise evidence and evaluate arguments, to recognize the existence (or non-existence) of logical relationships between propositions, to draw warranted conclusions and generalizations, to test the conclusions and generalizations at which one arrives, to reconstruct one's patterns of beliefs on the basis of wider experience and to render accurate judgments about specific things and qualities in everyday life.

Moreover, the debate about whether these skills are general, or they are specific and content–dependent, impacted the research strategy in a significant extent. The main criticism of general courses on critical thinking arises from the difficulty in achieving the transfer of skills learned in other situations, contexts, or domains. Another major difficulty inherent to programs designed to teaching critical thinking is how to organize the teaching so that what has been learnt can be applied beyond the learning situation, in other contexts or in other situations (Nieto, Saiz, 2008).

Halpern (1996, 1998) proposes a model which can increase the probability of skills that have been learned also being applied outside the classroom, in real life. Her model consists of four components which address **what** to teach to improve CT and **how** to organize teaching so that what is taught is really learned. Halpern's approach (1998, 2003, 2006) can be understood as a kind of strategy for teaching and assessing CT, the steps being:

1) instruction and practice of the specific CT skills,
2) disposition to engage in a difficult type of thinking and its learning (distinguish between the capacity for thinking critically and the disposition to apply such skills),
3) promote transfer (not only being able to understand and use those skills or strategies but also be able to use them in new situations),
4) develop meta–cognition (facing several issues in order to convert implicit cognitive processes into explicit ones). This model has been modified and applied in our research methodology, which is presented in more detail in part 3.2.

Argumentation fallacies are common errors in reasoning that undermine the logic of our argument. Fallacies can be either illegitimate arguments or irrelevant points and are often identified because they lack evidence that supports their claim. In order to develop critical thinking, it is crucial to avoid the common fallacies in our own arguments and watch for them in the arguments of others. It is important to know them so that they can be spotted right away. This is essential because they can be used to spread fake news and half-truths; therefore, recognizing them will help us in our search for credible resources. The most frequent argumentation fallacies were explained and practiced with the students, as follows:

Ad hominem fallacy

- Definition: Insulting someone/a group of people or prescribing certain attributes to a certain group of people.
- Critical thinking question: *Is this objective? Why would this affect the validity of their claim if it's logical and supported by evidence? Does this move the focus of the debate away from the real issue?*

The straw man fallacy

- Definition: One party of a debate misrepresents what the other party of the debate said in order to attack the first party easier.

The ignorance fallacy

- Definition: Claiming that because something has not been proven, it is not happening/does not exist OR claiming that because something has not been disproven, it is happening/does exist.
- Critical thinking questions: *Can we make a conclusion based solely on the fact that something is not proven? Don't we need evidence for every conclusion that we make?*

The false dilemma

- Definition: The author makes it seem as if the world were black and white and is making us choose a between a limited number of solutions.
- Critical thinking question: *Is this solution that the author proposes the only way to go? Aren't there more solutions to the problem? Isn't the author over-simplifying reality?*

The false cause

- Definition: The author wrongly identifies the cause of something.
- Critical thinking questions: *What evidence do we have to make a conclusion? What is the cause? Is it a correlation or causation? Correlation = 2 things happen at the same time; causation = thing 1 causes thing 2.*

Generalization

- Definition: This is probably the most frequent fallacy. It consists of claiming something which might be true, but not for everyone.
- Critical thinking questions: *Who does 'people' refer to? Does this really apply to everyone? Is there not even 1 person who does the opposite? How do we know there is not such a person?*

(Source: Theodoulides et al., 2020)

Paul (2005) stated that critical thinking is unique and purposeful thinking in which thinkers systematically impose purposes, criteria and intellectual standards, and assess their thinking, taking charge of the construction of thinking, and assessing the effectiveness of their thinking according to those purposes, criteria and standards.

As critical thinking is a social process, its assessment should also be a social process involving a multiplicity of experiences, contributions and perceptions (Brookfield, 1997). Accurate assessment requires an informed understanding of the phenomenon being studied. Since critical thinking is context and person specific, the setting up some criteria makes the assessment process standardized, objective and transferable to any purpose. Brookfield's assessment assumptions have been applied in the research methodology, and those are as follows:

- "critical thinking can be assessed only in specific contexts (studying the dimension of action: what students do as well what they say is crucial),
- critical thinking can be assessed by other peers, or leaners themselves,
- assessment of CT should allow learners to demonstrate and justify their own engagement in critical thinking" (Brookfield, 1997, p. 19 – 20).

Our thinking largely determines the quality of our work, learning, and life. Critical thinking ought to become an everyday activity, as it empowers people and gives them freedom. Therefore, it is a new life philosophy, a new way of thinking and also living.

The concept of critical thinking is too complex to be limited to just one defined construct. From all the mentioned definitions we can summarize that the condition of critical thinking encourages the individual to explore and investigate assumptions, biases, and also an ability to review the arguments and propositions of decision makers for their applicability to the various problems and situations.

According to Halpern (1998), to engage appropriately in critical thinking first requires a certain attitude toward critical thinking and analysis. She includes a positive view of critical thinking and a willingness to engage in and commit some effort to the work required to develop this skill. To be willing to shift from teaching content to teaching students how to become critical thinkers and then to be able to put it into practice can be a difficult task. Students need to be challenged to debate – justifying and arguing – why they possess some beliefs through a process of self – reflection.

Understanding critical thinking is essential for the development of transversal competences, which highlights the urgent need to make crucial changes in current teaching and learning. In recent decades the concept of educating students to think critically has been continuously mentioned in educational reports, government policies and it constitutes a fundamental element in almost each curriculum or study program. Universities are increasingly more aware of the need to equip their students not only with content-specific knowledge, but above all to lead them to become independent thinkers, capable of thinking comprehensively in different dimensions (Flores et al., 2012).

On the other hand, the reality of introducing the process of critical thinking into teaching in several countries, including Slovakia, lags behind. The insufficiency of the Slovak school system in this area has been confirmed by its Ministry of Education, reporting that Slovak students are not well prepared for the present and the future. Specifically, they have difficulty working independently, discussing, thinking, formulating their own opinion, making decisions and taking responsibility for them (Vančo et al., 2016). All of these skills are part of the complex skill of critical thinking. This has been confirmed by several research studies. One research study examined the critical thinking skills of 116 Slovak university students of out-of-school care pedagogy (Kosturková, 2014). The respondents achieved an average score of 41.8, which is a very low score compared to the maximum of 80, as well as compared to students from the Czech Republic - 47.5 or from Great Britain - 61.4 (Kosturková, 2014). The results of the research showed that the students were not able to classify and analyze the acquired knowledge in order to draw relevant conclusions. The inability of graduates to identify and solve problems is related to their limited ability to perceive reality, a low level of critical thinking, which can be reflected in their wrong decisions and the ability to justify their decisions (Theodoulides, Niklová, Kormancová, Liptáková, Haviar,2021).

However, the methodology, training, learning outcomes and results of all efforts to remedy this have still not been satisfactorily implemented and achieved in Slovak universities. Despite the challenge to develop critical thinking and transversal competences, most university teaching is content based, based on the acceptance of presented and generally accepted knowledge. Higher

education is facing a big challenge focusing on transversal competences within which critical thinking skills will be developed. But the question that has been raised here is whether the deficiency in critical thinking skills is a result of such deficiency among the teachers? If critical thinking skills are not well-developed through the educational system, there are major consequences - the lack of transversal competence development. The research findings in Slovakia showed the shortcoming in teachers' ability to use some of essential approaches that foster critical thinking skills during teaching activities. During their interactions with students, the raising of questions and having a dialogue was rarely used by teachers (Theodoulides et al, 2021, p. 48).

And this is one of the reasons for creating this book - to clarify the essence and possibilities of the application of critical thinking processes and, thanks to them, the development of transversal competences. Now we will examine in more detail what the term critical thinking means.

Throughout this book we emphasize the role of critical thinking in developing transversal competences. The task to explore a problem, question, or situation involves the main goal of integrating all available information about an issue and this can be undertaken only when there is an intentional focus on implementing the critical thinking ability in teaching activities which are specifically designed to foster TC.

Reflection as a process of social interactions

Most scholars examining the term 'reflection' start their studies referring to the work of J. Dewey, J. Huberman, D. Schon and D. Kolb. As Moon (1999) describes, they focus on reflection in Dewey's psychological and educational approach, Huberman's concept of reflection as a tool used in the development of particular knowledge, Kolb's context of experiential learning and Schon's context of professional development. These theories constitute a fundamental base from which our focus on transversal competences has emerged.

Reflection is defined as a cognitive process in which people attempt to increase their awareness of personal experiences and therefore their ability to learn from them (Gordon Hullfish & Smith, 1961; Gray, 2007).

Reflection means thinking, self-knowledge, consideration circumstances and context. It is one of the forms of rational knowledge processing and understanding (Theodoulides et al, 2020).

Daudelin (1996) and Hall (2002) state that reflection aims to intensify cognitive elaboration of experimental data, that leads to necessary behavioral changes. This view is not accompanied by critical understanding of the mechanisms by which it shows an impact on learning outcomes, results, and behavioral choices. As we learn how to do something, we perform activities, make decisions or adjustments without 'thinking about it', or our spontaneous 'knowing-in-action' every day. Schon (1987) explains that a familiar routine may produce unexpected results, errors, or even usual actions produce usual outcomes, or we can find something odd because for some reason, we have begun to look at them in a new way. Such a pattern of inquiry supposes a process of reflection, which can be perform intentionally or by purposeful guidance in teaching.

Dualism in reflection processes has been identified by Anseel, Lievens and Schollaert (2009). They suggest that reflection is a dual process model of information processing and in-depth analysis and elaboration of complex data, influences learning and behavioral outcomes. That has been further advanced as reflection interventions, which may be instrumental in helping students to switch their mode of knowledge (data or information) processing from automatic to conscious, leading to better learning from experience and thus enhance their performance (Theodoulides et al., 2020).

Reflection opens the door for effective information flow and interactions which are essential to build good relations based on trust.

Currently, a paradigm shift is slowly occurring in the teaching process, as emphasis is being placed on self-knowledge, self-reflection. Of course, it concerns not only learners (students), but also the teachers themselves. It applies to everyone who enters the teaching process. According to J. Moon, *"Reflection is a form of mental processing that we use when we expect to accomplish a goal or achieve some expected result. We use it to better understand relatively complicated or unstructured thoughts. Reflection is largely based on re- processing of knowledge, understanding, or emotions, which we have..."* (Moon, 1999, 2004).

Brookfield (2017) explains that his reflective model is a teaching tool for educators. He characterizes critical reflection as a permanent and deliberate process of identifying and checking the accuracy and validity of teaching assumptions. The model focuses on both the teacher and the student, creating closer relationships and a safe and open environment for education and the learning process. In the model, he explains reflection from four perspectives, so called lens - student eyes, peer perceptions, personal experiences and theory - to help uncover and explore teaching assumptions.

To make good decisions about the ways in which learning is organized, assignments are set up, instruction is progressed, and specific classroom protocols are applied, it is necessary to know what is going on in the minds of students. The main idea behind this involves careful planning of teaching activities which includes goals, selection of suitable forms, structuring the learning process, defining the learning outcomes, setting up sufficient timelines and making the process of final assessment transparent. Hence, it is the essence of a student-centered approach, which can be briefly described as making sure that students understand: the problem statement, what they are expected to produce, how they will experience learning and what the criteria are for their assessment and evaluation. Feedback and criticism can be obtained from students through anonymous responses. A non-defensive response to anonymous feedback and to appreciate that is key. Some key questions can be asked at the end of learning activity to find out how students reflect on their learning path, e.g. *What do you think/try to look back on the past weeks and specify what did you learn? How do you know you've learned it? What do you infer that from?* W*hat made you interested in learning something new?*

Reflection and self-discovery are essential means to critically evaluate relationships in any environment, as well as the impact of the external environment.

The above approaches extend the concepts and multi-theoretical base in the analysis of social interactions, in which relations, feedback, reflection, trust and motivation play an important role. Mutual understanding and relationships between teacher and student are framed by continuous communication and exchange of information. This is an on-going social exchange which takes place during the reflection process. It comprises the individual resources, skills and capabilities of both actors that are used in all processes (processes of critical thinking and reflection) and the expected outcomes and results within the educational system.

It is necessary to realize that reflection is only the starting point, the beginning in the long-term process of a student's as well as a teacher's development. A prerequisite for reflection is the ability to realize its necessity in our further development, but also the willingness to implement it. The process of reflection (especially when just starting with reflection) can also be unpleasant, because it forces us to be honest with ourselves, to get to know ourselves, to be aware of our shortcomings, failures, but also what we need to improve. Reflection forces the students to take responsibility for how they learn and progress, but also the teachers for how they teach. Thanks to reflection, we become observers and critics of ourselves. If we realize that the process

of reflection is a mental process, we will be successful. If we do not realize this, the whole process of reflection will be useless and pointless. Therefore, it is necessary to perceive reflection as an active and conscious process, which may initially bring obstacles to the individual, e.g., student's self-reflection regarding experiences with previous teaching methods, previous teachers or the group of students to which the student belonged, but in the end it can change the student's way of thinking, change his position in the group or gain deeper knowledge.

For instance, Dawson (1996) proposes a process which can be conducted in three steps: 1. Return to experiences - recall, specify important events. 2. Connecting with feelings – with two aspects: using beneficial feelings and removing or keeping obstructive ones. 3. Evaluate the experience - this is a re-examination of the experience from the point of view of the individual's goals and knowledge. It involves the integration of new knowledge into the individual's conceptual framework.

Another view is presented by Peterson and Kolb (2017) who explain that we learn many things throughout life unconsciously, through exploration, and thus without the intervention of reflection and thought. In adults, this process slows down a bit due to fixed habits, stereotypes, skills and ingrained beliefs. Paradoxically, however, as our brain is neuroplastic and it matures, we also become capable of what we call full-fledged learning. In addition to simply perceiving and acting, we develop the capacity for critical reflection and conceptual thinking.

As Dewey (1933) stated, we begin to reflect when we are in a state of doubt or uncertainty. In such situations, we face difficulties and doubts, and we feel helpless and unable to resolve the situation. Teachers also experience similar situations in their work. We see this as key to the learning process. By solving problems, we get rid of doubts and confusion, which always appear naturally in the learning process, and therefore it is necessary to learn from them. He points to the positive role of self-reflection in the development of students' critical thinking, which should also be the role of the teaching process at higher education institutions. Through self-reflection, we also learn how to develop ourselves. Self-reflection is also a way to learn from our own experiences without needing someone to guide us or tell us something. In using the term self-reflection, we want to describe a thought process that is active and on which we concentrate. It is an activity through which a person relives previous experiences and evaluates them anew. It is a natural way of thinking. Consciously or not, we all do it with or without control (Moon, 1991).

Part 2

A comprehensive view of transversal competences in higher education: through critical thinking and reflection

Prior to designing the framework for the development of transversal competences, the research strategy and philosophy must be carefully thought out and planned. The second part of the book is devoted to the description of the preparatory, organizational, and evaluation phases of our predominantly qualitative research design. Chapter 3 describes the research objectives, data collection and data processing methodology. Our action research chosen as the most adequate research method took place in the context of real teaching of regular university courses. It consisted of several research phases and to some extent followed on from the previous long-term investigation of the development of critical thinking and reflection carried out within the framework of several projects and activities of the authors. For this reason, the content of Chapter 3 builds on these starting points, especially on the previous Chapter 2.3. The understanding of critical thinking skills and how they relate to transversal competencies is clarified in detail.

Based on the research results, in Chapter 4 we introduce a comprehensive view of transversal competences in higher education. Both chapters reflect the conceptual complexity of all four selected transversal competencies as well as the challenges faced by contemporary universities by implementing teaching aimed at developing these competences.

Chapter 3

Investigating transversal competences: action research strategy

3

To fulfill the aim of this monograph - to develop a new framework of transversal competences together with recommendations on how to support them in the university environment (in Chapter 4), an action research methodology was implemented. The goal of our action research was to find evidence for our argument that in the context of higher education it is possible to increase the level of transversal competences through processes associated with critical thinking skills and reflection within higher education. Of course, supporting the growth of transversal competences in higher education is a very complex and ambitious goal. The reason why we decided to devote efforts to proving such an argument is that (a) we consider it necessary for higher education to respond to the challenges of current societal needs and strive for the real development of transversal competences, as well as because (b) in social sciences testing tools and experiences to demonstrate the development of such complex learning constructs are still lacking.

Studying the work of Diana Halpern (1998, 2014), Richard Paul (2005), and Linda Elder (2007), as well as several studies by Stephen Brookfield (1997, 2017) showed that they all suggest the importance of setting standards for critical thinking, judgment, and evaluation. Since our team had some previous experience in measuring critical thinking parameters and critical reflection analysis, we decided to investigate the idea of interconnectivity between critical thinking, reflection and other transversal competences for the purpose of their simultaneous development. We decided to experiment with using the critical thinking measurement framework to measure other transversal competences, and also see if they could all be reflected through critical reflection analysis. We expected that the practical implementation of their connection would become a positive agent in the development of transversal competences and actually facilitate valid measurement of the state of transversal competences.

Competences are generally complex social constructs including processes and their development is a long-term process. The experts mentioned in Chapter 2 emphasized that their development does not take place in one random hour, but mainly through systematic and targeted efforts. Therefore, in Chapter 3, we describe a detailed and thoughtfully designed action research strategy and its implementation to confirm our thesis.

As critical thinking and reflection are complex social processes, the research methodology was designed in several phases, allowing a comprehensive view of how transversal competences can be systematically developed. In our qualitative research investigation, we verified a desirable level of development of students' transversal competencies through applied criteria of critical thinking and reflection.

3.1 Research philosophy, goals, strategy and methodology

Our research efforts reflect the real societal need for the development of transversal competences as well as critical thinking and reflection skills in higher education studies. Our research philosophy refers to the nature of the transversal competences presented in Chapter 1 as well as of critical thinking processes and reflection described in Chapter 2. Transversal competences have a global character; they are applicable in different contexts of personal and professional life; they respond to societal changes. They are complex as they relate to human's abilities to cope with and understand the complexity of the world and to find ways to achieve the fullest possible human well-being (Chapter 2). As Chapter 2 also describes, not only the nature of transversal competences, but also the nature of critical thinking processes is so complex that it is difficult to research their entire complexity.

Challenges in assessing twenty-first century skills lie in our lack of comprehensive understanding of the nature and development of the skills, of their multidimensionality, and of how to partition variance in behavior that is attributable to knowledge or attributable to a skill. Despite this somewhat skeptical view, in our research we want to look more closely at what may happen with any transversal competence if teachers are aware of current societal problems and respond to them via new, competence-focused methods.

In the wider research context, we have devoted ourselves to finding answers to the following **research questions**:

1. Which transversal competences reflect the current era of digitization and innovation?
2. Is there any interconnectivity between the development of critical and reflective thinking skills and transversal competences?
3. How can transversal competences be fostered in the higher education environment?

The goal of our research in 2021 and 2022 was to find evidence that, in the context of higher education, it is possible to increase the level of transversal competences through processes of critical thinking and reflection, for which various development and measurement methodologies have already been developed (verified personally by one of the authors of this monograph).

The originality of our research lies in the thesis that within teaching processes requiring critical thinking and reflection skills, it would be possible to gradually develop also specific transversal competences (four of characterized in Chapter 2.3 - selected according to the preferences of societal authorities and documents listed in chapter 1). Of course, an important requirement for all educational goals is monitoring their achievement. Therefore, even in the case of the four transversal competences selected by us, it was necessary to propose not only a methodology for their development, but also a valid measurement tool. We hypothesized that if transversal competences are interlinked to critical thinking and reflection, it might be possible to apply ways of measuring critical thinking standards and critical reflection analysis to measure and reflect transversal competences as well.

Our **research strategy** was based upon an extensive study of relevant theories and approaches (Chapters 1 and 2), setting up research assumptions and the design of social processes of critical thinking and reflection opening the door for developing the transversal competences. The research strategy emphasizes the need of complex understanding of the standards of critical thinking, the role of critical thinking in specific TC, how they can be assessed and evaluated. It also examines the deeper relations between critical thinking, reflection and transversal competences with the main research aim to propose four key transversal competences as a framework which reflects the current global and societal challenges, i.e., a) digital, media and information literacy, b) collaborative problem solving, c) sustainability and diversity awareness and d) learning and continuity to learn (in Chapter 4). This educational change does not happen overnight, because it is not one significant emotional event; rather it is "a series of experiences which teach critical thinking" (Karjalainen & Nissilä, 2011, pp. 594 and ff.) For this reason, in our research, we decided to observe the process of development of transversal and critical thinking development over a sufficiently long period of time, specifically during two semesters of the academic year 2021/2022.

So before the action research tool place**,** it was necessary to prepare a curriculum and teaching strategy for two university courses, applying the principles of the development of transversal competences via critical thinking processes, as the research was focused precisely on the results of this innovative way of teaching. However, in order to draw conclusions about their appropriateness or inappropriateness it is necessary to monitor, measure, regularly evaluate and reflect these changes.

Of course, it can be assumed that transversal competences as complex and overlapping social constructs will need complex strategies to investigate them, which requires the time and effort of a team of researchers. Although we have been aware of these demanding research expectations since the beginning of our research, we nevertheless decided to enter it and thus take the first step towards investigating if it is possible to change the educational paradigm in our higher education institution via education oriented on transversal competences and critical thinking. We designed transformational processes in two subsequent university subjects oriented towards these goals and implemented them in real teaching. Teaching in these courses took place in accordance with the requirements placed on the processes of critical thinking and reflection (according to Chapters 1 and 2). The entire process of implementing these changes in regular university courses was systematically monitored using action research methods.

To be able to tackle real-world needs - described in Chapter 1 – "in participatory, collaborative, and cyclical ways in order to produce both knowledge and action" we decided to use the **action research methodology** (O'Leary, 2004). It is commonly considered adequate for social sciences research, especially when the situation is "too ambiguous to frame a precise research question. Mostly, though, in accordance with its principles, it is chosen when circumstances require flexibility, the involvement of the people in the research, or change must take place quickly or holistically" (O'Brien, 2001, p. 4). When it comes to research in the context of higher education institutions, which intend to gradually implement changes in their education, action research is particularly appropriate. Just as the teaching of individual courses in the curriculum is repeated cyclically, the possibility of improving is also repeated through the changes and innovations made.

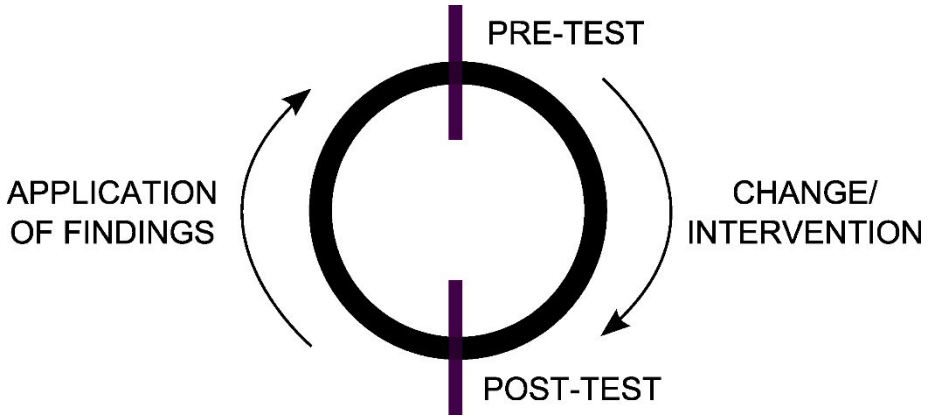
Based on these characteristics of action research, we considered it to be suitable for discovering the hitherto unexplored relationship between transversal competences and the skills of critical thinking and reflection, and thus their development in the higher education context.

Action research as a problem-solving process consists of four steps (O'Brien, 2001, p. 3): (a) planning based on problem diagnosis - see Chapter 1 and 2, (b) action based on consideration of alternatives (described in this Chapter 3), (c) observation, and (d) evaluation and reflection. All these steps (actually) took place in our action research.

Action research is a type of research activity that meets five characteristics:

- Its goal is change or development – In our research, the research focuses on the need to design a way of effective development of transversal competences through regular school courses.
- It is accomplished by a teacher who strives to identify a pedagogical problem and solve it through the application of research based on scientific procedures. - In our research, one of the research team members was a teacher in the groups where the research was carried out.
- It is based on the real needs of a specific environment - In our research, the research was carried out at one higher education institution with the need of transversal competences development.
- Research participants are represented by insiders (actors from the school environment) - in our research: 60 students studying in both HE courses.
- Its process is a closed cycle, consisting of four inevitable phases (Fig 2):
  1) pre-test, first measurement, status mapping – In our research, the first measurements was accomplished in September 2021.
  2) Intervention, usually longer-term, with clear goals, mostly of an educational or socializing nature.
  3) post-test, the second measurement, verification of the effectiveness of the intervention – In our research, there were several measurements – the 2nd in November and the 3rd in December 2021, the 4th in May 2022.
  4) implementation, including evaluation of the benefits by comparing the pretest and posttest with a proposal for corrections in the implemented intervention – In our research, evaluation and reflection was accomplished by students (in December 2021 and May 2022) as well as by the research team (May 2022).

Figure 2 The cycle of action research



Source: PF UMB (2019).

Due to the complexity of the research objective and to the qualitative design of the research, the research team consisted of three researchers - teachers from different faculties of the Matej Bel University. One of them - the initiator of the research project, who had several years of experience in developing critical thinking and applying the concept of Critical Reflection Analysis, enabled the other two researchers to participate in her teaching, to observe the lessons and then individually analyze the audio-recorded data.

The research team members acted in a role of critical friends, offering multiple perspectives and points of view on a situation, and helping to decide which parts of our analysis or response are valid and which require re-examination (Brookfield, 2017). Colleagues were invited to observe what the teacher is doing or engage in critical conversations with them, helping to identify aspects of his practice that are usually hidden. Through another lens, he/she talks about the fact that personal learning experiences are intertwined with teaching practice. Personal experiences usually move us more than the findings of a research study and remind us of what is intrinsically important in learning. The most intensive cooperation of the entire research team took place in the phase of validation and objectification of the research findings: all three researchers shared their personal evaluation of the research data, compared them with each other and created the resulting matrix of quantitative results

The research sample consisted of students of two regular courses International Management and Management of Innovation in their master's studies at the Faculty of Economics, Matej Bel University (N=60). However, due to the complications caused by the ongoing COVID-19 pandemic, not all students in this sample participated in all activities within the two courses observed by the researchers.

An essential part of our research strategy was elaboration of an **Assessment Framework** (Tab 5) based upon the critical thinking criteria, piloted, and validated in previous research (Theodoulides et al, 2020, Theodoulides & Nafoussi, 2021, etc.). They have been formulated in such a way that they integrate most of the skills and abilities which are essential for the proposed transversal competences, i.e., digital, media and information literacy, collaborative problem – solving, sustainability and diversity awareness and learning and continuing to learn. The evaluators assess the level of each of the eight criteria on a scale from 1 to 5 (1 - the lowest level of criterion fulfillment, 5 - the highest level of criterion fulfillment), which means that the maximum number of points for all criteria is 40 (=100%). The details of this Framework scale are described in Appendix A.

Table 5 The Assessment Framework based upon the critical thinking criteria

	Criterion	Rationale
1.	**Information, data and media analysis and reasoning**	The criterion describes how well a student can analyze information and, most importantly, identify fallacies within text, find logical flaws, and understand author's point of view or even manipulation in relation to whether the source of information is relevant and trustworthy. The fundamental prerequisite for this criterion is a natural proclivity to question data and information rather than accepting it as true.
2.	**Structural analysis**	The criterion describes understanding deeper causes and roots of a situation and problem within a society. Students are able break words down into their basic parts to understand their meaning. The process involves textual analysis since knowledge of a few word parts can give clues to the meanings of many words. It is also an ability of politicizing notions of culture, knowledge and power as well as developing understanding the source, information and media manipulation.
3.	**Open mindedness and empathy**	The criterion describes understanding and accepting the existence of other viewpoints and a willingness to understand others' worldviews and how these came about. We do not necessarily expect students to accept all other opinions as valid, but we do expect them to reflect on their origins instead of attacking the personal characteristics of those who hold them. The criterion also includes the skill of engaging in debate and modifying one's own opinion, if necessary, and thus contributing to a pleasant and constructive atmosphere.
4.	**Making judgements upon arguments (argumentation skills)**	Synthetize and make connections between information and arguments. Students can construct a strong argument, their ability to formulate coherent and factual arguments to reflect the participants' viewpoints. This criterion also describes the effective use of facts to support these claims and the use of counter arguments to further conclusions and bolster one's argument. Students are aware and recognize argumentation fallacies during discussion.
5.	**Problem solving**	Students can identify a non-familiar problem and clearly identify the core of that problem. Ability to suggest a solution (in both conventional and innovative ways), evaluate its contribution to a problem, suggest benefits and potential side-effects of a chosen solution. The criterion also describes how well students can identify and ask questions that lead to better solutions. Also, the ability to break these solutions down into steps and outline a roadmap or further steps for their implementation.

6.	**Praxis**	Student can recognize the importance of cross-sectoral and multi-actor networks within the specific eco-system. He/she attempts to have a dialogue with various actors in relation to issues and participates actively and sensibly in roles and responsibilities one encounters in one's adult life. He/she provides specific evidence of their personal involvement in societal events, actions, and voluntary contributions in the external environment.
7.	**Bias reflection**	Recognizing cognitive biases, understanding, and reflecting on one's own biases, identifying their origin (prejudice and stereotypes, cultural dimensions, religion and geographic influence, personal and professional development). The criterion also involves being able to reflect on the consequences of such biases as well as the willingness to minimize negative biases and their effects.
8.	**Questioning their own and others' views and developing group/team relations**	The criterion describes the student's interest in forming relationships through raising open and causative questions which enhance interactions in debate. Relations are based on trust, respect, and equivalence. Humor is used sensitively with no sign of undermining someone else. Students also show the ability to reflect their own's view and willingness to change or modify their previous opinion which might lead towards better team results.

Source: authors

To reflect on the acquired competences, the Critical reflection analysis was used, which was validated and verified in previous research studies (see especially the works by Theodoulides - more details in Chapter 3.2).

The timeline of our action research as well as the structure of research samples involved in individual procedures and activities is presented below (also in a brief version in Table 6):

First observation and assessment (September 28 – 30, 2021)

- *Research sample and procedure*: 12 groups, each group 4 – 6 members, total number of participating students n=59; videos and recordings, group discussion and analysis of the recordings.
- *Inputs:* teacher's instructions on CPS, theoretical readings and lecture, material about Sustainable Development Goals (SDGs),
- *Objectives:* based upon the secondary resources to be able to analyze, assess the specific SDG example and its relevance to the Agenda 2030.
- *Processes:* individual search, sharing the understanding within the group discussion, group decision – making and problem – solving.

- *Outputs:* individual analysis of the examples of specific SDG (59), search for the suitable resources (132), the 'best example' of SDG (13) with reasoning.
- *Learning outcomes:* justifying own's search and providing evidence, practicing argumentation based upon the facts and relevant data; improving students' skills in debating.
- *Expected impacts:* reflection on the actions which lead towards sustainability, the awareness of the importance of relevant sources of information.

Second observation and assessment (November 15 – 17, 2021)

- *Research sample and procedure:* 12 groups consisting of 4 – 6 students – n=58; online discussions, and recordings via MS Teams, group work and analysis.
- *Inputs*: lecture on interculture dimensions, literature and readings, classification of cognitive biases, two storytelling examples from Eduma's database called 'Živá knižnica', search of the various sources of hoaxes, articles on conspiracy theories, blogs etc. on various social media.
- *Objectives*: to share different points on how we perceive the topics of diversity (migration, multiculturalism) and 'otherness' (LGBT, Roma), recognize some stereotypes and prejudice, thus build awareness of our cognitive biases and work on their elimination.
- *Processes*: online group discussion on various scenarios related to diversity issues and conduct a problem-solving activity in a structured way.
- *Outputs*: new knowledge about sustainability development goals, solution to scenarios of situations and submission of the group reflection and written 'message' to a person who does not represent the majority group.
- *Learning outcomes:* new knowledge about diversity, recognizing own's cognitive biases.
- *Expected impacts*: change or at least to re-consider our prejudices, stereotypes or views often formed by traditions, societal narratives and/or lack of experience, data, information.

Third assessment and evaluation (December 15 – 30, 2021)

- *Research sample and procedure:* n=56 students, analysis of an essay assignments.
- *Inputs:* lectures, theories, articles, surveys, statistical reports, business case studies.
- *Objectives:* to improve study skills, deepen the knowledge, recognize own cognitive distortions, improve a set of critical thinking skills in areas that shape: a) knowledge – to establish what you have read and learned, b) comprehension - better understand the text you read and helps you to find the deeper meaning of things and to express and explain them accurately, c) understand the problem – testing the ability to fully understand the problem and come up with the right answer.
- *Processes:* analyzing and developing strong arguments, synthetizing the knowledge and information into meaningful conclusions.
- *Outputs:* essays on various topics related to globalization, sustainability, diversity, multinationals

- *Learning outcomes:* to distinguish fallacies in arguments and misconceptions independently and accurately, reflecting the various points of views, understanding current social, political, economic and environmental challenges.
- *Expected impacts*: Improved thinking and writing – writing is essentially a reflection of thoughts and 'the better we can think, the better we will write'.

Student's feedback and reflection on the course (December 17, 2021)

- *Research sample and procedure:* online questionnaire, all the students in the sample N=60.
- *Inputs:* completion of all assignments, study material, lectures, and readings.
- *Objectives:* to obtain the individual students' feedback and reflection on their learning, the content of the subject, used methods and techniques.
- *Processes:* close and open–ended questions for evaluation.
- *Outputs:* overall course evaluation.
- *Learning outcomes:* students' feedback and students' self–reflection on what and how they studied and learned.
- *Expected impacts*: development of new knowledge, improvement in some skills and forming new attitudes.

Fourth assessment and evaluation (May 5, 2022)

- *Research sample and procedure:* n=44 students, 9 innovative projects, groupwork.
- *Inputs:* theory, practical examples and experience provided by experts from practice, mentoring and coaching.
- *Objectives:* to create and test group innovative ideas which fulfilled the key criteria – innovation, sustainability.
- *Processes:* facilitation and coaching of the group work, self–guided team with delegation of the tasks among the team members, self–assessment.
- *Outputs:* presentations of the innovative ideas/start-up to different stakeholders, Action learning project reports.
- *Learning outcomes:* successful completion and presentation of innovative projects, feedback and awards given by experts.
- *Expected impacts*: gained practical experience and challenged personal as well as group development.

Table 6 Elements and processes in two university courses focused on critical thinking and transversal skills monitored by action research (academic year 2021/2022)

	1st observation & assessment, September 2021	**2nd observation & assessment, November 2021**	**3rd assessment and evaluation, December 2022**	**Feedback and reflection, December 2022**	**4th assessment & evaluation, May 2022**
Research sample N=60	n=59 students	n=58 students	n=56 students	n=60 students	n=44 students
Research procedure	group discussions about sustainability recorded, analyzed, coded	Online group discussions, group work, analysis of recordings, coded	Students writing argumentation essays, analysis of essays	Online questionnaires analysis	Group project work, analysis, couching by 3, InnoLab evaluation
Inputs	Teacher's instructions, case studies, theoretical studies, lectures	Lectures, theoretical and empirical studies, case studies	Lectures, theoretical & case studies, statistical reports, surveys	Lectures, studies	Theoretical and case studies, mentoring & coaching, evaluation expertise
Objectives	Be able to: analyse, assess, think critically, use online resources, social media properly	Be able to: share own viewpoints, awareness of stereotypes, biases – to eliminate them	Learn to learn& argumentation skill, critical thinking skills (Bloom's higher thinking skills)	Be able to give feedback and reflection on learning	Be able to create and test group innovation (criteria: originality, ethics, sustainability)
Processes	Individual study and search, sharing in discussion –group reflection, group decision making, problem solving	Online group discussion - problem-solving	Analysis and development of written arguments, synthesis -coming to conclusions	Assessment and evaluation, self- reflections, group reflections, giving feedback	Facilitation & coaching of groupwork, personal and group feedback
Outputs	Individual analyses – reasoning, evaluation, choice	Solutions to scenarios – generated ideas, group reflections, written messages	Essays (on globalizations, sustainability, diversity, multiculturality)	Overall course evaluation	Innovative start-ups, reports, their presentations of group project

Learning outcomes	Knowledge about SDGs, ability to justify one's search, providing evidence, argumentation and debating skills, critical thinking	Knowledge about diversity issues, recognition of own's cognitive biases	Ability to distinguish fallacies, to reflect various points of view, understanding societal challenges	Knowledge about critical thinking processes, ability to give feedback, self-reflection	Abilities to design a start-up, its justification, presentation skills, feedback skills
Expected long-term outcomes	Reflection skills (area: sustainability), awareness of relevancy of resources	Change/ re-consideration of prejudices, stereotypes	Improved critical thinking and writing reflections	Knowledge, developed transversal skills, new attitudes (together – new competences)	Ability to apply in practice, personal transversal skills transformation, group collaboration development

Source: authors

Last but not least, we must summarize our ways of ensuring the **validity, reliability** and **objectivity** of our research in relation to the awareness of the **limits of** our **research.**

We were aware that by implementing action research as a predominantly qualitative research procedure, we would not be able to ensure the validity of our research through a large sample or random sampling. We tried to solve this by triangulating (1) research methods used in action our research (analyses of recordings of discussions, of written works, of reflections and feedback), (2) three researchers forming an interdisciplinary research team (management, education, IT), (3) triple verification of results (observation, recordings and discussions and their quantitative measurements, feedback, reflection). The effort for ensuring reliability was manifested in consistent quantified measurements of the fulfillment of the critical thinking criteria (according to the verified Critical Reflection Analysis), as well as in the quantified evaluation scale created by three independent experts. The objectivity consisted in the fact that (1) the methodological procedure of our action research was based on the previous theories and experiences of other researchers, (2) two researchers from other scientific fields (than the teacher researcher), who did not know the given groups of students before, entered the evaluation from the perspective of other sciences and their research and theories.

The limits of the research undoubtedly include the fact that both courses, monitored by our action research, were implemented in the changing conditions of the pandemic COVID-19 and thus influenced methods of contact teaching with students. The students started with face-to-face classes for the first two weeks, then moved to the online space. There were long periods in which teaching through Microsoft Teams was understood as a substitutional method, and thus not as a preferred method of teaching full-time students. The long wait for a return to normality as well as personal restrictions related to the pandemic also likely affected the extent to which students could develop their new competences and skills.

3.2 Critical Reflection Analysis – theory, application and discussion

Reflection is an integral part of each closing cycle in action research, both from the point of view of the teacher-researcher and from the students. Reflective practice included in action research is based on the cycle of registering procedures and results and striving for change. In our research, students were expected to participate in critical reflection. Now we will describe in detail what Critical Reflection Analysis is and how we used it in our action research.

Our predominantly qualitative research methodology presented was designed as an integration of Critical Reflection Analysis and observation of students' self-involvement in developing their specific transversal competences through the acquisition of the critical thinking skills during two university courses. Even though predominantly a qualitative research design was used, the qualitatively analyzed results (in Chapter 4) were supplemented with a partial quantitative evaluation of the developed competence levels.

In our suggested assessment criteria, presented in Table 5, the ability to reflect is an inevitable part of several criteria, for instance '**digital, media and information literacy'** in which reflection helps to identify fallacies within text, find logical flaws, and understand the author's point of view, or even manipulation, in relation to whether the source of information is relevant and trustworthy. In another criterion,**bias reflection'**, defined as the ability to reflect on one's own biases, identifying their origin (prejudice and stereotypes, cultural dimensions, religion and geographic influence, personal and professional development), such reflection contributes to minimizing wrong and misleading judgments, which very often lead towards bad decisions. This requires deeper understanding of what reflection and self-reflection is and the ability to perform them.

A critically thinking teacher encourages his/her students to have active doubts rather than passive acceptance. He/she tries to minimize the influence of prejudice and bias in the rational evaluation of evidence, builds judgments on evidence, can thus consider alternative explanations.

A critical and reflective teacher creates a learning environment for students in which they also develop the ability to a) take into the perspective of others, b) be self-aware and realize the potential of possible bias, c) adapt to new circumstances and at the same time demonstrate a certain skepticism, manifested by doubts in a case of lack of evidence, d) consider alternatives, e) draw conclusions on the basis of carefully examined evidence, f) distinguish between the evidence and the person bringing the evidence (Ruisel, 2004).

Halpern (1998) initially proposed an evidence-based, multifaceted model of critical thinking as the basis of a critical thinking curriculum. The model depicted not only the skills and methods of critical thinking, but also the inclination to apply those skills, the ability to identify appropriate opportunities for critical thinking, and the ability to monitor progress and quality of thinking.

She suggests that a critical thinker displays these characteristics:

- a willingness to engage in and persist at a complex task;
- habitual use of plans and the suppression of impulsive activity;
- flexibility or open-mindedness;
- willingness to abandon nonproductive strategies (trying to self-correct them; and
- an awareness of the social realities that need to be overcome (Halpern 1998, p. 452).

These include an ability to analyze or argue, decision-making and problem-solving skills, an ability to generate alternative explanations or points of view, and then sensibly judge them, and an ability

to test hypotheses. A key aspect is also students' ability to transfer knowledge, skills, patterns or analogies appropriately from the representations of past experience stored in their memory to the current problem.

How can we know whether our students have these characteristics, or whether they can develop the skills and abilities of critical thinking? How can we monitor progress or improvement of some skill? Moreover, different critical thinking skills, for instance argumentation skills, recognizing fallacies and biases or identifying problems or dilemmas can be gradually fostered throughout several activities and assignments. Monitoring progress was the main aim for our research strategy to achieve a qualitative shift of specific CT parameters presented in Table 5.

Halpern (1998) calls this ability metacognitive monitoring, through which the progress of any critical thinking activity can be observed, evaluated against its goal, and the teacher's efforts adjusted accordingly. She also noted that many educators do not consider these foundations of cognitive science when developing critical thinking lessons and curricula. She argued that undergraduate students demonstrate poor transferal of critical thinking skills and abilities, citing an example in which 99% of college students endorsed at least one paranormal phenomenon (in Messer and Griggs, 1989).

Halpern also suggested that many adults are not able to extend critical thinking skills to contexts outside of formal education settings. For example, most adults read horoscopes and most of them believe that they are written for their own personal situation (Lister, 1992, in Halpern, 1998).

The work of Stephen Brookfield in critical thinking and reflection has already been mentioned. He offers guidelines for conducting critically reflective research (Brookfield, 1995, 2008) as well as methodologies to assess and evaluate critical thinking among students.

The main assumptions formulated for the research conducted in academic year 2021 – 2022 reflect the current level of transversal competences in higher education as well as the urgent need to change the approach towards different learning strategies in which the two processes of critical thinking and reflection will dominate. These assumptions were formulated as follows:

a) ***developing transversal competences requires a systematic approach and a long – term focus,***
b) ***critical thinking and reflection are an inevitable part of each transversal competence needed to cope with the current challenges and***
c) ***the concept of specific transversal competences must be developed as a complex framework and through the specific contexts.***

Some other scholars have discovered the potential of critical reflection, not only as a learning tool but also as a method associated with education research (Smyth, 1999; Cunningham, 2012). This research method is embodied in three elements: critical, related to critical education or critical pedagogy (Johnson and Morison, 2010, Brookfield, 2008), reflective for reflecting on actions; and practice which describes the educator's activities in the workplace. Smyth (1999) introduce Critical Reflective Practice which consists of four steps (describing, informing, confronting, and reconstructing) as a new research method which allows the researcher to work with deep questions concerning equity, social justice and transformational education (in Cunningham, 2012).

Identification, study and finally enhancement of the transversal competences require deeper qualitative analysis. This kind of analysis produces observations, assessment and evaluation, reflection of examined processes, forming concepts, and testing the assumptions that are not possible to ascertain by statistical methods. Therefore, the research methodology has

been designed to analyze the content of transversal competences through the two processes which are inevitably intertwined.

As it was mentioned, critical thinking and reflection are social processes. In 2013, the Reflection Method had been created by two authors Theodoulides and Jahn, which aimed to observe and evaluate various processes, those being difficult to be quantifiably assessed. The results obtained have been deeply examined and the findings provided an important basis for further improvements. The processes of reflecting and formulating some improvements help to increase the quality of processes as well as individual performance. Ever since, the successful results of using this method and its potency have encouraged us to improve this method. The synthesis of several theories focused on the three core processes of learning, critical thinking and reflection brought a new dimension to the original version of this research method. Those contributed to the construction of a relatively new research method, i.e., Critical Reflective Analysis (CRA) which have been already widely used in several completed research activities (Theodoulides, 2018; Theodoulides, Kormancova, Cole, 2019; Theodoulides et al, 2020).

CRA is a method that offers the possibility to identify the key processes or parameters that can be observed, evaluated, and assessed. CRA is considered as the broad method that can be utilized and generally applied for monitoring of any social process. Its aim is to offer a solution and to provide measurements as well as the qualitative evaluation of observed phenomena which might be difficult to examine by quantitative methods only. Therefore, CRA is characterized as mainly qualitative method, but it is performed by using evaluation scales and ranges that are expressed as quantitative measures. The results obtained provide important evidence for constructive discussion and further improvements.

Critical Reflection Analysis (CRA) is a suitable method as it requires reflection in relation to past and present and helps to propose future action. Critical reflection is an extension of critical thinking. It asks us to think about our practice and ideas and then it challenges us to step back and examine our thinking by asking probing questions. It asks us to, not only delve into the past and look at the present, but importantly to speculate about the future and take necessary actions which lead to successful transformation and significant changes.

CRA is also an effective tool to establish an objective judgement on the use of strategies, resources, and actions in teaching and learning (Theodoulides et al, 2020) which make an impact on the development of transversal competences in a higher education environment. To accomplish these purposes there are some partial aims which guide the implementation of CRA in our research:

a) introduce the new research approach, which combines both assessment and evaluation procedure for the examined parameters,

b) determine the correlation between critical thinking, reflecting, and learning processes which develop complex narratives of transversal competences,

c) construct and test guidelines for a new research approach which provides a deeper and objective understanding of developing transversal competences as a system framework in any curriculum.

The original framework for CRA consists of five steps which are described as the general guidelines and specific steps. Those are as follows:

1. describing the contents
2. designing the system and/or subsystems
3. confronting key processes and formulating the assumptions

4. identifying and assessing key parameters/criteria
5. reflection, feedback and feedforward actions

(Theodoulides and Jahn, 2013; Theodoulides, 2018; Theodoulides and Kormancova, 2021).

The first step in CRA involves the gathering of data, to accumulate enough information to understand the internal and external environment of a studied topic or a case. The main methods of information collection are those which are usually used in qualitative research using case studies such as an interviewing, observation and/ or an experiment. Additionally, several reports, internal documents and financial data are also presented and examined in order to get a comprehensive understanding of the specific theory, area, topic, sector and/or segment of the studied phenomena, target group or activity.

The design of the course/system and subsystems represents the second stage of the CRA framework. Questions starting with *what?* arise to understand the co-called 'Big Picture' concept. A few different forms of reflective actions and decisions are generated in the immediate and longer term.

Stage three of the CRA, confronting key processes, is the place to deal with the information that emerges from the reflections. The questions that arise in this stage start with *how?* to identify the key processes and interactions within them. The assumptions, or the so called 'taken for granted beliefs' about the world around are examined. The assumptions give a meaning and purpose to who we are and what we do (Brookfield, 2017).

Critical thinking and reflections are used in this stage, thus providing deeper understanding of which processes are important to consider for analysis.

Stage four is related to the identified processes in the previous stage, and those parameters or criteria which are the most important for successful results within the examined processes are formed and assessed. The system and evaluated processes are influenced by several parameters, variables, and criteria. The impact of some of them is negligible, therefore the aim is to identify those which influence the processes and system significantly. In the original version of this method, presented in the earlier work by Theodoulides and Jahn (2013), the process of assessment and evaluation begins with the creation of a chart which consists of five zones and measurements from 1 to 99 and qualitative evaluation of the researched variables. The outcomes and qualitative evaluation of the variables is formulated always differently depending on the expected performance and level of the variables/parameters/or observed processes. The numbers 0 and 100 are not considered since there is an assumption that there has been a starting point. To add a motivational element, an assessment ends with a value of 99 as there should be always some space for improvement.

This points range seemed to be very complicated for preparing the assessment and evaluation of complex parameters, therefore the scale from 1 to 5 can be used. The detailed description of the observed parameters is provided in Assessment Chart as Appendix A.

The most important tools in CRA are feedback, reflection, and self – reflection. These enhance the changes and potential improvements to all observed processes. They become key elements of the final stage of the CRA, which is called reconstructing. Here, several types of feedback as well as reflection can be applied. The best way to scrutinize the observed processes and unearth our assumptions is to have more observers, i.e., colleagues, or even to use the students' own eyes.

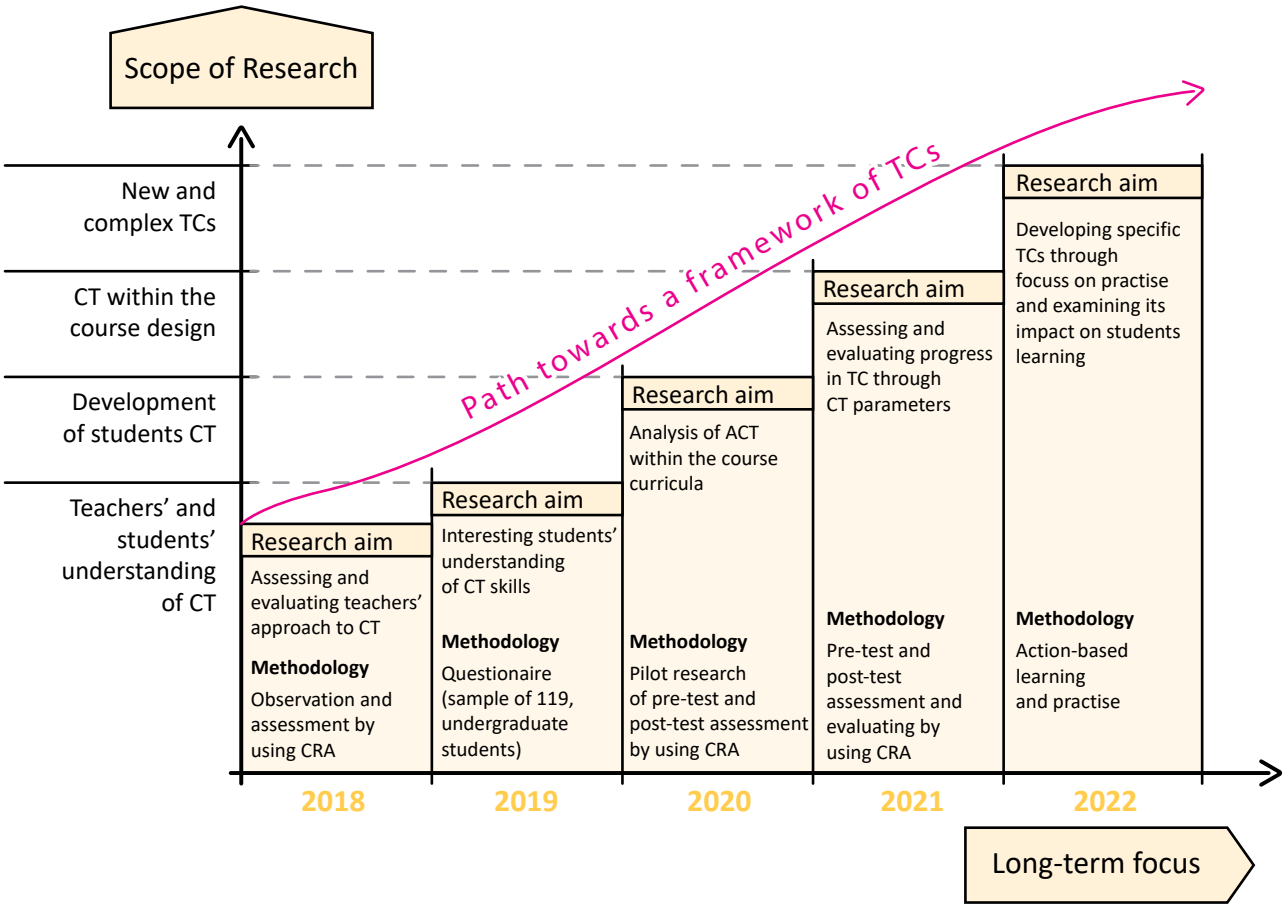
The core actions, changes, and new ways to improve processes are envisioned by using CRA. Both assessment and evaluation analysis provide sensible outcomes, comparisons with

theories and other research or personal experiences. That can all help to make decisions about which parameters need to be improved and how to problem – solve.

3.3 Description of the wider context of the implementation of the research strategy since 2018

We started exploring the process of education with a focus on teaching and learning towards the development of critical thinking in 2018. The research was conducted in several phases which are presented in more detail in Fig 3.

Figure 3 Timelines and the scope of the research conducted (years 2018 – 2022)



Source: authors

Evaluation of the teaching and learning processes should provide an assessment of what was done, what works, how it was achieved (tools, methods, techniques, approaches), highlight expected but also unintended learning outcomes and provide feedback to teachers and offer some strategic recommendations for future changes.

Stone (2004), Deardoff and van Gaaen, (2012) mentioned that in conventional quantitative higher education evaluations, its input and output concentrate mainly on individuals rather than on a societal level, which makes it difficult to observe the impact on groups, teams and/or communities Even though several quantitative assessment tools exist, they devote very little attention to education (teaching, learning, personal development), research and outreach (Yarime and Tanaka, 2012). Their limitations in relation to transdisciplinary approaches and social experiments have been also noticed (in Koehn, Uitto, 2014, pp. 624).

Since our research challenge is to study progress in development of TC by modelling an experiment of assessing multilevel processes such as critical thinking, reflection and learning, quantitative methods are insufficient.

To produce meaningful insights, evaluation of transversal competences needs to apply qualitative measures. The use of qualitative methods offers the cross-checking of findings and enriched explanation through triangulated perspectives (Stern, 2004, in Koehn, Uitto, 2014, p. 625). Moreover, the use of mixed methods generates important synergies and provides additional comparisons, supporting evidence and additional insights that single method studies do not offer. Given the pervasive influence of assessments in all activities, adoption of CRA as an appropriate evaluation method guided our research and findings in the direction of deeper analysis of TC. Qualitative evaluation, by using CRA, emphasizes context and goes beyond simple measurements towards uncovering the key relationships and identifying the roots. As already mentioned in the previous part, CRA effectively combines the quantitative approach to evaluation with qualitative ones.

Since the nature of qualitative data is rather exploratory and qualitative analysis often deals with a huge amount of raw data, a clear plan of specific steps is essential (Wilson, 2014). Another reason to develop an effective path towards gathering and analyzing the data is to make the qualitative analytical process a bit more explicit and easier to understand to any reader. To fulfil this intention, the implementation of CRA provided us with significant results that constitute a reflection on what changes could be incorporated either in study curricula and/or a teaching and learning strategy in further education.

I. Examining the readiness of the HE environment for the development of critical thinking

Burjan (2010) states that, in Slovak education system, we take it for granted that teachers "tell students how things are" and then students are expected to "take note" of the information presented by teachers. Asking questions, starting discussion, argumentation or just a hint of a different point of view on the part of students as basic manifestations of critical thinking (CT) are perceived as questioning what the teacher says and sometimes as an attack on his/her authority. It is striking that in a higher education environment, where scientific research and education should be based on questioning, comparing, arguing, and asking open-ended questions, this is not a common practice.

In autumn 2018, the teaching approach of university teachers (N=17) at University of Matej Bel, Slovakia was observed, with the main goal of finding out how interactions between teacher and students enhance development of some critical thinking skills as well as how it might help to establish an environment where questions and discussion will be present. The observations were conducted by two professional observers and assessment was done using CRA (Tab 7). The assumption target values were proposed based upon the number of reports, studies, selected theories related to HE and role of critical thinking which have been presented in Part 1.

Table 7 The teachers' (educational) focus on developing critical thinking skills (N=17)

Assessed parameter (N = 17)	**Assumption (scores from 1 - 99)**	**Observer's assessment (scores from 1 - 99)**	**Average of teachers' own assessment (scores from 1 - 99)**
Searching for relevant sources of information	68	**38**	53
Encouraging continuous questioning	57	**25**	35
Proposing solutions based upon facts	48	**22**	46
Developing argumentation	63	**41**	54
Continuous raising questions	72	**25**	41

Source: Theodoulides et al, 2020

The findings addressed the need to conduct a serious discussion at any HEI about the role of the teacher and how he/she can make an impact on developing students in terms of their critical thinking skills. The observers' score are below the assumed standards on all parameters. The results indicate that, despite the extensive interest in making the higher education environment more student–centered, in reality it is not as easy as we assume.

After the observations and assessment, discussions took place with each teacher where the results were reflected, and feedback provided. From the presented results in Tab 7 the teachers assess themselves in every parameter higher than observers did. In most of the parameters the teachers' self-reflective assessment was even double that of the observers. It seemed to support the statement by the Critical Thinking Foundation that 'teachers assume they are teaching critical thinking skills, and their students pretend they are learning them' (Paul, 2007).

That none of the standard value had been achieved, confirms the results of reports and surveys, discussed in previous parts of this book, that teachers in Slovakia lack critical thinking skills. It has been proven that only teachers who continuously practice and foster their critical thinking are able to develop these skills among their students (Theodoulides et al., 2020).

Our effort to investigate existing prerequisites to support better learning continued in April 2019, when 116 students at bachelor level, study program Business Economics and Management, MBU were surveyed. The aim was to identify how students perceive the higher education environment from the point of view of their active participation and to find out what are the barriers to it. In the formal higher education system, there is recent emphasis on transversal competences which stress the need to include more discussion in the classroom and encourage students to question everything. Unfortunately, the results from the survey (88.4 percent of students raise question during class very rarely or only sometimes) indicate a rather passive approach towards learning, which does not foster the debate or argumentation. There were two main reasons 'what would help to ask more' identified. The first one is related to studying the topic in advance, so students would know what the discussion will be. The second main reason has been mentioned as an 'informal atmosphere where will be no fear or stress from asking anything'.

In terms of a passive way of obtaining information, the result showed that 80.3 percent of students have no doubts about what the teacher is saying and take that information as the only approach. They claimed that did not have enough information to oppose their teacher (72.4%). This answer runs counter to the finding that 44.9 percent spent more than 3 hours every day on internet and social media, but that is not connected with education. Moreover, only 20.7 percent of respondents compared the obtained information with other sources. Surprisingly, 10.3 percent of students stated that 'even the teacher cannot know everything'.

Teachers and also students may face barriers to critical thinking which vary from person to person, but some barriers have been identified as the most frequent and can be overcome. Those are as follows:

1. *Misunderstanding what is meant by critical thinking or criticism* – some people assume that critical thinking and 'criticism' means making negative comments, or if a person is good at criticism than he/she will be characterized as unpleasant (Cottrell, 2005). As a result, they make only positive comments and avoid providing feedback on what can be improved. From our survey, 45,7% of students are afraid to say something inappropriate and their classmates could find it embarrassing.

2. *Over-estimating our own reasoning abilities* – we tend to believe our own belief systems are the best and that we have good reasons for what we do and think. But it is easy to fall into poor habits. On the other hand, 45 percent of students admitted that they do not have enough information to oppose in a discussion. From the provided example, only 22 percent of students distinguished the weak and strong arguments correctly.

3. *Lack of methods, strategies, or practice* – there are many sources to develop CT skills, but not every strategy or method is sufficiently rigorous for higher-level academic thinking and professional work. Students expected to be asked directly - they are not willing to start a discussion (15,5%). They find their group too big to say something relevant (32,8%).
   It can be confirmed from the conducted observations what techniques and forms teachers used and that they are lacking knowledge, skills and mainly practice which might help them to create positive relations, interactions in the class, and thus develop critical thinking among their students (Theodoulides et al, 2020).

4. *Reluctance to question experts* – it can seem strange for students who know very little about a subject to be asked to criticize works by those who are more experienced. For example, in English-speaking universities critical analysis is a typical and expected activity. On the other hand, in post–communist countries like Slovakia, 32,2% of students considered it as an inappropriate behavior towards a teacher. They found it rather impolite or rude to question their teachers. More than half of students (51,7%) stated they always trust the information presented by their teacher. Almost 89 percent of students stated that they never, or very seldom asked anything in the classroom (Theodoulides et al, 2020).

5. *Affective reasons* – emotional content can add power to an argument, but it can also undermine an argument, especially if emotions seem to take the place of reasoning and evidence that could convince others. This is happening when sensitive topics and issues are discussed such as LGBT, genetic modification, religion, criminal justice, etc. It can be overcome by giving more consideration to the evidence that supports the arguments relating to these issues (Cottrel, 2005). But since 60.3 percent of students stated that they do not study a topic enough before a lecture/seminar, they are unable to provide evidence, data or relevant information and most of their contribution to discussion is subjective, i.e., how they feel (often as their own prejudice and stereotype), or it is very vague and general.

6. *Mistaking information for understanding* – students can misunderstand the purpose of activities and methods that foster learning skills, preferring facts and simple answers. Brookfield (2017) supports the existence of this barrier from his own teaching experience. When he provided an example from his own life to illustrate the concept better, sometimes in students' evaluation of his class they called him arrogant. In our survey, those students who claim that 'they question the teacher or present different views' it is based on their working experience or discussions with other people from an external environment. Such a student's contribution to discussion is welcomed but on the other side it needs to fit the context of the class. This is the task of the teacher to clarify the context or to ask the student about it if that is not clear. Teachers should not be afraid to ask questions or admit that they do not know in front of their students.

7. *Insufficient focus and attention to detail* – critical thinking involves precision and accuracy. Poor criticism can result from making judgments based on too general an overview of the subject matter. CT activities require focus on the exact task in hand. Practicing critical thinking skills is hard work for both teachers as well as students. This was studied by the entire qualitative research and will be confirmed and discussed in detail in Chapter 4.

II. Using critical thinking and reflection to master transversal competences

At the present, the focus of local and international research has shifted towards examining the connection between critical thinking and transversal competences, as it gains growing interest from various stakeholders in the educational eco-system in last couple of years (Chapters 1 and 2).

Speaking about measuring the level of the specific competence, and even its development over some time, might tempt us to think that it is possible to do. Yes, there have been a lot of more or less successful attempts to produce instruments to measure various human features or skills in a mathematically exact, valid and reliable way – which, in the case of an experiment like ours, would be possible only in 'laboratory conditions'. Real life education brings in so many other unmeasurable and unexpected variables that it would not be possible to come to rigidly persuasive results such as those in natural sciences experiments. And besides that, the problem with competences is even more complicated as they themselves are of a complex nature, and not only that, but they are also mutually intertwined. Even if we knew exactly which specific skills, knowledge, or attitudes they cover, and could be able to measure them separately, what about measuring them in symbiosis within human character?

On the other hand, the purpose of this book is to emphasize the need to focus on and develop the transversal competences in the higher education context. That means that we want to suggest there is a need to recognize the current state of these competences, with e.g., university students, and then to make efforts to nurture their growth which would be evident in some way. In other words, we presuppose that there exists a possibility, a feasible objective way of their development even though in the mindset of the regular formal education system.

We present the research as an experiment, which was implemented within two university courses whose content and used teaching methods were modified to be taught in a non-traditional, innovative way, supporting the development of transversal competences via processes of critical thinking and reflection.

We hope to show that through these modelled processes it is possible to develop the transversal competences of students in almost any higher education course.

Now is the time to prove and show why we are so sure that this kind of competence-focused education really makes a difference. The main output of the research was expected to observe and provide evidence of gradual progress in transversal competences through the continuous improvement of critical thinking skills among the graduate students. The research was conducted in two semesters, i.e., the winter and summer semesters, in the academic year 2021/2022 on the master study program. Around 50 – 60 students in the winter semester and 44 students in the summer semester were introduced to the framework of transversal competences via two subjects - International Management and Management of Innovations. It is most important to prepare the activity or situation which matches the course curriculum, is related to one or even more transversal competences is suitable for assessing critical thinking skills as well as to reflection. This means that students are well informed about why they are doing a specific activity and what goal they are aiming for. This approach is particularly appropriate when students are required to engage in activities that they may perceive as threatening, such as applying critical thinking to their long-term assumptions (or prejudices and stereotypes). By explaining to students why we expect a certain activity from them, how we divided them into groups and why we chose specific texts and other necessary data, we will strengthen their confidence and willingness to participate in the activity. If we ask someone directly what their preconditions are, we surprise them with this question, as they may not be able to define them, or they may not even realize what their preconditions are. In such a situation, it will help students when they work with the most specific examples, texts, simulations and thus find out the assumptions in specific situations. The key questions are: Why did you decide that? What evidence to confirm the hypothesis seems the most convincing to you? Why does one theory explain an example better than another?

Here we present some of the theoretical principles that we respected in the creation of educational process in our two innovative courses focused on critical thinking and transversal skills:

A suitable technique, recommended by Brookfield (2017), is a "disorienting dilemma". Often such a dilemma is an unexpected situation that forces a person to start thinking differently about something he/she has hitherto considered immutable. A disorienting dilemma raises the need to rethink our current assumptions or values and changes the meaning of events in our lives. Such a dilemma should meet two conditions: on the one hand, it should be so unusual that it will distract students, but at the same time is not unpleasant, so that they do not avoid solving it. This could be, for example, a negative interpretation of a work that is generally considered good.

In his works, Brookfield (2012, 2017) states that the acquisition of elements of the CT process works better when it has a structure and develops best in small groups. Those group activities that have a clear assignment and specific rules of communication are more effective than free discussion.

Tsankov (p. 134) pointed out the most important considerations when mastering the transversal competences in higher education. These are as follows: (1) redefining the goals of education; (2) paying special attention to students' needs and learning motives; (3) introducing adaptive teaching strategies; (4) designing a dynamic environment which supports learning—flexible, mobile, guaranteeing interaction and cooperation; (5) reaching a new level of monitoring and evaluating learning outcomes. We tried to follow this procedure in our educational innovation.

As academic research lacks a widely accepted framework for evaluating transversal competences, Deardorf and van Gaalen (2012) suggested some key elements to be considered when preparing a comprehensive analysis, i.e., inputs, objectives, processes, outputs, outcomes and expected impacts. (In order) to deal with some qualitative methods' limitations, our research consisted of several phases and was structured and prepared extensively. Embedding evaluation based upon CRA in well-constructive research activities helps draw broader conclusions from qualitative data.

In talking about self-reflection, we also must consider teacher self-evaluation. Self-evaluation is a good tool that helps them to improve their work. Self-reflection is a subjective generalization of information about yourself, based on consideration of your activity, behavior, attitudes, opinions, actions and activities. It is a way of processing feedback information that is conducted as a dual process, i.e., giving and receiving feedback (Theodoulides et a., 2020).

Educators who lead students to self-reflection must know what it really means to think. Of course, self-reflection in the teaching process goes beyond the importance of thinking. It is a critical and self-regulating factor that motivates the teacher to check the performance of his students, to evaluate their progress based on predetermined specific criteria. Through self-reflection, students can identify their strengths and weaknesses, which will enable them to formulate practices and strategies to improve their performance.

Chapter 4

From research evidence to a framework of transversal competences in higher education

4

Through several forms of research, a large amount of material has been collected. Evaluation of the research was carried out as a triangulation of key findings presented in this chapter. The main emphasis is placed on the analysis of data, information, and results of observations with a focus on the proposed four transversal competences: digital, media, and information literacy; collaborative problem-solving; sustainability and diversity awareness; and learning to learn and continuing to learn.

The interrelations and impacts of critical thinking and reflection on fostering transversal competences have been examined. We found out that the set of four transversal competences we defined was developed via the processes of critical thinking and reflection.

In the final part of this chapter, the proposal of a new framework of transversal competences is presented. The main reason for such a framework to exist is to direct higher education on the path of transformation, which is inevitable for any higher education institution (HEI) when fulfilling its role and mission within society.

4.1 Assessment of transversal competences: research results, interpretation, discussion

Before but also during the entire research, we as a research team asked ourselves the question: How can we provide evidence that the selected four transversal competences (digital, media, and information literacy; collaborative problem-solving; sustainability and diversity awareness; learning to learn and continuing to learn) have been developed?

As we explained in our research methodology (Chapter 3), we used several research techniques in our action research to obtain data about their real development during our respondents' participation in two HE courses. From a quantitative point of view, we examined and assessed each competence in detail, both in the initial stage of the research (at the beginning of the academic year 2021/22 at our university) and in the final stage of the research (at the end of these courses are taught in a new, innovative, competence-focused way). From a qualitative point of view, we analyzed reports and reflections on the process of their development during the intervention, as well as feedback. We reflected on the differences, and we attempted to assess and evaluate whether there had been any evidence of changes in the competences. We are also interested in seeing how the students themselves reflect their abilities and in understanding what knowledge, skills, and attitudes represent each competence at the end of the term.

To summarize the ways of measuring the four transversal competences (already mentioned in Chapter 3), the following data collection methods were used:

- **Authentic pre- and post-term student discussions (**which were part of the seminars) were recorded, analyzed, coded, and assessed by a team of three independent evaluators (via Critical Reflection Analysis). Based on the aim of the course, their discussions were focused on a combination of economic and global issues such as sustainability, diversity, tolerance, and otherness. The final groups' results are listed as Appendices A and B in this volume.
- **Students' reflective Activity-based reports** on their innovation projects were analyzed qualitatively. The key findings are discussed within each competence analysis.

- **Individual essays** written on various topics related to international management, e.g. globalization, sustainability, interculturalism, diversity, and multinational corporations.
- **Questionnaires** focusing on the students' self-assessment and reflecting the impacts of several teaching modes and topics on their learning.

The first (pre-test) assessment was done at the beginning of the observed period in September 2021 and the second (post-test) evaluation was completed at the end of the study section in November 2021; our intention was to capture and measure improvement of TCs. There were 12 groups recorded and observed in both assessments, with each group consisting of four or five members, yielding totals between 53 and 60 students - although the total number of students in the group was 60, due to the covid pandemic, all 60 could not participate in each measurement. Although the target segment was the same, that is, graduate students attending the class of International Management, due to the subject curricula, there was a different content/assignment prepared for the first and for the second assessment. That does not fully conform to the pre-, post-test assessment procedure followed by Brookfield's concept (2012).

The research strategy has been developed as kind of experiment which was aimed at confirming the complexity of TCs as well as how they are interrelated to each other. The evaluation of the key research findings has been performed by using the Critical Reflective Analysis method (described in detail in Chapter 3.2). The authors suggest using the following quantitative scale to measure them: 1 point – poor, 2 points – developing, 3 points – satisfactory, 4 points – good, and 5 points – excellent level. Even though there was a recommendation provided by the authors (Theodoulides & Jahn, 2013) of the original reflection analysis method to use points starting from 1, there were few groups assessed with zero points. If there was no evidence of at least some effort by any group member that would correspond with the description of the observed parameter, the group performance was assigned zero points.

To process and evaluate the research data, the research team carried out:

- their thorough qualitative analysis, coding and scale measuring according to the validated tool Assessment Chart (Appendix A)
- students' assessment and evaluation pre- test (Appendix B) and post-test (Appendix C)
- synthesis of different sets of obtained research data (based on triangulation).

Assessment of digital, media, and information literacy (DMIL) competence development

Our extensive studies of the theoretical background of digital, media, and information literacy (DMIL) in Chapter 1 support our argument that within the framework of transversal competences for any higher education institution (except technical science focused HEIs), DMIL competence relates strongly to abilities to evaluate these resources and use them meaningfully.

After studying the basic characteristics of DMIL we suggested that it would be necessary to it via parameters (numbers 1, 2, and 4) of the Assessment Chart based upon the critical thinking (Appendix A). Their rationale can be summarized as follows:

a) **The information, data and media analysis, and reasoning** describe how well a student is able to evaluate the credibility of the resources, analyze information and most importantly, identify fallacies within text, find logical flaws, and understand the author's point of view or even manipulation in relation to whether the source of information is relevant.

b) **Structural analysis** describes understanding of deeper causes and roots of a situation and problem within the society. Students can break words down into basic parts in order to

understand the meaning. The process involves text analysis since existing knowledge of word parts can give clues to the meanings of many new words. It is also an ability of politicizing the notion of culture, knowledge, and power as well as developing understanding of resource, information, and media manipulation.

c) **Making judgments upon arguments**. This synthesizes and makes connections between information and arguments. When students can construct a strong argument, it expresses their ability to formulate coherent and factual arguments to reflect the participants' viewpoints. It also shows the effective use of facts to support these claims and the use of counterarguments to further conclusions and bolster one's argument. Students are aware of and recognize the argumentation fallacies during the discussion.

Quantitative assessment

The group discussions carried out have been analyzed using CRA, which provided the measurement of the three parameters related to DMIL competence and are presented in Table 8.

Table 8 Assessment of the DMIL Parameters (according to the Assessment Chart - Appendix A)

Parameter **N=60**	**First (pre-test) assessment total score (n=59)**	**Second (post-test) assessment total score (n=58)**	**Progress**
Information, data and media analysis, and reasoning	20	19	(-1) point
Structural analysis	15	25	(+10) points
Making judgments upon arguments	13	20	(+7) points

Source: authors

The higher education environment has at its disposal a huge number of academic-quality resources. The skills for quickly and accurately finding the correct information are not only essential for academic studies but also transferable to life after university (Grix, Watkins, 2010).

This is also associated with the skills of evaluating and assessing the Internet and distinguishing the suitability of non-academic sources which are still relevant and can be useful for various tasks and assignments.

When evaluating the first parameter '***Information, data and media analysis and reasoning'*** (see Appendix A) and looking at the two measurements of overall group results, there was no progress achieved. This finding is in contradiction to a self-assessment of students provided by an end-of-semester questionnaire where 96.7 percent stated that they had gained better skills of working with data and information since the beginning of semester.

All groups scored 20 points in the first measurement at the beginning of semester and 19 points in the second measurement at the last seminar (see Appendices B and C).

Even though there was no overall increase in this parameter, there is a sign of progress. At the beginning of the semester only one group scored 3 out of 5. After the completion of eight seminars, another evaluation was performed, and three groups received a score of 3 out of 5. None of the groups received a score of 4 or 5.

The results of the evaluation of the groups' performance during the two seminars was influenced by the different activities conducted at those seminars. This research limitation is discussed further in Chapter 4.2. Nevertheless, the focus has been given less on how to find the resources, but rather how to recognize the relevance of the sources and to categorize and use them effectively within the discussions, as well as reflecting on what has been found from the relevance point of view. During the first measurement at the beginning of winter semester concerning the activity which is described (Appendix B) resources were used and evaluated. Fifty-six percent of resources were very general; either governmental websites, or statistics (of Slovakia only), and/or official web pages of international institutions. Thirty-three percent of resources provided information either about an article, or in most cases there was a specific case study or company's project/ best practices. Alternative, irrelevant, or disputable sources of information occurred in 13 sources, which represents 10% of all resources provided.

In the process of assessing the skills of students included in this field, their ability to adequately work with both primary and secondary information sources (see Chapter 2.3), typical for HE studies, as well as the existence of cognitive distortions in students' thinking was investigated. In the questionnaire, 85 percent of students claim that they can recognize cognitive distortions in their thinking and 81.7 percent know where those biases come from. A deeper analysis of the cognitive biases is presented in the next sections with their relation to other transversal competences such as a) sustainability and diversity awareness and b) learning to learn and continuity in learning.

The ability to justify a view and provide evidence upon information and data from a credible and relevant source is represented by argumentation skills. These skills contribute to the development of DMIL because they are closely related to the first observed parameter 'information, data and =media analysis' and have been formulated as '***making judgments upon arguments'*** (more on argument in Chapter 2.3). In our questionnaires, 96.7 percent of students claimed that their argumentation skills had improved throughout the observed period, consisting of eight seminars.

When evaluating this parameter, asking crucial questions consisting of what, who, why, where, when, and how can evaluate the quality of information and suitability of the selected source.

By conducting the assessment of this parameter using CRA, progress was observed in this parameter starting from 13 points as an overall result obtained in the first measurement to 20 points in the second measurement. The two groups scored 4 points in the second measurement, and this result did not occur in the first measurement.

During the first assessed activity, students were asked to provide a short argumentation in written form of their individual SDG (Sustainable Development Goal) example. The simple question *'On the basis of what information, data and facts do I argue that my source/example is related to the SDG?'* had been asked. To be consistent with the evaluation procedure, CRA has been implemented, using the same score from 1 to 5. Of all 59 submitted, analysis based upon arguments, there was no answer which earned the highest score of 5. The 17 answers which met criterion 4, represent 29%, where the arguments were formulated logically, were well-grounded, used some data (not fully supported), and there was a reasoning about the relevance of resources used. Another 12 answers (20%) met criterion 3. They provided a specific source of information, usually the name of the institution, but without any reference to source and the arguments were not based upon any data, figures, or facts. The next 13 answers fulfilled the score of 2, where the argumentation was very vague and general. This represented 22% of all students' short analysis exercises. The

group of analyses that contained almost no hint of argumentation comprised 17 analyses, which represented 29 percent of all assignments.

The group discussions and the argumentation through their individual participation was qualitatively analyzed in the next section, thus providing better explanations on understanding what contributes to a good argumentation.

Formulating strong arguments based upon the correct literature reviews was one of the criteria for essay evaluation (third evaluation based upon CRA, see Table 6), which was also one of our research activities. We believe that writing an essay in a higher education environment is the most effective form of learning. It emphasizes critical reasoning, developing argumentation skills and formulating conclusions. In a professional and academic essay, it is required to present reasoning using a formal structure, which develops additional skills among students, such as: selecting and structuring reasons which support a conclusion, presenting arguments in a consistent way, and using logical order and such language which effectively presents the line of reasoning (Theodoulides et al., 2020).

From our teaching experience, we have found out that formulating a topic and instructing the students on how to write an essay is not an easy task for the teacher. The reason is obvious; this form of learning is not often used by teachers, and if those who use it for assignments do not formulate it specifically, it may be incorrectly interpreted by students.

A vague and non-specific essay thesis tends to result in very general work with many limitations, useless reasoning, weak arguments, lousy conclusion, use of non-relevant secondary sources, and in the end, frustrated students as well as unhappy teachers. Be aware of the tremendous effort of the teacher as well as the students who participated in our research during the entire semester; the evaluation results of the submitted essays came as a success. Again, CRA was used, where the assessment points started from 1 – the poorest work, up to 5 – excellent work.

Of 56 assessed essays, 42.7 percent of students received the highest of mark 5, 34 percent of essays scored 4, 21.5 percent of essays achieved a score of 3 and only 1.8 percent of essays were scored at 2. There was no single essay on the poorest level of 1.

Writing an essay also trains students in the third observed parameter which develops DMIL competence, i.e., **'structural analysis.'** This criterion is rather difficult to evaluate and measure since it interrelates to deeper understanding of a text or source of information and recognizes manipulation. The academic essay is a very suitable form because it guides students to learn to support their arguments with data and relevant information. At the same time, by examining the topic in depth and from different points of view, they try to arrive at the objective truth.

The groups' overall performances in this parameter throughout the two observations show satisfactory results. The improvement was by 10 points from the first assessment, where the groups scored 15 points overall, to 25 points in the second evaluation. The highest score reached of 3 in the first assessment was only obtained by one group, while in the second assessment, there were 4 groups with score of 3 points and one group was assessed at 4 points.

Qualitative assessment

Nowadays, when we are flooded with a lot of diverse information that is not always true or is often interpreted in different ways by different sources (in modern times, we call it by various terms, for instance conspiracies, hoaxes, or 'fake news'), it is problematic to navigate it, to search for an 'objective truth,' and approach it critically. We believe that continuously raising questions, such as *Based on what are you saying this?, How can you prove that?, Can you provide any evidence?, How*

can you justify that? and many more fundamental questions, can help us to orient ourselves in a complex and complicated world.

In the digital age, influenced by the rapid growth of information and communication technologies as well as the strong influence of social networks which are forming the debate in non-constructive, often rather violent ways, the skills to filter information, to lead discussions through the exchange of different opinions and to accept them, to not only support one's claims with facts but also correct one's opinion upon the obtained feedback and engage in self-reflection … all this shapes the communication of the present time.

The transversal competence DMIL has been defined in Section 1.4 and has very comprehensive and broad context. Since our research was conducted in two subjects belonging to the social sciences, our examination of DMIL has been focused on students' abilities to find, recognize, and use resources of appropriate academic quality, manage online information for academic study, and also for their personal development. Nevertheless, referring to Cottrell and Morris (2012), the key skills for using technology to support studies developed gradually. As the information available online continues to increase at a rapid pace, it becomes all-important for students to be able to:

- identify the right kinds of information for the purposes of the specific assignments,
- understand how to conduct effective searches for the needed information, and
- use online tools to share information for group assignments and communicate effectively.

Through basic research questions, we mapped how students used online information in the assignment, which digital knowledge and skills they applied, and to what extent they used social networks to fulfil the assignment's goals. The information was provided by submitting nine 'Action learning project reports' in which students reflected on their four-month group work of creating an innovative start-up. As already mentioned, Google was used as the search engine. A vast amount of information is available on the Internet but requires a long amount of time for searching. It seemed that students did not use the advanced searches of Google Scholar, with its Boolean operators which could have narrowed or extended their search for suitable information.

> *'During the analysis, we encountered a problem with the actual search for relevant resources, and therefore already existing products. Once we had already come across resources and started studying everything that already existed, we realized the power of competition and that it would be difficult to implement our idea. We also tried to search for relevant sources in the English language, because it was likely that we could find more results in the global world. In some places, we had problems formulating keywords, which made the competitor analysis difficult.'*

Even though there were already possibilities for groups to have meetings face to face, they preferred to communicate via MS Teams.

> '*We created a shared Word document where we marked the necessary information and could work at the same time. When creating the presentation, we once again used the shared PowerPoint format, and everyone worked on the presentation at the same time. It saved us a lot of time and was more efficient for us.'*

Even though some students had no previous experience with prototyping a product or creating an application, with the help of an IT expert and consultation with a business expert on start-ups, they managed to prepare it. They worked with platforms such as the Play Store and the App Store. In the process of creating the prototype, the Balsamiq program and the free online graphic design tool Canva were used. Based on the above findings and knowledge from several months of practical project experience, we can say that students can acquire basic digital skills very quickly in any assignment. There are several free available applications in the virtual space that provide students with basic knowledge on how to use them. However, recognizing a relevant source, gaining a deeper understanding, and processing the context of information represents more demanding abilities and critical thinking skills.

The qualitative approach to the evaluation of 'digital, media, and information literacy' competence emphasizes students' capabilities to evaluate resources, work and understand the use of data and statistics, and other complex skills which have been defined in those three selected CT parameters. Moreover, the dynamics and interactions within the group should help individual members to obtain more knowledge and learn from each other. We hope that all this can contribute to a better ability to work in the digital era and ultimately contribute to their responsible decision making as well as their behavior.

From our two years conducting education online, we can state that when performing the first research activity (pre-test assessment) in person at the beginning of the semester in September 2021, face-to-face group discussions were extremely important for students. First, explaining what the research was about together and the students agreeing to sign the 'research consent' clarified any unusual procedure and supported the building of trust between teacher and students.

The second seminar (post-test assessment) was conducted online via MS Teams due to the pandemic. Nevertheless, students had already experienced innovative forms of teaching, therefore the groups' online discussions were run smoothly.

As already mentioned, based upon the quantitative measurements of the first observed parameter ***'information, data, and media analysis and reasoning***,' students did not make any progress. This can be explained by two essential facts:

Firstly, there were two different assignments prepared and evaluated in the pre-test and post-test assessment due to planned learning outcomes and expected impacts (see description in Table 6) within the subject curricula as well as different forms of implementation (present and online).

The structure of the first observed seminar (pre-test assessment) consists of a few tasks and related question: *From secondary sources (e.g., articles, studies, videos, research, blogs) find an example of a specific SDG. Based on what data and facts do you argue that your example, activity, product or service is related to a specific SDG?*

The key findings from the two observations and from the third self-assessment presented by the 'Activity-based report' all aim to point out students' strengths in a specific observed parameter and what difficulties that groups had experienced.

As analyzed previously and proved in terms of correlation, the quality of individual assignments prepared for the first seminar and used in the group discussion made a significant impact on the group discussion and its outcome. That was sometime due to the poor quality of resources, limited credibility of data, and relevance of the found information presented by each member to its group. Discussion about the suitability of sources was missing. Questions like *Who published it?, What and whose interests are evident?, How does your example relate to the topic?*, or *Where did you find it?* were not raised by group members. Those would have directed the group's discussions towards formulating good arguments and reasonings.

Based upon their short analysis, it is evident that they trust international institutions, i.e., UN, UNESCO, UNICEF, World Bank, EU and ministries (mainly in Slovakia) and their reports and statistics. As Harford (2020, p. 22–26) states, without statistics it is impossible to tell the truth – to understand the world, statistics are necessary for a clear and honest illumination of reality. Students, especially in the first seminar (pre-test assessment), passively presented their source, often did not mention who published it and where it was published and read it without their own evaluation of how they understood it or why they chose it.

In some cases, there was an effort to share an interesting source of an article (activist, famous person, or reputable institution) with other group members when the topic was of their personal interest or if they had had a personal experience, i.e., topics related to greenwashing, LGBT, and volunteering or humanitarian aid.

In one group, evidence was observed of cross-checking from various sources.

On the other hand, expressions such as *I like your example* or *It's a good example for our topic* were very often heard in the groups. However, the reasoning leading to clarify 'why he/she thinks so' was no longer heard in the groups' discussions. Such an assessment without justification is based on feelings and impressions, not on facts, information, or concrete findings. Students had difficulty with our question *What information do you use to justify your choice of the best example and why*?.

When we use statistics wisely, transparently, and objectively, we see trends that help us make the right decisions. We can detect manipulation and become aware of the influence of emotions, cognitive distortions, and prejudices that arise from faulty logic and untruths. This ability is important when we want to discuss constructively and formulate coherent and factual arguments to reflect our point of view. After performing the evaluation of the parameter **'making judgments upon arguments,'** the typology and examples of argumentation fallacies were introduced and practiced later in the next seminar after the first evaluation. That can confirm the improvement of the students' argumentation skills measured and performed in the post-test assessment and mainly during their essay-writing process.

During the first seminar (pre-test assessment), students struggled to formulate a coherent argument and generalization was present in several discussions. The discussions during the second seminar (post-test assessment) showed satisfactory improvements. Students started to question the data and information. The question *'does this information capture the essence*? was raised or some advice *'let's think about this more'* was proposed in the groups.

What was consistently observed during both observed seminars was that ad hominem fallacy, false dilemma and false cause argumentation mistakes happened within the groups. That was observed in discussing so-called sensitive topics, e.g., the LGBT community or multiculturalism. As Brookfield (2012, p. 24) notes, the most complex assumptions for identification and questions are those embedded in dominant ideologies such as democracy, capitalism, white supremacy, patriarchy, and heterosexism.

The content of some contemporary media (mostly social media) confirms his claim. It appears there are a lot of angry and hateful comments there, so it's no wonder that someone could have trouble deciding what to believe and have no power to protect themself against such negativity.

Some groups thoroughly described the background of the analyzed situation in relation to societal problems, e.g., discrimination against Roma or poor treatment of members of the LGBT community. The group which scored the highest in the second evaluation took the discussion to a deeper level by asking themselves a few questions, for example: '*Why we are still facing this issue in Slovakia? Is our legislation prepared to address this? What are the stereotypes in our society?'*

The above reflections indicated the ability of some students to understand deeper connections and problems which have been assessed by the criterion of ***structural analysis.*** Yet, some groups (there were four with zero points) struggled to analyze the basic parts of the text and had difficulties describing the main meaning. Some other groups did start to display limited ability and effort to break down the information in order to reflect on whether the source was suitable and thus provide information which was needed for the assignment. On the other hand, their discussions lacked the logical flow which would help them to synthesize the parts into related meaning, which would lead towards deeper causes.

Based on two approaches (quantitative and qualitative) to the investigation of DMI competence, we tried to indicate mutual connections and links between: the ability to find suitable sources, knowing how to use data and information in argumentation, and trying to get closer to the objective truth through a constantly deepening understanding of the topics under investigation.

Assessment of collaborative problem-solving competence (CPSC) development

Similar to other transversal competences, collaborative problem-solving competence is also a relatively complex construct. We agree with Care & Kim (2018), who say there is a specific problem with measuring complex skill sets, such as collaborative problem solving or global citizenship, because of the "difficulty of identifying the degree to which each subskill might contribute unique variance, or the degree to which demonstration of one subskill might depend on reaching some hurdle level of competence in another". So, what can be measured when speaking about collaborative problem-solving competence? In chapter 1.4, several definitions and approaches to collaborative problem-solving competence were presented, including its structure. In general, it seems that most of the above-mentioned authors recognized two constituent sub-competences or sets of skills under collaborative problem-solving competence: a) cognitive skills and b) social skills. Here is the summary of them.

Cognitive skills necessary in collaborative problem-solving consist of:

- Knowledge building is strongly dependent on the ability to find information or to acquire adequate knowledge. So, assessing this competence requires measurement of the state of the pre-knowledge, and the ability to perform structural analysis of the causes/roots of a situation.
- Higher thinking skills (analysis, synthesis, comparison, evaluation, creative thinking).
- Task regulation skills: confronting and resolving real, cross-disciplinary situations where the solution path is not immediately obvious.

These essential skills correspond to the content of the defined 'problem-solving' parameter.

Social skills necessary in collaborative problem-solving include:

- Communications skills enabling sharing the understanding and interaction of tasks.
- Collaboration skills – including motivation – enabling participation in group problem solving:
- Investing the effort required to come up with a solution in the team.
- Pooling the group members' knowledge, skills, and efforts to reach that solution.
- Being able to monitor group progress (or lack thereof) towards resolving a problem.
- Being able and willing to productively leverage the knowledge and skills of other group members.
- Perspective taking.

- Social regulation, including overcoming non-cognitive factors: e.g., negative feelings, previous frustrations, feelings of inferiority, personality features, motivation, etc.).

Quantitative assessment

To try to measure and quantitatively assess the cognitive side of the collaborative problem-solving competence, three parameters of the Critical Reflection Analysis were measured and evaluated by three independent evaluators.

Based on the methodology for evaluating transversal competences as proposed in Chapter 3, the CPS competence was evaluated via three CRA parameters: Problem Solving (No. 5), Praxis (6), and Questioning & creating team (8). They include all the above-mentioned skills and abilities – which are inherently both cognitive and social in nature – needed in the situation of collaborative problem solving (Chapter 1.4):

a) **Problem solving**: We used this parameter to measures the ability to identify a non-familiar problem, clearly name the core of the problem, suggest a solution (in both conventional and innovative ways) and evaluate its contribution to the problem, and suggest benefits and potential side effects of the chosen solution. It includes the ability to identify and ask questions that lead to better solutions and the ability to break those solutions down into steps and outline a roadmap – further steps for their implementation.

The problem-solving process consists of several phases: 1. understanding and defining the problem, identifying the causes, etc., 2. generating ideas that might lead to solving the problem (e.g., via brainstorming), 3. choosing a solution based on the set of criteria, 4. testing the solution, and 5. reviewing the results. These processes require several micro-skills and capabilities such as "active listening, analytical skills, collaboration, communication, creativity, critical thinking, data analysis, decision making, dependability, emotional intelligence, facilitation, flexibility, honesty, initiative, impartiality, leadership, mediation, planning, prioritization, record keeping, research skills, risk management, team building, and time management" (Smart, 2020).

b) **Praxis** was applied in measuring the ability to recognize the importance of cross-sectoral and multi-actor networks within a specific ecosystem, in other words, to recognize the big picture we wrote about in 2.3. In our research, this parameter was mostly evident in the way the teams elaborated the implementation of their projects in an external environment. It pointed especially at the attempts to have a dialogue with various actors and personally actively participate in various events and activities in the external environment.

c) **Questioning one's own and others' views and developing group/team relations** – With this criterion we measured the students' ability to establish mutual relationships through asking open and causal questions, use of humor, self-reflection, willingness to change their previous opinion, which can lead to better team results. This parameter is crucial for collaborative problem-solving competence as it shows how individuals reflect on each other's statements, how they change them under the influence of the discussion, and at the same time their effort to form good relations in the group.

The atmosphere in class becomes an important element for open discussions. From a survey conducted in 2019, 45.7% of students stated they are afraid to say something inappropriate in front of their classmates which might be embarrassing. Additionally, 32.8% of them find that if their group is too big, they are not confident to say something relevant (Theodoulides et al., 2020).

Creating a pleasant atmosphere and building good relations can be challenging for students as well as teachers in online discussions. During the almost two years of education being conducted online, there were various trainings and workshops offered for free to advise teachers how to organize and manage fruitful discussions in a virtual environment.

Of course, the value of collaborative problem-solving competence is not just the sheer sum of these three sets of skills. Their combination creates an extra added value of collaborative problem-solving as it requires a special set of attitudes, knowledge, and skills to combine, compare, evaluate, synthesize, and put them to use in a balanced and sensitive way.

The total score of the groups is presented in Table 8. The details of all 12 groups' score are presented in Appendices B and C.

Table 8 Parameters for CPS competence (N=60)

Parameter N=60	**First (pre-test) evaluation total score (n=59)**	**Second (post-test) evaluation total score (n=58)**	**Progress**
Problem solving	9	26	17
Praxis	2	20	18
Questioning one's own and others' views and developing group/team relations	23	22	(-1)

Source: authors

In the pre-tests of the **problem-solving** sub-competence, the highest number of points per group was 2 out of 5, which means it was just at the developing stage in all groups**.** All other groups had zero or poor entrance level of problem-solving sub-competence. In post-term discussions, the shift of the overall class as well as individual group changes were evident. It rose almost 3 times. The highest level of points in post-test was 'good' (4 points) in case of one group; two groups showed to have reached satisfactory level (3 points). So, the overall growth of this sub-competence was evident.

The results of the **praxis** parameter illustrate the fact that students showed virtually no level of engagement in the social and global issues surrounding them (2 groups - poor level and other groups - zero involvement). This negative pre-test score was rather surprising. It is possible, and this is only a speculation, that to some extent the content of the pre-test task (related to the course curriculum) and the students' attitudes towards it could also have influenced this result, namely that they were choosing completely new mini-projects for their task in which they had insufficient pre-experience or they had not yet had the opportunity to be personally involved (perhaps due to the pandemic). However, the overall growth in this sub-competency is clear. Apart from two groups, all other groups showed a certain level of involvement in practice. Although it was the lowest level in 5 cases (score 1), it is particularly important to highlight the great progress in 3 groups, one of which reached a good level (score 4), two satisfactory (score 3) and one developing (score 2). Overall, the developed level of personal involvement in political and other wider social (injustice, problems within own community) involvement clearly achieved the highest increase out of all sub-competences (18 points compared to initial state).

The overall result (-1) of the parameter **Questioning one's own and others' views and developing group/team relations** has its reasons. First, it should be noted that in comparison with the other 7 competences, its score in both tests were comparatively high. The pre-test score was much higher than all other competences or their average (11) in pre-tests. This can be explained by the kind of task and topic that the students were tested on in the pre-test assignment (on various sustainability resources and topics). In the pre-tests, most of the SDG (sustainable development goal) projects that the group members discussed within their groups represented completely new information for the others and thus raised a considerable number of questions and also the necessity of their reflection in order to choose one of the projects for the whole group's argumentation. The post-test score on sharing various opinions on different kinds of issues – mostly diversity – for which most of the group members did have more cognitive pre-knowledge, did not reflect a raising of many more questions compared to the pre-test questioning of one's opinions. In the end, the overall post-test result was the third highest (22). As further explained in 4.3, etc., it was one of the real-life limitations of the research that the students had to solve tasks on various topics as was requested in the curriculum and so the research tasks copied the real teaching tasks, and it could be considered a kind of action research. It is worth noting that in both pre- and post-tests, three groups reached the 'good' level. The reality also showed differences between the groups. One group's score was particularly low – mostly zero (6x0) – in most parameters in the post-test, including for this criterion. These were very biased discussions with no attempt to change one's opinion or willingness to discuss the topics presented in the post-test.

Even though this criterion achieved a lower score (by one point) in the second overall measurement, this parameter was strongly reflected in the group project and was very positively perceived by each group. The team's enthusiasm for the functioning of individual members and 'pulling together' is recorded in the CPS competence. In the qualitative analysis of CPS competence, the extent to which students asked questions to better understand each other and at the same time get to know each other, build trust, and create good relationships in the group was examined in closer interconnections.

The measurement of **all three parameters of collaborative problem solving** together (5, 6, and 8) give a more realistic view. At the end of our course initiative, the number of points for all groups combined increased from 36 points in the pre-test to 68 points in the post-test. This means that the course doubled the level of the measurable skills included in collaborative problem solving.

Another source of quantitative (and qualitative) data about the development of our selected 4 skills were the e-questionnaires filled in by students of the course after it ended. Although most data related to collaborative problem solving will be reported on in the later section on qualitative approach to evaluation (they were responses to open questions), students confirmed in their reflections that they realized growth in the parameter of **practice** – personal involvement in the world around them: up to 88% of students say that they realize the surrounding world is very complex and has a lot of issues that have to be dealt with in society. Up to 61.7% of students stated that they changed their views and attitudes towards some polarizing societal issue. Almost 40% of students said that they had been actively working on all assignments: *„Now I better understand the societal context."* About 36% of students became aware of the increase in their competence based on discussions with their classmates. When asked what helped them in studying this course, the three (out of 7 possibilities) highest-frequency responses were: a) discussions with schoolmates (45%), b) group work (42%), and c) discussion with feedback during the lessons (32%). This greatly outweighed personal interest (23%), individual reading materials (15%) or teacher's approach (29%). They especially appreciated the group discussion with reflection on the issue of diversity (36%). When asked '*How did you come to learn that*?', the students responded (ordered from the highest to the lowest occurrence of responses): excellent discussion in groups and also discussions and explanations with the teacher, as well as relaxed discussion.

To sum up, we can say that the *quantitative* results of how the course (based on critical thinking and reflection) developed collaborative problem solving are positive and encouraging. Of course, to generalize these results further, research with a control group would be needed. The researchers were aware of the need for a control group but, objectively, there was no such group as there was no other parallel course with the same content and aims in the curriculum. Yes, there was a possibility to measure some other course, but in the case of university settings, it is not easy – and can turn out humiliating – to find somebody who would voluntarily like to be observed as teaching in an 'old' way. On the other hand, the added value of this kind of analysis of 'authentic higher education process' is evidence of what is happening among students belonging to Generation Z during their collaborative work – contrary to artificially constructed measurement in laboratory settings.

The quantitative 'real-life' data indicated that our elaborated change of the methodology of higher education had a significant impact on students' transversal competence development and provided evidence of the feasibility and effectivity of this transversal competence-focused transformation so desperately needed in higher education and in society.

Qualitative assessment

Qualitative data were acquired from (a) recorded group discussions in the beginning and at the end of the course, from (b) questionnaires, and from (c) group project reports.

Group discussions

In pre-tests, some students asked the other team members questions such as „*What was your intention? We need to have a reliable source – which sources did you use for this, and what kind of data did you use? What results from this? We need to have examples with reliable facts.*" The rest of the groups were on the zero or poor level – they did not ask questions, comment on, or analyze the statements; they took them for granted. It was obvious that they did not have the social skills to develop discussion, share their own opinion, or start the team building. The interactions seemed quite superficial and reserved.

In the teams' post-test discussions, almost all groups had a fluent interaction, full of a variety of ideas. Students did not want to wait and waste time, they knew how to stir the discussion, and coming back to the assignment, there was always somebody leading the discussion, checking for proper understanding, asking the causal questions, and giving examples from real life. Students were not afraid to share their own opinions, even if contrary to the majority; they were thinking more in depth, although, on the other hand, they seemed uninhibited to use humor in some parts of their communication. They seemed to be aware of the positive side of the team identity, with some even praising themselves, remarking '*We are a good team*.' In general, most groups showed signs of enlarging the scope of their critical thinking and coming to consider group diversity as a positive element. They were more aware of the depth of social problems, showed more interest in topics that they did not know about, and displayed a willingness to modify their initial opinion. The discussions were more effective, with the teams coming to some conclusions that they had prepared arguments for. Of course, there was still a lot of room to grow, but all three evaluators noticed evident signs of the fact that they had learned that to be active, they have to work as a team, communicate, know each other's opinions, and come to some results. They were able to reflectively evaluate their own thinking and discussion process, e.g. '*So far we have not come to the point yet...' – 'Now we have to summarize the strategy of how to...' – 'Let's list the specific steps...' – 'Let's come back to the context/situation ... the circumstances of that person.' – 'Can you see the correlation between ...?'*

The results realistically show that there may be – and always will be – differences among the groups, as each group has its own unique constellation of 4–5 differing personalities and levels of pre-knowledge and pre-experience, and thus creates a distinct discussion dynamic, with a distinct intensity and flow. Ruisel (2004, pp. 138–139) warned that "if collaborative problem solving takes place within a certain fixed group of people, it is necessary to be aware of the risk of the influence of group dynamics on cognitive processes, especially the emerging pressure of conformity". In our research, we have noticed that in the case of the two groups with the lowest level of collaborative problem-solving competence, there were minor signs of the emergence of *group thinking,* which might have led to their decisions being wrong or at least at a very poor level. When the discussants in both groups learned further arguments in favor of their initial position, they seemed to strengthen their very coherent initial opinions (e.g., during discussions on gender identity and equality). In one case the negative emotional filter towards 'LGBTI issues' triggered a more critical, analytic approach to problems. The groups with attitudes open to reflection and discussion seemed to be able to think more creatively (Funke et al., 2018).

For collaborative problem solving, communication skills are also constantly repeated as necessary skills in the context of the development of cross-cutting competences (refer to Chapter 1.3). From other research studies – some mentioned above in this volume – it seems that Generation Z is gradually losing the ability to express their opinion in more elaborate sentences or even complete sentences. The anonymity and communication conditions in virtual spaces often used on social media are destroying their ability to speak face to face, in public, or in front of a group of classmates, and to present their opinion in a constructive way (Bíloveský, as cited in Theodoulides et al., 2020). We will expand on this fact in the qualitative analysis.

Questionnaires

Open responses of students (to open questions) confirmed that collaborative problem-solving competence has its own important place among other competences and students' statements showed their preference for it.

Solving societal and ecological problems that formed the content of the seminar was very interesting: „I enjoyed analyzing and solving problems of today's world."

The most appreciated element of the course was the group work and the group discussions: '*Some tasks were difficult, and we may not have worked them out correctly, but at least we came up with the faulty solutions together. And we finally got it.' – 'The important thing was that no opinion was bad; the discussion was open, and this gave rise to a feeling of safety and freedom of view.' – 'Different opinions helped me during group work and assignments.' – 'At the beginning of the semester, I didn't know what it would be, but gradually I started to like group work.' – 'Group work motivated me. The topics we discussed were important and interesting.' – 'Group discussions were much livelier than studying literature.'*

Group project reports

As the third research element in processing the qualitative research data, content analysis of the students' group reports was used. The intention was to evaluate the growth of students' cognitive and especially social collaborative sub-competences (problem solving, practice, questioning, and team development).

The reports were written by 9 groups, each consisting of 4–5 students from the university course Management of innovations, focused on transversal skills. One of the course assignments was to design an IT-Business Model Innovation. Students were assisted in this process by the teacher, who prepared several worksheets for them guiding their process of designing innovation, and by the assistance of two external experts (in the area of IT and innovations). The whole course, except for the first two seminars, was accomplished in an online space via MS Teams because of COVID-19

pandemic lockdowns (closed university buildings). Students had to follow this algorithm of Design Thinking (EDCCT):

- Emphasize - preparation for problem solving.
- Define the problem - choosing 1 product/service/problem for the innovation model based on why a customer would like it.
- Create ideas - generation of problem solutions (divergent thinking).
- Create a prototype - create a 'prototype' of the chosen solution (convergent design thinking).
- Test the created prototype and have it evaluated by an external expert.

In their reports, the students had to present their group reflection on the process, how they worked, the roles of individual team members, the difficulties, and strong and weak points of working on their innovations in groups.

Reports on the CPS processes:

All groups described the phases of their collaborative problem-solving process:

- Phase 1: *Situation awareness and sense-making*. The following processes took place: getting to know each other and mapping the situation in the market sector with the aim of finding the potential problem areas. They used several discussion methods: brainstorming, brainwriting, and/or painstorming.

- Phase 2: *Defining the problem*. Filtering/reducing ideas in order to choose one problem out of all suggested that would be the object of each group's innovation project, then familiarization with the nature of the problem, the desired goal. For this task, the students used discussions, reflection, 5 times WHY technique, etc.

- Phase 3: *Creating ideas on how to solve the chosen problem*. Production of "the solution paths that define the problem space". As preparation for this stage, the students worked on the worksheets set by the course teacher where they had to think and explicitly define the vision, mission, customer characteristics, and problem solutions. All groups consulted their ideas with the external expert on innovations; on the basis of the experts' recommendation some groups modified their first innovation plans.

- Phase 4: *Creating a prototype*. At this stage, students worked on details of their innovation. *Incubation periods* - As this problem-solving process took place over the whole semester, the students had a lot of space to refocus and leave the problem aside for a while to 'incubate' as they also had to, e.g., study for other course assignments. These periods ended with the final 'aha moments' - ideas on how to move the innovation idea forward/reformulate it, etc.

- Phase 5: *Testing and evaluation*. After creating the prototype, it was tested on a sample of potential customers with the intention of finding out interest in the given product. Then, if possible, the students incorporated the test results into a refined version of the prototype and presented it in front of a jury at InnoLab center.

The stages of problem solving, as implemented and reflected on by the students, reflected the requirements for problem-solving processes (e.g., in Halpern, 2014). For this reason, we can conclude that, from a qualitative point of view, there was a learning process of developing the first sub-competency, namely the competence of **problem solving.**

The course requirement was to prepare the innovation **collaborativel**y. '*Each member participated in the brainstorming with a specific idea. Regardless of whether we had different or similar ideas/ opinions, we were able to discuss them together by constantly asking 'and why?' so we never had a destructive conflict, and therefore we were able to negotiate and agree on a common solution.*'

As the students reflected, they used various forms of problem-solving techniques, combining team discussions with individual work on assignments. In their discussions. They were **questioning their own and each other's views.** They learned to share through their constructive criticism and feedback: '*It was always welcome, so we had no problem accepting it; on the contrary, it guided us to the next steps in the project.*' … *'During our discussions, various ideas and proposals were generated by each team member. However, we had to mutually explain the given proposals, discuss them and finally agree on the best idea/proposal. It certainly helped that we discussed the given proposal until everyone was clear about it.' – 'Even if there were problems or situations in the team where we did not agree on a given matter, we were able to discuss it, listen to each other and understand each other. It helped that we all had the same goal, which we wanted to achieve as best and as efficiently as possible*.'

As evidence of collaboration in their work, the students reflected on the different roles that individual member of the group played in the topic, e.g.:

- Leader/project manager - 'the driving engine of the team' – some groups said they did not have a leader, sometimes identical with the initiator or organizer of the meetings.
- Presenter - a person who was able to answer questions very well and quickly.
- IT expert/technician.
- Note taking, writing records, taking care of the administration.
- Checking formulations, grammar, and word order.
- Illustrator - taking care of the aesthetic aspect of the presentation and prototype.
- Project 'controller' - giving notice on deadlines to process a presentation or submit a final thesis.
- Designing an innovative prototype.
- Designing the presentation.
- Searching for resources.
- Project opponent.

The students tried to work together, balance each other's strengths and weaknesses, and create space for building the relations in the group as a team. In their reflections, they stated that establishment of relations within the team was not difficult for them. They set the rule that they would communicate clearly and transparently with each other and agree on the way of working in a team: '*This fact actually enabled us to work out all tasks with ease, creativity, and without conflicts*.' … 'A*t first we introduced ourselves and everyone said what they enjoy and are interested in, so it was then easier to divide the tasks – who will participate in what*.' … *'From the first meeting, we had no problem talking and expressing our true feelings.' … 'Each member of the team was able to not only express their thoughts, whatever they were, but also politely reject another member's idea that was not so good in their eyes.' … 'There were no conflicts in our team during meetings. The atmosphere of the team was maintained in a good and positive spirit, mainly because of humor, which made the moments at work more pleasant.' - 'It was thanks to fast and open communication, where everyone could express their opinion, and every idea was considered.'*

In their reports, students also identified their struggles and weak areas in their collaborative problem solving which still needed improvement, namely defining the problem ('*We were concerned about whether our idea was feasible and whether we would have a problem with building the prototype later*'); identifying key partners or determining a customer segment; defining the vision and mission; calculating the cost of the innovation; time coordination; preparing the final presentation for the final evaluation in InnoLab in the city where the university was located; communication and involvement of all team members; finding resources and using them; or being in the role of entrepreneurs. So, the students appreciated the advice and assistance from the course teacher and external experts: '*The experts helped us with forming a realistic view of the innovation, creating a prototype, and then testing the application*.'

The students described the process of designing the innovation as a process that really demanded critical and creative thinking**:** '*We think that this process went relatively smoothly. We came up with ideas to a great extent. We had no problem imagining what we wanted to create or improve. We also had no problem creating a presentation, flyer, or website. We tested the prototype on our university educators. So, this step was easy for us as we didn't have to look elsewhere for sources of leads.' … 'It was easy for our team to process the basic information about our innovative product ... Furthermore, we had no problem with the creation of PowerPoint presentations, which we presented at school and at InnoLab in front of their jury.'*

Let us now discuss the data from the *qualitative analysis* of students' reflections on their collaborative problem solving with other experts, namely Halpern (2014):

Although the students followed the EDCCT algorithm of 5 steps set by their teacher in the beginning of the course, the description of the sequence of steps written by the students shows that they understood their principles and used them in harmony with other authors, e.g., Halpern (2014, p. 458), suggesting the problem-solving procedure step by step – and they overlapped with those that the students described.

The same harmony with Halpern's suggestions can be seen in the case of methods used for collective problem solving (Halpern, 2014, p. 491–492). All teams used brainstorming as the basic method for choosing a problem as a group and then for solving the problem. Interestingly enough, several student teams came to the idea of using a procedure mixing individual creative thinking with team brainstorming, which – in a more articulated form – has been described, e.g., by Boddy (2012) and mentioned in Halpern (2014, p. 492) as a 'two-stage method of brainstorming'. Confirmed by recent research, it is a method where in "the first stage, people work individually and in silence, which often produces more ideas than when working in group" and only then do they work in teams. It turned out to be a productive way to generate good ideas that solve problems in the case of our experiment as well.

More advice given by Halpern (2014, p. 497) and arranged by the course teacher in our experiment was consultations with an expert**:** "Sometimes the best way to solve a problem is to let experts do it for us, or at least help us with solving the problem." In our experiment several teams reflected on the experience with the two external experts invited into the course as a very positive, helpful intervention in their problem-solving process. Specifically in cases when they were stuck and were not able to decide which innovation to choose, but also in the role of opponents who did not approve their ideas, showing the counterarguments, and thus turning the students back to find a different variant or solution.

All but one team confirmed that the most difficult part of the whole project was to define where the problem was, which was the precondition to them subsequently finding a suitable problem-solving strategy. And this is yet another piece of evidence for the impact of this experimental course. In the traditional courses, students are often asked to solve a problem – in our case, they first had to become familiar with the context in which they had to define, depict, and clarify it out of the complexity of real-life problems. This capability of situation awareness is another sign of effective problem-solving competence (Halpern, 2014, p. 458). Some teams had to go through 'a crisis' – a situation when they realized that their problem was ill defined, and so they had to go through the painful stage of restating it, which, on the other hand, is a valuable contribution to problem-solving competence development.

Although group work has been an integral part of higher education for decades, often it has not been used/properly used for the purposes of the final evaluation of students' work during the term. In our experiment, a substantial part of the evaluation was based on the result of collaborative work of the students. But, as Halpern says (2014, p. 498), "in real life, problem solving is often done

in groups". The question is why it is so. Some psychologists (Wooley et al., 2010, as cited in Halpern, 2014, p. 498) say that the groups have a distinct, so-called 'collective' intelligence. Depending on several factors under collective intelligence, some groups were "more likely to solve problems than others". Scholars presuppose the dependence of group success "on the average intelligence of the members of the group or even the intelligence of the smartest member of the group", rather than on how they relate to each other. Although in our case we did not search for this data, the recordings of collective discussions seem to confirm that in a case where all group members exhibited fluent, flexible, and creative thinking, the flow of the group's lateral thinking was faster and richer than in groups where only 1 or 2 people showed signs of flexible, critical, and creative thinking. Wooley et al. (2010) also mentioned other factors influencing the level of success of group work, specifically social sensitivity, i.e., how sensitive the students are to other students' moods and whether team members take turns in the discussion, allowing everyone to contribute. Here again, in the case of our recordings of online MS Teams discussions visually showing the actual process of taking turns, it can be said that groups with more rotations of turns came to richer decisions and got more points. Wolley et al. also suggested using appropriate tools (e.g., white boards) for helping the process of collaboration. Our students reported the use of online shared documents that helped them in their work.

Assessment of sustainability and diversity awareness (SDA) competence development

The fundamental content of the competence is given in Chapter 2.3. The need to understand what the terms 'sustainability' and 'diversity' is very important when designing educational activities. Higher education institutions are expected to reflect the new phenomena in which those two terms are in the current era. There is a challenge to promote sustainability and diversity awareness within the study curriculum and in various subjects. As it has previously been stated (Chapter 1), our emphasis has been placed on examining how students are able to understand the complexity of those two terms and how important it is to think deeper about them to discover the causes and interrelated issues and dilemmas.

We suggested a procedure and guidelines which can help raise awareness of sustainability and diversity not only for students but also for teachers. That can foster this awareness as a competence and facilitate its implementation of sustainability and diversity strategies within HEIs. The criteria on which this SDA is based provides us with an assessment tool, helping us examine the knowledge processing and communication within the group when related to SDA.

The assessment of the SDA competence has been performed through four parameters, as follows:

a) **Structural analysis:** describes understanding deeper causes and roots of a situation and problems within the society. Students can break words down into their basic parts to understand the meaning. This process involves text analysis since knowledge of a few word parts can give clues to the meanings of many words. It is also an ability to politicize notions of culture, knowledge, and power, as well as developing an understanding of the source, information, and media manipulation.
   When studying a topic for discussion or writing an essay which should consist of strong arguments and deeper analysis, it is necessary to dedicate effort and time to searching relevant academic resources and read them to obtain foundational knowledge. 72.4 percent of students admitted in one of our surveys that one of the reasons they do not actively participate in discussions is their lack of knowledge and information (Theodoulides et al., 2020).

b) **Open-mindedness and empathy:** describe understanding and accepting the existence of other viewpoints and a willingness to understand each other's worldviews and how these came to be. We do not necessarily expect students to accept all other opinions as valid, but we do expect them to reflect on their origins instead of attacking the personal characteristics of those who hold them. The criterion also includes the skill of engaging in debate and modifying one's own opinion, if necessary, thus contributing to a pleasant and constructive atmosphere.

c) **Praxis:** shows an ability to recognize the importance of cross-sectoral and multi-actor networks within a specific ecosystem**.** This person will attempt to have a dialogue with various actors to participate actively and sensibly in roles and responsibilities they encounter in their adult life.
This parameter was also evaluated in the competence of CPS, where it was mainly related to the work of the team and in the implementation of their project in an external environment. In the context of the SDA competence, the abilities described in this criterion refer to the understanding of the social ecosystem in relation to the topics of diversity and sustainability.

d) **Bias reflection:** describes the recognition of cognitive biases, understanding and reflecting on one's own biases, and identifying their origin (prejudice and stereotypes, cultural dimensions, religion and geographic influence, personal and professional development). The criterion also involves being able to reflect on the consequences of such biases as well as the willingness to minimize negative biases and their effects. Kahneman (mentioned in Chapter 2.2) drew attention to this tendency when making judgments. According to them, people are not guided by rational arguments and precise rules when making judgments, but rather heuristics. They are simplifying judgment rules, allowing for quick judgments to be made, often accompanied by a subjective belief in their correctness. These are cognitive biases. The extensive list of various types of cognitive biases accounts for around 180 different cognitive distortions.

The key dimensions of assessment of critical thinking criteria provided the assessment of the SDA competence – of what works, why, and in what form and context, highlighting intended and unintended results. Using CRA, the group discussions have been analyzed and some criteria have been observed in more competences but in a different context, i.e., related to specific transversal competence.

Quantitative assessment

Two topics were prepared to analyze and discuss for the first and second measurement of the parameters. The first one, conducted in person, was related to Agenda 2030, where the examples of specific Sustainable Development Goals were searched and analyzed. The seminar where the second measurement was performed was organized online, and the prepared topic was related to diversity issues. This seminar was scheduled as the last one at the end of the International Management subject, i.e., after several different seminars and assignments in which a group of around 70 students participated. This was extremely important because topic diversity was rather unknown to students. However, it is a very complex and broad topic; therefore, it might be challenging for a teacher to decide on: what context to prepare, what series of various assignments will help students to gain key knowledge, what teaching approach will be the most suitable in relation to critical thinking skills, and finally what the expected learning outcomes are.

Table 9 shows the increase in each parameter, showing that students have made significant progress in SDA competence.

Table 9 Key parameters for SDA competence

Parameter N=60	First (pre-test) evaluation total score (n=59)	Second (post-test) evaluation total score (n=58)	Progress
Structural analysis	15	25	10
Open-mindedness and empathy	14	23	9
Praxis	2	20	18
Bias reflection	2	18	16

Source: authors

However, it is important to say that abilities related to the parameter 'praxis' were limited to being evaluated in the pre-test assessment due to the content of the first seminar, i.e., the assignment and performed tasks. This fact confirms the claim that if we want to develop TCs, it is necessary to carefully prepare the content of the subject and especially the activities and forms that will be focused on the specific competence. This occurred during the second (post-test) assessment where one group obtained a high score of 4, and three groups scored 3. On the other hand, there were 7 groups which received the lowest score of 1 and 0 points.

The abilities of students to understand the external environment and different actors were mainly enhanced in the third evaluation during the innovation project assignments and via the Action-based reports, which were qualitatively assessed.

The second highest progress was achieved in students' ability to recognize the **biases**. Such an improvement can be attributed to a separate seminar focused on cognitive distortions, clarifying their nature, introducing several types, and especially their practices, since the students had never encountered descriptions of cognitive biases anywhere.

What can be considered as significant evidence of the improvement of this parameter is the evidence that while in the first measurement 10 groups out of 12 had zero skill in bias reflection, in the second measurement there were only three groups with zero points. The highest score during the first evaluation was 2 points, which was obtained by only one group. At the end of the semester, there was one group with the highest score of 4 points, which can be attributed to the students' clear identification of the biases as well as the recognition of their origins and discussion of how it impacts on our behavior.

From student (No. 60) feedback surveys conducted in December 2021, 85 percent of students stated that they can recognize cognitive biases in their thinking and 81.7 percent said that they know where those biases come from.

Based upon the results from analysis of the qualitative information, it can be confirmed that even this ability has progressed but there are still shortcomings in recognizing the different biases. The qualitative analysis showed that some students had serious deficiencies in their thinking and reflection in the context of engaging in stereotypical thinking and having some level of prejudice, which is significantly influenced by cognitive distortions.

The parameter **'structural analysis'** has also been observed in DMIL competence, and its progress was presented.

The students' interest in sustainability has been noticed through their choice of related topics for their essays. The topics of 'greenwashing,' impact of fast fashion on the environment, and climate changes due to globalization were represented by 44 percent, and topics on diversity were represented by 10 percent.

When evaluating this parameter within the context of the SDA competence, the most important abilities are associated with understanding the 'big picture' concept. Skills of structural analysis within the context of sustainability and diversity are visible when the current political, economic, social, and legal issues are understood in mutual interconnections and deeper roots of societal problems are identified. Also evaluated was the matter of whether students have fundamental knowledge and understanding of the role of global institutions, which can play crucial role in dealing with sustainability and diversity issues. While in the first measurement four groups did not show any ability for deeper analysis and understanding of contexts, in the second measurement it was only two groups. These abilities were noted in the qualitative analysis, where they will be explained in more detail.

When the topics of sustainability and diversity were introduced within the subject content, it was naturally expected that these topics would catch students' interest and that various points of view would be discussed. Based on such a premise, the '**open-mindedness and empathy'** parameter was defined. The results from the first measurement are surprising, where the highest score rating was 2 points and only 5 groups out of 12 got them. Three groups received zero points because there was a complete lack of opinions presented in their discussion. The participants passively agreed with the first opinion that was voiced in the group. Open-mindedness is not described as 'agreeing with everything,' but rather showing understanding of origins of different opinions and the ability to lead discussion in a non-violent way towards some meaningful conclusions. In the second measurement there was one group which scored 4 points and three groups which scored 3 points.

In the survey, 98.3 percent of students stated that they are more receptive to the opinion that not all of us have the same conditions and quality of life. Also, 93.3 percent stated that they are more aware of diversity and otherness in their surroundings. This will be critically confronted on the basis of observations and research evaluation in the qualitative analysis.

Qualitative assessment

Even though the topics of sustainability and diversity are beginning to receive more attention in the environment of HEIs in Slovakia, they are taken up in educational subjects as marginal topics. The intent of our research was to examine them in the context of the topics of the subject of international management and thus prove their cross-sectional nature, and to simultaneously examine how the development and understanding of these topics overlap among students who were experiencing them in the formal curricula for the first time.

The topic of sustainability was incorporated within the first seminar through the subject of International Management, which was presented as an assignment related to Sustainable Development Goals. The objective was to search for a specific case study or example and, based upon the information provided, to justify its fulfillment of the SDG's focus. The key principle of evidence-based findings was expected to provide a result of an individual analysis. The topic of diversity was prepared for the last seminar (second measurement), in which students were asked to discuss different model situations. The discussion followed the structure, which is presented in Table 6, and students were asked to provide a solution as well as to submit a short analysis.

Within the parameter '**structural analysis,**' the evaluation was focused on the students' ability to perform deeper analysis and show their understanding of the causes and roots of the dilemma or topic discussed. Students were asked to present their examples to other group members and mutually agree which ones met the SDG Agenda the best and why. Some discussions lacked deeper analysis. In some groups, the suggestion *'Let's take a closer look*' was heard, but further detailed considerations did not occur.

In some cases (groups with higher score), there was an observed effort to think about possible causes and impacts. It occurred in examples concerning the innovations and use of technologies that can make life easier in some developing countries.

Those groups' discussions which scored lower points (1 and 2) remained in a rather descriptive mode. They described an example on the SDG but did not explain why they thought that what they found satisfied the specific area of the SDG well. They often settled for general information from an external source where the SDG topic was mentioned.

The group which scored the highest (3 points) in the pre-test assessment provided a detailed analysis of chosen examples from various sources. They also sufficiently discussed the topic by adding more data and information, e.g. '*What else can be used? How does this information connect to...?*'

In order to understand the deeper causes and roots of a topic and how it can be discussed in various areas such as legal, economic, cultural, and social, the post-test assessment focused on several model situations to be discussed and suggesting a solution. The discussion was guided within this structure:

1. *Reaction (What immediately needs to be done at the given moment?)*
2. *Background (What is the cause of the given situation? What circumstances could have caused it?)*
3. *Strategy (What can be done in similar situations, and how can they be prevented? How can they be coped with?)*

The model situations were related to various issues of diversity such as gender, multiculturalism, and LGBT and ethnic communities. The second observed seminar provided interesting findings. In most cases, the groups started to discuss the model situation with very general comments, referring only to written information in the provided text.

During the second task, where they were asked to analyze the 'background of the situation,' their understanding of the broader context ('big picture' concept) was expected to develop. The model situations were aimed at enlarging their way of thinking to start to realize the current societal problems which might cause the envisioned problems. These attempts are related to the parameter '**praxis**.' Since the model situations described instances in which 'diverse groups of people' such as Roma, foreigners, or the LGBT community find themselves, we assumed that the students would share their experiences with these people.

The highest score of 4 was received by just one group in this observed parameter. The group discussed gender equality, where the legal, economic, cultural, and societal issues were considered.

Students (both male and female) surprisingly connected the tradition of 'šibačka' - beating women with a stick" (our free translation) during the Easter holidays as a custom that puts women in an unpleasant situation, and they considered it very violent.

The groups with higher score (2 and 3) showed the effort to raise questions such as '*What are the missing institutional or legal procedures? Why is there no intention to improve or change some stereotype?*' but they were lacking in their search for answers. Moreover, additional causes or roots of the described situation were not mentioned.

Those groups which scored the lowest did not show understanding of a societal dilemma or problem. The students focused very narrowly on only the specific moment presented in the model situation. They did not show an understanding of what the problem stems from, nor the broader context. They were preoccupied by *'what to write down'* as the preparation for their presentation, with them commenting *'this is enough, there is no point to talk more.'* Some comments were very limited, for instance '*this is how it is in Slovakia,'* but there was no intention to search deeper into the question 'Why is it so?'

In some groups, there was an awareness of the existence of prejudices in society, e.g., against the Roma, but the discussion very quickly turned into general statements and clichés, without a deeper analysis of the background. There was rarely a hint of a different point of view in the groups; everyone quickly agreed on the analysis as well as on the solution to the situation.

The third assignment, 'innovation project start-up,' which was qualitatively evaluated based upon the Activity project report, aimed to map the students' views on sustainability and diversity. There were nine innovation projects prepared, all of them focused on creative ways of using ICT with the intention of improving the quality of life of a selected group of customers. The extent to which they met the criterion of sustainability was justified in a very general way in the final Activity-based project reports.

'We live in a very hectic and accelerated world. Our innovation reflects this and tries to simplify the life of our customers…. Pollution of the planet, global warming, and sustainability are very discussed topics. We tackled this challenge in our innovation and tried to contribute in a small way to improve the situation.'

On the other hand, the innovation project was a great challenge for the students. Several criteria were set which the project had to meet, as well as a few rather demanding required outputs to be produced. The students' understanding of the 'big picture' concept related to sustainability was examined throughout the analysis based upon the structure of the following questions:

Q1: How do you see the sustainability of your idea and on what basis do you claim it?

Q2: What societal (and also global) challenge does your idea reflect on? Argue based on facts, data, theory...related to your product/service that you have stated DMIL competence.

Q3: On whom (stakeholders in a wider context) does your idea have an impact and how? And in what and how does that manifest?

Q4: What do you see as the limitations of your idea from a sustainability point of view? How could they be solved?

We will present the essentials of the provided answers (A1 to A4) to those analytical questions, which will demonstrate the difficulties we have identified among the groups, in the context of the structural analysis parameter.

A1: The students saw the sustainability of their project mainly through energy savings, waste reduction by eliminating food waste, or by using ecological material.

A2: Very vague and general opinions were presented in response to this second question. There was a lack of data or concrete information that would help them to understand the broader meaning of their idea. In two projects, they referred to the SDGs, namely responsible consumption and education. However, even these challenges were not supported by data, statistics, or facts.

A3: Here they named who the stakeholders were and how they would use their product. In the second part of the question, they should have focused on considering what impact their product/

service would have on individual interest groups. In neither group was there even an attempt to demonstrate an impact or a suggestion as to how it could be monitored.

A4: They saw potential limitations related to sustainability in the use of ICT and rapid obsolescence of technologies, in the demandingness of updated versions, in competitive products, and in marketing.

When evaluating the parameter **'open-mindedness and empathy,'** a variety of different points of view was expected to appear in discussions. Those groups which scored a 3 expanded the discussion by adding more information (sometimes their own experience as well) to discuss the situation. If the discussion spread in this way, after some time the group members started to discuss the topic more boldly. There was an effort to discuss the situation from several angles, but sometimes the discussion deviated from the essence of the problem.

In one group's discussion, a qualitative shift was noticed. At the beginning of sharing their first impressions from the model situation, the discussion was very superficial; many stereotypical opinions were even voiced about the position of men and women in society. However, when one member recalled a lecture with data on gender inequality in Slovakia, other members of the group began to talk about what gender stereotypes and economic inequality they had encountered. The atmosphere remained constructive, and it seemed as though the group members enjoyed the discussion.

The group which scored the highest number of points (4) showed an interest in the topics and respect by listening to each other. All the members were leaning towards the speaker, fixed their eyes on him, and nodded approvingly, creating better relationships. Students' monologues were interrupted by curious questions focusing on specific topics, impacts, and knowledge about the results, thus providing a better understanding of a given problem. Questions were raised without any hesitation and answered with information about the source. There was very dynamic interaction between the group members.

However, in most groups, questions were not asked at all. On the contrary, students showed a tendency to agree to another proposal very quickly without asking for more detailed information or at least developing a discussion.

Such a scenario was clearly demonstrated during the second seminar, which took place online. In the groups with a low point evaluation, cooperation or interest in a pleasant atmosphere, which would result in a good result of the assigned task, was not demonstrated.

In several studies focused on Generation Z, it is stated that they are more open and sensitive to injustice. At the same time, it is characterized as more liberal, which is reflected in their attitude towards the LGBT community.

According to our observations, some students adopted a social narrative based on prejudices and stereotypes regarding both LGBT and non-empathic attitudes towards Roma in society. The comments '*Why does the LGBT community bother society?... What do they want?*' were explicitly stated by a member of one group.

The criterion of '**cognitive bias reflection'** was at an extremely low level in the first observation, with a total score of only 2 for all groups. The group discussions over the materials that the students had processed demonstrated a complete absence of awareness of any bias. They seemed to lack the knowledge of what their cognitive biases were, and more specifically how to distinguish them, as well as how they were influencing their way of thinking.

On the other hand, after several lectures and seminars conducted during the semester, the progress measured in this parameter was significant. Students started to recognize the prejudice

and stereotypes which originate in mono-cultural society and are also influenced by the religion and traditions that are still strongly evident in their home country. Some comments provided evidence for the improvement of bias reflection: *'How do migrants feel in small towns where people are staring at them?' 'It is extremely difficult for foreigners here…'*

There were several biases evident in students' way of thinking, for example: *confirmation bias* in their tendency to search for, interpret, focus on, and remember information that confirms their opinions or the ways they have tended to think '*innovations are always good'* or *'Roma people are abusing our social system and they do not want to contribute."*

Another bias called *Authority bias* or obedience to authority describes the human tendency to give more weight to the opinions of authorities and to be much more influenced by opinions like *'multinational corporations' innovations are matching SDGs because they say so.'*

The Dunning-Kruger effect (the tendency of unskilled individuals to overestimate their own ability and the tendency of experts to underestimate their own ability) was observed in the students' simplistic way of thinking. After attending the seminar on cognitive biases, they were able to recognize it (85 percent claimed this in the questionnaire).

Even though there was progress in this parameter, the qualitative evaluation of their discussions together with their work on the projects and essays showed us that there is still a lot to do in their bias reflection.

Assessment of learning to learn and continuing to learn (LLCL) competence development

Learning to learn and continuing to learn competence is a complex of multidisciplinary and cross-disciplinary functions which were examined in our research throughout quantitative and qualitative measurements of eight parameters. In other words, this competence synthesizes the results from the previous evaluations since in each transversal competence there has been emphasis on developing new abilities represented by those specific parameters. We were inspired by the mentioned basic principles of the theory of constructivism in the formation of teaching and learning activities which were structured to encourage and empower students to reflect on their own development. The structures of those that were an essential part of our research are described in section 3.3. As Cottrell (2005) stressed (mentioned in 1.4), learning development highlights social and experiential factors in learning and different learning forms were developed during the researched period which generate opportunities for students to experience something new. It can include what and how they learn, how context affects their learning, and how students' individual approaches and their participation within the group/team impacts on their learning experience. Moreover, what the learning environment is and how the higher education environment influences learning and supports continuous learning is also important to consider. This is discussed in more detail in section 4.2, where the final thoughts on transformation of HE in relation to transversal competences development are presented.

For this reason, our thesis is that LLCL's competence is multifaceted. In our research we demonstrate this through the interconnections between all investigated competences as well as via several learning concepts which were implemented when examining those four transversal competences. Before showing the results of our measurements, we first explain the arguments of this thesis (based on theories in 1.4 and 3.3):

Critical thinking and problem-solving skills have repeatedly occurred in several reports mentioned in previous chapters and sections (see Chapter 1 and 3.3) and have been called some of the

most important skills that students must possess to cope with technological and informational development and to compete in a global world.

Transversal competence collaborative problem solving has already been evaluated and presented in section 4.1.2. Problem-based learning has been implemented in our teaching activities as a way of learning with and through problems and challenges. In our earlier reference to Pyper (2021 – in Chapter 1.4, we have already shown that PBL includes several dimensions of learning goals, such as constructing an extensive and flexible knowledge base, problem-solving skills, self-directed learning skills, becoming effective co-workers and intrinsically motivation. This was also in our qualitative evaluation of the LLCL.

This way of learning establishes a collaborative learning environment in which learners themselves define the problems/dilemmas to be analyzed and solved, then make the right decisions. It satisfies the learner-centered approach in teaching and learning because learners feel in control of what is happening, and their learning skills develop to a great extent.

The development through active reasoning (as an essential component of the digital, media, and information literacy competence) and purposeful solution of cognitive tasks (sustainability and diversity awareness competence) can be established via ***activity (action)-based learning***. According to this approach, it is of the utmost importance that science presents itself to the learners not only as a system of knowledge that has already been built but also as a system of characteristic problems and tasks, which may present possible ways for their solution. At the core of the activity-based approach, the purposeful action, hands-on experience in a dynamic and real-life experience interacting with various actors, is identified as the most important learning factor (Reis, 2011, Blank, 2013, as cited in Laptev, Shaytan, 2022).

The activity-based approach has been used in designing the fourth research activity, which was an innovation project.

Another innovative way of learning was established by implementing ***design thinking,*** which was introduced in the sciences by Simon (1996) and later expanded on the innovation creation and organizational change by Brown (2009) and Martin (2009). It refers to the human-centered approach to problem solving and creation of innovation (Laptev, Shaytan, 2022).

It can be described as a non-linear, iterative process that teams use to understand potential users, challenge assumptions, redefine problems and create innovative solutions to prototype and test. It involves five phases – empathize, define a problem, create an idea, prototype, and test; it is most useful in tackling problems that are ill-defined or unknown. Those were implemented in a process of innovation (start-up) creation in the innovation project.

Due to the growing complexity of tasks, globalization and fast-moving innovation, the source of creativity appears in the diverse knowledge produced by a group of individuals or a team. Therefore, another learning approach makes it possible to collaborate and learn from each other, which is established in ***cooperative (collaborative) learning***. It offers positive interdependence, individual responsibility, interaction within the team, gaining social skills, and group reflection (Johnson and Johnson, 2014) and it has been described more specifically within the already proposed transversal competence collaborative problem solving.

Psychologist David Kolb (1984) defined the learning process based on experience where reflection is a key element. The educator's role is to create a learning environment so that the student can move on to the next phase and not be required to go through the same experience without changing their reflection on learning (Moon, 1999).

Reflection is therefore related to thinking and learning and plays an important role in deepening these processes. It has been considered as a means of overcoming more common thought patterns that allows for a critical attitude and perspective (Moon, 1999). Reflection means thinking and self-knowledge, considering circumstances and contexts.

It is one of the forms of the intellectual processing of knowledge and its understanding. It also involves emotions in reflection (Theodoulides et al., 2020, p. 78), especially when reflecting the cognitive distortions as the key ability examined within the sustainability and diversity awareness competence.

In the context of LLCL competence development, the process of learning together with our approach on how to evaluate this competence quantitatively and qualitatively is discussed further.

Quantitative assessment

Three transversal competences were evaluated according to selected parameters. As shown in Table 10, except for the two parameters, i.e., digital, media, and information literacy and questioning one's own view and developing group relations, progress was recorded in all other parameters for the monitored students. In some of the studied parameters, the improvement was significant, and that is why it is very important to analyze the factors and present their impact on the individual monitored parameters and therefore also on the monitored competences.

Table 10 Progress in learning to learn (N=60)

Parameter N=60	**First (pre-test) evaluation total score (n=59)**	**Second (post-test) evaluation total score (n=58)**	**Progress**
Information, data, media analysis, and reasoning	20	19	(-1)
Structural analysis	15	25	10
Open-mindedness and empathy	14	23	9
Making judgments upon arguments	13	20	7
Problem solving	9	26	17
Praxis	2	20	18
Bias reflection	2	18	16
Questioning one's own view and developing group relations	23	22	(-1)

Source: authors

We have found that despite the expectation that the younger generation is digitally skilled, the groups struggled with providing deeper information analysis and using more academic relevant

resources on formal courses. There was also a shortcoming observed in their abilities to search and sufficiently use 'key words' by using academic ICT tools mainly offered by university libraries. Their reasoning based on relevant data and facts was insufficient. This was also reflected in the next monitored parameter 'making judgments upon arguments' which recorded the lowest improvement.

The second parameter in which no improvement was recorded was in the parameter 'questioning one's own and others' views and developing group relations' Having an interest in asking probing questions as well as leading a group discussion through questions has long been perceived as an uncommon quality in higher education students in Slovakia. Our observations confirm this. Being able to constructively discuss what facts the different views stand for, and their origins is related closely with the previous parameter. So, there is proof that without solid academic knowledge, relevant resources, and training to raise questions, the discussions in classes will remain general, vague, and meaningless.

The significant improvement in the parameter 'bias reflection' was related to a very low rating in the pre-test, which was because the students had no prior knowledge about cognitive biases, how they affect our data analysis, and how they affect our reasoning.

The significant progress in the 'praxis' parameter was related to the fact that the content of the first evaluated seminar did not provide any opportunity for students to demonstrate the abilities described in this parameter. This confirms the claim that the learning process is not a random, ad hoc activity, but must be carefully thought out and planned.

This is confirmed unequivocally in the 'problem-solving' parameter, where, even though in the first evaluated seminar the students had to jointly analyze SDG examples and choose the one that was best related to this agenda, in the second seminar, they were given specific model situations where the problem-solving process was explicitly determined.

If we want to examine the learning process and student development in individual parameters, it is most succinctly presented in the Appendices B and C. Through points from 1 to 5, and especially through a qualitative description, the skills students have to demonstrate in individual points, or their progress, are described. Such a connection of quantitative and qualitative assessment is offered by the CRA method.

Despite the overall significant improvements in individual parameters, in the post-test assessment at the end of the semester, there were groups that were evaluated at zero, that is, no investigated ability appeared. No group would earn the maximum of 5 points. The number of groups with the highest and the lowest score in each parameter is presented in Table 11.

Table 11 Highest and lowest scores in the post-test assessment

Parameter N=60	Number of groups with the highest scores	Number of groups with the lowest scores
Information, data, media analysis, and reasoning	3	3
Structural analysis	4	1
Open-mindedness and empathy	4	1
Making judgments upon arguments	4	2
Problem solving	4	1
Praxis	4	1
Bias reflection	4	1
Questioning one's own view and developing group relations	3	4

Source: authors

The evaluation of the essay assignment, where many essays were scored with the highest points, provides evidence of a successful learning path. It was continued by the innovation projects, which were evaluated by three external experts. Of these projects, three were assessed to have received the lowest points, three projects in the middle, and three were excellent. One of those excellent projects was accepted by the Slovak Business Agency for future financing in the 'young entrepreneurship scheme.'

Qualitative assessment

As part of the qualitative analysis of LLCL competence, our intention is to provide a closer view of its systematic formation during the investigated period and individual activities that were part of our research.

At the same time, we will present the students' reflection on their motivation in the learning process during the studied subject International Management as well as during the implementation of their innovation project, which they've presented in the Action-based reports.

The changes in the course design and teaching activities have been intended to focus on the student-centered learning process. In Table 12, the content of the two evaluated seminars is presented where emphasizing the students' participation and active involvement in their reflection was a key objective.

Table 12 The content of the seminar

Opportunity to learn	Learning through developing critical thinking	Reflection focus
First assessed seminar **(pre-test)** The goal was to analyze examples of the implementation of individual SDGs in different countries based on secondary sources.	*Based on what information, data, facts... Do I argue or claim that my example is related to the SDG agenda?* *How and in what way does your chosen example fulfill the content of the SDG goal?*	*Has your understanding of the SDGs changed? In what way and how? What helped you?* *What new or different things did you realize?* *How will you use it in your next study?* *What other experiences did you gain while working on this assignment, both individually and later within a group?*
Second assessed seminar (post-test) The aim of the discussion was to share different points of view with each other, to talk about how we perceive the topics of diversity or 'otherness', to recognize argumentative fallacies in texts, and to be aware of one's own cognitive biases.	*What argumentative fallacies and cognitive biases have you spotted in your posts in the 'Hate library'? Please be specific.* *What information, data, or facts would you look for if you wanted to better understand the topic?* *Where do you usually look for information? What resources do you use?*	*What are the first questions that come to mind?* *What are your concerns? What conditions them?* *What factors influence the misunderstanding of diversity and the hatred towards otherness/diversity?*

Source: authors

In discussing our results in this competence with theories of learning it is important to mention several facts. When learning is happening, the human mind processes stimuli or information in different ways and deals with tasks in different ways according to their complexity. That's why we present cognitivism as a theoretical approach known from psychology focusing precisely on cognitive and mental processes. Cognition is a term that includes the processes of perception, remembering, imagination, reasoning, speech, and thinking, as well as the processes of receiving and processing information. The cognitive side of learning means that if a person learns something, he or she must perceive, understand, and remember it (Turek, 2008). According to Kalechyts (2018), the main task of teaching is to develop students' cognitive abilities. To achieve this goal, the author recommends teaching new learning material primarily using the induction method, mastering it by understanding rather than memorizing, and developing students' communicative skills.

Such an approach was evident during the groups' work on their innovation projects. Through reflective questions, we found out what the students perceived as the most important element of learning and what strategy and approach to learning they chose. The structure of the reflective questions was a key part of the LLCL competence in the Action-based report. The answers to those

questions were required from each group member. The summary of the key highlights from the students' reports are presented below together with some students' quotes.

There were structured as follows:

1. What or who most influenced your interest in learning something new in this project? Please specify.

The teacher's approach and the content of the subject was very innovative because the emphasis was placed on the students' active involvement and practical work in the external environment on individual tasks. There was also the possibility to consult partial assignments with two experts from practice. Their expertise in ICT, start-up businesses, and informal consultations was highly appreciated by the students.

> **'***One may think that he or she is perfect, proficient – that he/she thinks about every issue and every topic sufficiently. But at each seminar I found out how much there is still room for improvement. Constantly thinking about every single situation, I asked myself a lot of new questions that needed to be answered. I learned to work in a group, or better said, in a team'.*

2. What was your most significant learning experience in this project? Why should this particular learning experience be considered meaningful?

The entire process of innovation creation and gaining practical experience from business was mentioned several times. Another learning experience was related to presenting innovation in the external environment for the first time. It was organized to take place in the InnoLab venue in front of a jury of three members. Some students admitted that this was a test for them in terms of time management and self-management.

> *'Being able to come up with an idea, justify my own reasons well enough, meet people from practice, and get feedback from people who are engaged in business'.*

3. Through which activity did you gain new insight/knowledge? What specific insight/knowledge was it and how did it manifest itself?

Here, specific methods were mentioned such as design thinking, divergent methods of thinking, 5 times WHY, the Pecha Kucha format for presentations, and digital tools like the Pencil app and other Apple applications.

> *'Presenting something new in public in front of 'strangers' who are even experts from practice – who know the 'what' and 'how.' It gave me confidence.*
>
> *But what I want to mention is that this whole Innovation Management subject gave me a lot of knowledge and insights, especially the creation of innovative products by using design thinking, since I had never created something like that in my life. I thought creating something new was completely easy, but after this experience I know that it takes a lot of hard work and perseverance'.*

4. Which skills do you think you have developed the most and on what basis do you think so?

The skills and experience of teamwork was stated very frequently. Even though the teams were created by the teacher and the students did not know each other personally after two years of online education, all teams declared that their teamwork was very good, and they learned a lot about themselves and about how to communicate with other team members. They've mentioned that listening and respecting each other when they were discussing the project were important skills within their team.

Students stated that their creative thinking and presentation skills were improved along with analytical and time management skills.

> *'Working in a team, as I personally don't prefer working in teams, but I felt really good in this team, and it was a pleasure to work with such creative people. The next one I would mention would be improving my presentation skills'.*
>
> *'Critical thinking. I think this is because the entire process of creating our innovation project meant „looking at the same thing from multiple points of view". Every single thought or idea still had „two sides of the coin" and it was necessary to think about it and deal with more and more questions that began to arise in one's mind. In addition, it was also teamwork, which moved to the online space during the pandemic, so it was great to work again in person, thanks to which I got to know better people whom I only saw in the corridors or as whatever icon in MS Teams'.*
>
> *This course really helped me and showed me that you can go beyond the limits and not be afraid to experiment with innovative ideas. I also think that I developed creativity, which I mainly used when creating an idea. My technological skills have improved as well'.*

5. Has your previous approach or attitude towards learning changed? In what way and how? If not, then state why it did not happen.

All students stated that they had experienced such a way of learning for the first time. It brought them to a lot of discoveries that learning can be done in a non-traditional way.

Learning through practical experience and solving individual parts of the project using ICT, which was a big challenge for many students, turned out to be fun in the end.

> *'I experienced this style of learning in this subject for the first time and it should be practiced in several other subjects'.*
>
> *'Yes, it has definitely changed, because in many subjects, I had asked myself why I was learning it, because I wouldn't use it in life'.*

6. What key conditions or factors occurred (in the team, during seminars, in your personal settings) that enabled your learning (not only acquiring new knowledge or skills but also perhaps changing your attitude, behavior, or approach) to take place?

The most valuable factors were repeatedly stated among most students: several opportunities to meet, discuss, and get feedback from the experts from the practical world. Their coaching and leading the students towards the final results was mentioned as their first experience working so closely with practitioners and was considered crucial for their learning.

Another key factor was teamwork – the long and frequent team meetings, almost all of which were done via MS Teams, and meetings in person during seminars. The collaboration of each team was very effective, constructive, and enjoyable for the team members.

> *'Presenting our innovation project in front of people from practice was inspiring for me, due to the reason that I learned to accept feedback'.*
>
> *'The key factor was mainly teamwork. In our team, we were able to work well together, and we complemented each other well, because each member of the team excelled in something different'.*

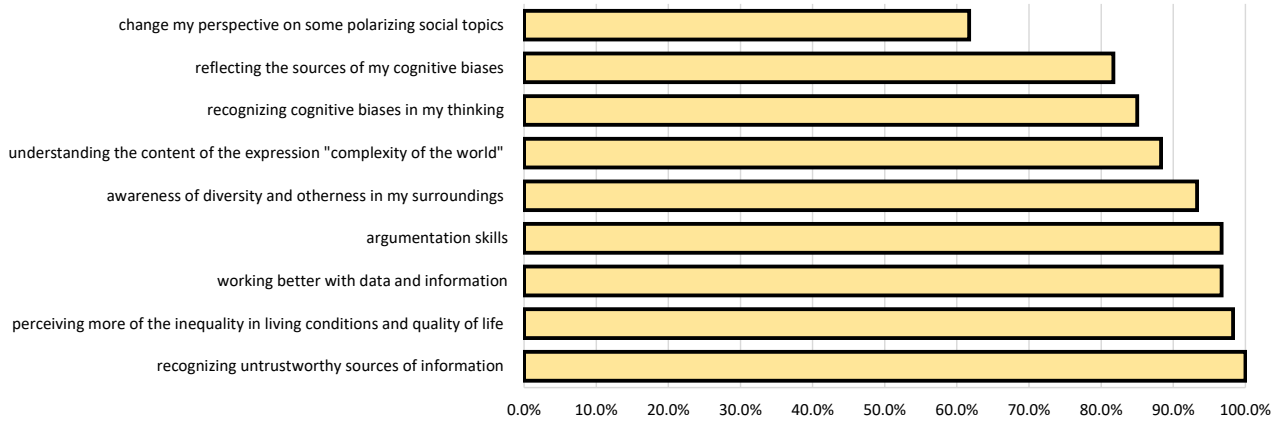
4.2 A novel approach to designing a framework of transversal competences

The above-mentioned few learning principles and approaches (of course, there are many more) all examined transversal competences which can be seen as opportunities for the manifestation of students' aspiration and ability to realize their potential (their knowledge, skills, experience, attitude, and personal qualities) in a successful, creative, and productive way. Transversal competences are formed, developed, and manifested during an activity because, as opposed to generalized universal knowledge, they have a profoundly practical and dynamic character.

In this perspective, learning through systems of cognitive educational tasks must first focus on the cognitive work of the learner so that the relevant transversal competences are built in the process of their implementation. Teaching is effective when it corresponds to the level and skill of the learners and follows their improvement, gradually transforming into unobtrusive support which runs parallel with the development of students' autonomy. The learner is the subject and the main actor in the process of education and transforms it into a social space for learning and interaction. Ensuring autonomous learning is in line with the understanding that knowledge is not transmitted directly by passively perceiving during teaching but is built through an active dynamic process in which input information is subjected to transformations depending on the students' prior knowledge and their personal learning style.

Some skills related to the researched parameters of the TCs have been examined after the post-test assignment. The survey asked students to reflect on what they had learned. The self-reflection of the target group of 60 students presented in Fig 4 provides us with a valuable opportunity to further investigate the experience of students engaging in the various class activities, its impact on their knowledge and obtained skills, and most crucially, to compare that with our research results.

Figure 4 Survey results: What do you think you learned during the period under study? (N=60)



Source: authors

The survey outcomes show that students develop a strong ability for data analysis and performing relevant resource searching. Another highly valued set of skills learned by the target group were the argumentation skills. It opposes our evaluation results of the parameter 'making arguments,' which showed a very small increase of only 7 points, with 3 groups which were assessed at zero points at the post-test assessment. Both abilities were examined within digital, media, and information literacy, which, as a complex set of specific skills, did not show progress (-1).

When the question '*What do you think you learned from it?*' was raised in the survey in order to discover the sources of students' learning, the 'active participation on all assignments and the discussions with colleagues' came out as the two most useful sources.

The discussion with classmates was again ranked first in response to the question '*What helped you in your learning regarding the content and topics within the subject?'*

Within the parameter *'Questioning one's own view and developing group relations*,' the content and quality of discussions between students were evaluated. It examined how they asked each other questions, how they clarified who and what they were talking about, and why they thought so (see the description of the parameter in Appendix A). We did not notice any improvement in this parameter, which is indicated in Table 10.

It was interesting to note the high level of reflection upon developing the awareness of diversity and realizing the inequality which relates to sustainability and the diversity awareness transversal competence.

These findings revealed significant discrepancies between students' self-assessment and the results of our evaluation. Students did not receive a precise description of individual parameters before the survey was conducted, nor was the reflection on learning organized. This resulted in them having insufficient knowledge of what it means to work with data and facts and how to use them in argumentation. At the same time, it points to the fact that it is very important to justify exactly what is to be evaluated, by what criteria, what the content of the individual criteria is, and so on.

While these students' views undoubtedly remain important, a new paradigm of development of transversal competences introduces a whole new set of issues which need to be addressed.

Care & Kim (2018) claim that providing evidence about the increase of 21st century or transversal skills in the educational process is still in its infancy. Assessing their development in the classroom

has been a major challenge for teachers, especially in the case of multidimensional transversal skills. One of the problems is how to ensure that the school tasks would mirror authentic life situations 'across different contexts' in which they are to be applied. So not only should the tasks develop the transversal competences, but their assessment should also be authentic. The issue of measurement and assessment of these skills is a specific problem with measuring complex skill sets because of the "difficulty of identifying the degree to which each subskill might contribute unique variance, or the degree to which demonstration of one subskill might depend on reaching some hurdle level of competence in another. Challenges in assessing twenty-first century skills lie in our lack of comprehensive understanding of the nature and development of the skills, about their multidimensionality, and about how to partition variance in behavior that is attributable to knowledge, or attributable to skill" (Care & Kim, 2018, p. 22 & 23).

This book aims to proceed beyond the description of transversal competences and to provide only an understanding of their content. We have dealt with the challenge of how to evaluate them in the context of their complexity through the proposal of parameters listed in Table 5 and Appendix A. The proposed parameters support the opinions of experts as well as various studies processed in the first chapter which assert that critical thinking skills are some of the most essential skills for the current era. It is clearly defined in the rationale of eight parameters, which is elaborated and presented in Appendix A.

The four proposed transversal competences, i.e. digital, media, and information literacy; collaborative problem solving; sustainability and diversity awareness; and learning to learn and continuing to learn were examined and evaluated by those parameters, which confirms our argument that they intertwine with each other, they are formed across several disciplines, and there are mutual connections between them.

By processing and presenting the most influential theories and concepts in the second chapter, we tried to point out the need for a deeper reflection on how we think, what affects us, and especially how we can improve our mental processes.

In Chapter 3, the focus on critical thinking and reflection began. The particular focus has been given to several approaches which indicate the urgent need to implement critical thinking and reflection in processes of teaching and learning in the HE environment.

Based on the findings from the triangulation of the research outputs, the importance of feedback and continuous questioning to support thinking and learning proved to be crucial. The process of developing TCs should therefore be built on *four basic pillars: critical thinking, reflection, feedback, and questions.*

Critical thinking as a way of thinking and as a new life philosophy

Several definitions of critical thinking have been presented in Chapter 3; therefore, there is no need to repeat that. But what we want to show is that merely acquiring critical thinking skills is not enough.

As Markoš (2019) argues, critical thinking equips us with knowledge and several skills that will help us orient ourselves in today's complicated world. He offers the broader philosophical context of this topic, explaining how critical thinking can be developed as a new way of thinking and coping with some difficulties which technologies and the flood of information have brought to our lives.

Moreover, this ability is a continuous, or even 'never-ending' process of sharpening those sets of skills. Such a way of thinking will constantly accompany us and help us find our way. At the same time, this will help us to build an inner strength that recognizes manipulation and lies, which will

give us freedom in thinking. The process of critical thinking is a path that leads people to make effective decisions about what opinion to consciously accept, reject, or suspend action on in order to reach the 'objective' truth.

Why is it so important to begin to form critical thinking as a philosophy of life? It is because human beings are vulnerable in the virtual world. We have become addicted to new technologies, and we need to protect ourselves from manipulation, populism, and conspiracies, and also be able to deal with the cognitive biases and stereotypes which are a legacy of the previous political, cultural, and societal systems.

The world is changing very quickly and the content of some current media (alternative media, social media. and networks) is flooding us with huge amounts of misinformation. Communication with elements of conspiracy and hate has intensified with the emergence of social networks such as Facebook and Twitter, and many new ones will appear where information is spread en masse, quickly, and very easily. According to Šnídl (2017), several new media have been added, for which the term 'conspiratorial' is used, but it is more accurate to call them 'disinformation' media, because not all of them spread only conspiracy theories. They do not work with data or facts, their main purpose is to spread messages that are anti-systemic, they question science and medicine, and last but not least, their narrative is extremely negative. There is so much hate, anger and fallacies that it is no wonder any human has difficulty deciding what to believe and feels powerless to protect themself against that negativism. Understanding different situations and topics in society, evaluating data and information, and sharing and evaluating meaningful experiences which are based upon evidence are great challenges that we all face today.

Critical thinking can be a kind of 'weapon' to give us security and protect dignity, freedom, and even our life. Being able to think critically gives us spiritual power and thus it can be a new philosophy on how to live.

Over the past two pandemic years, the need for critical thinking has proven to be vital. Due to various disinformation media, people stopped listening to experts and began to distrust science. This is a huge challenge for universities, scientists, and educators to restore the public's trust in science.

Scientific thinking is that mode of thinking in which the thinker improves the quality of their thinking – about any scientific subject, content, or problem – by skillfully taking charge of the structures inherent in thinking and imposing intellectual standards upon them. Scientific thinking is, like all critical thinking, self-directed, self-disciplined, self-monitored, and self-corrective. It presupposes assent to rigorous standards of excellence and mindful command of their use. It entails constructive argumentation, reasonings, continuous raising of curious questions, as well as a commitment to developing the intellectual skills, abilities, and dispositions of the critical mind.

Through our research philosophy and strategy, described in Chapter 3, Section 3.1 and 3.2, we have tried to direct students in accordance with the proposed intellectual standards (see Appendix A) on the path of an academic way of thinking and performing. HEIs are expected to shape scientific thinking as well as prepare a capable workforce for the labor market through TC. This can be synthesized in the content of the examined transversal competences by the following recommendations of the well-cultivated critical thinker:

- Raises vital questions, dilemmas and problems, formulating them clearly and precisely (CPS, SDA).
- Gathers and assesses relevant resources, data, and information; understands deeper causes and interprets the results logically (DMIL, SDA).

- Comes to well-reasoned scientific conclusions and solutions, testing them against relevant criteria and standards (DMIL, CPS).
- Thinks open-mindedly, reflecting on their own and other cognitive biases, recognizing and assessing assumptions, implications, and practical consequences (CPS, SDA).
- Communicates effectively with others in proposing solutions to complex problems (CPS).

The competence of LLCL, as defined in the previous section, creates complex and inevitable prerequisites for the formation of other transversal competences. The growing interest in developing TCs has serious implications for learning development. Study skills of resources have generally been organized around traditional learning areas such as note-taking, academic writing, and referencing (Hartley et al., 2011), but only if HEIs want to focus on developing TCs that represent a shift in thinking. That can be described as learning through a process of inquiry, questioning, reflecting, and correcting one's own views all the time, which can be expressed as a continuation of learning which does not stop after graduation.

Feedback as an essential element in professional development

One of the most valuable tools in interactions between teachers and students is feedback. Its function can be seen as an opportunity to provide as well as obtain the information which enables both actors to understand how they perform, how effective their approach and behavior is, and most importantly, what can be improved or done differently. The process of giving and receiving feedback is one of the most essential processes in education. Students need to receive feedback in order to know how good their performance (assessment function of feedback) was, whether it was according to standards or criteria. Therefore, it is crucial to set standards both quantitatively and qualitatively. Referring to Armstrong and Stephen's clarification (2005, p. 236) that feedback should be based on facts, not subjective judgments, the implementation of the method of Critical Reflective Analysis (described in chapter 3) can support this argument. That also means that to conduct a constructive feedback process, hard data and figures must be combined with qualitative assessment and evaluation of the results. That fulfills another feedback function which is a motivational function for students. Students are encouraged to increase the expectations of their work when receiving more detailed explanation on what to improve, but more important is qualitative guidance on how to do it. It can be seen as a communication cycle in which the main aim is to exchange information about the individual or collective performance with those in a position to improve the observed performance, situation, approach, process, tasks, etc. With that being said, it becomes clear that receiving feedback from students is also very important for a teacher. How do teachers know whether everyone understood what was said or what they are required to do? Well, it will be checked during the examination period, but when talking about developing transversal competences, obtaining 'good' grades should be the ultimate objective for neither teachers nor students.

Incorporating feedback into everyday interactions as well as the key elements of the learning process is one of the most important prerequisites to developing transversal competences in higher education.

Since transversal competences are complex, it is crucial that they consist of the development of partial abilities, the degree of achievement of which will reflect whether the specific skill has been developed or not. That was reflected in our research when we examined each TC through parameters that were repeated in multiple competences. Parameters themselves consisted of several interconnected abilities that could make an evaluation more difficult. It will be mentioned later in Chapter 4.3, where research limitations are discussed.

Whitmore (2002) states that feedback is a tool which evaluates reality, proposals, or ideas about improvement and thus helps with real learning. It has been acknowledged by some students in their Action learning report. It confirms that feedback has been useful not only from teachers, but also from experts and practice, thus helping students to obtain better results.

> *'Thanks to feedback and guidance from the expert from business, I learned more about necessary preparations at the starting phase of creating an innovation. He notified us of errors or shortcomings in the field of our project's innovation and thanks to this, I understood that it is important to verify if my idea will be good enough to make it work.'*

The feedback from several different experts expanded the students' way of thinking, considering more views, and seeing the 'big picture' as it has been discussed in Chapter 4.1.

Feedback from experts was provided a few times and it was scheduled carefully within the content of the required assignments.

Feedback from experts in practice is important not only for the student but also for teachers. It will provide them with important knowledge precisely in accordance with the formation of the TC, which is practically oriented to a large extent, as defined in the 1st chapter. HEI cooperation with various actors from practice is essential for the successful development of TC. We deal with this in more detail in Chapter 4.3.

Some steps which have been tested throughout our pedagogical and research activities when implementing feedback in teaching and learning:

- All assignments and processes can be conducted through two-way feedback that is built upon transparent criteria/parameters for assessment and evaluation.
- Prepare the structure and content of criteria in both a quantitative and qualitative way and make them transparent during the whole process of teaching and learning.
- It is crucial to explain the meaning and reasons for implementing feedback as a tool for communication and mutual discovery of areas of potential change.
- Internal as well as external feedback should be conducted regularly and consistently, which can help to establish relations that enhance individual or group motivation for continuous learning and improvement.

The term feedback is closely related to reflection, and sometimes they overlap or cause some debate between scholars on how to distinguish between them and what their role is when developing transversal competences.

Reflection in thinking and learning

In Chapter 3, reflection has been defined with the purpose to establish an introductory understanding of how reflection has been implemented in the research, especially via the method of Critical Reflective Analysis (CRA).

Reflection as a tool has been used continuously when the structure and procedure of the research activities were planned as well as in some of the research outcomes, e.g., activity-based reports. Referring to the work of Hatton and Smith (1995), there is a distinction between dialogic and critical reflection. While dialogic reflection is a less intensive approach consisting of thinking 'What am I going to do? What information would I like to convey? Which method should I use?', critical

reflection refers to efforts for broader historic, cultural, and political values in framing problems to arrive at a solution. Critical reflection facilitates transformational learning that can happen either gradually or from a sudden or critical incident. We intended to implement a critical reflection concept, however, as it was observed during the research results through two main parameters – reflecting on cognitive biases and questioning one's own and others' views – that the students' backgrounds and experiences with reflective learning were very poor.

Referring to the work of Brookfield (2017), modeling critical reflection for students helps them move from dualistic and binary right/wrong thinking towards multiplicity and often divergent thinking. This process involves learning to live with contradiction and disagreement (p. 140). We have implemented a similar approach that was investigated mostly in the parameters 'open-mindedness and empathy,''bias reflection,' and 'questioning one's own view and developing group/team relations.' If we look at the pre- and post-test measurements in those parameters, where the results show minimal progress or extremely low levels at the beginning of testing, we argue that if we want to develop multidisciplined competence, this can be feasible through targeted content and well-thought-out student guidance. The qualitative analysis shows how difficult it was for students to 'question' each other, divert the discussion into new areas, or even to be brave enough to express contradictory ideas. To a large extent, members of the groups did not demonstrate their abilities to check that they understood each other correctly. In a few groups, members did ask questions designed to elicit why those views were held. What appeared more frequently was an effort to summarize each other's arguments into a collaborative group output.

As Brookfield (2017) suggests, introducing a critically reflective process when team members talk out loud informs the way they see themselves working together (p. 141). In our case, when the groups for innovation projects were formed by the teacher, the students did not know each other personally since they had been studying online for two years. Nevertheless, all nine teams stated in their final Activity-based reports that their team performed very well, there were no misunderstandings, and each member participated in the group work. Such reflection can be understood from two points of view. One could be seen as the responsible and active participation of each member, like fruitful discussions where everyone expressed their opinion, even if they could be controversial. On the other hand, mutual consent can mean that one member had been more actively proposing solutions, and the others agreed because they hadn't prepared anything, someone's suggestion suited them, or they had no opinion on the topic discussed.

The growth of the students' intrinsic motivation related to their interest in the studied subject from 56.7 percent at the beginning of the semester to 80 percent at the end of the subject's teaching indicates a positive impact of the subject content as well as the chosen teaching formats, e.g., many discussions, group work, examples from the real world and from various actors.

Reflection in the process of learning can be applied to gain better understanding of relatively complicated or unstructured ideas and it is largely based on the reprocessing of existing knowledge or understanding of emotions. On the other hand, reflection's emphasis on scrutinizing assumptions entails a strong element of vulnerability. It relates to critical thinking skills – that there might be a possibility of discovering assumptions which have been taken for granted for a long time and can misguide us, sometimes understood as 'common sense.' For example, when developing the 'sustainability and diversity awareness' competence, critical reflection can help in the discovery that some familiar problems or dilemmas have been read wrongly for many years (inherited prejudices) and our response to them has omitted a significant and broader perspective (stereotyping or lack of understand of the 'big picture'). That appeared in some groups when discussing the LGBT and migration topics.

As Brookfield suggests, people are more likely to display vulnerability if they feel that their expression of this behavior will be supported. It can be associated with courage to ask for help, or

admitting making mistakes (2017, p. 144). The parameter 'bias reflection' refers to this vulnerability and at the same time offers some advice on dealing with it. If we reflect on the fact that we do commit distortions (even the Nobel laureate Kahneman admitted that he also makes such mistakes), we can recognize them and correct them. This represents a concrete manifestation of the learning to learn and continuing to learn competence. But it is also the hardest thing to do, especially when we are not aware of those biases.

Every interaction shall be supported by the correct use of CRA as well as sufficient use of feedback. In the context of the description of the CRA method presented in Chapter 3, it is essential to carry out in-depth interviews with feedback and reflective questions at the end of the evaluation, and determine what factors, influences, and circumstances were present that influenced the results measured by CRA (both satisfactory results as well as abortive outcomes). We consider it necessary to link critical reflection with feedback to conduct a constructive discussion based upon questions which is supported by quantitative data and qualitative interpretation in TC development processes.

Unfortunately, it seems that in the current era, only charismatic performers or successful/excellent work results are rewarded. Asking questions for clarification or asking for more explanation is often perceived (even in the educational environment) as a lack of knowledge or a manifestation of incompetence. Therefore, when purposely using reflection in the process of learning, it is important to realize that learning from what does not work is on the same path as learning what does work. There must be room for failure in the reflective process.

The right questions for leading the process of critical thinking and learning

Learning only begins when teachers challenge students with real questions that demand a solution (Dawson, 1996), and critical thinking is best observed when students see the value in it and are self-motivated (Dellet et al.).

Therefore, this section addresses the high priority of helping students see *why* critical thinking is important to them, and quickly applying it to questions that are interesting and relevant to their lives (Bomer, 2000), rather than spending a lot of instructional time on uninteresting abstract concepts of learning.

We consider it important to start by pointing out the most influential concepts which we believe give us some guidelines on how to enrich our thinking and learning.

The beginning of the Chapter 2 is dedicated to Socrates and his followers. In addition to the concept called eudaimonia, we return to Socrates when we try to ask questions that force us to think more deeply and thus also develop critical thinking. It is therefore not surprising when we come across the term Socratic dialogue and Socratic questions in literature.

Ricci (2014) proposes a basic method that encourages the Socratic method of questioning, which enables the individual to cross-examine the claims of another individual to determine whether there are some conflicting contradictions or inconsistencies in opinions. If individuals use Socratic questions, they can understand the content and complexity of thinking, which improves their learning process.

Discussion using Socratic questions in the learning process was used to evaluate the process of learning to learn and continuing to learn competence. Asking questions and discussing and raising dilemmas are among the essential activities implemented in the education process at HEIs. It is expected that the teacher, during interaction with students, applies activities and techniques that initiate questioning.

> *'The teacher always asked questions which made us think about our ideas from different views, which always led us to new questions and answers'.*

Every assignment and seminar (see their structure in Table 6) that were part of the pre- and post-test assessment were designed in such a way that searching for a solution was structured to provide answers to several questions.

We can unequivocally state that the activity of raising questions is extremely important for developing critical thinking. However, not every question has such an impact.

According to Browne and Kelly (2015), there are three dimensions of critical thinking which tackle the best use of questions. That refers to a) 'awareness of a set of interrelated critical questions, b) ability to ask and answer these critical questions in an appropriate manner, and c) desire to actively use the critical questions' (2015, p. 20).

Despite the enormous effort and intensive asking of developing questions, progress was not demonstrated in the '*questioning one's own view and developing group relations*' criterion, which monitored the students' ability to question themselves and ask questions of other team members.

We assume that one of the reasons, as we have already mentioned, was the discussion in the online space in the post-test assessment. At the same time, our assumption that the development of critical thinking skills as well as the development of TCs is a long-term and purposeful process was confirmed. To assume that significant improvements will be achieved in a short time, e.g., during the semester, is wishful thinking and an unrealistic assumption of some teachers.

On the other hand, some statements presented by students and findings from their self-reflection indicated that they themselves perceived that the online space did not provide them with good interactions and, on the contrary, there was a lot of mutual questioning during the work on innovation projects in teams.

As already mentioned, some people might feel discomfort from asking or receiving questions and not everyone is comfortable having their argument questioned. Sometimes, one starts to feel uncomfortable or even threatened and as a result they refuse to talk.

Many people are not used to being questioned about their beliefs and values or expressing their views openly. In such situations, Kahneman's System 2, which is presented in Chapter 2, Part 1, will help us. In contrast to System 1, which makes quick judgments based upon what little information is available without any deep, conscious thinking, System 2 has the ability to overrule these judgments and 'slow down,' asking ourselves the question 'Why am I thinking and what am I thinking?' (Browne and Keely, 2015).

The simplest questioning technique is '5 times WHY.' As Schick and Vaughan (2014) observed, in most discussions, we can hear a lot of 'What' beliefs, but seldom any good 'Whys,' as solid reasons behind them. It means nothing substantial enough to justify sharing the beliefs, and nothing reliable enough to indicate that these assertions are likely to be true (p. 2).

We might be under the impression that asking questions is easy and that it is one of the main activities of a teacher. Our research (see p. xx) also showed that this assumption was not confirmed in our sample. At the same time, the answers of the students revealed how often they ask questions and the reasons why asking questions is not common at HEIs (see p. xx), showing that creating an environment focused on discussions is a big challenge for academics.

The ability to ask the right questions, together with feedback and reflection, are building blocks under the critical thinking umbrella. Those four pillars provide support for the complex framework of transversal competences.

In their chapter 'Implications for Pedagogy,' Griffin et al. (2012) stressed a very important principle for development of transversal 21st century skills, saying that the approach of educators and education policy makers should not be a 'deficit' one, trying to fix some specific problems, but it should be developmental. The authors clarified that

> *"Developmental models build on and scaffold the existing knowledge bases of each student and help the student progress to higher orders and deeper levels of learning. A developmental model is also evidence based and focuses on readiness to learn. It follows a generic thesis of developing the student and points to a way of coping with knowledge explosion in school curricula. Developing 21st century skills will require people to work towards higher-order thinking and problem solving. There will be a need for teams of people working together solving problems who are able to operate at high levels of thinking, reasoning, and collaboration. This has implications for teaching as well as for the assessment of these skills. In order to become specialists in developmental learning, teachers need to have skills in using data to make teaching intervention decisions. They will need expertise in developmental assessment and in collaborative approaches to teaching, as well as a clear understanding of developmental learning models" (Griffin et al., 2012, p. 9).*

The research has addressed the need to introduce an approach which makes the development of transversal competences feasible and grounded in the context of higher education institution (HEI) study programs. We have highlighted current discussions on transversal competences by formulating assumptions: *TCs can be developed, but it is a long process.*

By conducting extensive research and relying on triangulation of the obtained results, this book is seeking a novel way of developing TCs in higher education by combining critical thinking and reflection. The findings indicate that despite the vast number of views and classification of TCs, several commonalities have appeared and have been integrated into the four broad sets of competences: digital, media, and information literacy; collaborative problem solving; sustainability and diversity awareness; and learning to learn and continuing to learn.

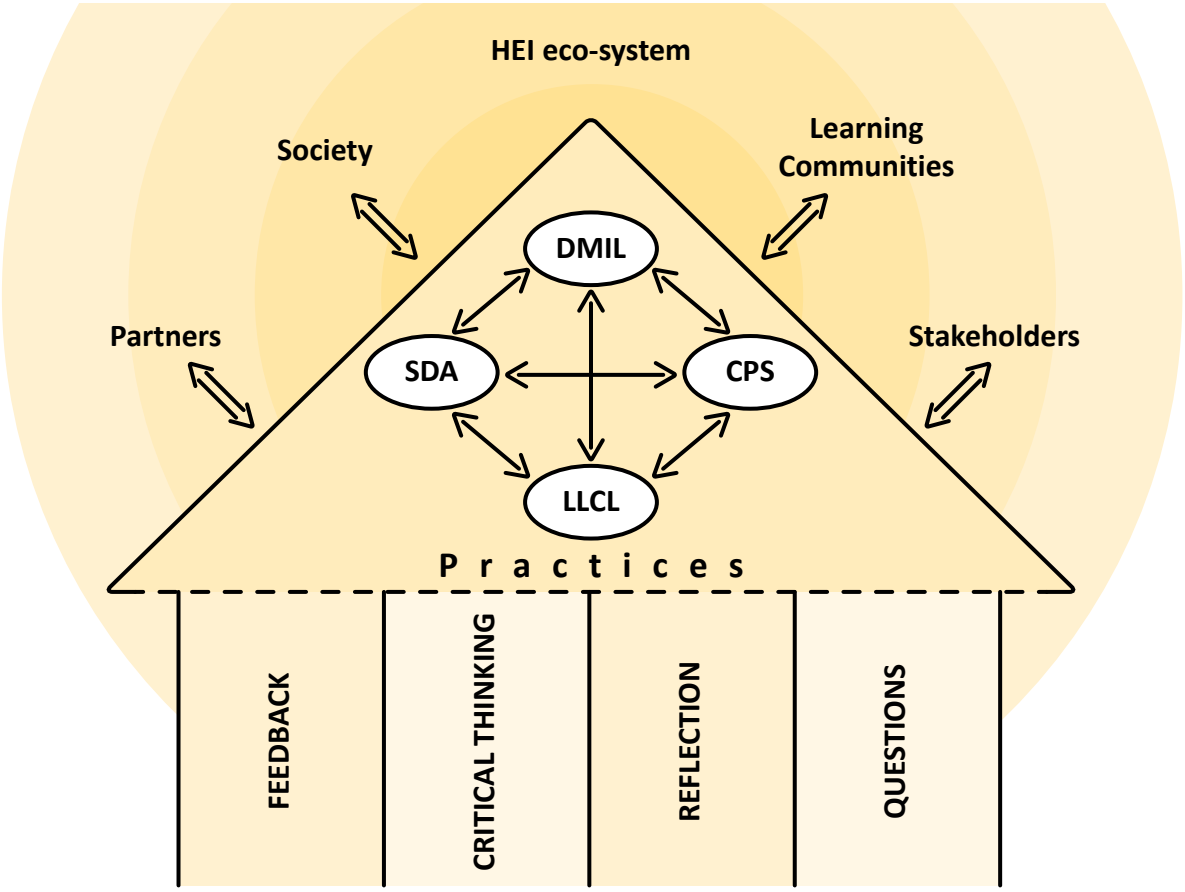
Of course, there are other views and recommendations that mention which additional competences are important. We do not dispute them, and they are not mutually exclusive. We propose these four sets of competences in the context of the current global and societal challenges to which HEIs are expected to respond, with the eventual goal to modify or change curricula to focus more on the enhancement of TCs.

These four sets of TCs have been tested, assessed, and evaluated through certain standards of critical thinking. The critical reflection concept has been presented via implementation of the method of Critical Reflection Analysis as well as facilitation of transformational learning that can alter the way people see themselves and the world around them. The results have been assessed considering the impact that teaching with focus has on critical thinking and the impact reflection has on development of TCs. Similarly, many experiences highlighted the need to incorporate more discussions, ask more questions, and incorporate regular feedback into the higher education environment. This will help to educate new generations to understand complex problems and act as responsible citizens.

Based on these findings and results, we are designing a developmental model (Fig 5), which means that we want to form a network for the development of transversal competences as a system. This framework of transversal competences aims to provide a view and better understanding of interrelatedness and interconnectivity not only between those four TCs but in the broader higher education ecosystem.

At the same time, this points to the phenomenon of how individual competences are related to each other. For this reason, we present the framework as a TC development system.

Figure 5 Framework of transversal competences



DMIL Digital, media and information literacy

CPS Collaborative Problem Solving

SDA Sustainability and Diversity Awareness

LLCL Learning to learn and Continuing to learn

Source: authors

Competences are not explicitly discussed in this framework, as they were extensively addressed in previous chapters. Our intention is to highlight a few facts that have resulted from extensive research; our work to date on the subject remains under investigation. They can be summarized in the following statements:

- Transversal competences that meet the requirements of the present time are formed through processes of critical thinking and reflection.
- Their content is complex and intertwined.
- The development of TCs is a long-term process and therefore they must be formed and mastered systematically across the entire education system.
- Their meaningful consolidation should be implemented in cooperation with all actors from within the ecosystem.

A special role in acquiring and perfecting transversal competences is played by practical education (Szafranski, Golinski, Sami, 2017, p. 7) that might be difficult to incorporate into academic education, which puts more emphasis on science. We argue that meaningful development of the transversal competences in HE can be realized through the close collaboration with different actors from the external environment. Therefore, the design of the TCs' framework refers to a general concept of the ecosystem and a 'big picture' concept which has been introduced in Chapter 1.1.

The teaching and learning approaches associated with this framework integrate the basic pillars, i.e., all skills of critical thinking, critical reflection, two-way feedback and open, inquisitive questions. Our findings suggest that those main pillars should be considered as additional building blocks when mastering TCs at higher education. They are crucial elements for the intended transversal competences, such as digital, media, and information literacy; collaborative problem solving; sustainability and diversity awareness; and learning to learn and continuing to learn, as they need to address many challenges of the current era.

4.3 Critical views, research limitations, and propositions for future actions

The education system in Slovakia urgently needs extensive and radical change. The poorly set up system of education in Slovakia is also confirmed by a study prepared for the Ministry of Education of the Slovak Republic which states that our pupils and students are not well prepared for the present challenges. They have difficulty working independently, discussing, thinking in context, formulating their own opinion, and taking responsibility for it (Vančo et al., 2016). All of the above missing skills are embedded in the comprehensive set of critical thinking skills.

Teachers believe they are already teaching critical skills, and students believe they are already learning critical skills, and both groups are resistant to change (Durr, Lahart, & Maas, 1999).

The most troubling aspect, though, is that teachers themselves lack CT skills (Paul, 1993), and therefore are in no position to teach CT skills, even if the curriculum demanded it. So whether we consider the future of our students in an international or domestic context, we cannot avoid the conclusion that there is a problem: students aren't learning the critical skills they need, and teachers are resistant to learning and teaching them. If we are to avoid economic disaster at both the individual and national levels, we need to start training our students to think critically; and we simply don't have the time for bureaucrats to make the necessary changes that will affect our kids, and their kids' kids, etc. (Paul & Elder, 2008).

If teachers themselves are struggling to navigate the complicated world of information and thinking in context and trying to implement rationality in their reasoning, how can they teach it to their pupils and students? One of the pieces of evidence that confirms the previous sentiment is a study done by J. Godo (2019), who conducted research among second-level primary school teachers throughout Slovakia (523 respondents involved) which was organized by the Focus

agency in June 2019. It was aimed to investigate what media the teachers use and trust as reliable sources of information. To the question '*If you were to recommend media to your students where they can find credible information about what is happening at home and in the world, which of the following media (whether in print or online) would you recommend to them?*' as many as 57 percent of the teachers would recommend 'Hlavné správy,' which is not a trustworthy source of information (see www.konspiratori.sk), but not the mainstream media, e.g., state-owned TV news, and 53 percent of them offered 'Zem a vek,' which is an alternative, disputable media outlet. Hlavné správy and Zem a vek ranked 3rd and 4th, respectively, in trusted sources, thus being prioritized by the teachers as comparable to traditional media such as Pravda, Denník N or SME.

Our attention is given to the higher education environment since the authors of this book work there. In 2019 qualitative research was conducted at Matej Bel University in Slovakia (see chapter 3) where the teaching process was observed to examine how university teachers (the target group consisted of 17 teachers from various faculties and disciplines) foster critical thinking among their students. It had been assumed that teachers themselves understood the fundamental concept of CT and they could use those techniques in their teaching activities which develop sets of various critical thinking skills. However, the findings showed that it was a big challenge for most teachers to accept CT as the teaching strategy and get familiar with the key techniques, for instance, how to analyze data and recognize fallacies, how to develop a good argument, and finally, asking the right questions.

Recognizing the importance of critical thinking skills among teachers and their continuous enhancement in all subjects of the education system is a key prerequisite to improving the teaching and learning in all educational institutions (Theodoulides, Niklova, Liptakova, & Kormancova, 2020).

Higher education institutions across the world are increasingly facing two big challenges. The first one relates to their scientific activities and their commercialization in the world of practice. The second one is about HEIs emphasizing students' acquisition of a broader range of skills and attitudes which should lead to widening their opportunities in their further academic journey, and more importantly in their successful placement in the employment market.

As Cenker (2014) states, the role of universities is influenced by the commercialization of knowledge focused significantly on the production of quantitative indicators and thus its social role as a place of freedom of thought, solidarity, and engaged ethics is disappearing.

Thus, HEIs play an important role within society in terms of reflecting the external needs by generating new knowledge as well as contributing to the development of appropriate competences. The knowledge that we have gradually gained through several studies and activities has confirmed that HEIs must reflect more on changes in the external environment and adapt the direction of their research and educational activities to them.

The necessity of closed collaboration between universities and external partners has been highlighted in our contribution to international research and was proposed by implementing the Quadruple Helix model presented by Dado et al. (2018). It is built on a type of relationship which encourages the process of fruitful exchange between several actors, i.e., university and science, industry, governmental authorities, and civil society. When applying this model within the education system in Slovakia, it became evident that universities must adapt their scientific, teaching, and learning objectives to regional and cultural particularities, which may also influence the development of the specific transversal competences. According to the opinion of the interviewed companies (international and national) operating in Slovakia, the HEIs' focus on 'practical' aspects of education is a crucial one (Purg, Bračič, & Pope, 2018, p. 198).

Of course, a collaboration with various actors is mutually beneficial, and it is presented in the proposed framework of TCs in Fig 5.

Through the content of this book as well as the proposed research strategy, its implementation and research results, we try to show that HEIs have a broader mission than just preparing graduates for practice. To justify this argument, we will use a premise that is currently often presented by the general professional public. Its content is based on the opinion that HEIs are currently preparing a generation for professions, jobs, and business the nature of which we cannot predict even in the scope of the next several years.

The external environment which we are currently working and living in has been described by the phrase *VUCA,* which means *volatile* – change happens rapidly and on a large scale; *uncertain* – the future cannot be predicted with any precision; c*omplex* – challenges are complicated by many factors and there are few single causes or solutions; *ambiguous* – there is little clarity on what events mean and what effect they may have.

Based on these VUCA findings, the dynamic change and the uncertainty of the external environment are affecting the focus of education to a certain extent. According to the report 'The Future of Jobs' provided by the World Economic Forum (2016), the main drivers of change are demographic, socio-economic, and technological trends. In addition to these general characteristics, several studies have pointed out that two areas related to *human resources* and *information technologies* are the biggest driving force to many challenges that we need to face (Deloitte, Global Human Capital Trends, 2016).

The influence of technologies, innovation and their development dynamics is progressing so fast that it is futile to explicitly name what skills will be needed in the future.

And so, in accordance with this statement, the goal of this book was formulated so that the content of the book offered theoretical starting points that would help understand the aforementioned dilemma, and at the same time propose TCs through the conducted research and demonstrate their complexity and wide-spectrum use.

The long-term focus on discussing what the gaps are between HE and the world of practice, looking for solutions for why our young generation does not achieve satisfactory results in international measurements, as well as suggesting how higher education should reflect on wider global challenges, all shifted our emphasis to the topic of transversal competences. It was also one of the goals of the ongoing Vega research project (2020–2022) titled 'The influence of electronic media on the development of transversal competences of Generation Z.'

Key aims of this book

The primary objective of all the work we've studied and researched was to design a new framework for mastering transversal competences in the higher education environment that reflects the challenges of the current era. Our approach to transversal competences is proposed as a feasible way to enhance these competences through key processes of critical thinking and reflection and at the same time to point out how changing the forms and approaches in teaching and learning can lead to the development of these competences.

In the process of implementing individual pedagogical and research activities, we constantly devoted ourselves to finding answers to the three research questions.

1. Which transversal competences reflect the current era of digitization and innovation?
2. What is the interconnectivity between the development of critical and reflective thinking skills and transversal competences?
3. How can transversal competences be fostered in the higher education environment?

Part 1 introduces our step-by-step approach, starting with Chapter 1 which focused on examining the core transversal competences which HEIs are expected to emphasize in their curricula. In Chapter 2, by selecting the most influential theories and concepts, we tried to explain the necessity to change the way of thinking. By starting from Socrates and looking at the work of well-known scholars, e.g., Kahneman, Waterman, and Halpern, the concept of eudaimonia was introduced. The reason why this chapter starts with ancient views and an explanation of the meaning of eudaimonia is related to our understanding of the purpose to focus on transversal competences in higher education. We argue that the goal of developing TCs is not only to create a good employee or worker but, especially, to develop the mind of a reasonable and responsible person.

Therefore, the selection of these theories was made in a meaningful way, so that the published partial findings provide the reader with inspiration and indicate the theoretical starting points for understanding our research strategy. Chapter 2 of Part 1 finalized the theorizing, and the four sets of broad and complex transversal competences were proposed. Those TCs, i.e., digital, media, and information literacy; collaborative problem solving; sustainability and diversity awareness; and learning to learn and continuing to learn, were presented in Part 1.

As Linda Elder from The Foundation for Critical Thinking stated, '*it is becoming increasingly clear that the survival and well-being of humans largely depends on our ability to work together successfully and productively, to reach out to one another, to help one another. Yet, problems of nationalism, ethnocentrism, and prejudice are pervasive across the world. People are raised to see their country or group as better than other countries or groups. They tend to favor the groups to which they belong. This is a natural tendency of the human mind. And it is a tendency fostered within most, if not all, cultures across the world*' (2021).

The four TCs have been assessed and evaluated by using a rather novel research approach. It was presented in detail in Part 2 of this book. It began with the description of the fundamental knowledge related to critical thinking and reflection which was implemented within the evaluation of transversal competences done by Critical Reflective Analysis.

The novelty of the conducted research lied in several points. First, in the design of the evaluation criteria, which were created to correspond to a significant degree with critical thinking skills and are presented in detail in Appendix X. Further implementation of the research with several interconnected activities provided enough extensive material and enabled the triangulation of findings. Finally, the connection of quantitative assessment with qualitative assessment contributed to the creation of a comprehensive picture of the content of individual TCs.

The research results showed the interconnectivity between the development of critical and reflective thinking skills and transversal competences. The results of the pre-test and post-test assessment provided evidence on how transversal competences can be fostered in the higher education environment. Since these two evaluations, it has not been possible to conduct face to face activities in an identical form due to the pandemic, and discussion online offered different interactions and group dynamics. This was acknowledged in the interpretation of the results.

The fulfillment of the main aim of this book is challenging. It tried to explore the interrelatedness between critical thinking, reflection and all four TCs which can be fulfilled by the creation of fair-minded critical societies in which all people's needs are met, and in which all people are encouraged to develop as rational, caring members of society.

Brookfield's (2012, 2017) first book, titled *Becoming a critically reflective teacher,* explains how to confront the contradictions involved in creating democratic classrooms by using critical reflection as a tool for ongoing personal and professional development. He explains the best way to unearth and scrutinize teaching assumptions by using four lenses: the eye of the student, colleagues' perceptions, relevant theory and research, and personal experience.

His second book *Teaching for Critical Thinking* establishes a basic protocol of CT that focuses on students uncovering and checking assumptions, exploring alternative perspectives, and taking informed actions. He explains when to make CT the classroom focus, how to encourage critical discussions, and ways to reach skeptical students.

The content of this book and the research conducted was inspired by Brookfield concepts. Our research philosophy was based upon the elements of critical thinking and reflection as well as its implementation via use of the CRA method present and justify the development of the TC.

The new design of a framework of TCs (Figure 5) referred to the aforementioned concept of the 'big picture' model. It is often suggested as a complex system which may assure that all elements of the teaching and learning are linked together. The teachers are required to create such a system for themselves and also for students. This is presented in Section 4.2.4. It helps them establish a clear understanding of what their teaching objectives and learning outcomes are, what assignments/tasks are most suitable to fulfill the objectives and obtain the learning outcomes, what the role of the teacher and other partners is, and their contributions to the teaching and learning processes. The framework of TCs (see Figure 5) is developed within the educational ecosystem in which elements of both external and internal environments must collaborate extensively.

The collaboration between HEIs and different stakeholders and also interactions between teacher and student are formed as social relationships which are driven by the basic needs to communicate, learn, integrate with the ecosystem, and express oneself. Although needs are very much actors' attributes, they evolve through relationships and are shaped by relationships (Todeva, 2006). These relationships between HEIs and the world of practice are generally driven by the common need of actors to form and have a certain human resource available. Therefore, it is mutually beneficial to seek out and create the means for such collaboration.

The evidence gained from the application of the new way of university education, focused on development of transversal competences and critical thinking, showed that the teaching methods and procedures used made a significant impact on all competences of the students of this course. Discussions in all phases of the course, either as brainstorming or assessment and evaluation of resources, and especially elaboration of a group project, brought the expected results.

For instance, working on a group innovation project is an effective way of developing problem-solving skills in the higher education context. Instead of the teacher 'assigning a problem', he just sets an authentic task: Students themselves must find a suitable object of their project design that they will train their skills on. It must be authentic - It exists in real life; it represents a real problem and has real beneficiaries. So before starting the process of problem solving itself, there is a phase before the initial decision making when students have to decide which problem they will focus on in their innovation project design.

Halpern (2014, p. 506) said that in the problem-solving process, the "problem is solved when the students can find 'paths' from the initial state to the goal." Exactly this is the point which we were seeking evidence for in the content analysis of the collaborative student project. The fact is that all 9 teams prepared their own business innovation in a responsible way, presenting it in front of their teacher and classmates, but also met two experts from practice who were able to instruct their problem-solving before the final product was prepared. Most of all, all projects were tested

by the customers and presented to the jury from practice, comprised of experts on innovations who confirmed the feasibility and the adequate level of the innovation.

Looking back at potential ideas for development of this transversal competence (in Chapter 2.4), we may confirm from the thesis that the approaches mentioned there have proved to be feasible and bring the expected results. Shared space was created in the university for two semesters, enabling the student groups to search for information that would lead to problem solving; we put the main emphasis on data analysis, team communication, enabling sharing, mutual negotiation of the essence of the issues, searching for solutions, planning the implementation of a specific solution to the problem, and mutually monitoring and reflecting on the appropriateness of the solution, or proposal of an amended solution.

The results show that the idea of two targeted courses that demand students be involved in several different activities bore the expected 'fruit' – it was successful. The success was confirmed in the result of interactive cooperation of students amid their life situations and other study requirements. Although the outcomes of their work on the assigned tasks varied in quality, they all had to learn to think more critically about the core of the topics in the courses – about the human processes and their impact on humanhood and the environment. Personally, but also as a team, they had to reflect on their own contribution to current global problems and tried to take a small step forward in reducing the enormous number of problems around us. And thus, the desired goal was fulfilled. Student teams were able to effectively put the acquired knowledge into practice, enhance their critical thinking skills, solve a variety of problems, and get prepared for the practical world.

To come to a more general conclusion, we can say that the accomplished educational innovation and its research confirmed that transversal competences are developable human competences – even within the formal higher education context. It can be achieved across almost any course without any extra expense. What it really demands are transformed teachers, focused on understanding the core social needs and willing to invest in transformation of the traditional activities and tasks and expecting the students to think critically and reflectively. The innovative way of teaching the course, the nature of the course assignments, and then their collaborative accomplishments by the student groups confirmed the core presupposition that "key competences for the 21st century go hand in hand with critical thinking" and reflection (OECD, 2017, p. 3).

> *"Education in the critical faculty is the only education of which it can be truly said that it makes good citizens." William Graham Sumner, Folkways, 1906*

Conclusion

Despite the recognition of the importance of focusing on the transversal competences in the higher education environment, most of the studies remain fragmented, insufficiently tackling the complexity of TCs and failing to highlight the TCs' relevance for the current era. This book aimed to propose a framework of TCs which explains their interrelatedness and connectivity with several skills of critical thinking while stressing the role of reflection when developing them.

Part 1 of the monograph reflects on the current social and global needs that place greater demands on transformational change in higher education. We pointed out the deficits or inability of the current practice of higher education to fulfill these needs. It can be supported that

> *„the demands on university graduates have changed drastically, especially in fields with high social impact. Graduates are expected to bring the competences needed to solve complex problems with them instead of acquiring them over a long period of practice ... These changes force the university to react to these changed demands in order to provide graduates with the needed competences for dealing with complex real-world problems" (Steiner & Laws, 2006, p. 326).*

In times as difficult as these, when the future of our planet, and thus of humanity, is threatened like never before, it is crucial to reflect, re-assess, and reconstruct the mission of higher education institutions. The criticism of the ineffective preparation of competent citizens of the planet through traditional education cannot be ignored anymore. Many scholars criticize classical training and education where learners acquire certain knowledge or skills, but there are "no competences in these types of trainings" (Bach & Suliková, 2019, p. 292). On the contrary, in 'competence development programs.' the students learn how to apply what they learned, including the theory. Yet another criticism has appeared – towards a simplistic way of competence development which stems from the idea that in classic learning processes, specific, clearly defined situations are specified. The key here is complexity reduction: only the essentials come into consideration "and there is not space for development of meta-competences, e.g., the transfer competence" (p. 294).

According to Darbellay, (2015) the traditional approach of the academic organizations' inter- and trans-disciplinarity might be viewed as a disruptive innovation strategy or as a means of evolutionary transformation of universities. However, and we agree with Darbellay, in this digital context, the medium and long-term sustainability of our universities will depend on their capacity for innovation between and beyond disciplinary divides based on the dual logic of continuity and transformation (pp. 172 - 173). This is the time of the need for a holistic, transdisciplinary, and interdisciplinary approach in higher education, which also means "intense interaction between university/science – with academics guiding and coaching students – and society to promote a mutual learning process between these groups. It can be seen as a move from science on or about society towards science for and with society" (Steiner & Laws, 2006, p. 325).

Experts on education say that one of the causes of the education crisis can be a significant deviation from philosophical doctrines, which emphasize non-material value starting points, the value of man, life, and humanity, towards economizing educational doctrines, which emphasize effectiveness, financial profit, accountability, and economy of the school system (Porubský 2010, p. 2–3, Kosová, 2013, p. 150).

But even if an education system is based on philosophy, it still needs to be critically reviewed and properly used for the benefit of all humanity. For example, we can refer to the impact of humanism, anthropocentrism, and individualism on education. The current school systems in democratic countries – not excluding higher education – are subject to the ideal of the individual value of a person versus the collective, and the value of the person as an individual is placed above the collective. However, if an individual lives for themself, they can become egoistic. But sustainability of life is incompatible with human egoism. Today, education is greatly influenced by individualism. The philosophy of individualism goes back to Descartes, who finds certainty of knowledge through his own existence (cogito, ergo sum). Kant has a categorical imperative that is based on the attitude of the individual. Today it is postmodernism, which emphasizes individuals and local value or local knowledge over common knowledge. The question is whether boundless individualism is a responsible or sustainable attitude in education in the current global crises.

And this was exactly the reason for framing the content of Part 1, Chapter 1 and 2, to point out the deeper reasons for – and *why* it is necessary – to develop the whole set of transversal competences (not just personal well-being and learning to learn but also media and information literacy, problem solving, or sustainability and diversity awareness) of current higher education students. We pointed out that it is not satisfactory if universities offer superficial intensive courses or a few specific skills trainings as a response to the acute needs of educating responsible future citizens and experts solving many global problems. It is necessary to think deeply about the essence of the changes that we want to achieve in higher education, and due to the 'love of wisdom' (philosophy), to return to the antient roots of the concept of happiness or well-being of individuals as well as society, and to look for current solutions in answering the questions of self-identity, purpose in life, and shared responsibility for what happens around us – as we saw in Waterman. At the same time, we offered a demonstration of *how* the development of critical thinking – as described by Ennis – should be understood comprehensively, based on the essence of dialogic/critical/reflective thinking.

Although the discussion about transversal competences (TC) has recently gained significant interest among many academics and scholars, the content and mainly the level of performing TCs in the higher education environment has not been studied extensively. The beginning of the monograph addresses the gap between theories (reports providing various classifications of TC) and practical appearance of TCs in higher education.

Part One ends with the description of four complex transversal competences which we believe can guide teaching and learning of students in the higher education environment towards developing more responsible citizens, which will shape a better future for themselves and also for society.

Part Two introduces a rather new approach, to investigate transversal competences through a set of critical thinking skills and the process of reflection. To assess whether students gained those competences, we have connected that with certain teaching methodologies and a unique assessment and evaluation process. A common structure of those pedagogies consists of the elements: sample and procedure, inputs, objective, processes, outputs, learning outcomes, and expected impacts.

The research methodology has been formed by using Critical Reflection Analysis (CRA), which provides the opportunity to conduct evaluation of any process in both a quantitative as well as qualitative way. CRA can be seen as a radical and innovative method which must be increasingly adopted by teachers in order to obtain evidence on what specific transversal competence can be developed in any subject and how it can be developed. The process of evaluation and discussion on how measurements were undertaken and how transversal competences were assessed in an approach which was both quantitative as well as qualitative are presented in Chapter 4.

The conducted research was carefully structured in four observations and guided evaluation, which were described in detail in Chapter 3. Research indicated that specific critical thinking parameters, i.e., 1) information, data, media analysis and reasoning, 2) structural analysis, 3) open-mindedness and empathy, 4) making judgments upon arguments, 5) problem solving, 6) praxis, 7) bias reflection, and 8) questioning one's own and others' views and developing group/team relations are crucial elements for developing the four sets of broad and complex transversal competences for the digital era, which were defined as follows: *digital, media, and information literacy; collaborative problem solving; sustainability and diversity awareness; and learning to learn and continuing to learn.*

The framework of the TCs was designed to highlight the important link between the academic and practical worlds. And not only in the context of TC development, which in several studies appears to be more practical, but especially as necessary cooperation between different actors and thus jointly forming a responsible citizen. Such connections in the complex nature of TCs and their connection with critical thinking have proven to be extremely crucial for HEIs' educational strategy.

The HEIs' focus on mastering transversal competences still needs to be implemented in the initial and continuous actions. Those four examined TCs are key prerequisites which contribute to the manifestation of the core values of HEIs within a society where the connectedness of education enables the raising of critical thinkers who understand the world around them and take responsible actions.

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Appendix A

Assessment Chart

	Parameter	1-5 point scale - levels				
	SCORE -->	1 point = poor	2 points = developing	3 points = satisfactory	4 points= good	5 points = excellent
1	**INFORMATION, DATA AND MEDIA ANALYSIS AND REASONING** The criteria describes how well a student is able to analyse information and, most importantly, identify fallacies within text, find logical flaws, and understand author's point of view or even manipulation in relation whether the source of information is relevant. The fundamental prerequisite for this criteria is a natural proclivity to questioning data and information rather than accepting it as true.	Student struggles to describe the main idea of the text. Some limited ability to realise that **"something is off"** with the source, information or data with instructor's support. Has a propensity **to accept information as true without questioning** when working individually.	Student is able to sense that some sources of information and also some **parts** of the text or conclusions contain fallacies or are logically flawed. May be able to pinpoint these parts with some support from the instructor. Only questions information **when prompted to do so or when the flaw is obvious.**	Able to identify the main idea of the text. The ability to question information and identify nearly all parts of the text with argument fallacies and other flows with limited support from the teacher. Begins to **question facts and validity of conclusions without instructor's intervention/**	Identifies the main idea of the text independently and accurately. Able to identify all argument fallacies, logical flaws, manipulations independently and begin to reflect on what effect these have on the audience. **Automatically questions facts, figures, conclusions presented in the text**. **Able to identify what information is omitted to manipulate the reader with support of the instructor.**	Identifies the main idea of the text independently and accurately. Able to independently and accurately distinguish all argument fallacies, logical flaws, manipulations and insightfully r**eflect on the effect they may have on the reader**. Can clearly identify where information may have been omitted/ manipulated to change the meaning of the text.
2	**STRUCTURAL ANALYSIS** The criteria describes **understanding deeper causes and roots of a situation and problem within the society.** Students are able to breake word down into their basic parts in order to undertsand the meaning. The process involves **text analysis, since knowledge of a few word parts can give clues to the meanings** of a large number of words. It is also an ability of politicising notions of culture, knowledge, power as well as developing understanding the **source, information and media manipulation.**	Student struggles to analyse the basic parts of the text and has difficulties to describe the main meaning of the text. There is **some limited ability and effort to synthetise** the basic word parts into related meaning which will lead towards deeper causes.	Ability to analyze the word parts and identifies the main idea of the text with some help. Able to sense that some **parts** of the text or conclusions contain fallacies or are logically flawed. The ability to recognize a **manipulation/ bias to a particular characteristic in one's society**- e.g. religion, common stereotypes, shared historical memory OR to **identify biases in oneself, but without the ability to trace them back to their origins**	The ability to **identify particular biases in oneself and trace their origins back to one's upbringing**, current **socio-economic status and privileges** (e.g. being a cis-gendered middle class white male)	The ability to understand how the **societally widespread biases** are influenced, **formed and perpetuated by the current state institutions** (e.g. the government's stances towards same sex marriages might perpetuate stereoypes about same sex relationships)	The ability to understand how the **current social, political and legal institutions have been formed by the social environments of our countries**. And the ability to **discuss whether actions can truly be individual, or just the products of the current and past society**

	Parameter	1-5 point scale - levels				
	SCORE -->	**1 point = poor**	**2 points = developing**	**3 points = satisfactory**	**4 points= good**	**5 points = excellent**
3	**OPEN MINDEDNESS AND EMPATHY** The criteria describes **understanding and accepting the existence of other viewpoints and a willingness to understand other's worldviews** and how these came to be. We do not necessarily expect students to accept all other opinions as valid, but we do expect them to reflect on their origins instead of attacking personal characteristics of those who hold them. The criteria also includes the skill of engaging in debate and modify one's own opinion if necessary thus contribute to **pleasant and constructive atmosphere**.	Critical of the viewpoints different from their own, tends to resort to personal attacks of the "others". Unwilling to engage in dialogue and question their own stance. Yet able to acknowledge some similar viewpoints and accept these as valid.	Critical of other viewpoints. Yet able to **lead a non-aggressive conversation** with someone who has different opinions under moderation. Does so with reluctance. Unwilling to modify their opinion	Willing to engage in dialogue with those with opposing views under little or no moderation. Acknowledges some other opinions as valid yet does not explore the origin of these opposing views. Remains unwilling to dramatically modify their own view on the topic when challenged.	The ability to **grasp where the other person is coming from and re-considering their own stances and positions.** Willingness to emphasize with opposition viewpoints and understand where these are coming from even when the student disagrees.	WIlling to accept the existence of some other world views. Understands the root origins of opinions and is willing to emphasize with those who hold them even when in disagreement with them. The ability to r**each an organic and non-aggressive conclusion to a conversation** (finding a middle point or if that is not possible, respectfully concluding that there are disagreements about the two of us, but that is ok)
4	**MAKING JUDGEMENTS UPON ARGUMENTS (ARGUMENTATION SKILLS)** Synthetize and make connections between information and arguments. Students are able to construct a strong argument, their ability to formulate coherent and factual arguments to reflect the participants viewpoints. This criteria also describes the effective use of facts to support these claims and the use of counter arguments to further conclusions and bolster ones's argument. Students are aware and also recognize the argumentation fallacies during the discussion.	Struggles to formulate a coherent argument supported by evidence or logic, only able to outline the general direction of his/her thinking	Able to provide a generalised argument yet fails to efficiently incorporate facts and evidence to support the argumen**t. The argument itself may be too vague or unclear to understand AND/OR have major logical flaws**.	The ability to formulate an argument, which is based on **evidence/sensible logic**. Able to **somewhat effectively deliver the argument to others**. The argument may, however, have some **logical flaws**.	The ability to **formulate a sensible and well-grounded argumen**t, which leads to a logical conclusion supported without significant logical flaws. Able to **reflect on some counter-arguments to justify his/her viewpoint**. Able to **clearly communicate** their idea to others.	The ability to formulate a sensible and well-grounded argument without any argumentation fallacies. **Able to effectively deliver the argument to peers and use counter-arguments to fully justify his/her viewpoint**.

	Parameter	1-5 point scale - levels				
	SCORE -->	**1 point = poor**	**2 points = developing**	**3 points = satisfactory**	**4 points= good**	**5 points = excellent**
5	**PROBLEM-SOLVING** Students are able to identify a non-familiar problems and clearly identify the core of that problem. Ability to suggest a solution (in both conventional and innovative ways), evaluate its contribution to a problem, suggest benefits and potential side-effects of a chosen solution. The criteria also describes how well students are able to identify and ask quetions that lead to better solutions. Also ability to break these solutions down into steps and outline a roadmap, futher steps for their implementation.	Able to vaguely or only partially **identify some societal problems when prompted by an instructor. Unable or unwilling to identify solutions.**	Able to somehow accurately and clearly identify societal or any ther problems. Can propose a partial solution to the problem.	Able to accurately identify visible social problems, injustices, systemic discirminations. **Beggins to reflect on the deeper roots of the problems and their effects. Can propose relatively complex solutions** to the problem, yet fails to assess these against one another.	Able to accurately and critically identify both visible and invisible discrimination,social problems, systemic injustices. Well-aware of their origins and consequences. **Understands own role in perpetuating the injustices**. Able to identify large-scale and personal action solutions to the problems. Begins to reflect on the effectiveness of these solutions.	Able to accurately and critically identify both visible and invisible problems. Well-aware of their origins and consequences and understands their own role in perpetuating the injustices. Able to identify solutions on both personal and societal level **as well as break these down into steps. Able to identify concrete steps the student can take themselves**. Can critically reflect on the side-effects of their proposed solutions and evaluate them against each other.
6	**PRAXIS** Student is able to recognize the importance of cross-sectoral and multi-actor networks within the specific eco-system. He/she attempt to have a dialogue with various actors related to issues, and also participate actively and sensibly in roles and responsibilities one encounters in one's adult life. He/she provides a specific evidence of their personal involvement in societal events, actions, voluntary contributions in the external environment.	Inactive in everyday societal structures, realtions with various stakeholders, may show only small interest in societal events, news that directly concern them. Rarely seeks for a opportunities or meetings with someone from practice, and/or has no interest in civil society gatherings. He/she practical experience is limited only to fulfill the school requirements.	**May passively engage with political issues that directly concern them** (through, for example, reading about them). **Might sometimes engage in political and civil-society activities** on selected topics of interest.	**Occasionally engaged in the political process through civil society groups or regularly votes because of a sense of duty.** May occasionally engage in political discussions on issues of interest but **does not make a conscious effort to engage with opposite opinions**.	**Regularly** engaged in civil society activities.. Always votes and takes part in official politics. **Reads on politics and may occasionally challenge their views through having political discussions or reading media with opposite views to their own**.	**Regularly** engaged in civil society activities, **might be a leader in an organisation**. Always votes and takes part in official politics. Reads extensively on political issues and r**egularly aims to engage with opposite opinions to their own**. Aims to **solve injustices and problems within their own communities** through volunteering or formal politics.

	Parameter	1-5 point scale - levels				
	SCORE -->	**1 point = poor**	**2 points = developing**	**3 points = satisfactory**	**4 points= good**	**5 points = excellent**
7	**BIAS REFLECTION** Recognizing the cognitive biases, understanding and reflecting on one's own biases, identifying their origin (prejudice and stereotypes, cultural dimensions, religion and geographic influence, perosonal and profesional development). The criteria also involves being able to reflect on the consequences of such biases as well as the willingness to minimise negative biases and their effects.	Either reluctant to acknowledge ones own biases or only recognises that such exist in abstract. Unable and/ or unwilling to reflect on their own biases.	The ability to understand **what a bias is** and point it out in interaction with another person, or in a text (without a deeper understanding of the origins of the bias) Students feel uncomfortable talking about their biases but **begin to recognise that their worldview is not objective when asked**	A subject can accept that their view is not objective and **can pin down some vague consequences of their biases** (for example a student may point out that they view immigrants in a subjective fashion and that my reflect on their attitude and treatment of said immigrants)	Students can identify their biases when asked and can **fluently discuss how these biases affect their worldview and actions.** Students can comfortably **discuss the origin of these biases and how these may reflect their backgroun**d	Students seek to identify and correct their biases and are cautious of the **effects these have on their actions aiming to rectify their consequences.** Students understand and can openly discuss the origin of these biases and explain how these relate to their background and upbringing
8	**QUESTIONING THE OWN'S AND OTHERS' VIEWS AND DEVELOPING GROUP /TEAM RELATIONS** The criterion describes the student's interest in forming relationships throughout the raising the opened and causative questions which enhance interactions in debate. Relations are based on trust, respect, and equivalence. Humor is used sensitively with no sign to undermine someone. Students also show the ability to reflect their own's view and also willingness to change or modify their previous opinion which might lead towards better team results.	The questioning own's and others' view is limiteed. Struggles to formulate an opened question which can shows an ability to reflect others and/or make some kind of selfreflection. The intention to get known others in the team is presented with the minimal effort and interest. The student strongly defends his/her opinion which is not based upon the facts and its open- mindness is limited. The personal interests in contributing to effective team performance is little visible.	Formulates some kind of opened question which contribute to the team discussion. Able to reflect on others' views but no sign of its own selfreflection that might develop better team relations. The discusion in the team is based more on general and rather vague statements than on facts. The team members perform more individually, interactions between them are small.	**Team members beggin to reflect on the deeper meanings. The interactions which might lead towards good relations and results appear**, yet fails to start questioning each other. The individual team members show ability to self-reflection by listening others' views and admiting some changes. The discusion within the team is based upon the facts what causes some ‚bitter feelings' and missunderstandings.	Students raise open questions in order to understand others views better and clarify any misinterpretations which which might cause some misunderstandings within the team. Can **constructively discuss on what facts the different views stand for and what is the origin.** Team members perform in the mutal cooperation and their effort to develop good relations which is needed to succesful results is visible.	Students **continuesly question each other in the pleasant and constructive way. The raised** open questions lead to better understading and clarifing any misinterpretations which contribute to forming a team and good relations. Can **constructively discuss on what facts the different views stand for and what is the origin.** Team members perform excellent cooperation in which humor,emphasis on good results and good relations are key aims.

Appendix B

Pre-test assessment score

Teams	Information, data and media analysis and reasoning	Structural analysis	Open MINDEDNESS AND EMPATHY	MAKING JUDGEMENTS UPON ARGUMENTS	PROBLEM-SOLVING	PRAXIS	Cognitive BIAS	QUESTIONING THE OWN'S AND OTHERS' VIEWS AND DEVELOPING GROUP RELATIONS
1	2	2	2	2	2	0	1	3
2	2	2	2	1	1	1	1	2
3	2	1	2	1	1	1	0	2
4	1	0	0	1	0	0	0	1
5	1	2	1	1	0	0	0	1
6	3	2	1	1	0	0	0	3
7	2	1	1	0	0	0	0	1
8	2	3	2	3	2	0	0	3
9	2	1	2	1	2	0	0	3
10	1	0	1	1	0	0	0	1
11	1	0	0	0	0	0	0	1
12	1	1	0	1	1	0	0	2
Total scores	20	15	14	13	9	2	2	23

Appendix C

Post-test assessment score

Teams	Information, data and media analysis and reasoning	Structural analysis	Open MINDEDNESS AND EMPATHY	MAKING JUDGEMENTS UPON ARGUMENTS	PROBLEM-SOLVING	PRAXIS	BIAS REFLECTION	QUESTIONING THE OWN'S AND OTHERS' VIEWS AND DEVELOPING GROUP RELATIONS
1	2	2	2	2	2	1	1	1
2	2	3	2	2	2	3	2	3
the best 3	**3**	**4**	**4**	**4**	**4**	**4**	**4**	**3**
4	1	3	2	2	2	3	2	3
5	1	2	1	1	2	1	1	2
second best 6	**3**	**3**	**3**	**4**	**3**	**3**	**3**	**3**
7	1	3	3	2	2	1	2	2
8	1	2	2	1	2	0	1	1
the worst 9	**0**	**0**	**0**	**0**	**1**	**1**	**0**	**0**
10	1	1	0	0	1	0	0	1
11	3	2	3	2	3	2	2	2
12	1	0	1	0	2	1	0	1
Total scores	19	25	23	20	26	20	18	22

Bibliography

ACT – American Colleague Testing. (2022). *Collaborative Problem-solving*. Available online: https://www.act.org/content/act/en/research/reports/act-publications/beyond-academics/cross-cutting-capabilities/collaborative-problem-solving.html (assessed on 3 June 2022).

Adam, S. (2004). *Using learning outcomes. A consideration of the nature, role, application and implications for European education of employing 'learning outcomes' at the local, national and international levels.* United Kingdom Bologna Seminar 1-2 July 2004. Edinburgh: Heriot-Watt University (Edinburgh Conference Centre).

ALA. (2017). *Digital Literacy. Welcome to ALA's Literacy Clearinghouse*. Available online: https://literacy.ala.org/digital-literacy/ (assessed on 13 March 2022).

Amankwah-Amoah, J., Khan, Z., Wood, G., Knight, G. (2021). COVID-19 and digitalization: The great acceleration. *Journal of Business Research*, 136, 602–611.

Amstrong, M., Stephens, T. (2005). *Management a leadership*. Praha: Grada Group Publishing, 2008.

Ananiadou, K., Claro, M. (2009). 2*1st Century Skills and Competences for New Millennium Learners in OECD Countries*. *OECD Education Working Papers*, No. 41, OECD Publishing. Available online: http://dx.doi.org/ doi10.1787/218525261154 (assessed 1 May 2022).

Anderson, L. W., Krathwohl, D. R., et al (Eds.) (2001). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Boston, MA: Pearson Education Group.

Andrade, M. S. (2020). Cross-cutting skills: strategies for teaching & learning. *Higher Education Pedagogies*, 5(1), 165-181, DOI: 10.1080/23752696.2020.1810096.

Amankwah-Amoah, J., Khan, Z., Wood, G., Knight, G. (2021). COVID-19 and digitalization: The great acceleration. *Journal of Business Research*. Available online: https://www.sciencedirect.com/science/article/pii/S0148296321005725 (assessed on 23 March 2022).

Aristotle. (reprint edition 2012). *Nichomacean Ethics, Book I, Chapter 8 & 10*. University Chicago Press.

Anseel, F., Lievens, F., & Schollaert, E. (2009). Reflection as a strategy to enhance task performance after feedback. *Organizational Behavior and Human Decision Processes*, 110, 23–35**.**

Bach, Ch., Suliková, R. (2019). Competence Development in Theory and Practice: Competence, Meta-Competence, Transfer Competence and Competence Development in Their Systematic Contex. *Management*, 14 (4), 289–304.

Bauman, Z. (2004). *Individualizovaná společnost.* Praha: Mladá fronta.

Bawden, D. (2008). *Origins and concepts of digital literacy.* Retrieved from: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.741.4617&rep=rep1& type=pdf 4.]. (Accessed 03 May 2022).

Berne, E. (2019). *Ako sa ľudia hrajú.* Bratislava: AKTUELL. [Slovak transl. from Berne, E. (1964). *Games People Play: psychology of human relationship*. New York: Grov Press.]

Black, M. (1946). *Critical Thinking*. New York: Prentice Hall.

Blewitt, J. (2010). 'Deschooling society? A Lifelong Learning Network for Sustainable Communities, Urban Regeneration and Environmental Technologies.' *Sustainability No 2*, Vol.11.

Bloom, B. S. (Ed.). (1956). *Taxonomy of Educational Objectives: The Classification of Educational Goals. Handbook 1: Cognitive Domain*. New York: David McKay.

Boddy, C. (2012). The Nominal Group Technique: An aid to brainstorming ideas in research- *Qualitative Market Research: An International Journal*, 15(1), p. 6–18. doi:10.1108/13522751211191964.

Braun, E., Spexard, A., Nowakowski, A., Hannover, B. (2019). Self-assessment of Diversity Competence as Part of Regular Teaching Evaluations in Higher Education: raising awareness for diversity issues. *Tertiary Education and Management*, 26, 2020, 171 – 183.

Brookfield, S. D. (1997). Assessing critical thinking. *New directions for adult and continuing learning.* No.75. Jossey – Bass Publishers.

Brookfield, S. D. (2012). *Teaching for Critical Thinking. Tools and techniques to help students question their assumptions.* US. Jossey-Bass A Willey Imprint.

Brookfield, S. D. (2013). Teaching for Critical Thinking**.** *International Journal of Adult Vocational Education and Technology,* 4(1), 1-15, January-March 2013/1.

Brookfield, S. D. (2017). *Becoming a Critically Reflective teacher*. Second Edition. San Francisco, CS. Jossey-Bass A Wiley Brand.

Brown, E. (2012). Eudaimonia in Plato's Republic. https://www.academia.edu/2846744/Eudaimonia_in_Platos_Republic

Brown, T. (2009). *Change by Design: How Design Thinking Transform the Organizations and Inspires Innovation.* NY: Harper Collins.

Browne, N. M., Keeley, S.M. (2015). *Asking the Right Questions. A Guide to Critical Thinking*. UK: Pearson Education Limited.

Brozmanová Gregorová, A. et al. (2014). *Service-learning. Innovative learning strategy.* Banská Bystrica: Matej Bel University in Banská Bystrica.

Brozmanová-Gregorová, A., Galková, L., Kurčíková, K., Šolcová, J. (2020). *Globálne vzdelávanie na slovenských vysokých školách vo výskumných súvislostiach*. Banská Bystrica: Belianum.

Brugger, W. (1994). Eudaimonie. In: *Filosofický slovník*. Breisgau: Verlag Herder KG, lect. Ústav filozofie a religionistiky (Institute of Philosophy and Religionistics, FF UK in Prague), pp. 78-79.

Buckingham, D. (2003). *Media Education: Literacy, Learning and Contemporary Culture*. Cambridge: Polity Press.

Bude, H., Spengler, J. (2017). *Society of Fear.* Cambridge, Oxford: Polity.

Butler, H.A. (2012). Halpern Critical Thinking Assessment Predicts Real–world Outcomes of Critical Thinking. *Applied Cognitive Psychology*, 26(5), 721-729. Retrieved from doi:10.1002/acp.2851. (Accessed on February 19, 2022).

Burbach, M. E., Matkin, G. Gina, & S. Fritz, S. M. (2004). Teaching Critical Thinking in an Introductory Leadership Course. *College Student Journal*, 38(3), 482-493.

Burgh, G. (2005). From Socrates to Lipman: making philosophy relevant. In Shepherd, D. *Creative Engagements: Thinking with Children.* Oxford: Inter-Disciplinary Press, pp. 25-31.

Burjan, V. (2010). *Dobrá škola*. Reviewed from: www.cestykdobrejskole.sk.

Care, E., Kim, H. (2018). Assessment of Twenty-First Century Skills: The Issue of Authenticity. In Care, E., Griffinn, P., Wilson, M. (eds). *Assessment and Teaching of 21st Century Skills: Research and Applications.* Cham: Springer, pp. 21-39.

Care, E., Griffin, P. (2014). An Approach to Assessment of Collaborative Problem Solving. *Research and Practice in Technology Enhanced learning,* 9(3), 367-388.

Care, E., Kim, H., Anderson, K., Gustaffson-Wright, E. (2017). *Skills for a changing world: National perspectives and the global movement*. The Brookings Institution. Available online: https://www.brookings.edu/wp-content/uploads/2017/03/global-20170324-skills-for-a-changing-world.pdf. (assessed on 13 June 2022).

Care, E., Kim, H. (2018). Assessment of Twenty-First Century Skills: The Issue of Authenticity. In Care, E., Griffinn, P., Wilson, M. (eds). *Assessment and Teaching of 21st Century Skills: Research and Applications.* Cham: Springer, pp. 21-39.

Cenker, M. (2014). *Rozvojové vzdelávanie. Témy a metódy*. Bratislava: Pontis.

Chatfield, T. (2018). *Critical thinking: your guide to effective argument, successful analysis and independent study*. NY: Sage Publications Ltd

Cottrel, S., (2005). *Critical Thinking Skills: Developing Effective Analysis and Argument.* NY: Palgrave Macmillan.

Cottrell, S., Morris, N. (2012). *Study skills connected. Using technology to support your studies*. NY: Palgrave MacMillan.

Conference of Ministers. (2003). *Realising the European Higher Education Area.* Communiqué of the Conference of Ministers responsible for Higher Education in Berlin on 19 September 2003. Available online: http://www.ehea.info/media.ehea.info/file/2003_Berlin/28/4/2003_Berlin_Communique_English_577284.pdf. (assessed on 2 June 2022).

CoEU - Council of the European Union. (2004). *Education and Training 2010. The Success of the Lisbon Strategy Hinges on Urgent Reforms.* Available online: https://data.consilium.europa.eu/doc/document/ST%206905%202004%20INIT/EN/pdf (assessed on 3 April 2022).

CoEU - Council of the European Union. (2018). *Council Recommendation of 22 May 2018 on key competences for lifelong learning* (Text with EEA relevance) (2018/C 189/01). Available online: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604(01)&from=EN (assessed on 13 March 2022).

Csikszentmihalyi, M. (2015). *Flow: Psychologia optimálneho prežívania*. Citadella. [transl from: Csikszentmihalyi, M. (1990). *Flow: The Psychology of Optimal Experience*. New York: Harper and Row.].

Cunningham, CH. L. (2012). Critically reflective leadership. *Australian Journal of Teacher Education,* Vol.3/4, pp.46–58. (accessed on 26 April 2022).

Čepic, R., Tatalovic Vorkapic, S., Lončaric, D., Andic, D., Skočic Mihic, S. (2014). Considering Transversal Competences, Personality and Reputation in the Context of the Teachers' Professional Development. *International Education Studies*, 8(2), 2015. Canadian Center of Sciences and Education. (Accessed on May 28, 2022).

Dado, J. et al. (2018) Management and Leadership Development Needs: Case of Slovakia. In Purg, D., Bracek-Lalic, A., Pope, J. A. (2018). *Business and Society: Making Management Education Relevant for the 21st Century.* Switzerland: Springer.

Daley, E. (2003). Expanding the concept of literacy. *Educause Review*, 38(2), 32-40.

Darbellay F. (2015). Rethinking inter- and transdisciplinarity: Undisciplined knowledge and the emergence of a new thought style. *Futures*, 65, pp. 163-174.

Daudelin, M.W. (1996). Learning from experience through reflection. *Organizational Dynamics*. 24 (3), 36-48.

Dawson, G. (1996). *Teaching self-reflection: A necessary part of the learning process*. Retrieved from http://electronicportfolios.com/reflection/mosepMod2-1adds.html Dewey, J. (1991). How to think. Buffalo, NY: Prometheus Books.

Deardorff, D.K., van Gaalen, A. (2012). Outcomes assessment in the internationalization of higher education. In Deardorff, D.K., de Witt., H., Heyl, J., Adams, T. (Eds.). *The Sage handbook of international higher education.* pp. 167– 190. Los Angeles: Sage.

Deci, E. L., & Ryan, R. M. (2008). Hedonia, eudaimonia, and well-being: An introduction. *Journal of Happiness Studies*, 9(1), 1-11. http://selfdeterminationtheory.org/SDT/documents/2008_DeciRyan_JOHS.pdf.

Delors, J. (1996). *Learning: The treasure within. (Report to UNESCO of the International Commission on Education for the Twenty-first Century)*. International Commission on Education for the Twenty-first Century. Available online: https://unesdoc.unesco.org/in/rest/annotationSVC/DownloadWatermarkedAttachment/attach_import_5d7cfeb1-abc6-4930-9d52-fe0595c6ea1c?_=109590engo.pdf&to=46&from=1#pdfjs.action=download (assessed on 5 February 2022).

Dewey, J. (1991). *How to think*. Buffalo, NY: Prometheus Books.

Dietrich, A. (2003). Functional neuroanatomy of altered states of consciousness: The transient hypofrontality hypothesis. *Consciousness and Cognition*, 12(2), 231-256.

Dombrovská, M., Landová, H., Tichá, L. (2004). Informační gramotnost - teorie a praxe v ČR. *Národní knihovna: knihovnická revue [online]*. Praha: Národní knihovna České republiky, 15(1), 7-18. Available online: http://full.nkp.cz/nkkr/pdf/0401/0401007.pdf (assessed on 25 February 2022).

Donaldson, S.I. (2009). In search of the blueprint for an evidence-based global society. In Donaldson, S.I. (Eds.). *What counts as credible evidence in applied research and evaluation practice?* Thousands Oaks: Sage, pp.2–18.

Drăghicescua L. M., Cristea S., Petrescu, A.M., Gorghiu, G., Gorghiu, L. M. (2015). The Learning to Learn Competence - Guarantor of Personal Development. *Procedia - Social and Behavioral Sciences,* 191, pp. 2487 – 2493.

Durr, C. R., Lahart, T. E., Maas, R. M. (1999). Improving Critical Thinking Skills in Secondary Math and Social Studies Classes. *An Action Research Project*. US: Graduate Faculty of the School of Education. ERIC ED 434016.

Dweckova, C. S. (2015). Nastavenie mysle. Nová psychológia úspechu. Citadella. [transl. from Dweck, C. S. (2006). *Mindset: The New Psychology of Success.* Penguin.

Dweck, C. S. (2016). Recognizing and Overcoming False Growth Mindset. *Edutopia* (January 11, 2016). https://www.edutopia.org/blog/recognizing-overcoming-false-growth-mindset-carol-dweck.

EC - European Commission. (2018). *The European Qualification Framework: supporting learning, work and cross-border mobility.* 10th anniversary. Available online: KE-01-18-211-EN-N.pdf (assessed on 14 January 2022).

EC – European Commisison. *2030 DIGITAL COMPASS: the European way for theDigital Decade.* Available online: https://futurium.ec.europa.eu/en/digital-compass (assessed on 3 January 2022).

EC - European Commission. (2020). *European Skills Agenda: Skills for Jobs.* Available online: SkillsAgenda_2July_EN.pdf (assessed on 14 January 2022).

EC - European Commission. (2018). *VISKA – Visible Skills of Adults Project Lead: Skills Norway. Criteria for assessing Transversal skills*. Available online: Criteria-for-assessing-Transversal-skills.pdf (viskaproject.eu) (assessed on 14 February 2022).

Economou, E. (2016). *Research Report on Transversal Skills Frameworks. ATS2020 - Assessment of Transversal Skills 2020.* European Commission. Available online: D1.1_ TransversalSkillsFrameworks_CP.pdf (ats2020.eu) (assessed on 14 January 2022).

Elder, L. (2007). Our Concept and Definition of Critical Thinking. *Foundation for Critical Thinking* (accessed on November 10, 2021).

Elder, L. (2021). The Foundation for Critical Thinking. Series of brochures and articles.

Ennis, R. H. (1962). A Concept of Critical Thinking: a proposed basis for research in the teaching and evaluation of critical thinking ability. *Harvard Educational Review*, 32(1), pp. 81-111.

Ennis, R. H. (1987). Critical Thinking and the Curriculum. In Heiman, M., Slomianko, J. Eds.). *Thinking Skills Instruction: Concepts and Techniques.* Washington, D.C.: National Education Association, pp. 40-48.

Ennis, R. H. (1989). Critical Thinking and Subject Specificity: Clarification and Needed Research. *Educational Researcher,* 18 (3), pp. 4-10.https://doi.org/10.3102/0013189X018003004.

Ennis, R. H. (1993). Teaching for higher order thinking. *Theory into Practice,* 32(3), p.181.

Ennis, R. H. (2011). T*he Nature of Critical Thinking: An Outline of Critical Thinking Dispositions and Abilities* (Presentation at the Sixth International Conference on Thinking at MIT, Cambridge, MA, July, 1994). Last revised May, 2011. https://education.illinois.edu/docs/default-source/faculty-documents/robert-ennis/thenatureofcriticalthinking_51711_000.pdf.

Ennis, R. H. (2015). Critical Thinking: A Streamlined Conception. In: Davies, M. et al. (eds.). *The Palgrave Handbook of Critical Thinking in Higher Education.* New York: Palgrave Machmillan, pp. 31-47.

EP- European Parliament & CoE – Council of Europe. (2007). *Key Competences for Lifelong Learning, as stated in the European Reference Framework.* Available online: youth-in-action-keycomp-en.pdf (britishcouncil.org) (assessed on 14 April 2022).

EP - European Parliament. (2006). *Recommendation 2006/962/EC on Key Competences for Lifelong Learning.* Available online: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006H0962&from=EN (assessed on 25 January 2022).

EP - European Parliament. (2016). *European Parliament resolution of 19 January 2016 on skills policies for fighting youth unemployment*. Available online: http:// www.europarl.europa.eu. (assessed on 14 January 2022).

Eriksson – Zetterquist, U., Mullern, T., Styhre, A. (2011). *Organization Theory. A Practice – Based Approach*. New York: Oxford University Press.

Eshet-Alkalai, Y. (2014). Digital Literacy: A Conceptual Framework for Survival Skills in the Digital Era. *Journal of Educational Multimedia and Hypermedia,* 13(1), 93-106.

European Digital Competence Framework for Citizens. 2017 The Institute of Technology Unitec - https://guides.unitec.ac.nz/infolitstaff.

European Parliament and Council of the European Union. (2006). Framework of Key Competencies for Lifelong Learning. Recommendation of the European Parliament and the Council, of 18 December 2006. *Official Journal of the European Union*, 2006/962/E, L394/10-18. Retrieved from http://eur-lex.europa.eu. (accessed on May, 24, 2022).

EU (2017). Digital Competence Framework for Educators (DigCompEdu). Available online: https://joint-research-centre.ec.europa.eu/digcompedu_en. (assessed on 24 May 2022).

Faccione, P. A. (2011). Critical thinking: What it is and why it counts. *Insight Assessment*. pp. 1-28.

Fadel, C., Trilling, B. (2009). *21st Century Skills: Learning for Life in Our Times*. San Francisco: Jossey-Bass.

Flores, K. (2012). Deficient Critical Thinking Skills among College Graduates: Implications for leadership. *Quinn & Heath Harding Educational Philosophy and Theory*, 44 (2).

Forrester. (2009). *Enterprise and SMB Software Survey North America and Europe,* Q42009.

Fraillon, J., Schulz, W., Friedman, T., Ainley, J., Gebhardt, E. (Eds.). (2013). *International Computer and Information Literacy Study: ICILS 2013. Technical report.* Amsterdam: IEA. Available online: https://www.iea.nl/sites/default/files/2019-04/ICILS_2013_Technical_Report.pdf (assessed on 23 January 2022).

Frede, D. (2017). Plato's Ethics: An Overview. In: *Standard Encyclopedia of Philosophy. First published Tue Sep 16, 2003; substantive revision Wed Dec 6, 2017*. https://plato.stanford.edu/entries/plato-ethics/.

Frederiksson, U., Hoskins, B. (2008). Learning to learn: What is it and can it be measured? *JRC Scientific and Technical Reports*. European Commission JRC. http://doi.org/10.2788/83908.

Funke, J., Fischer, A., Holt, D.V. (2018). Competences for Complexity: Problem Solving in the Twenty-First Century. In Care, E., Griffinn, P., Wilson, M. (Eds). *Assessment and Teaching of 21st Century Skills: Research and Applications*. Cham: Springer, pp. 41-53.

Gates, S., Lippman, L., Shadowen, N., Burke, H., Diener, O., and Malkin, M. (2016). *Key soft skills for cross-sectoral youth outcomes*. FHI360 & YouthPower Actio. Available online: https://www.fhi360.org/sites/default/files/media/documents/resource-soft-skills-report.pdf (assessed on 15 March 2022).

Global Human Capital Trends. (2016). Deloitte University Press. Retrieved from: https://www2.deloitte.com/content/dam/Deloitte/global/Documents/HumanCapital/gx-dup-global-human-capital-trends-2016.pdf (accessed 29 October 2021).

Gordon Hullfish, H., Smith, P.G. (1961). Reflective Thinking: The method of Education. In Anseel, F., Lievens, F., Schollaert, E. (eds.) Reflection as a strategy to enhance task performance after feedback. *Organizational Behavior and Human Decision Process.* 110, pp 23 – 35.

Gray, D. E. (2007). Facilitating management learning: Developing critical reflection through reflective tools. *Management Learning*, 38, 495–517.

Griffin, P., Care, E., McGaw, B. (2012). The changing role of education and schools. In Griffin, P., B. McGaw and E. Care (Eds.). *Assessment and teaching 21st century skills*. Heidelberg: Springer, Heidelberg.

Grix, J., Watkins, G. (2010). *Information skills. Finding and using the right resources.* NY: Palgrave MacMillan.

Hábl, J. (2011). Humanitatis officinae? Rethinking Comenius' Notion of Educational Anthropology. *E-Pedagogium*, 11(4), pp. 7-27. https://e-pedagogium.upol.cz/artkey/epd-201104-0002.php.

Halpern, D. F. (2014). *Thought and Knowledge: An Introduction to Critical Thinking.* 5th edition, Psychology Press.

Halpern, D. F. (2014). Stages of problem solving. In Halpern, D. F. *Thought and Knowledge: An introduction to Critical Thinking*. 5th edition. New York, Psychology Press, pp. 451-509.

Hanesová, D. (2022). Preventing Humans from Becoming Unhuman" Comenius's Restoration from the Perspective of a Contemporary Educator. In Hábl, J. (ed.) *The Restoration of Human Affairs: Utopianism or Realism?* Eugene: Pickwick Publications, pp. 77-98.

Harford, T. (2020). *How to make the world add up*. Bratislava: N Press, 2021.

Harris, A. (2007). Distributed leadership: conceptual confusion and empirical reticence, *International Journal of Leadership in Education*, 10(3), 315 325, DOI: 10.1080/13603120701257313.

Hartly, P., Hilsdon, J., Keenan, Ch., Sinfiled, S., Verity, M. Eds. (2011). *Learning Development in Higher Education.* NY: Palgrave Macmillan.

Hatton, N., Smith., D. (1995). Reflection in teacher education – towards definition and implementation. Teaching and Teacher Education, 11. In Moon, J. (1999). *Learning Journals. A handbook for academics, students and professional development.* NY: RoutledgeFalmer.

Hermann, R. R., Bonzanini - Bossle, M. (2018). Bringing an entrepreneurial focus to sustainability education: A teaching framework based on content analysis. *Journal of Cleaner Production*, 246, 2020. DOI 119038.

Hitchcock, D. (2018). Supplement to Critical Thinking: History. In *Standard Encyclopedia of Philosophy.* https://plato.stanford.edu/entries/critical-thinking/history.html.

Hoopers, W. (2001). About how to reach the truth in development co-operation: ODA/DFID's education papers. *International Journal of Educational Development*, 21, pp. 463–470.

Horny, P., Durina, J. Prenositeľné kompetencie absolventov slovenských vysokých škôl. Bratislava: CVTI.

Holt, J. (2011). Two Brains Running. *The New York Times*, 25 November 2011. https://www.nytimes.com/2011/11/27/books/review/thinking-fast-and-slow-by-daniel-kahneman-book-review.html.

Hullfish, H. G., & Smith, P. G. (1961). *Reflective thinking: The method of education*. Dodd, Mead.

Hunter, M. (2004). *Mastery Teaching.* Thousand Oaks, CA: Corwin Press.

Huta, V., & Waterman, A. S. (2014). Eudaimonia and its distinction from hedonia: Developing a classification and terminology for understanding conceptual and operational definitions. *Journal of Happiness Studies, 15*(6), p. 1425-1456.

INEKO. (2017). *Populism and corruption are main threats to democracy in Slovakia: Summary of the country report on the state and development of democracy in Slovakia.*

International Youth Foundation. (2013). *Getting Youth in the Door: Defining soft skills requirements for entry-level service sector jobs.* Available online: https://iyfglobal.org/sites/default/files/library/Getting_Youth_In_The_Door_Soft_Skills_Report.pdf (assessed on 24 January 2022).

James, W. (1902, re-published 2002). *A Study of Man: The Varieties of Religious Experience.* London: Routledge.

Janková, M. (2015). *Zamestnávateľský prieskum (The Employers' Survey).* Bratislava: CVTI SR. Available online: https://www.cvtisr.sk/buxus/docs/VS/absolvent/zamestnavatelia.pdf (assessed on 14 February 2022).

Johnson, L., Morris, P. (2010). Towards a framework for critical citizenship education, *The Curriculum Journal*, 21:1, pp 77-96. Routledge., DOI: 10.1080/09585170903560444 (accessed on December 15, 2020).

Jones, R. E. (2013). Review of A. W. Price, Virtue and Reason in Plato and Aristotle. *Polis* 30, pp 122-126. https://www.academia.edu/5049782/Review_of_A_W_Price_Virtue_and_Reason_in_Plato_and_Aristotle.

Kahneman, D. (2019). *Myslenie rýchle a pomalé.* Bratislava: AKTUELL. [transl. from Kahneman, D. (1994). *Fast and Slow.* 1st (First) Edition. New York: Farrar, straus and Giroux].

Kalechyts, A. (2018). Formovanie kritického myslenia na hodinách ruského jazyka na vysokej škole. In *Inovatívne trendy v odborových didaktikách v kontexte požiadaviek praxe*. Nitra: Pedagogická fakulta UKF v Nitre.

Kane, G. C. et al. (2019). *The Technology Fallacy: How People Are the Real Key to Digital Transformation*. The MIT Press.

Karjalainen, A. & Nissilä, S-P. (2011). Designing an Educational Program for HE Teachers. A developmental Program in Authentic PBL Settings. In *PBL across the disciplines: research into best practice*. Aalborg: Aalborg Universitetsförlag, pp. 594–620.

Kautz, T., Heckman, J. J., Diris, R., Weel, B., Borghans, L. (2014). *Fostering and Measuring Skills: Improving cognitive and non-cognitive skills to promote lifetime success*. OECD. Available online: https://www.oecd.org/education/ceri/Fostering-and-Measuring-Skills-Improving-Cognitive-and-Non-Cognitive-Skills-to-Promote-Lifetime-Success.pdf (assessed on 24 January 2022).

Koehn, P. H., Uitto, J. I. (2013) Evaluating sustainability education: lessons from international development experience. *High Education*, 67, 2014, Springer. pp. 621 – 635.

Koehn, P. H., Uitto, J. I. (2013). Evaluating sustainability education: lessons from international development experience. In *High Education* (2014), 67 (pp. 621- 635), Springer. DOI 10.1007/s10734-013-9669-x. [Retrieved June, 25, 2022].

Komenský, J. A. (1992). *Obecná porada o nápravě věcí lidských [General Consultation on the Restoration of Human Affairs]*. Vols. I–III. Praha: Nakladatelství Svoboda.

Kosturková, M. (2014). Úroveň kritického myslenia študentov odboru vychovávateľstvo. Presov: *Lifelong Learning – celoživotní vzdelávaní*, 4 (1), 45-61.

Kosová, B. (2013). *Filozofické a globálne súvislosti edukácie.* Banská Bystrica: PF UMB.

Kosová, B., Hanesová, D., & Šukolová, D. (2019). *Doktorandská škola - cesta k transformácii a inovácii doktorandského vzdelávania vo svete a na Slovensku (Doctoral school – The way to transformation and innovation of doctoral education in the world and in Slovakia)*. Banská Bystrica: Univerzita Mateja Bela v Banskej Bystrici – Belianum.

Kozárová, N., Gunišová, D. 2020. *Stratégie rozvoja kritického myslenia vo vyučovaní PEDAGOGIKY.* Nitra: PF UKF.

Krkovic, K., Mustafic, M., Wüstenberg, S., Greiff, S. (2018). Shifts in the Assessment of Problem Solving. In Care, E., Griffinn, P., Wilson, M. (eds). *Assessment and Teaching of 21st Century Skills: Research and Applications.* Cham: Springer, pp. 55-73.

Krsková, A. (2003). *Stát a právo v evropském myšlení.* Praha: Eurolex Bohemia Kubeš, M. et al. (2004). *Manažerské kompetence.* Praha: Grada.

Kulašik, P. et al. (2003). *Dejiny politických teórií. Od staroveku do súčasnosti.* Banská Bystrica: UMB, Fakulta politických vied a medzinárodných vzťahov.

Laptev, G., Shaytan, D. (2022). Co – design based learning for entrepreneurs in the digital age. *Measuring Business Excellence,* 26 (1), 93 – 105. Emerald Publishing Ltd. DOI 10.1108/MBE-11-2020-0158.

Laukkonen, R., Biddell, H., Gallagher, R. (2018). *Preparing humanity for change and artificial intelligence: Learning to learn as a safeguard against volatility, uncertainty, complexity and ambiguity*. OECD. Available online: http://www.oecd.org/education/2030/. (assessed on 14 June 2022).

Leal Filho, W. et al. (2016). Implementing and operationalising integrative approaches to sustainability in higher education: the role of project-oriented learning. Elsevier. *Journal in Cleaner Production*, 133, 126 -135.

Lipman, M. (1991). *Thinking in Education*, New York: Cambridge University Press; 2nd edition, 2003.

Livni, E. (2018). A Nobel Prize-winning psychologist says most people don't really want to be happy. https://qz.com/1503207/a-nobel-prize-winning-psychologist-defines-happiness-versus-satisfaction/.

Loden, M., Rosener, J. (1991). *Workforce America. Managing Diversity as a Vital Resource*. Homewood, IL: Business One-Irwin.

Lopez, G. (2021). *Critical Thinking Skills: Advanced Strategies and Reasoning Skills to Increase Your Decision Making (A Guide for Improve Your Critical Thinking Skills)*. Tomas Edwards.

Luka, I., Seniut, I. (2019). Developing Students' Language Competence and Essential 21st Century skills for Future Employability: The Case of Latvia and Lithuania. *Acta Educationis Generalis,* 9(2), 1-23.

Magno, C. (2010). The role of metacognitive skills in developing critical thinking. *Metacognition and Learning*, 5(2), 137-156. Available online: http://doi.org/10.1007/s11409-010-9054-4. (assessed on 27 March 2022).

Markoš, J. (2019). *Sila rozumu v bláznivej dobe. Manuál kritického myslenia*. S doslovom Ondreja Gažoviča. Bratislava: Knižná edícia denníka N. NPress.

McCormick, R. (2006). *Learning how to learn: A view from the LHTL project England*. Learning to learn network meeting report from the first network meeting, January 30-31, 2006.

MC - Ministerial Conference Bologna. (1999). *Bologna Declaration*. Available online: https://www.ehea.info/page-ministerial-conference-bologna-1999 (assessed on 17 March 2022).

McFarlana, D., Ogazon, A. (2011). The Challenges of Sustainable Education. In *Journal of Multidisciplinary Research,* 3(3), 81 – 107.

McGrath, J.E., Berdahl, J.L., Arrow, H. (1995). Traits, Expectations, Culture and Clout: The Dynamics of Diversity in Work Groups. In Jackson, S.E., Ruderman, M.N. (eds.), *Diversity in Work Teams.* Washington, DC: American Psychological Association.

Messer, W. S., & Griggs, R. A. (1989). Student belief and involvement in the paranormal and performance in introductory psychology. *Teaching of Psychology,* 16(4), 187–191. https://doi.org/10.1207/s15328023top1604_4.

Mičienka, M., Jirák J. (2007). *Základy mediální výchovy*. Praha: Portál.

Moon, J. (1999). *Learning Journals. A handbook for academics, students and professional development.* NY: RoutledgeFalmer, 2005.

Moon, J. (1999). *Reflection in Learning & Professional Development. Theory and Practice.* UK: RoutledgeFalmer, 2007.

Moon, J. A. (2004). *Reflection in learnig and professional development. Theory & practice*. US: RoutledgeFalmer.

Moore, C. (2019). *What is Eudaimonia? Aristotle and Eudaimonic Wellbeing.* https://positivepsychology.com/eudaimonia/.

Murray, N. (2016). Dealing with diversity in higher education: Awareness raising and linguistic perspective on teachers' intercultural competence. *International Journal for Academic Development*, 21, pp. 166 – 177. DOI 10.1080/1360144X.2015.1094660.

MŠVVaŠ SR - Ministry of Education, Science, Research and Sport in the Slovak Republic. (2022). *Akčný plán informatizácie a digitálnej transformácie vzdelávania v SR na obdobie 2021 – 2024*. Available online: https://www.minedu.sk/akcny-plan-informatizacie-a-digitalnej-transformacie-vzdelavania-v-sr-na-obdobie-2021-2024/(assessed on 27 February 2022).

Natale, S., Ricci, F. (2006). Critical thinking in organizations. *Team Performance Management*. Vol.12, No.7/8, pp. 272-277. https://doi.org/10.1108/13527590610711822.

Nieto, A.M., Saiz, C. (2008). Evaluation of Halpern's "Structural Component" for improving critical thinking. *The Spanish Journal of Psychology*, 11, 266-274. Retrieved on May 7, 2022.

Nissilä, S. P., Karjalainen, A., Koukkari, M., Kepanen, P. (2015). Towards Competence-based Practices in Vocational Education – What Will the Process Require from Teacher Education and Teacher Identities? Center for Educational Policy Studies- Journal, 5 (2), 9-30.

Nutil, P. (2018). *Média, lži a příliš rychlý mozek: průvodce postpravdivým světem*. Praha: Grada.

O'Brien, R. (2001). Um exame da abordagem metodológica da pesquisa ação [An Overview of the Methodological Approach of Action Research]. In Roberto Richardson (Ed.). *Teoria e Prática da Pesquisa Ação [Theory and Practice of Action Research*]. João Pessoa, Brazil: Universidade Federal da Paraíba. (English version) Available: http://www.web.ca/~robrien/papers/arfinal.html (Accessed 20/1/2002).

O'Leary, Z. (2004). *The Essential Guide to Doing Research*. London: Sage.

Odporúčanie Európskeho parlamentu a Rady z 18. decembra 2006 o kľúčových kompetenciách pre celoživotné vzdelávanie, Úradný vestník Európskej únie, 962/ES. Retrieved from: http://nuczv.sk/wpcontent/uploads/2006_Klucove_kompetencie_pre_CZV.pdf.

OECD (2017). *PISA 2015. Collaborative Problem-Solving Framework*. OECD Publishing. Available online: https://www.oecd.org/pisa/pisaproducts/Draft%20PISA%202015%20Collaborative%20Problem%20Solving%20Framework%20.pdf. (Accessed on 27 March 2022).

OECD. (2005). *The definition and selection of key competences.* OECD Publishing. Available online: https://www.oecd.org/pisa/35070367.pdf (assessed on 23 June 2022).

OECD (2010). *PISA 2012. Field Trial Problem Solving Framework*. OECD Publishing. Available online: https://www.oecd.org/pisa/pisaproducts/46962005.pdf (assessed on 27 February 2022).

OECD (2017a). *OECD Skills Outlook 2017: Skills and Global Value Chains.* OECD Publishing. Available online: https://doi.org/10.1787/9789264273351-en. (assessed on 27 March 2022).

OECD (2017b). *La définitionet la sélection des compétencesclés.* Available online: http://www.oecd.org/dataoecd/36/55/35693273.pdf. (assessed on 17 April 2022).

OECD. (2018). *PISA 2018 Global Competence*. OECD Publishing. Available online: https://www.oecd.org/pisa/innovation/global-competence/ (assessed on 1 May 2022).

OECD (2019). *The OECD Learning Compas 2030: Future of Education and Skills 2030: Conceptual learning framework*. OECD Publishing. Available online: https://www.oecd.org/education/2030-project/teaching-and-learning/learning/skills/Skills_for_2030.pdf, https://www.oecd.org/education/2030-project/.

Oppland, M. (2016). *Eight Characteristics of Flow According to Mihaly Csikszentmihalyi*. 15 December 2016. Available online: https://positivepsychology.com/mihaly-csikszentmihalyi-father-of-flow/

Ostrow Michel, J. (2020). Toward Conceptualizing Education for Sustainability in Hugher Education. In *New Direction for Teaching and Learning*. Wiley Periodicals, Inc. Spring 2020.

Ostertágová, A., Čokyna, J. (2020). *Hlavné zistenia z dotazníkového prieskumu v základných a stredných školách o priebehu dištančnej výučby v školskom roku 2019/2020: Zhrnutie výsledkov a odporúčania.* Inštitút vzdelávacej politiky Ministerstva školstva, vedy, výskumu a športu SR. Available online: https://www.minedu.sk/data/att/20815.pdf (assessed on 27 March 2022).

Paul, R. (2005). The State of critical thinking today. *New Directions for Communities Colleges*. 130, 27-38.

Paul, R., Elder, L., Bartell, T. (1997). California Teacher Preparation for Instruction in Critical Thinking: *Research Findings and Policy Recommendations*: Sacramento, CA: State of California, California Commission on Teacher Credentialing.

Paul, R., Elder, L. (2008). *The Miniature Guide to Critical Thinking Concepts and Tools,* Foundation for Critical Thinking Press.

Paul, R., Elder, L. (2008). Critical and Creative Thinking. *The Thinker's Guide by The Foundation for Critical Thinking.*

Paul, R., Elder, L. (2010). The Miniature Guide to Critical Thinking Concepts and Tools. Dillon Beach: *Foundation for Critical Thinking Press*. / Paul-Elder Critical Thinking Framework.

Pasiar L. (2020). Digitálna, informačná gramotnosť a kritické myslenie v prípadových štúdiách. In: PAVERA, L. KRPÁLKOVÁ, KRELOVÁ, K. NOVÁK, J. a kol. 2020. *Pohledy na středoškolského učitele odborných předmetů*. Praha: KDEP FFÚ VŠE [online]. (Accessed 05 April 2022).

Periáñez - Caňadillas, I., Charterina, J., Pando-García, J. (2019). Assessing the relevance of digital competences on business graduates' suitability for a job. *Industrial and Commercial Training*, Vol 51, No3, pp. 139- 151. Retrieved from: https://www.emerald.com/insight/content/doi/10.1108/ICT-09-2018- 0076/full/html. (Accessed 04 May 2022).

Peterson, K., Kolb, D. A. (2017). *How you learn is how you live. Using nine ways of learning to transform your life*. Oakland: Berrett-Koehler Publishers.

Peterson, K., Kolb, D.A. (2017). *How you learn is how you live.* US: Berrett – Koehler Publishers Inc.

Petress, K. (1998). What Is Critical Thinking and Why Is It Useful*? University Times*, p. 3, 7; University of Maine at Presque Isle.

PF UMB (2019). *Metodický pokyn 4/2019 k tvorbe a a obhajobe záverečných prác*. Banská Bystrica: PF UMB, p. 4.

Pintrich, P. R. (2004). A Conceptual Framework for Assessing Motivation and Self – Regulated Learning in College Students. *Educational Psychology*, 16 (4), pp 385 – 407. Retrieved from http://dx.doi.org/10.007/s10648-004-0006-x. (Accessed July 28, 2022).

Platón. (1990). *Ústava*: *Dialógy I*. Bratislava: Tatran.

Platón. (2009). *Štát.* Bratislava: Kalligram.

Plattsburgh State Information and Computer Literacy Task Force. 2001. Available online: https://guides.library.unt.edu/medialiteracy/information-literacy-defined (assessed on 13 March 2022)

Porubský, Š. (2012). *Úryvky z dejín pedagogického myslenia.* Banská Bystrica: PF UMB.

Porvazník, J. (2011). *Celostný manažment*. Bratislava: Sprint dva.

Potter, W. J. (2010). The State of Media Literacy. *Journal of Broadcasting & Electronic Media*, 54(4), 675–696. DOI: 10.1080/08838151.2011.521462.

Pritchard, M. (2022). Philosophy for Children. In: *Standard Encyclopedia of Philosophy.* https://plato.stanford.edu/entries/children.

Purg D., Braček-Lalič, A., Pope, J.A. (2018). *Business and Society. Making Management Education Relevant for the 21st Century*. Switzerland: Springer.

Pyper, J.S. (2021). Problem-Based Learning as a professional learning model helped me with the sudden demand of remote learning, and I believe is helping me offer students ownership and their own voice in their learning. *Academia Letters*, Article 563. DOI 10.20935/AL563.

Rajský, A. (2021). *Filozofia výchovy: Vybrané state.* Trnava: PF TU v Trnave.

Research Methodologies Guide. Iowa State University. 9 September 2022. https://instr.iastate.libguides.com/researchmethods/actionresearch.

Ricci, T. (2014). *Critical thinking in organizations*. Performance Management.

Rieckmann, M. (2012). Future - oriented higher education: Which key competences should be fostered through university teaching and learning. Elsevier: *Futures,* 44, 127 – 135.

Ries, L. (2011). *Člověk a výchova.* Ostrava: OU v Ostrave.

Rosling, H., Rosling Rönnlund A., Rosling, O. (2018). *Factfulness:* Ten Reasons We're Wrong About the World-and Why Things Are Better Than You Think. Flatiron Books.

Ruisel, I. (2004). *Inteligencia a myslenie.* Bratislava: Ikar.

Rychen D.S., Salganik, L.H. (Eds.). (2003). *Key Competencies for a Successful Life and a Well-Functioning Society*. Göttingen, Germany: Hogrefe & Huber.

Sá, M. Ch., Serpa, S. (2018). Transversal Competences: Their Importance and Learning Processes by Higher Education Students. *Education Sciences*. MDPI.

Sausa, D. A. (2006). *How the Brain Learns.* 3.ed. Thousand Oaks, CA: Corwin Press.

Schick, T., Vaughn, L. (2014). *How to think about weird things: Critical thinking for a new age.* US: McGraw – Hill Education.

Scholz, B., Vuorio E., Matuschek S. & Cameron I. (2009) *Research Careers in Europe: Landscapes and Horizons.* Strasbourg, ESF. Available online: http://archives.esf.org/fileadmin/Public_documents/Publications/moforum_research_careers.pdf assessed on 17 March 2022).

Schon, D.A. (1987). *Educating the reflective practitioner*. C: Jossey - Bass. A Willey Inprint.

Shared 'Dublin' descriptors for the Bachelor's, Master's and Doctoral awards. A report from a Joint Quality Initiative informal group. 2004. Available online: https://www.uni-due.de/imperia/md/content/bologna/dublin_descriptors.pdf (assessed on 13 April 2022).

Smith, D., (2014). Introduction. In Smith, D. (Ed.) *Diversity and inclusion in higher education. Emerging perspectives on institutional transformation*. London/NY: Routledge. DOI 10.4324/9781315797885.

Sostero M., Milasi S., Hurley J., Fern˙andez-Macías E., Bisello M., (2020*). Teleworkability and the COVID-19 crisis: a new digital divide?* Seville: European Commission, 2020, JRC121193.

Steiner, G., Laws, D. (2006). How appropriate are two established concepts from higher education for solving complex real-world problems? A comparison of the Harvard and the ETH case study approach. *International Journal of Sustainability in Higher Education*, 7(3), 322-340.

Stern, E. (2004). Evaluating partnerships. In Liebenthal, A., et al. (Eds.). *Evaluation and Development*, pp. 29 -41. New Brunswick: Transaction.

Stone, D. (2004). Research partnerships and their evaluation. In Liebenthal, A., et al. (Eds.). *Evaluation and Development*. New Brunswick: Transaction, pp. 29 -41.

Stone, D. (2004). Research partnerships and their evaluation. In Koehn, P. H., Uitto, J. I. (2013). Evaluating sustainability education: lessons from international development experience. In *High Educ* (2014), 67 (pp. 621- 635), Springer. DOI 10.1007/s10734-013-9669-x. [Retrieved on June, 25, 2022].

Stordy, P.H. (2015). Taxonomy of literacies. *Journal of Documentation*, Vol. 71, No 3, pp. 456-476. Retrieved from: https://doi.org/10.1108/JD-10-2013-0128. (Accessed 05 April 2022).

Szafranski, M., Golinski, M., Simi, H. (editors). (2017). *The Acceleration of Development of Transversal Competences*. Kokkola: Centria University of Applied Sciences.

Succeeding in the VUCA paradigm (2016). Ernst & Young LLP. Retrieved from: www.ey.com/Publication?vwLUAAassests/ey. (accessed 14 May 2020).

Syed, J., Ozbilgin, M. (2015). *Managing Diversity and Inclusion. An International Perspective*. London: Sage.

Šnídl, V. (2017). Pravda a lož na Facebooku. Bratislava: N Press Knižná edícia denníka N.

Taylor, C.C.W. (2021). Euidaimonia. In *Routledge Encyclopedia of Philosophy.* Doi:10.4324/9780415249126-A125-1. https://www.rep.routledge.com/articles/thematic/eudaimonia/v-1.

Terzieva L., Luppi E., & Traina, I. (2015). Teaching and assessing transferable/transversal competences. The case of SOCCES. *Science and research*, 8, 25-56.

Theodoulides, L., Jahn, P. (2013). *Reflexná metóda ako nástroj učenia sa v organizáciách. Vybrané techniky a praktické aplikácie.* Bratislava: Iura Edition.

Theodoulides, L. (2018). *Process – relational approach towards leadership*. Banska Bystrica: Belianum.

Theodoulides, L., Kormancova, G., & Cole, D. (2019). *Leading in the age of innovation: Change of values and approaches.* New York: Routledge Taylor & Francis Group.

Theodoulides, L.a kol. (2020). *Rozvoj kritického myslenia koučovacím prístupom vo vysokoškolskom prostredí*. UMB, Banská Bystrica: Belianum. https://doi.org/10.24040/2020.9788055717920.

Theodoulides, L., Niklova, M., Liptakova, K., Nafoussi, G. (2020). *Fostering critical thinking in higher education through a coaching approach.* UMB, Banska Bystrica: Belianum. https://doi.org/10.24040/2020.9788055718002.

Theodoulides, L., Nafoussi, G. (2021). Implementation of Critical Reflection Analysis in Teaching and Learning Focused on Developing Critical Thinking Skills. In Tsounis, N., Vlachvei, A. Eds (2021) *Advances in Longitudinal Data Methods in Applied Economic Research*. Springer Proceedings in Business and Economics. https://doi.org/10.1007/978-3-030-63970-9.

Todeva, E. (2006). *Business Networks: Strategy and Structure*. Oxon: Routledge.

Tsankov, N. (2017). Development of Transversal Competences in School Education (A didactic interpretation. International Journal of Cognitive Research in Science, Engineering and Education. Vol 5, No.2, pp 129-144. Retrieved from DOI:10.5937/IJCRSEE1702129T. Accessed June, 28, 2022.

Turek, I. (2008). *Didaktika*. Bratislava: Iura Edition.

ToVET – Together for Future VETskills. EU project. Available online: https://www.tovet.eu/about/ (assessed on 27 March 2022).

Turek, I. (2005). *Inovácie v didaktike: Príspevok k realizácii projektu Milénium vo vyučovacom procese na základných a stredných školách*. Bratislava: MPC.

UNESCO. (2013). *IBE Glosary of Curriculum Terminology.* Geneva: UNESCO International Bureau of Education. Available online: http://www.ibe.unesco.org/fileadmin/user_upload/Publications/IBE_GlossaryvCurriculumTerminology2013_eng.pdf (assessed on 7 June 2022).

UNESCO. (2015). *Rethinking Education: Towards a global common good* http://www.unesco.org/new/fileadmin/MULTIMEDIA/FIELD/Cairo/images/RethinkingEducation.pdf.

University Libraries. Available online: https://guides.library.unt.edu/medialiteracy/information-literacy-defined. (assessed on 1 March 2022).

Vančo, M., Srnánková, Ľ., Blanár, F., Slovíková, M. (2016). *Analýza získavania prierezových kompetencií na slovenských vysokých školách (Analysis of acquisition of cross-sectional competencies at Slovak universities*). Bratislava: CVTI SR. Available online: https://www.minedu.sk/data/att/10091.pdf.

Van Dijk, J. A. G. M. (2006). Digital divide research, achievements and shortcomings. *Poetics*, 34(4/5). https://doi.org/10.1016/j.poetic.2006.05.004 (accessed on May, 5, 2022).

Vare, P., & Scott, W. (2007). Learning for a Change: Exploring the Relationship Between Education and Sustainable Development. *Journal of Education for Sustainable Development*, *1*(2), 191–198. https://doi.org/10.1177/097340820700100209.

Vaughan, M. (2013). *The Thinking Effect: Rethinking Thinking to Create Great leaders and the New Value Worker*. Boston, London: Nicholas Brealey Publishing.

Viser, J. (2001). Learning Communities: Wholeness and partners, autonomy and dependence in learning ecology. Papers for *International Symposium on learning Communities, Barcelona*.

Viser, J. (2012). Reflections on a definitions. Revisiting the meaning of learning. In Aspin, D., Chapman, J., Evans, K., Bagnall, R. (Eds). *Second International Handbook of Lifelong Learning*. Springer.

Wales, Ch. E., Nardi, A. H., Stager, R.A. (1987). *Thinking Skills: Making a Choice*. Windsor; Morgantown : University of Windsor; West Virginia University.

Waterman, A. S. (1990). The relevance of Aristotle's conception of eudaimonia for the psychological study of happiness. *Theoretical and Philosophical Psychology*, 10, pp. 39-44.

Waterman, A. S. (1993). Two Conceptions of Happiness: Contrasts of Personal Expressiveness (Eudaimonia) and Hedonic Enjoyment. *Journal of Personality and Social Psychology,* 64(4), pp. 678-691.

Waterman, A. S. (2008). The Implications of Two Conceptions of Happiness (Hedonic Enjoyment and Eudaimonia) for the Understanding of Intrinsic Motivation. *Journal of Happiness Studies*, 9, 41-79.

Waterman, A. S., Schwartzb, S. J., Zamboangac, B. L., Ravertd, R. D., Williams, M. K., Agochae, V. B. Kimf, S. Y., Donnellang, M. B. (2010). The Questionnaire for Eudaimonic Well-Being: Psychometric properties, demographic comparisons, and evidence of validity. *The Journal of Positive Psychology,* 5 (1), 41–61.

Wenger, E., 1998. *Communities of Practice. Learning, Meaning and Identity*. New York: Cambridge University Press.

Wilson, S. (2014). Using Secondary Analysis to Maintain a Critically Reflexive Approach to Qualitative Research. *Sociological Research Online,* 19(3), 1-12.

Wilson-Ahlstrom, A., Yohalem, N., DuBois, D. L., Peter, J., and Hillaker, B. (2014). *From soft skills to hard data: Measuring youth program outcomes. Forum for Youth Investment*. Available online: https://www.search-institute.org/wp-content/uploads/2017/11/DAP-Ready-by-21-Review.pdf (assessed on 13 June 2022).

Winter, J., Cotton, D. (2010). ‚It's not just bits of paper and light bulbs'. A Review of Sustainability Pedagogies and their Potential for Use in Higher Education. In *Sustainability Education.* NY: Routledge, pp. 54 – 69.

Whitmore, J. (2002). *Coaching for performance*. London: Nicholas Brealey Publishing.

Wooley, A. W., Chabris, C. F., Pentland, A., Hashimi, N., & Malone, T. W. (2010). Evidence for a collective intelligence factor in the performance of human groups. *Science*, 30, p. 686–688. doi:10.1126/science.1190483.

World Economic Forum (2018). The Future of Jobs Report. Reviewed from: http://www3.weforum.org/docs/WEF_ Future_of_Jobs_2018.pdf.

World Economic Forum. (2016). The Future of Jobs, Employment, Skills and Workforce. *Strategy for the Fourth Industrial Revolution*. Available on: http://www3.weforum.org/docs/WEF_ Future_of_Jobs.pdf.

Wrench, J. (2002). Diversity Management, Discrimination and Ethnic Minorities in Europe: Clarifications, Critiques and Research Agenda. *Occasional Papers and Reprints on Ethnic Studies,* 19, 1–179.

World Economic Forum. (2016). *The Future of Jobs. Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution.* Available online: https://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf#page=1&zoom=auto,-82,842 (assessed on 10 April 2022).

World Economic Forum. (2018). *The Future of Jobs Report*. Available online: http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf (assessed on 7 June 2022).

Whittemore, S. (2018). Transversal competencies essential for future proofing the workforce. https://www.researchgate.net/publication/328318972 (assessed on 23 January 2022).

Yarime, M., Tanaka, Y. (2012). The issues and methodologies in sustainability assessment tools for higher education institutions: A review of recent trends and future challenges. *Journal of Education for Sustainable Development*, 6 (1), 63 – 77.

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology*, 81, pp 329 - 339. Retrieved from http://dx.doi.org/10.1037/0022-0663.81.3.329. (Accessed on November 24, 2021).

Zovko, M.-É. (2013). *Call for papers: Bildung und Paideia: Philosophical models of education.* http://philevents.org/event/show/8894.

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