APPLICATION OF THE CASE METHOD IN THE FIELD OF SKILLS DEVELOPMENT

The relationship between a transformative teaching method and skills development in business education

DOCTORAL THESIS

Supervisor: Dr. Erzsébet Czakó

Ábrahám Zsolt

Budapest, 2023

ZSOLT ÁBRAHÁM

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DOCTORAL SCHOOL OF BUSINESS AND MANAGEMENT

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Dedicated to my family, friends and colleagues

"The value of a college education is not the learning of many facts but the training of the mind to think"

Albert Einstein

1. INTRODUCTION

In my dissertation, I examine the application forms of the case method in the field of skills development. I do all this along the lines of two processes: on the one hand, in the age of the information society, we learn and work by using digital tools and we are connected to each other, share and process information twenty-four hours a day. Thanks to digital development, explicit knowledge became widely accessible, which had a significant impact on employees and educational institutions. In addition to gaining knowledge, more and more emphasis is placed on the development of skills. On the other hand, with the establishment of the Harvard Business School in 1908, not only a new business school was born, but also a new teaching methodology in business, the case method. In the last hundred years, case method has undergone a significant transformation: in addition to traditional classroom teaching, it facilitated new forms of skills development in different spheres of work.

In my article-based doctoral dissertation, I examine the applicability of the case method as a teaching methodology in business education and in the area of skills development. During my research work, I searched for the answer to the main research question, "*What are the application forms of the case method in the field of skills development?*"

During my doctoral work, I undertook to write an article-based dissertation, during which I divided the main question into three sub-questions: (1.) *How do case-based education and international case competitions contribute to skills development?*, (2.) *How can the case method be applied in the field of skill mapping and student talent management?*, and (3.) *What are the potential applications of the case method in Hungarian primary and secondary public education?* While the first two research sub-questions examine the relationship between the case method and business education in higher education, the third sub-question intentionally focuses on the applicability of the method in primary and secondary education.

1. *Introductory article - Top of the pyramid? Case-based education and case competitions:* The introductory article examines the development of case-based business education in Hungary and reviews the experiences of participation in international case competitions. The study is based on the single case study of the “Business Economics Pyramid” developed by the Institute of Business Economics at the Corvinus University of Budapest.

2. *Second article - Mapping problem-solving competencies and talent management strategies for universities:* The article presents a case-based skill assessment among the first year students at the Budapest Business School. Based on the results of the case-based skill assessment, three talent clusters were identified and four talent management strategies were recommended to the course administrators and university managements.
3. *Third article - Application of case method in the Hungarian public education:* The article examines the potential applications of case method in Hungarian public education through an evaluation framework. Six subjects or groups of subjects were studied using the evaluation framework containing seven assessment criteria. Hungarian literature, history, geography and the so called value-based subjects (divinity and ethics) are the most suitable for the application of the case method in public education.

The purpose of the introductory article is to present the basic concepts related to case-based education and international case competitions and to create a conceptual framework for the investigation of further research topics through the case study of Business Economics Pyramid[1]. Building on this, the second article of the paper-based dissertation focuses on the skills that can be developed with the case method and their assessment. The result of the data collection carried out during the quantitative research is a cluster analysis, in which the article proposes the development of different talent management strategies for each student cluster. The third article of the dissertation extends the scope of research from the regular framework set by higher education and business courses and examines the applicability of the teaching method in the field of primary and secondary education based on the National Core Curriculum.

My doctoral dissertation consists of seven chapters. After the first introductory chapter, the second part of the dissertation presents the research questions, the purpose and the relevance of the research; the research methodology, validity and reliability limits, and the structure of the article-based dissertation. The third chapter presents the theoretical background of the research and the research results. The fourth chapter encompasses the published articles that form the basis of my article-based dissertation in their original form submitted to the journals. The fifth chapter presents the key findings and main contributions of the paper-based

[1] The Business Economics Pyramid is a training structure related to the former Institute of Business Economics of the Corvinus University of Budapest. It aims to develop students' business problem-solving skills through courses that build on each other over five semesters, as well as to prepare the most talented and ambitious students for international case competitions. Since September 2022, as a result of organizational transformations related to the university, the Business Economics Pyramid will continue under the name "case track".

dissertation to the scientific community. I close my dissertation with references and a list of publications related to my work.

112. RESEARCH OVERVIEW

In my doctoral dissertation, I examine the applicability of the case method and case-based business education in the field of skills development. In the following chapter, I present the rationale for my choice of topic, the structure, purpose and relevance of the research. Following that, the chapter will explain the research questions and the research methodology, and then it will address the issues of validity and reliability. The chapter closes with the structure of the article-based dissertation.

2.1. Justification of the research topic

According to Maxwell (2005), research goals include motivations, desires and goals related to research. In his opinion, it is important to understand our own goals as researchers, as these are the ones that guide the research work and support us in prioritizing our tasks. Research goals also help us to understand and reflect on the value creation related to the research work.

Based on Maxwell (2005), I identified the topic selection of the dissertation along three aspects - intellectual, practical, and personal. I describe them below:

1. *Intellectual aspect:* Case method and case-based education are closely related to the issue of problem solving and competence development. The application of the method can have significant contributions in the field of pedagogy, skill and competence development, recruitment and selection, and business development. In my research, I examine and explore the role of the case method in the development of problem-solving skills and abilities. To do this, I developed a comprehensive conceptual framework based on the case method, which can be used to develop problem-solving skills.
2. *Practical aspect:* Examining the application possibilities of the method is important not only from a scientific but also from practical point of view. The development of the conceptual framework involves the creation of several educational tools and models that help the method to be widely used. During the examination of problem-solving abilities, I would like to demonstrate what skills and competencies can be measured and developed.
3. *Personal aspect:* I have been dealing with case solving since 2008. As a university student, by completing the Business Economics Pyramid of the Corvinus University of Budapest, I had the chance to represent my university and our country at one of the

world's most prestigious international case competitions. The competition organized by the National University of Singapore (NUS) in 2009 was followed by many other competitions that had a great impact on my professional development, my attitude to teamwork and my professional mindset. In 2012, after obtaining my master's degree, I founded the startup company Case Solvers, which has contributed to the development of approximately 30,000 students through cca. 300 case-based trainings in 33 countries around the world. With our team, we organized more than 30 national and international level case competitions in the last 10 years. In the past decade and a half, I have therefore been able to actively deal with the case method and case-based skills development in several roles as a case solver student, university lecturer, case writer, case competition organizer and skills development trainer (Figure 1). During my research work and in my doctoral dissertation, I consciously built on this unique experience and strove for the validity expected by the scientific community.

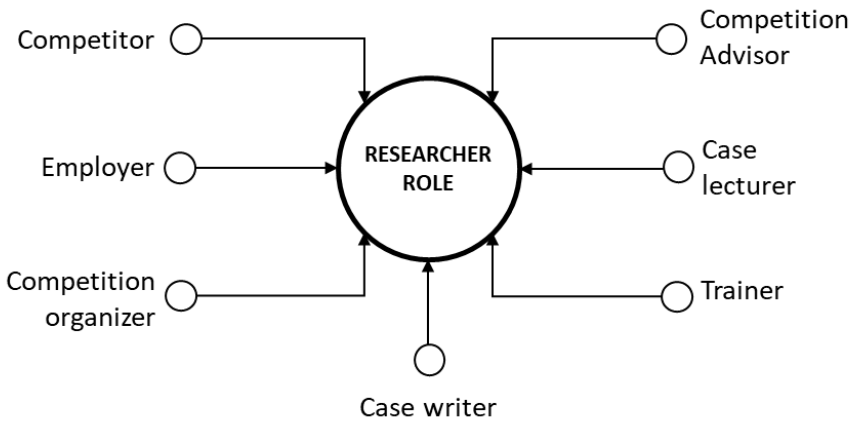

Figure 1: My researcher role
Source: Author's compilation

During the analysis of education through business case studies, the role of the researcher is also affected by other roles relevant to the topic. In relation to case-based education, I identified seven different roles (*competitor, case competition advisor, university instructor, development trainer, case writer, competition organizer, employer*) that had an impact on my research work.

As a case competition participant, I learned how to work under time pressure and learned to apply the knowledge I gained about a specific company problem in practice. I experienced working in a team, and also the atmosphere of domestic and international case competitions closely. As a case competition advisor, I have participated in preparing dozens of case teams for domestic and international competitions in the past 10 years. As a university lecturer, I

integrated the case method into the teaching of the subjects I taught - business economics, applied business economics, cases on business economics, cases on international business strategy, international business economics. All of these involvements provided me with significant experience for the investigation of the application of the case method in domestic formal higher education. My work as a skills development trainer is related to my role as a trainer in the educational startup company Case Solvers, where I had the opportunity to deal with talent management and skills development in the form of trainings in 33 countries around the world, often in very different cultural, social and educational environments. As the author of more than sixty business case studies, I learned how to design a case study, construct the related business problem, and organize relevant and less relevant information from the point of view of problem solving. As the founder of Case Solvers, I took an active role in organizing national and international case competitions at high school, university and young employee levels. What I experienced during competition organization helped me to better understand the motivation of the organizers, jury members and other external partners. As an employer, I see the expectations of students graduating from business schools and the skills they bring to the labor market.

2.2. Research structure

The structure of the research is mostly based on the iterative model defined by Maxwell (2005), according to which research is an interactive and iterative process, during which the individual elements simultaneously form an integrated whole and interact with each other. Figure 2 summarizes the elements of the interactive model:

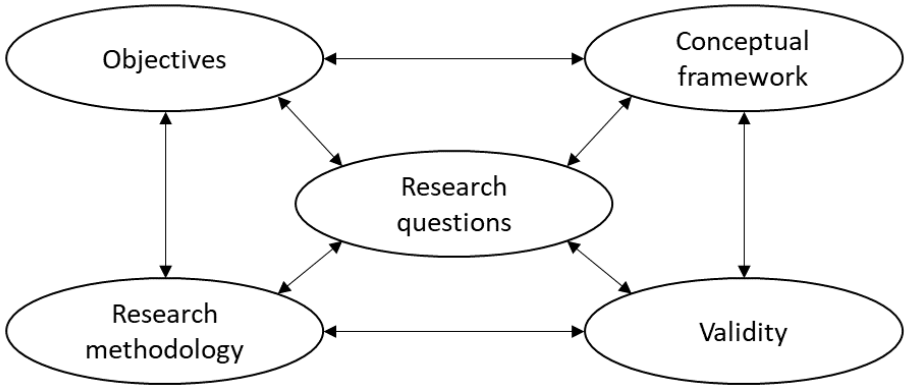

Figure 2: Interactive research design
Source: Maxwell (2005)

According to Guba and Lincoln (1994), all research is embedded in a research paradigm, which affects the researcher's work. By consciously choosing a research paradigm, researchers express their view of the world and scientific issues.

I classify my research philosophy as a pragmatic research philosophy (Saunders et al., 2009). When choosing the methodology, I considered several alternatives. I believe that the nature of my research does not fit into either the positivist or the interpretive research paradigm. I do not work with hypotheses and I do not derive my questions from theoretical literature, but I empirically examine the research problems I raise and try to draw general theoretical conclusions based on them. In my research, I use scientific methods to reveal a problem I have learned in practice. I approach the case method in my dissertation in a new way, therefore, my research is exploratory in nature and thematizes a practical phenomenon, and draws theoretical conclusions based on this.

A mixed methodology research design best suits the pragmatic approach and the inductive approach I use. I consider the use of mixed methodology relevant for several reasons. In my dissertation, I undertake to examine the case method as a complex practical phenomenon. One focus of the research is the Hungarian context of the case method. I can examine the

characteristics of the background of the participants, the types of competitions, and the organizers mostly with quantitative methods. The other leg of the research examines the patterns of the participants' behavior, competencies, and motivations. I consider it more effective to investigate these questions with qualitative methods. During the individual researches, I use different data collection methods - mini focus group, semi-structured interview, case study - which I present in detail in the given publications.

I see my work as applied research, where the source of the research problem and the research questions are derived from experience gained in practice. The research results are believed to be useful in practice and create value for students, higher education institutions, and business enterprises. In the following section, based on Maxwell (2005), I present the purpose and relevance of the research for the main stakeholders.

2.3. Relevance of the research

Although the case method has a history of more than a hundred years in the world of business schools, today only a narrow segment of business schools uses it exclusively as a primary educational method. Social changes in recent decades have a significant impact on the development of the case method, and the widespread use of the method itself contributes significantly to the training of problem-solving citizens (Damnjanovic and Mijatović, 2017). The case method used in business schools is suitable for skills development and thus can have a significant impact on the functioning of future employees (Dlačić, Damnjanovic és Ribarić, 2017; Damnjanovic, Proud és Milosavljevic, 2020; Győrfy, 2014; Ábrahám 2019).

The scientific investigation of the case method can be considered as relevant from three points of view:

1. With the spread of digitization and the Internet, explicit knowledge has become a commodity, and the labor market competitiveness is not anymore based on factual knowledge, but by the ability to apply it. Under the umbrella of digitization, gamification, robotization, machine learning and artificial intelligence are gradually coming to the fore, which, in addition to the spread of easily algorithmizable machine processes, further strengthen the need for complex problem-solving skills, such as critical thinking (Kapp, 2012). The quest for digitization was intensified by the COVID-19 pandemic, and the players in the field of education and training faced new challenges (Ábrahám, 2021).

2. The role of higher education, including business schools has changed, in addition to the transfer of subject knowledge, the development of skills and competences has come to the fore. Well-functioning methodologies for measuring subject knowledge and knowledge existed, but the practical measurement, digitization and automation of competence and skills are still in their infancy (Aun, 2017; Ábrahám, 2022).
3. The labor market has changed, there is a labor shortage in many areas, which encourages businesses to develop new forms of recruitment and selection. Case competitions are a new form of competency-based recruitment and selection. In addition to the labor shortage, the skills gap between the skills expected by the actors of the labor market and the skills students possess graduating from higher education is constantly increasing, employers are placing more and more emphasis on the development of employees' skills (*upskilling*) (Chinn et al., 2020; Nohria, 2021).

Each of the three points of view listed has an impact on the future of business education and is a strong incentive to rethink the current pedagogical methods.

The research problem identified in my PhD studies consists of two parts. One is a more than hundred-year-old educational method used by elite business schools, the other is a pressure from the changing labor market and transformation of higher education. So there is an educational method which I argue that can be used in mainstream public and higher education (Ábrahám and Erőss, 2022). Although the topic of the case method has been elaborated by several authors in the past decades, the examination of its applicability in mainstream education is still incomplete.

My chosen research topic is relevant to three key areas: (1) higher education and the scientific community, (2) employers, and (3) students and employees. I describe them in the following three subsections.

2.3.1. The relevance of research for higher education and the scientific community

The research can be considered as relevant for the scientific community in three ways. On the one hand, business and pedagogical literature related to the case method is still little researched and not systematized these days. On the other hand, case method is still used by a few business courses as an educational methodology. By reviewing and organizing the literature related to the field, it becomes possible to use the common language and definitions used in education. Last but not least, by examining the connections between skills development and case method,

a tangible toolkit is put into the hands of colleagues who teach business case studies, write business case studies, and prepare for case competitions, which they can put into daily practice.

2.3.2. Relevance of research for students and employees

Examining the areas of application of the case method is relevant for both students and employees for two reasons. On the one hand, the learning and development experience of students is improved by the appropriate application of the case method in a varied form. The role-play related to the cases, the decision-making situations, the presentation, competition and cooperation are important elements of the method that increase the commitment and engagement of students and employees. In addition to improving the learning and development experience, during case-based skills development case solvers can develop a very tangible learning curve within a short time and acquire skills that they regularly use as employees in their everyday work.

2.3.3. Relevance of research for employers

Last but not least, the examination of the case study method in the field of skills development is also relevant for employers from two aspects. Firstly, the consistent application of the method can reduce the skills gap between applicants and the expectations of existing employers, and secondly, the correct application of the method can improve the accuracy of the company's recruitment process and increase the commitment of employees.

2.4. Research questions

The main research question of my PhD research: *What are the application forms of the case method in the field of skills development?* When formulating the research questions, I divided the research topic appropriately horizontally and vertically.

The individual publications deal with the sub-questions examined during my research in more detail in the following topic breakdown:

1. *Introductory article - Top of the pyramid? Case-based education and case competitions:* How do case-based education and international case competitions contribute to skills development?

2. *Second article - Mapping problem-solving competencies and talent management strategies for universities:* How can the case method be applied in the field of skill mapping and student talent management?
3. *Third article - Application of case method in the Hungarian public education:* What are the potential applications of the case method in Hungarian primary and secondary public education?

The starting point of my research work was the case competitions. The introductory article examines the potential of case-based education and participation in international case competitions from the skills development point of view. Since an important aspect of case competitions is the measurement of skills, I devoted the research behind my second article to the examination of the case method and the area of skill measurement and student talent management. Nowadays, many high school-level case competitions are hold in Hungary, so the research behind the third article of my article-based dissertation examines the question of the applicability of the case method in the field of public education. Figure 3 summarizes the relationship between the individual articles and the research questions.

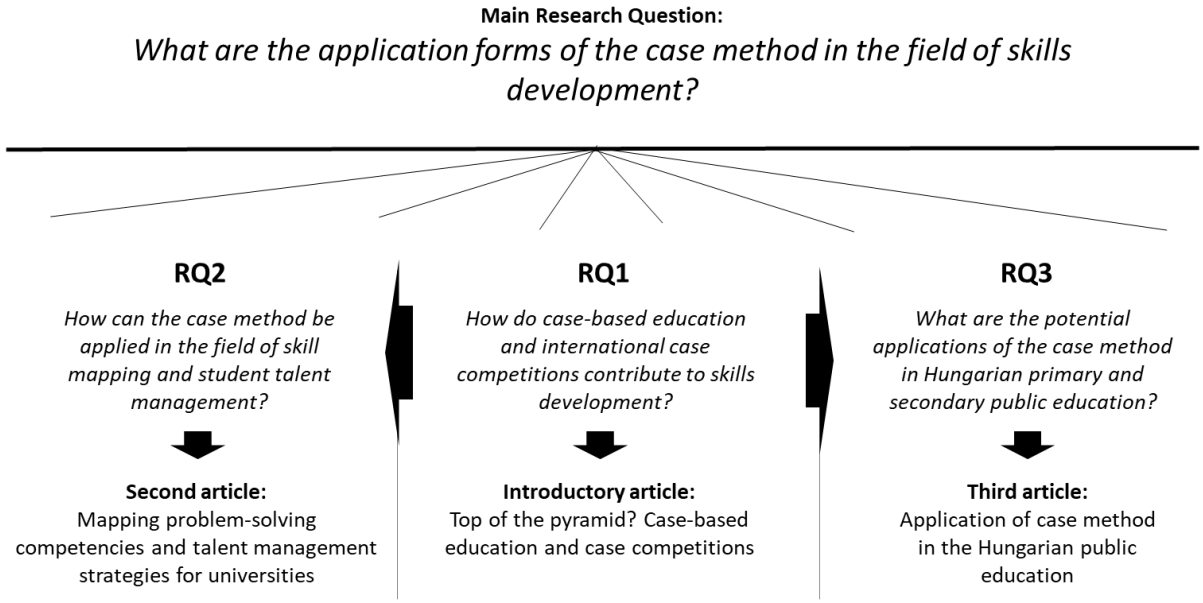

Figure 3: The relationship between the individual articles and the research questions
Source: Author's compilation

In the rest of the chapter, I elaborate on the research questions examined in the publications in detail.

2.4.1. Introductory article: Top of the pyramid? Case-based education and case competitions

In the early ‘90s, after the regime change Corvinus University of Budapest (CUB) was the first in Hungary to start teaching based on case studies and preparing university students for international case competitions. As part of the Bologna process, two major case competition courses were created at CUB, the Strategic International Management (SIM) course linked to the Institute of Strategy and Management, and the Business Economics Pyramid related to the Institute of Business Economics. The purpose of the article, written together with Erzsébet Czakó and Miklós Kozma, was to provide a comprehensive overview of case-based education and student talent development, as well as participation in international case competitions related to the Business Economics Pyramid.

The research questions examined in connection with the topic can be divided into three groups:

1. What are the characteristics of case-based business education?
2. How was the case-based business education developed at Corvinus University of Budapest’s undergraduate programs?
3. What are the main takeaways of undergraduate international case competition participation at Corvinus University of Budapest?

Related to the three above explained research questions, 14 findings were made to provide a comprehensive picture of the case-based teaching method, and to present the form of talent management based on case-based business education, the Business Economics Pyramid. The explicit aim of the article is to establish the basis of further research and educational development with its findings.

During the preparation of the article, we defined the research questions and the related research methodology together with the co-authors. When preparing the article, my primary task was to conduct the literature review and conceptual framework related to the case method, whereas the case method in undergraduate education was the contribution of Erzsébet Czakó, and the experiences of the international case competition are the work of my co-author Miklós Kozma. The propositions related to the research results were formulated together with the co-authors.

2.4.2. Second article: Mapping problem-solving competencies and talent management strategies for universities

With the spread of digitalization and labor market trends, the automation of the recruitment and selection process and the measurement of employees' skills have become increasingly important. The background of the research is a skills assessment software based on the case solution, through which it is possible to measure the problem-solving skills of the users during work. In the frame of the research conducted at the Budapest Business School, we assessed the skills of all first-year students using the software called Spartafy (presented in details in the article). The results of the skills assessment were linked to the students' demographic data.

The research questions examined can be divided into two groups:

1. What clusters can be formed among the first-year students at Budapest Business School based on the results of a case-based skill-assessment?

2. What talent management strategy and action can be assigned to the cluster of students with different problem-solving skills?

The purpose of the article is to demonstrate through a specific example the possibility and importance of measuring problem-solving skills, as well as the potentialities of data-based talent management related to skill measurement.

The research behind the article was a joint project of Case Solvers and Budapest Business School. The research assessed the problem-solving skills through Case Solvers' Spartafy software, which is based on the work of Dániel Szőgyényi and myself. We planned and prepared the demographic questions related to the research together with the co-authors. The sampling related to the research was carried out by Bálint Ecker and Szilárd Németh. We developed and examined the clusters related to the research together with Dániel Szőgyényi, while we jointly proposed talent management strategies related to each cluster.

2.4.3. Third article: Application of case method in the Hungarian public education

With the spread of high school-level case competitions, it became opportune to examine the application of the case method in public education. In 2008, the European Union introduced the European Qualifications Framework (EQF), which aims to create a uniform framework for each level of training (Europass, 2023; Derényi and Vámos, 2015). While the introductory and

the second articles of the dissertation examined levels 6 and 7 (undergraduate- and master-levels of higher education) of the EQF, the third article is focusing on levels 1-4 (primary and secondary education).

The research background of the article was provided by the experience related to the high school case competitions organized by Case Solvers (OKPV, CasePénz, Márkaland, Cégre fel!), as well as the new National Core Curriculum introduced in 2020.

Two main research questions were identified:

1. In which subjects taught in primary and secondary education in Hungary can the case method be effectively applied?

2. How can case-based education be introduced into Hungarian primary and secondary education?

The purpose of the research questions is twofold. On the one hand, the research examines the applicability of the method for each subject along a predefined set of criteria, and on the other hand, it proposes the possibility of a partial or full introduction of the transition to case-based education in the case of history, geography, Hungarian literature and the value-based subjects.

2.5. Research methodology

When deciding about the research methodology of my PhD research, I chose the mixed methodology. According to Király et al. (2014), the mixed methodological approach includes research that uses both qualitative and quantitative data to research a topic or question. During the application of the mixed methodology, quantitative and qualitative methods can be used at the same time or at a different time (Hanson et al., 2005). The application of the mixed methodology was also justified by my active involvement and my different roles in the case method area as described in chapter 2.1.

Figure 4 summarizes the layers of the methodology applied in my research work.

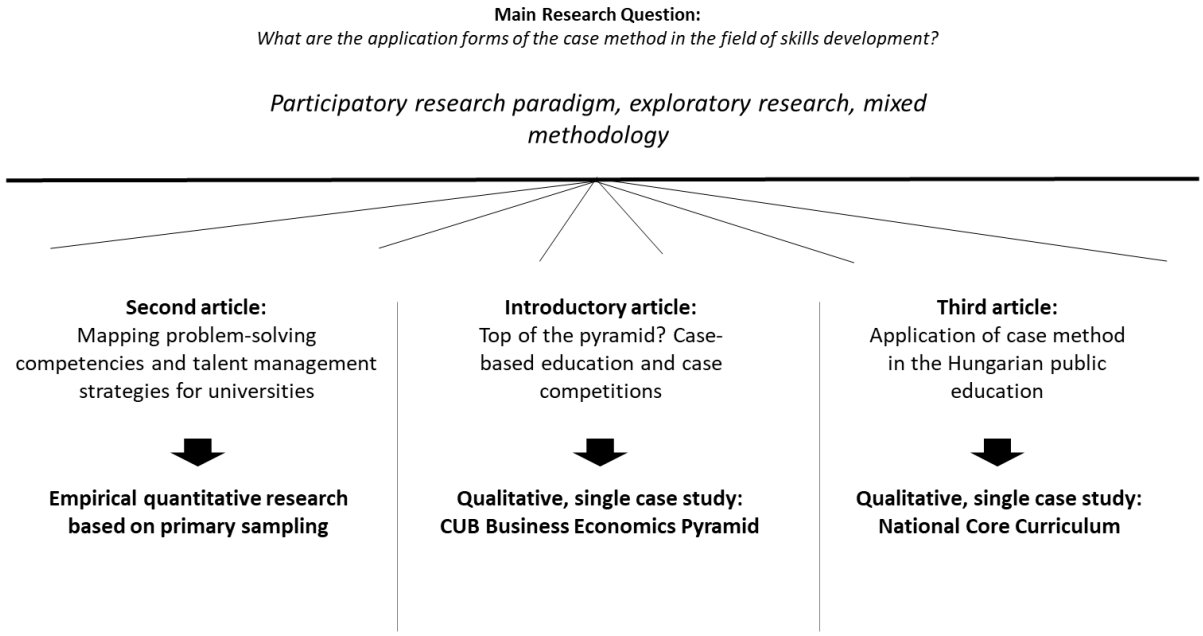

Figure 4: Layers of research methodology
Source: Author's compilation

The introductory article of my dissertation, written together with Erzsébet Czakó and Miklós Kozma, is a qualitative descriptive research based on a single case study design (Gummesson, 2008). Relying on the case study of the Business Economics Pyramid by the Institute of Business Economics at Corvinus University of Budapest, we investigated the experiences of education based on case studies and international competitions and aimed to make general conclusions.

The second article of my dissertation, written jointly with Dániel Szőgyényi, Bálint Ecker and Szilárd Németh, is an explanatory research based on my own sample of 546 student

respondents. The data collection was carried out in the fall of 2020 among the first-year students of the Budapest Business School. As part of the quantitative primary research, we measured the problem-solving skills of university students and assigned talent management strategies to the clusters formed with the method cluster analysis.

The third publication of my article-based dissertation, written together with Domokos Erőss on the application possibilities of the case method in the field of public education, is also a qualitative, descriptive research based on the single case study method (Gummesson, 2008). In this article we studied the National Core Curriculum, which was amended in 2020, and we explored the potentialities of primary and secondary education based on the case method. Based on the case of the Hungarian National Core Curriculum and the related evaluation criteria system, we made general findings regarding the applicability and introduction of the case method in case of different school subjects.

2.6. Validity and reliability of research

The reliability of a research is the stability of the findings and conclusions found in the research, while validity means the truth of the findings (Altheide & Johnson, 1994). When examining the validity and reliability of my PhD research, I examined the factors identified by Haradhan (2017), which are the research time horizon, research methodology, selection of data collection methodology, and the neutrality of the research subjects.

According to Haradhan, there are four options for improving the validity of the research (Haradhan, 2017):

1. Clear definition and operationalization of the research goals
2. Measurement coordinated with the research goals
3. Checking the measurements
4. Comparison of the obtained results with other research results

The research planning behind this article-based dissertation was consciously taking into consideration the relationship between the main research question of my dissertation (*What are the application forms of the case method in the field of skills development?)* and the RQs behind the related publications. In case of the published articles, me and my co-authors took conscious efforts to improve the research validity and reliability defined by Haradhan (2017).

In the introductory article published in Budapest Management Review the research goals were developed and operationalized together with my co-authors. By applying the single case study methodology (Gummesson, 2008), both qualitative and quantitative data were available: as for quantitative, we involved statistical data provided by the Institute of Business Economics (at CUB), as for qualitative, we relied on the empirical experience gained during different international case competitions. The results were compared with different research results, for example with the results of the Advisors Café of the Central European Case Competition (CECC) which is jointly organized by Case Solvers and the Corvinus University of Budapest (Ábrahám et al., 2019; Ábrahám et al 2020).

In case of the second article, "Mapping problem-solving competencies and talent management strategies for universities", the formulation of the research questions, assessment methodology and data collection were coordinated. As part of the research, we performed measurements on the same sample and the same case twice, in September and December 2020. Since 2020, the measurements have been taking place continuously with the same methodology.

The third article of this article-based dissertation is also based on a single case study, namely the National Core Curriculum which we assessed by our own evaluation methodology. When developing the evaluation methodology, international best practices were used which met the international standards. to improve validity and reliability.

2.7. Conference participations and additional publications related to the research topic

During my PhD studies, I participated as a speaker in both domestic and international conferences related to the application of the case study. I published my partial research results in the conference volumes related to the conferences. In the past five years, I participated as a speaker in 3 international and 5 domestic conferences.

I have produced several publications related to the case method, which can be divided into three groups: 1) articles and studies closely related to my research, 2) studies submitted to conferences, 3) case studies about specific company problems. Table 1 contains the publications related to the case method that have already been published under my name.

Category	**Publication**
1) Publications connected to my research	Ábrahám, Zs. (2022) 'A kutatás játszma az akadémiában', *Educatio* 31 (2), pp. 332–335
	Ábrahám, Zs. (2021) 'A Wizz Air mint globális diszkont-légitársaság', in Blahó-Czakó-Poór (szerk.): *Nemzetközi menedzsment*.
	Ábrahám, Zs. (2021) 'Mesterséges intelligencia és az e-learning: az online oktatás jövője', *Educatio* 30(1) pp. 169-173
	Ábrahám, Zs. (2018) 'Az esettanulmány-módszer alkalmazása a biztosítási szektor ismertségének növelése érdekében', *Biztosítás és kockázat*, 5(3) pp. 76-91.
	Ábrahám, Zs., Fejes P. (2022) 'Forgasd ki: játékosított tanulás a biztosítási szektorban', *Biztosítás és kockázat* 9(2) pp. 60-78.
	Ábrahám, Zs., Havran, Zs. (2021) 'Merre tovább 30 év után? A Béres Gyógyszergyár Zrt. nemzetközi stratégiája', in Blahó-Czakó-Poór (szerk.): *Nemzetközi menedzsment*.
2) Conference papers	Ábrahám, Zs. (2019) 'Accross the Universe – Building the skill universe through case solving' EIBA Conference, Leeds, UK
	Ábrahám, Zs. (2018) 'Measurement and development of employability skills through case competitions', *Intelligens szakosodás az innováció és a versenyképesség elősegítése érdekében konferencia*.
	Ábrahám, Zs. (2018) 'Az esettanulmány-módszer használata a közoktatásban', *Digitális Pedagógus Konferencia*.

	Ábrahám, Zs., Czakó, E., Kozma, M., Matyusz, Zs., Stocker, M. (2022) 'Advisors' World Café. Summary of findings', *Central European Case Competition.* 2022.
	Ábrahám, Zs., Czakó, E., Kozma, M., Matyusz, Zs., Stocker, M. (2021) 'Advisors' World Café. Summary of findings', *Central European Case Competition.* 2021.
	Ábrahám, Zs., Czakó, E., Kozma, M., Matyusz, Zs., Stocker, M. (2020) 'Advisors' World Café. Summary of findings', *Central European Case Competition.* 2020.
	Ábrahám, Zs., Czakó, E., Kozma, M., Matyusz, Zs., Stocker, M. (2019) 'Advisors' World Café. Summary of findings', *Central European Case Competition.* 2019.
	Ábrahám Zs., Kozma, M. (2021) 'The WebEye case' in *Conference proceedings. International Applied Business Conference. The Evolution of Small and Medium Enterprises in the 21st Century and Beyond.*
3) Case studies[2]	Ábrahám, Zs. (2022) 'Heroes of delivery. The foodpanda case', *4th Central European Case Competition* Ábrahám, Zs. (2019): 'Árpolitika és közösségi média' in *Vállalatgazdaságtan. Feladatgyűjtemény*. ISBN szám: 978-963-503-802-2
	Ábrahám, Zs. (2019) 'Mi lesz veled Tiger Wood?' in *Vállalatgazdaságtan. Feladatgyűjtemény.* ISBN szám: 978-963-503-802-2
	Ábrahám, Zs., Frang, G. (2019) 'The OTP Bank case', *1st Central European Case Competition*
	Ábrahám, Zs., Hoffmann, J. (2019) 'The Tresorit case', *1st Central European Case Competition*
	Ábrahám, Zs., Kozma, M. (2023) 'Game-changer prosumers on one platform. The Navitasoft case', *5th Central European Case Competition*
	Ábrahám, Zs., Kozma, M. (2022) 'Carbon neutral supply chain and the engine of sustainability. The Schneider Electric case', *4th Central European Case Competition*
	Ábrahám, Zs., Kozma, M. (2020) 'The WebEye case', *2nd Central European Case Competition*
	Ábrahám, Zs., Pistrui, B. (2023) 'Sustainable promotion of music in Hungary. The House of Music Hungary case', *5th Central European Case Competition*
	Ábrahám, Zs., Stocker, M. (2021) 'Building a national blue chip company. The MVM Group case', *3th Central European Case Competition*

[2] As part of my work at Case Solvers, I wrote 63 case studies for domestic and international case competitions, as well as for skills development trainings. The list of case studies written for educational and skills development purposes is contained in the list of publications presented in Chapter 7 (7.3).

	Ábrahám, Zs. (2022) ‘A kutatás játszma az akadémiában’, *Educatio* 31 (2), pp. 332–335

Table 1: Other scientific activities connected to my research
Source: Author’s compilation

2.8. The structure of my dissertation

My article-based dissertation is based on three articles, and the articles are in 2.3. The main research question formulated in chapter 1, "*What are the application forms of the case method in the field of skills development*?" Table 3 contains the titles of the articles and the research questions related to the each article.

I prepared the introductory article together with Erzsébet Czakó and Miklós Kozma and submitted it in April 2020 to the Budapest Management Review with category "B" classification. The article was published in the 2nd issue volume 52 (2021) of Budapest Management Review LII. The second article, written jointly with Dániel Szőgyényi, Bálint Ecker and Szilárd Németh, was published in the international "Q3"-rated journal Higher Education, Skills and Work-based Learning on April 28, 2023. The publication of the article in print form is currently in progress. The third article, written together with Domokos Erőss, was published in issue 4 of 2022, Educatio, a journal classified as "A" in Hungary.

The research questions related to the publications that are part of my article-based dissertation are presented in Table 2. And the published articles are presented in their final, submitted form in Chapter 4, without changes.

Publication	**Research questions**
Introductory article *Top of the pyramid? Case-based education and case competitions*	1. What are the characteristics of case-based business education? 2. How was the case-based business education developed at Corvinus University of Budapest's undergraduate programs? 3. What are the main takeaways of undergraduate international case competition participation at Corvinus University of Budapest?
Second article *Mapping problem-solving competencies and talent management strategies for universities*	1. What clusters can be formed among the first-year students at Budapest Business School based on the results of a case-based skill-assessment? 2. What talent management strategy and action can be assigned to the cluster of students with different problem-solving skills?
Third article *Application of case method in the Hungarian public education*	1. In which of the subjects taught in primary and secondary education in Hungary can the case method be effectively applied? 2. How can case-based education be introduced into Hungarian primary and secondary education

Table 2: Publications submitted as part of the paper-based dissertation
Source: Author's compilation

3. THEORETICAL BACKGROUND

The research presented in my doctoral dissertation is located on the border of two areas. On the one hand, the case method as a teaching method used in business education provides an opportunity to learn the concepts and tools used in management and executive education (Christensen és Carlile, 2009). Another area behind my research is the competence frameworks used in education that define the development goals assigned to different qualification levels. The purpose of Figure 5 is to describe the theoretical background of this doctoral dissertation.

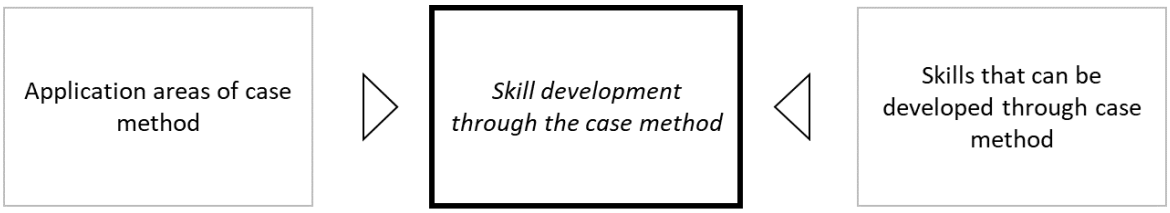

Figure 5: Theoretical framework of the dissertation
Source: Author's compilation

The first part of the theoretical background chapter reviews the evolution of the case method and its six stages of development, and then presents the concept of the case ecosystem along the lines of three research aspects - (1.) environment and stakeholders, (2.) educational community, and (3.) interactions and dependencies between the actors. This is followed by an overview of the basic definitions and concepts related to the case method and the areas of application - case discussion, extracurricular case discussion, case assignment and case competitions - using the case method map.

The second logical thread of the theoretical background chapter is based on the European Qualifications Framework (EQF), which was adopted by the ministers responsible for higher education of the European Union member states in 2006 and it is related to the European Higher Education Area (Derényi and Vámos, 2015). After reviewing the frameworks, I identify the skills developed during the case solving activity through an original skill classification framework, consisting of four categories and 21 skills (Ábrahám, 2019, Ábrahám et. al., 2023). In addition to the skills, I present the types of knowledge that can be acquired using the case method (Ábrahám, 2018).

3.1. Case method as a teaching method in business education

The case method was developed at Harvard University and became more and more widespread in business higher education over the last century. In the following chapter, I present the historical evolution of the methodology, and then explain the most important concepts related to the method. I close the chapter by presenting the concept of the case ecosystem and four different application forms of the method (Figure 6).

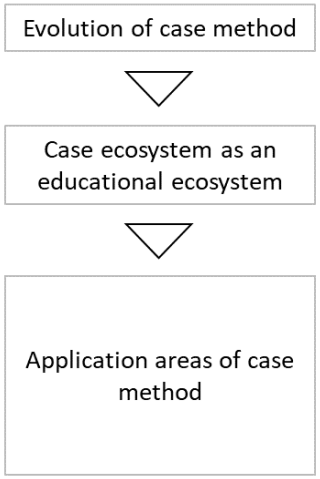

Figure 6: The theoretical guiding thread of the dissertation is based on the case method
Source: Author's compilation

3.1.1. The origins and evolution of case method

Harvard Business School (HBS) celebrated the 100th anniversary of the case method in April 2022. The case method is constantly changing. To understand its evolution over the past 100 years, it is essential to understand its philosophical background. The modern history of the method began with the American pragmatism in the 1870s at Harvard University, but the origins of the method date back to the ancient Greece. I identified six stages in the development of the case method: (1.) philosophical foundations, (2.) birth of a teaching method, (3.) early years of Harvard Business School, (4.) expansion of the case method, (5.) the new era of business schools and (6.) outside the classroom. Table 3 summarizes the 6 stages of development.

Phase	Description
1) Philosophical foundations	➔ The philosophical foundations behind the method can be traced back to the classical ancient Greece, where the individual Greek city-states developed different educational models (D'Angour, 2019). ➔ In the 5th century BC, Athenian private schools imparted skills and knowledge related to the seven liberal arts: grammar, logic, rhetoric known as the trivium were the basic liberal arts, while arithmetic, geometry, astronomy, music known as the quadrivium known were supplementary subjects (Parker, 1890). ➔ That's when dialectics appeared, a form of argumentation based on the dialogue of arguments and counterarguments, which promotes statements and opposites. The result of the dialectic can be the refutation of a relevant statement, or the synthesis or combination of contradictory statements, or the qualitative improvement of the dialogue. ➔ The Socratic method developed by Socrates, the essence of which method is to reveal the causes of a problem through questions. The basic principle of the Socratic method is that one learns with the help of reasoning and logic (Kerr, 1999). ➔ In addition to Socrates and the classical dialectic, the philosophical trend of pragmatism, widespread in the United States of America in the 19th century, also had a significant impact on the development of the case method. ➔ John Dewey (1938) believed that formal schooling does not adequately utilize the potential of students. Instead of traditional teacher-centered education, he outlined an action-based, student-centered education. He believed that students learn more from guided experiences than from authoritarian instruction, and that education should be based on experience and that experience should be complemented by reflection (Kreber, 2001 cited in Dewey, 1938).
2) Think like a lawyer - the birth of a teaching method	➔ The concept of the case method as a teaching method was born in the Harvard Law School in the 1870s under the name casebook method (Weaver, 1991). ➔ The textbooks used in law schools were called casebooks, which contained legal case studies typical of the Anglo-Saxon precedent-based legal system. Based on these case studies, the students mastered the most important legal definitions, rules, and concepts (Moskovitz, 1992). ➔ The method spread during Christopher Columbus Langdell's tenure as dean, and by 1895 six faculties of Harvard University were using the method as a primary teaching methodology (Garvin, 2003).
3) Early years of Harvard Business School	➔ Harvard Business School was founded in 1908, and its first dean, Edwin F. Gay, proposed "*a similar method that emphasizes classroom discussion, supplemented by lectures and frequent reports, which can be called the problem method*" (Garvin, 2003: p. 60). ➔ Adaptation and implementation of the case method at HBS was particularly slow, as the courses in the early years were still general and descriptive (Merseth, 1991). ➔ The situation changed in 1919, when Wallace B. Donham was named the new dean of Harvard Business School. According to Donham, the successful application of the method required two factors: 1) high-quality teaching materials, case studies, and 2) educators willing to gain experience and support the use of the case method (Merseth, 1991). ➔ Donham created the Bureau of Business Research to collect and develop cases for educational purposes and convinced Melvin Copeland, a professor of marketing, to create a problem book instead of a standard

	textbook (Bridgman & Cummings & McLaughlin, 2016). ➔ Between November 1920 and July 1921, almost 94,954 mimeographed problem sheets were produced. The initial cost of writing the case study was financed by the case companies. By 1923, face-to-face instruction had been completely replaced by case-based discussion courses (Merseth, 1991). ➔ By 1923, the Casebook method used by the Law School and the case method used by the Business School were separated into two different pedagogical teaching methods.
4) Expansion of the case method	➔ In the 1920s and 30s, responding to the social and economic crisis, Donham and several of his contemporaries began to rethink the essence of the case method. He recognized the importance of change and leadership in these times. ➔ By presenting three stories, Bridgman and his co-authors (2016) highlighted that the case method is more than a leadership training method. The authors emphasized the value- and philosophical-based nature of the case method of the period between the two world wars, since then, in addition to traditional business questions, values and philosophical questions appeared more and more frequently when presenting managerial decision-making situations (Bridgman et al., 2016).
5) New era of business schools	➔ After World War II, business education in the United States began to grow rapidly. The United States Congress passed the Servicemen's Adjustment Act in 1944, which provided education to 2,232,000 veterans between 1945 and 1956 at a cost of US$5.5 billion (Olson, 1973). ➔ Traditionally, business schools in the United States have functioned as institutions of practical education, with the goal of providing the tools and teaching the skills necessary to become a qualified business professional. ➔ This paradigm was changed by two influential reports published in 1959. The Gordon-Howell Report was funded by the Ford Foundation and criticized the weak scientific basis of business education. Another report, Educating America's Business People, concluded that business schools place too much emphasis on cases and practice and not on research and theory (Roos, 2014). Both reports sparked debate about the role of business education and led to a separation of research and teaching approaches in business schools. ➔ In the 1950s, there was considerable enthusiasm for the method, which was also helped by a system of guest instructors. The summer school was funded by the Ford Foundation, and between 1955 and 1965 more than 200 instructors from the world's leading business schools participated. Visiting professors and case method workshop participants developed their case teaching skills and learned how to develop cases independently (Garvin, 2003).
6) Outside the classroom	➔ In 1981, two MBA students, Nora Kelly and Annette Wilde, founded the National MBA Case Competition, and the first case competition was held in 1982 with the participation of 5 business schools (Concordia University, McGill University, University of Ottawa, Université Laval and Université du). Québec à Montreal) in Canada. The first prize was shared between the Université du Québec à Montreal and McGill University (mbacasecomp.com, 2021). ➔ Nowadays, many forms of application of the case method have emerged outside the classroom environment. In addition to competitions, consulting companies and training companies have started to use the method for recruitment outside the classroom (e.g. case interview format), as well as for skill development and measurement purposes (Ábrahám, 2023)

	➔ Leading consulting firms have started using cases during job interviews to test candidates in real business situations. During the 30-60 minute case interviews, the applicants have to individually solve different types of business cases, develop a framework and a solution proposal. Today, case interviews are not only used by consulting firms, but have become a popular form of interview for general strategy and business development positions worldwide..

Table 3: Historical development of the case method
Source: Ábrahám (2023)

Six stages of the development of the case method can therefore be identified (Figure 7). From solid philosophical foundations, the method became a major teaching method in law education in the United States of America in the 1870s. It appeared in business education with the establishment of the Harvard Business School in 1908. From the 1920s, the method became the defining teaching method of American business education. After World War II, due to the international spread of business schools, the method became widely known. From the 1980s, with the appearance of case competitions, the method started to conquer outside the classroom, and today, in addition to case-based education, we can talk about the development of the so-called case ecosystems (Ábrahám, 2023).

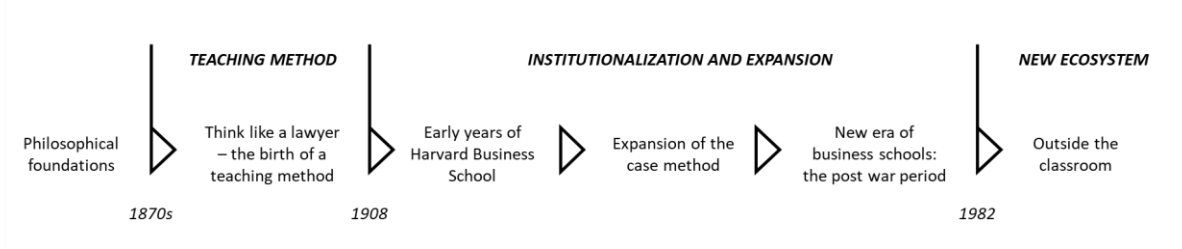

Figure 7: Evolution of the case method
Source: Author's compilation

This subsection presented the historical development and evolution of the case study method, and answered the question of how the case ecosystem was formed. The next chapter presents the ecosystem itself and its three main driving forces.

3.1.2. The case method as an educational ecosystem

New creative business solutions, the development of start-up culture and educational reforms have created new paradigms in our modern society worldwide (Ibarra, Ganzarain and Igartua, 2018). This change is facilitated by social media platforms and new technologies (Buasuwan, 2018) and education systems must keep up with these disruptive trends. The traditional role of

the university – teaching and researching – was expanded with a third mission and broke the boundaries of the universities, establishing interactions with the external environment (Würmseer, 2016).

Koul and Nayar (2021) identified four stages in the development of the educational environment. First, Education 1.0 focused on educating the masses and eradicating illiteracy, while the second phase, Education 2.0, focused more on the educational process of universities and formal education. Education 3.0 changed the role of the teacher and used more technologically advanced tools in the classroom. Finally, the fourth stage, Education 4.0, puts the student at the center and aims to provide "*knowledge workers*" for future jobs who have the necessary skills and competencies.

This change has led to an ecosystem-based approach that examines the different components of an interacting system separately and the dynamic interactions between them. According to Garcia-Penalo et al. (2015), ecosystem is a community of organisms whose vital processes are interrelated and whose development depends on the physical characteristics of the environment. An ecosystem is an open boundary system that allows additional components or processes to be added and therefore has a suitable design to address the educational need (Koul and Nayar, 2021). Pearce and McCoy (2007) describe the term "*educational ecosystem*" as the intersection of the domains of teaching/learning, research/discovery, and cognition/engagement, where the assets and interests of all stakeholders converge in order to achieve a win-win synergistic effect. Karalash and Baumöl's (2019) definition of an educational ecosystem consists of three key components: the environment and stakeholders (1), the educational community (2), and the interaction and interdependence between these actors (3). In my doctoral dissertation, I use this framework to present why the case ecosystem can be considered an educational ecosystem.

The historical evolution of the case method shows the complexity of the method and its potential. The flexibility of the format and the solid foundations of the method allow practitioners to continually innovate and develop new ways of applying the traditional case method. Since 1908, a new ecosystem has emerged based on the case culture with its own actors and institutions. Figure 8 shows the concept of the case ecosystem in business education.

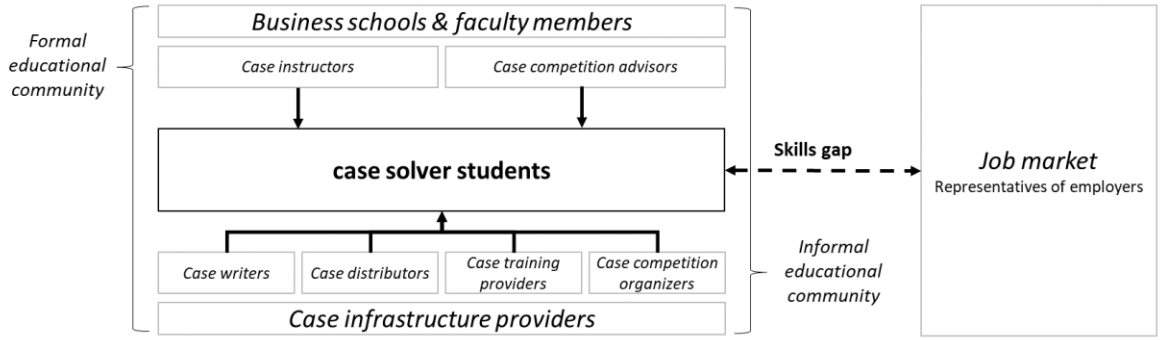

Figure 8: Actors of a case ecosystem
Source: Ábrahám (2023)

3.1.2.1. Environment and stakeholders

Four different types of stakeholder groups can be distinguished within a case ecosystem: 1) case solver students, 2) business school instructors, 3) employers' HR representatives, and 4) infrastructure providers, such as case writers, distributors, training providers, and case competition organizers.

1. **Case solver students** or **learners** are the cornerstone of the case ecosystem. These students participate in formal case-based education, case-based trainings, and case competitions. The knowledge and skills acquired are also used in job interviews and in the later stages of their professional careers.
2. **Educators** and **case competition advisors** form the second stakeholder group in the case ecosystem. They teach with cases and prepare case-solving teams for national and international level case competitions. Instructors have a triple role, as they act as facilitators, mentors and coaches (Ábrahám, Czakó and Kozma 2021; Dooley and Skinner, 1977). Facilitators enable students to learn and develop and help students become active participants and learners at their own learning styles and paces. Mentors invest time and energy in less experienced students to help them develop by building trust. The competition advisors (*or coach*) prepare teams for domestic and international level case competitions. To do this, they need to understand the competencies of team members and the most important motivational factors influencing their performance.
3. **Employer representatives** represent a diverse group of stakeholders. The composition of the group may vary by industry, functional area, hierarchical level or geographic location. Company managers are often invited to classes and case competitions, as the

main actors (*or protagonists*) of the case studies, to present their dilemmas to the case-solving students. Recruiters actively participate in these events as their primary goal is to find, engage and recruit the most talented students into their organization. Learning and development partners organize internal or external L&D programs. They continuously monitor business school's different leadership and executive programs and improve their organization's L&D portfolio.

4. **Infrastructure providers** are specialized providers (or *experts*) who use the case method to create educational and business value. Professional case writers are mainly researchers or educators who design, write and publish case studies in various length and formats. Case study distributors (e.g. Harvard Business Publishing, Case Centre, Asia Case Research Centre) aim to promote case writing and case-based business education, and to collect and distribute the latest business cases to educators. The main goal of service providers based on case-based training (e.g. Case Solvers, PrepLounge) is the development of professionals through the case method, as well as the development of their problem-solving, project management, collaboraation and communication skills. Organizers of case competitions (e.g. universities, case clubs) host competitions at national and/or international level.

The case ecosystem has global and local implications. Local ecosystems are formed around business schools that have adopted the case method. These communities are the drivers of the local talent labor market as they provide curricular and extracurricular learning opportunities for talents. Due to the globalization of higher education and the labor market, local ecosystems are also internationally connected. International students, international case competitions and infrastructure providers bring global perspectives to the education community.

3.1.2.2. Educational community

Case-solving students and instructors form the educational community behind the case method. As part of case-based business education, the primary goal behind the application of the case method is the development of students' knowledge and skills. The case method as problem-based learning (Ábrahám, 2019) and experiential learning (Kolb, 1984; Kreber, 2001, Ábrahám and Fejes, 2022) can be combined with learning led by an instructor or a trainer (Comyn and Berwer, 2018).

The case ecosystem includes formal and informal learning communities. Formal learning communities are case-based undergraduate or graduate education programs at business schools where students must follow a specified curriculum and graduate with a business degree. In contrast, the informal learning communities in the case ecosystem consist of students who are willing to engage in extracurricular activities to develop themselves. In most cases, they are members of a case club, which provides them with a learning platform in parallel with their formal studies. These clubs provide their members with occasional training sessions and the opportunity to participate in occasional competitions (Ábrahám et al., 2019).

3.1.2.3. Interactions and dependencies between actors

Interaction and dependency is the third component of Karalash and Bauml's (2019) definition of an educational ecosystem. Within the case ecosystem, the interaction between different stakeholders is organized around three key factors from the students' perspective: (1.) learning and development through the case method, (2.) winning a case competition, and (3.) getting a job.

The first interaction is about learning and development, which is the essence of the case ecosystem. Instructors and trainers engage with students to facilitate learning (acquiring new knowledge and developing problem-solving skills) through case studies. Both applications of the case method have a P2P (*peer-to-peer*) learning aspect, as students learn from their peers through both classroom discussions and case competitions.

Doing well in case competitions and winning it are other important points of interaction between stakeholders in the case ecosystem. Student teams compete for a trophy and propose a solution to the business case provided by a case company. The student teams were prepared by case competition advisors and judged by representatives of companies. The entire experience of the competition is provided by the competition organizers.

Lastly, getting a job is also an important driver of the ecosystem. To get a job, students are taking significant effort to develop themselves and prove their excellence to the representatives of the job market. The case method is used for on-the-job skill assessment in the format of case competitions, case interviews and assessment centers (Ábrahám, 2019).

3.1.3. Basic concepts related to the case method

Although nowadays the case method is used in several scientific fields, from law to economics to medicine (Merseth, 1991), the focus of my doctoral research is its applicability in business education. The case method is therefore a pedagogical method that focuses on teaching through examples - so-called case studies.

In the following chapter, I will clarify the three concepts related to the research topic - case study, case-solving, and case-based education, arranged in separate subsections.

3.1.3.1. Definition and types of case studies

Numerous case study definitions exist in the academic literature (Gummesson, 2008). In both English and Hungarian literature, the definitions of business case and case study are constantly mixed up. There are authors (Levin, 1995) who see the two concepts as a kind of synonym, while others endow them with two different contents. The reason for the difference in content behind the concepts is the different purpose of using the cases and their physical appearance.

According to Erskine et al. (1998), a case study is a description of a real business event, which includes the decisions, challenges, opportunities, problems and attitudes that a person or organization faces related to the event (Erskine, Lender and Mauffette-Lender, 1998). Based on all of this, we can consider the case study as a simulation of a real event.

According to Kardos and Smith (1979), a well-written case study deals with a real problem, is complex and consists of subproblems, contains sufficient information, and is authentic and believable to the reader. Case studies usually focus on a decision-making situation or problem. In the case of business case studies, the challenges related to the operation of the company (e.g. growth, resource distribution issues) are the focus of the case study. The key questions typical of case studies can be divided into parts in each case. Processing the case means solving partial problems and answering partial questions. In order to be interpretable and solvable, the case study must contain the right amount and quality of information. The decision-making situation and information included in the case study must be real and coherent so that an interpretable solution can be built on it.

According to Levin (1995), cases are contextualized narratives designed for educational and learning purposes that examine factual and complex issues. An important part of the concept is the inclusion of the educational goal in the definition. Erskin and his co-authors (1998)

identified the case studies along the analysis, conceptual and presentation dimensions along the so-called Case Difficulty Cube concept. Based on the protagonists, their focus and their scope, the case studies can range extremely widely (Ábrahám, 2018). We find case studies of start-ups, personal management dilemmas, or even transformations of multinational companies.

When examining the case study definition, it is worth reviewing the definition of two business schools, the Harvard Business School (HBS) and the Ivey Business School, that traditionally use the case method. According to HBS, "*a teaching vehicle that presents students with a critical management issue and serves as a springboard to lively classroom debate in which participants present and defend their analysis and prescriptions*" (Harvard Business School, 2019). If we look at Ivey's definition, a case study is a "*A case is a real problem and challenge faced by a real company at a critical management decision point. You're placed in the role of decision-maker, asked to analyze the data, develop alternatives and make and defend your recommendations*" (Ivey Business School, 2019 pp. 1). The most important difference between the two definitions is that, while the Harvard definition focuses on the discussion around the case study, the Ivey definition emphasizes the problem-solving process and the person of the decision-maker much more.

In our article (Ábrahám, Czakó and Kozma, 2021) written jointly with Erzsébet Czakó and Miklós Kozma we grouped the case studies based on three aspects - type of problem, the structuredness of the problem, and the accuracy of the questioning. The type of problem can be company-wide, dealing with corporate strategic issues (for example, a company acquisition), or based on functional (for example, marketing or financing) problems. Based on the structure of the problem, in the case of cases based on ill-structured problems (Bartee, 1973), the goal of the case solver is to create a well-structured problem, or at least a better one, by solving it. It is the quantity and quality of information available in connection with the problem raised in the case study, the complexity of the problem, and the knowledge of possible solution directions that can determine the structure of the problem. Based on the accuracy aspect of the questioning, if the case study contains explicit questions, for the students solving the case, the questioning is the alignment point during the solution. If there are no clear questions related to the case study, the students start processing the case study by identifying the key question and the related problem (Ábrahám, Czakó and Kozma, 2021).

According to Hammond (2002), the most important benefit of using case studies is that they teach managers to identify real problems and key issues related to them.

3.1.3.2. Case-based education

Case-based business education always focuses on an ill-structured business problem. A characteristic of an ill-structured problem is that too little or too much information is available to the decision-maker, the decision criteria are not well defined, which means that there is no clear solution to the problem (Bartee, 1973).

In his article, Levin (1995) goes further and writes about case-based teaching in addition to the case method. He calls case-based education those curricula that are partially or completely based on the education of cases. According to Argyrys (1980), there are five factors which can be seen as the core factors of case-based teaching method: (1.) a problem relevant to decision-makers, (2.) intensive involvement of participants, (3.) minimal involvement of instructors, (4.) opinions freedom (there are no right or wrong answers), as well as (5.) the drama related to the decision-making situation.

According to Schulman (1992), the greatest added value of using cases in education is their content and not the way they are used. On the contrary, Christensen (1987) and Merseth (1991) took an opposing position, emphasizing the process of class case discussion. There have been many articles in the literature (Freeman, 2005; Hammond, 2002; WoodBrunner-Ross, 1976) about the case discussion and the role of the teacher and the students (Dooley and Skinner, 1977) during the discussion process. According to Christensen and Carlile (2009), case-based teaching courses can also be interpreted as theory-building enterprises that can significantly contribute to the development of the academy. On the one hand, the theory creation process can be aided by the use of case studies during class work, and on the other hand, students' ability to create theories can also be developed in the courses.

3.1.3.3. Case solving

There is a rich and wide-ranging literature on the ability development effect of business schools and MBA programs. I call the processing of case studies case solving. The case solving is therefore a process in which an individual or group tries to provide answers to the problems directly or indirectly raised in the case by themselves or with the help of a case instructor in a predetermined time interval.

3.1.4. Areas of application of the case method: the case method map

The case method used in business training is constantly and organically changing. The aim of the following chapter is to stop the wheel of time, unlike before, and examine the areas of application of the case method more deeply, to provide a kind of map of the possible areas of application.

The areas of application of the method can and should be examined along the learning environment and learning outcome dimensions. The first dimension is the educational environment, which can be classroom-based or non-classroom-based. During traditional classroom instruction, students work on the case study in a classroom, in the presence of an instructor (Charan, 1976; Dooley & Skinner, 1977). In a virtual or traditional classroom environment, the case solving activity fits naturally with the curriculum that uses the case method for a specific educational or developmental purpose.

The non-classroom environment means that the case-solving activity is not part of the formal, institutionalized education, and the students process the case study on a voluntary basis, as part of extracurricular activities.

The second dimension of the case method map is the expected educational output. During the solution of the case study, two types of end products can be created, the processing can take place in the form of a discussion and a presentation. Traditionally, the case method (or Socratic method) is a question-and-answer method, where the discussion process itself and the related reflection ensure the learning experience.

In other cases, the expected result is a presentation (which can be in different technical formats) given by the students who worked on the case study. During the preparation for the presentation, the case solvers think over, discuss, and structure their thoughts, based on the analyzes they make decisions about the possible solution directions, and they visualize their proposals and present them to the audience in the form of a presentation.

Based on the educational environment and the expected educational output, Figure 9 presents the case method map, which shows four different areas of application of the educational method: (1.) classroom discussion of the case study, (2.) extracurricular case discussion, (3.) classroom case assignment, (3.) case competitions.

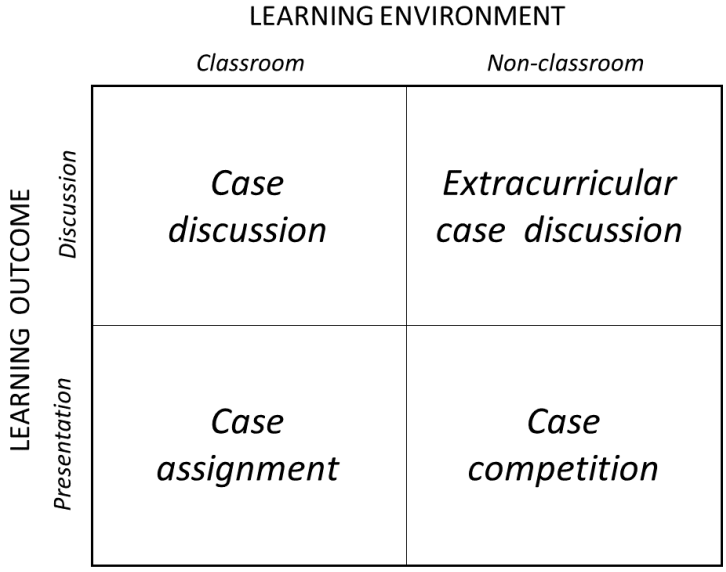

Figure 9: Case method map
Source: Author's compilation

As part of the research, the different applications were investigated by five criteria: 1) teaching objectives, 2) role of instructor, 3) type of case study, 4) expected outcome and 5) motivation of the students.

1. **Teaching and learning objectives:** Case-method has numerous interpretations in the scholarly literature. Through case method participants can develop new theories and academic concepts (Christensen and Carlile, 2009), develop their cognitive and emotional intelligence (Boyatzis et al., 2002) and develop their problem-solving skills (Ábrahám, 2019).

2. **Roles of instructor:** Dooley and Skinner (1977) identified four different roles of instructor along the teaching goal, style and philosophy: Facilitator, Coach, Quarterback and Demonstrator. A *Facilitator* case instructor leads the case solving with little or no case introduction. A facilitator assumes that participants are well-prepared about the case. This role is mainly leaving the responsibility with the case solvers. The coach plays a more active role than the facilitator. The *Coach* is motivating and developing interest, connecting the dots, linking the particular aspects of the case study and taking an active role in order to move the case solving process. A *Quarterback* case instructor is in charge of the crucial decisions about the case solving activity and plays a key role in making things happen. A

Demonstrator instructor is a doer and walks the students through the case. A demonstrator assumes that the instructor is more efficient in case solving then the students.

3. **Type of case study:** There are different types of case studies based on the reality, structuredness, and clarity of a business problem (Ábrahám & Czakó & Kozma, 2021).

4. **Expected outcome:** The case method may have different outcomes. Haywood-Farmer (2016) identifies discussions, written case study reports, case presentations as potential outcomes for case solving. During a traditional case discussion, the protagonist of the case study initiates the discussion with cold calls (Hammond, 2022). Written case study reports are essays, which are delivered by the students as part of their formal educational program. Case presentations are normally MS PowerPoint presentations, which may structure and deliver the information from the protagonist's perspective.

5. **Motivation of the students:** Students motivation can be divided into three categories: 1) formal motivation, 2) personal development and 3) gamified learning experience. Students are participating in different academic programmes and case solving is part of their syllabus. As they get scores and grades for their work, this formal motivation is indubitable. The most conscious students would like to develop themselves through the case method. They want to gain new knowledge about academic concepts, theories, companies, industries, functional areas and geographical markets. They would like to develop their cognitive and emotional intelligence and problem-solving skills in order to become a better professional person. Besides the formal and personal development goals, the gamified learning experience is also crucial. Students prefer to role play and compete instead of monotonous reading and learning.

The purpose of the case method map is to present the possible areas of application of the case method, the rest of the chapter presents the four areas of application in detail.

3.1.4.1 Case discussion

Case discussion is the traditional application of case method, where the instructor acts as a protagonist and the students are answering and commenting on her questions about the case. The case discussion shows the *complexity* and *diversity* of business situations and decision makers and students learn from the discussion itself. A case study never has a good or bad answer, as the different group of managers and decision makers will have different views and interests on these complex business situations. The amount and quality of available information may vary as well, which leads the case solvers into diverse interpretations and development of different narratives about the same topic.

"*The essence of the case method is the process of putting forward different points of view, defending your position, and listening actively to others in order to understand and constructively criticize others' points of view*" (Haywood-Farmer, 2016 pp. 4.). Haywood-Farmer (2016) notes that discussions may sometimes seem repetitious and unorganized. He also mentions that these discussions require and develop the participants' communication skills (talking and listening). It is a two-way interaction, where the students are learning from each other and teaching each other. Standoffish and more introverted participants may talk less and be silent, while others are not listening and waiting for their mates' view and comments.

Case instructors are assuming that the students prepared for the class and read the case. They are primarily acting as a *Facilitator* or *Coach* and are in charge of the organic flow of the classroom discussion. In some cases (e.g. lack of proper discussion time) they might change their role and can act as *Quarterback* or *Demonstrator* within these case discussions. Cases which are used for case discussion, have a specific scope which is in-line with the teaching objectives of the course. As part of the preparation, students receive guiding questions from the instructor to trigger the discussion.

Students are attending these courses as part of their formal business education. Besides the scores and grades, they see the value of personal development as the case discussion is a good example for peer-to-peer learning experience because it requires the active listening and talking skills of the students simultaneously.

3.1.4.2. Extracurricular case discussion

The extracurricular case discussion is a non-classroom application of case method. This application represents a more informal format of the method which is based on the interest and intrinsic motivation of individuals. As this application is a form of a self-learning process formal teaching objectives are normally blurry or simply not exist. There is no formal instructor in this discussion, professors or instructors may appear in a mentor type role. As this format is outside the formal classroom, various types and categories of cases could be discussed.

3.1.4.3. Case assignment

The team or case assignments are the other main applications of the case method in a classroom environment. As part of the formal curriculum, students have to solve cases as individual or case assignments and deliver the review or presentation to the instructor. The main objective of an assignment is to test the course-specific knowledge and case solving abilities of students.

The course instructor receives the outputs of the assignment and is responsible for the evaluation. The evaluation is based on a criteria system, which was communicated to the class participants in advance. The case studies which are used for case assignments are normally closed and include specific questions to trigger the students' thinking. In terms of scope, these case studies are in-line with the learning objectives of the course and normally cover similar topics which were discussed during the class. As part of the assignment, the students have to answer the initial questions in order to solve the case. The format of the expected outcome of case assignments may vary, essays, reports and presentations are the most frequent forms.

In addition to development and learning, successful completion of the course and maximization of the scores is the main motivation of students.

3.1.4.4. Case competitions

Since 1982, case competitions have been representing a special non-classroom application of case method (Ábrahám, 2023). Case competitions are unique opportunities for students particularly in business but also in other areas to solve at least one case study within a certain amount of time in a competitive situation. Participants have the opportunity to improve their ability to work in a team since the majority of these contests are team-based (Ábrahám et al., 2019). A team always has its own rules, roles and processes. The members are planning and implementing the main steps of the case solving process by themselves (Kunselman & Johnson, 2004). After they are finished with case solving, they present their case solutions to a professional jury. Maier-Lytle et al. (2010) identified four main benefits of participating in a case competition: gaining new, specialized knowledge (1), developing communication skills (2), learning how to work in a team (3) and improving the position in the labour market (4).

Case competitions create opportunities for companies to observe students in a professional working environment, evaluate their performance and utilize case competitions as a screening process as part of their talent acquisition and recruitment programs (Ábrahám, Fejes and Paulitsch, 2019). From the participants' perspective the most important benefit of case competitions is their contribution to the students' professional development (Menna, 2010; Corner et al., 2006). Through cases students simulate a real-world business situation and they are given an on-the-job and peer-to-peer learning opportunity.

In case competitions, case companies may get valid feedback from young generations on their existing strategies, inspired by new ideas or validate the existing ones. This kind of mini consulting simulation may help to engage employees and get fresh ideas for further strategy development activities. International case competitions are also considered as platforms to promote certain topics among an international professional community.

The case study used on these events may depend on the format and scope of the competition. Traditionally there are competitions which focus on short (e.g. 4 hours) cases, while others are more specialized on long (e.g. 24 hours) cases. Today, the newest competitions have more than one case and both formats. In terms of scope, the traditional case competitions are focusing on strategic topics (e.g. growth strategy, restructuring), but competitions with a specific scope (e.g. innovation, marketing, finance) are existing as well.

Teams on case competitions are supported by team advisors who are delegated by the university of the participating team. Team advisors have an important role before and during the case competition. Before the case competition, the advisors are mainly focusing on the team selection and their preparation to the specific competition. There are different models for selection, some teams are self-organized, while in other cases a group of advisors are making the selection decision based on the case solvers' academic and case solving track record. During the competition, the advisor provides professional and emotional support for the team Professional support means the processing of jury members feedback after the case presentations and the advisors personal feedback after each case (advisors are allowed to listen to the case presentations). Case competitions are stressful from the emotional side. Young people must work under time and performance pressure. This may cause stress and conflicts within the team. A good advisor can deal with this stress and keeps the team on the right track (Ábrahám et al., 2019b).

Case competitions are extracurricular activities, which is mainly built on the intrinsic motivation of the participants. Participants of case competitions like to compete and would like to win the contest. Winning a competition would mean professional recognition and prizes. These extrinsic factors are also influencing the participating individuals' motivation (Ábrahám et al., 2018).

Preparing for national- and international-level case competitions is a complex process, which often lasts several years. In recent decades, three different types of case competition preparation models have emerged, adapted to local characteristics: (1.) university-based case competition course, (2.) student association-based preparation, (3.) cooperation between university and student association. The different models are presented in Table 4.

Preparation model	Description	Example
1) University-based case competition course	➔ Case competition preparation course is part of the formal curriculum ➔ The preparation is led by a faculty member and the participant students are receiving grades and credits ➔ Case competition invitations are received by the university ➔ The preparation and the case competition is financed by the university	Business Economics Pyramid, University of Minnesota, Ivey Business School
2) Student association-based preparation	➔ Case competition preparation is part of the student association's offerings to students ➔ The preparation is fully extra curricular	Corvinus Consulting Club, RSM Consulting Club, The Students' Consulting Club, St. Gallen
3) Cooperation between university and student association	➔ Case competition preparation is the combination of curricular and extra curricular activities ➔ The preparation is jointly coordinated by the university and the student association ➔ There is a split between the roles and responsibilities of the university (e.g. finance, advisor) and student association (e.g. organization, alumni)	FON Case Club, UTS Case Club, Business Consulting Club Cluj Napoca, EVK College for Advanced Studies, Rajk College for Advanced Studies

Table 4: Comparison of case competition preparation models
Source: Author's compilation

3.1.4.5. Summary of the application forms

Table 5 provides the comparison of different case method applications based on the teaching objectives, role of instructor, type of case study, expected outcome and motivation of the students.

Criteria	Case discussion	Team discussion	Case assignment	Case Competition
Teaching and learning objectives	Share and discuss different views about a business case to acquire new concepts and knowledge	Develop problem-solving skills of individuals, strengthen teamwork	Assess the acquired knowledge and concepts	Develop problem-solving skills of students under time pressure and compete
Role of instructor	Instructor may take the role of a facilitator, quarterback, coach and demonstrator	There is no need formal instructor	Course instructor is in charge for the case assignment	Advisors (or coaches) support the team during the competition
Type of case study	Case studies are fitting to the teaching objectives of the course syllabus	Various type of case studies based on the case solvers' interest	Case studies are fitting to the teaching objectives of the course syllabus	Mainly strategic topics, format is in-line with the rules & guidelines of the competition
Expected outcome	Classroom discussion	Team discussion	Presentation or written report for the instructor	Presentation and/or executive summary for a jury panel
Motivation of the students	Fulfill a course as part of their studies; Get good grades on the course	Mainly intrinsic motivation to develop and for fun	Fulfill a course as part of their studies; Get good grades on the course	Develop problem-solving skills, win the competition, and get professional recognition

Table 5: The comparison of the different applications of the case method
Source: Author's compilation

The different applications of the case method have a common foundation. In each case the main objective is to develop the problem-solving skills of learners and teach concepts through ill-structured cases. Besides the common objectives, each application is using the same set of concepts and frameworks. Classroom discussions, case-based trainings, case competitions and case interviews are using the same case infrastructure. They need case studies, which were developed by case writers, distributed by case centers and case instructors and students were trained by faculty members of business schools or other case-based training organizations.

3.2. Competence frameworks and skills development in education

Another logical guiding thread of the theoretical background of my doctoral dissertation (Figure 10) is skills development and the related competence frameworks. In the following chapter, I will briefly present the main historical stages of competence measurement and development, then I will present the general competence framework in the European Union, as well as the education and development frameworks defined by the European Qualifications Framework (EQF) related to the European Higher Education Area. At the end of the chapter, I present my own taxonomy of the skills and knowledge that can be developed during the case study solution.

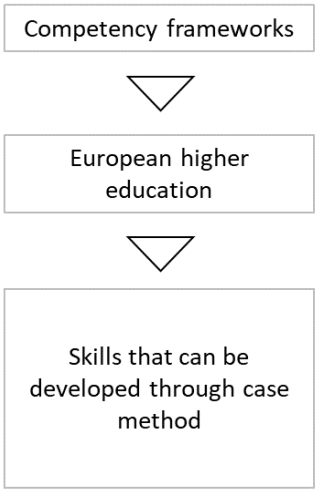

Figure 10: The theoretical guiding thread of the dissertation is based on competency framework
Source: Author's compilation

3.2.1. The roots of competency mapping and development

The second unit of the theoretical background of my research work is the literature dealing with the measurement and development of competence frameworks and skills, which goes back almost hundred years. Since my research work related to the PhD dissertation is related to the field of business education, I will also deliberately describe the issue of competence measurement and development only from this point of view. The PhD dissertation is not discussing deeper psychology and pedagogical perspectives and only focusing on formal higher education in the context of the European Higher Education Area.

Theories dealing with the study of personality examine the connections between a person's unconscious motives and schemas and observed behavior patterns (McClelland, 1951). According to McClelland (1973), the traditional intelligence quotient (e.g. IQ score) cannot predict an individual's success at work. In his opinion, this requires the collection of competencies required to perform the given job, which is possible through different types of tests.

Based on the results of McClelland, Spencer and Spencer (1993) created the concept of competence, which are skills and abilities that individuals acquire during work, study, training, and everyday experience.

According to Boyatzis (1982), an individual provides maximum performance when his ability or talent is consistent with the demands of the workplace as well as the organizational environment. He organized the key competencies into three groups, distinguishing between (1.) cognitive abilities, (2.) emotional and (3.) social intelligence.

Katz and Kahn (1986) classified competencies into four different groups, distinguishing (1.) technical or functional, (2.) managerial, (3.) human, and (4.) conceptual competencies. Carroll and McCrackin (1988) divided the competencies into three groups and distinguished (1.) basic skills related to strategic creation, (2.) leadership and managerial competencies related to managing people, and (3.) job-specific functional competencies.

The iceberg model defined by Spencer and Spencer (1993) occupies a prominent place in the systematization of competencies, skills, behavior, personality and beliefs (Figure 11). The model distinguishes between visible (above the water surface) and invisible (below the water surface) elements of competence. Skills and knowledge are located on the visible part of the iceberg, thus they are components of competence that can be developed relatively easily. Personality, motivation, and values are the underwater, invisible elements of the iceberg that covertly but influence an individual's performance.

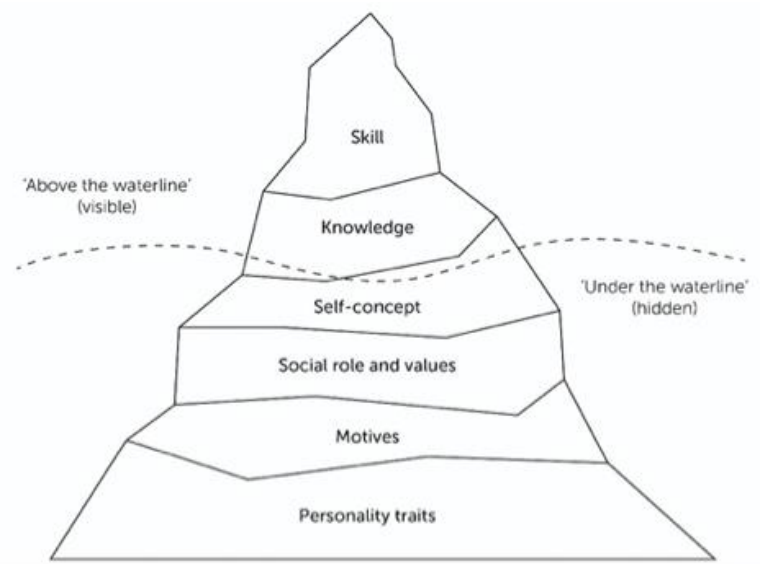

Figure 11: Iceberg model
Source: Spencer and Spencer (1993)

Today, competency frameworks have emerged, which examine the relationships between individual competencies with a different goal system, methodology and point of view. Since the research behind my doctoral dissertation and the publications related to it examine the possibilities of application in Hungarian public and higher education, when examining the competence frameworks, I use the frameworks defined by the European Union and designated by the European Qualifications Framework as a basis, due to the following three research aspects:

1. ***Accepted competence framework***: The eight key competences defined by the European Union - mother tongue communication, foreign language communication, mathematical, natural science and technological competences, digital competence, learning to learn, interpersonal and civic competences, entrepreneurial competence and cultural competence - are widely accepted and is used in the member states of the European Union, including Hungary.
2. ***Geographical focus:*** Although the case method is traditionally associated with the Anglo-Saxon, and most importantly, the North American business education system, the majority of examples and cases used in my research are related to the educational frameworks defined by Hungary and the European Union.
3. ***Public and higher education focus:*** The cases used in my research work are related to secondary and higher education, which are structurally aligned with the levels of the European Training Framework.

In the rest of the chapter, I present the European Qualifications Framework (EQF) and the eight key competencies defined by the European Union.

3.2.2. European Qualifications Framework

On June 19, 1999, the ministers responsible for higher education of 29 European countries signed the Bologna Declaration, the purpose of which was to create the European Higher Education Area. In the declaration, the signatories formulated three main goals: to facilitate the mobility of students, teachers and researchers, to prepare students for the expectations of the labor market and for active citizen participation in democratic social life, and to provide widespread access to high-quality higher education based on democratic principles and the freedom of science (EHEA, 2023).

In March 2000, the Lisbon European Council defined a new strategic goal for the European Union. According to this, the European Union must strive to be the most competitive and dynamic knowledge-based economy in the world, which is capable of sustainable growth by providing a higher proportion of employment, better jobs and stronger social cohesion. The interim report of 2004 formulated the application of the common European reference framework and principles. One important element of this is the key competences that everyone must acquire and that form the basis of the success of later learning (European Commission, 2019. A key competence is a transferable, multi-functional unit of knowledge, skills and attitudes that everyone must have in order to complete and develop their personality, fit into society and be employed (EHEA, 2023).

Category	**Definition**
Knowledge	It consists of established concepts, facts and figures, ideas and theories that support the understanding of a certain area or topic.
Skill	Ability to execute processes and use existing knowledge to achieve results.
Attitude	A mindset or tendency that describes an action or reaction related to different ideas, persons or situations.

Table 6: European Union definitions of knowledge, skills and attitudes
Forrás: European Commission (2019)

In 2018, the European Union defined the key competences required for lifelong learning, which was largely based on the reference framework defined in 2004 (Table 7).

Competency	Description
1. Literacy competence	Communication is the ability to express and interpret thoughts, feelings and facts, orally and in writing, and to interact appropriately with language in a full range of social and cultural contexts - in education and training, at work, at home and in leisure.
2. Multilingual competence	It is the basis for understanding, expressing and interpreting thoughts, feelings and facts in speech and writing in an appropriate range of social contexts according to the needs or wants of the individual. Foreign language communication also requires skills such as those related to mediation and cross-cultural understanding.
3. Mathematical competence and competence in science	Mathematical competence includes the use of addition, subtraction, multiplication, division, percentages and fractions in mental and written calculations to solve a variety of everyday problems. The emphasis is on the process rather than its output, i.e. more on the activity than on the knowledge. Scientific competence is the ability and inclination to explain the natural world. Technological competence is the intelligent application of this knowledge and methodology when man transforms the natural environment according to his recognized needs or wants.
4. Digital competence	Confident and critical use of electronic media in work, leisure and communication. This competence is related to logical and critical thinking, high-level information management skills and advanced communication skills. At the most basic level, skills related to the use of information and communication technologies include the ability to search for, evaluate, store, create, present and transmit information using multimedia technologies, as well as the ability to communicate on the Internet and participate in networks.
5. Personal, social and learning to learn competence	"Learning to learn" includes the ability to organize and regulate one's own learning independently and in groups. It includes the ability to manage time effectively, solve problems, acquire, process, evaluate and integrate new knowledge, and apply new knowledge and skills in different contexts.
6. Citizenship competence	Interpersonal competences include all the behaviors that an individual must acquire in order to be able to participate effectively and constructively in social life and to resolve conflicts when necessary. Interpersonal skills are essential for effective personal and group interaction and can be used in both public and private life.
7. Entrepreneurship competence	Entrepreneurial competence has an active and a passive component. It includes, on the one hand, the effort to trigger change, and on the other hand, the ability to accept, support and apply innovations caused by external factors. Part of entrepreneurial competence is the individual's responsibility for his own actions, the development of a strategic approach, setting and achieving goals, and success orientation.
8. Cultural awareness and expression competence	"Cultural competence" includes the importance of creative expression of thoughts, experiences and feelings in various ways - including music, dance, literature, sculpture and painting.

Table 7: Eight key competencies that form the basis of lifelong learning
Source: European Commission (2019)

The key competencies must be acquired during the period of compulsory education and training. Different learning outcomes are assigned to each qualification level (see Table 8) along the dimensions of knowledge, skills and responsibility and autonomy (Europass, 2023).

The introductory and second articles of the article-based dissertation are focusing on EQF levels 6-7 (basic and master's degrees of higher education), while the third article reviews the

application possibilities in public education, which can be linked to EQF levels 1-4 (primary and secondary education). The EQF levels are defined along the dimensions of knowledge, skills, responsibility and autonomy, of which the research focused on the acquisition of knowledge and development of skills dimensions by using the case method.

Levels	Knowledge	Skills	Responsibility and autonomy
Level 1	Basic general knowledge	Basic skills required to carry out simple tasks	Work or study under direct supervision in a structured context
Level 2	Basic factual knowledge of a field of work or study	Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools	Work or study under supervision with some autonomy
Level 3	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	Take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems
Level 4	Factual and theoretical knowledge in broad contexts within a field of work or study	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities
Level 5	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge	A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others

Levels	Knowledge	Skills	Responsibility and autonomy
Level 6	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	Advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study	Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups
Level 7	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research. Critical awareness of knowledge issues in a field and at the interface between different fields	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields	Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams
Level 8	Knowledge at the most advanced frontier of a field of work or study and at the interface between fields	The most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice	Demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research

Table 8: The levels of the European Qualifications Framework
Source: Europass (2023)

3.2.3. Acquisition of new knowledge and skill development through the case method

The following chapter presents its own taxative framework of the skills and information that can be learned and developed during the case solving. The purpose of this chapter is to present types of knowledge and skills that form the basis of the skill assessment and development methodology behind my research work.

The case method is a form of active learning (Qureshi 2019), during which many active learning elements appear. An example of this is problem solving, which activates the decision-making areas of the brain (Hoogendorn 2015). Acquiring new knowledge and combining previous knowledge is also an important element of the case method, which activity stimulates the brain pathways of previous knowledge and connects the new one with it, thereby strengthening learning (Hoogendorn 2015). Group work activates the social, emotional and motor pathways at the same time, which results in more information that can be stored during learning (Hoogendorn 2015).

During the development of the taxonomy of knowledge and skills, I took as a basis the concept of the T-shaped people, which appeared in the internal operations of the consulting company McKinsey in the 1980s, and then became widely known in the 90s, David Guest (1991) "*The hunt is on for the Renaissance Man of computing*", following his article published in The Independent. The essence of the concept is that T-shaped people have both interdisciplinary skills and deep, functional skills (Figure 12).

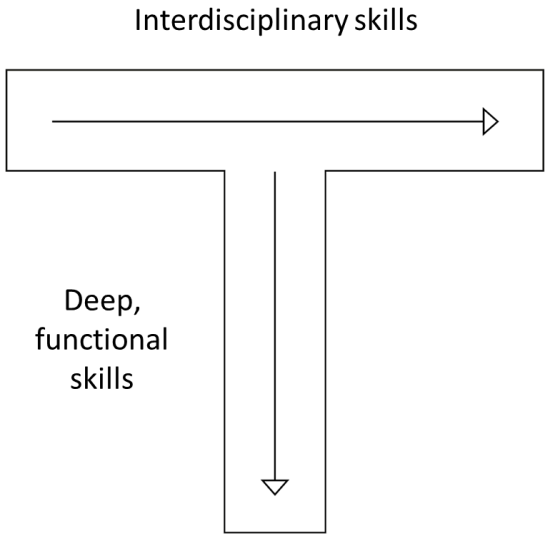

Figure 12: A T-shaped people
Source: David Guest (1991)

The first dimension of the T-shaped person is given by deep, functional skills. The application of the case method in the field of skills development is worth investigating in this dimension first, since the method is suitable for imparting in-depth, specialized knowledge and developing functional skills. Along the depth dimension: skills and knowledge related to the business problem, functional area, industry, company, and geographic area can be developed (Figure 13).

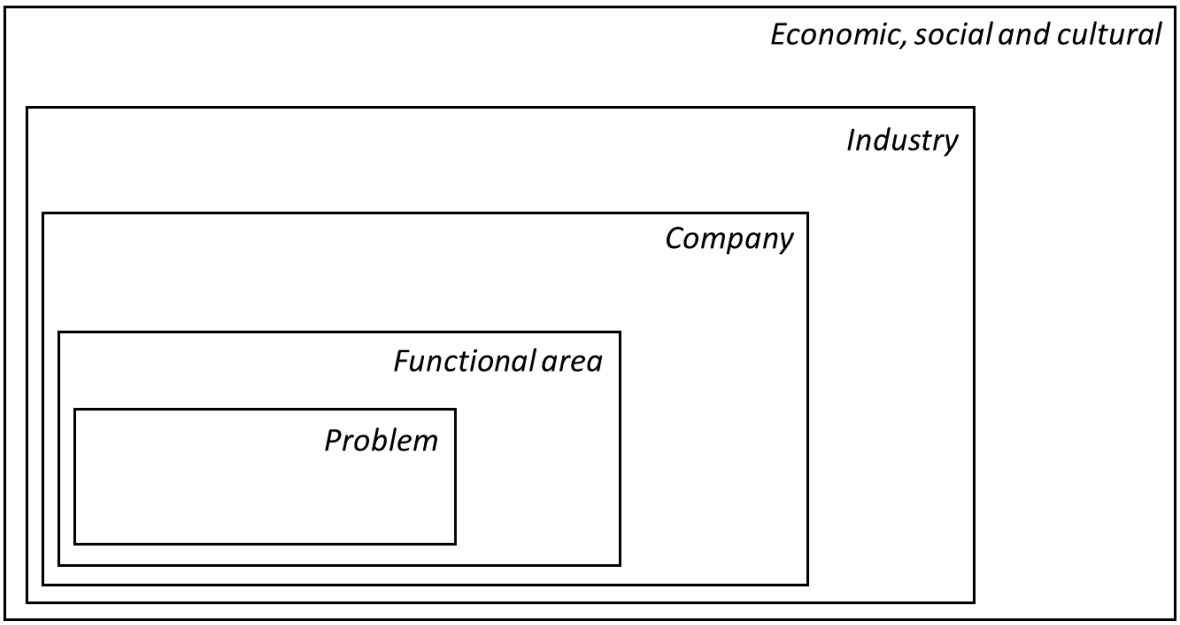

Figure 13: Knowledge that can be developed during case solving
Source: Ábrahám (2018)

Business case studies are built around a business problem, therefore for their interpretation and exploration it is essential to explore and learn about the wider context. Directly or indirectly five different levels of knowledge can be identified around each problem defined in the case study to be processed. These are summarized in Table 9:

Case study example: **The low-cost airline Wizz Air wants to increase its fleet with 200 new planes by 2030**	
Type of knowledge	***An example of acquiring knowledge***
Problem specific	The main question of the case study raises a question of growth as to how the capacities increased by the acquisition of new machines should be used in terms of profit maximization.
Functional	It follows from the question that those who solve the case study examine sales, marketing, and functional topics related to traditional operations in depth.
Company specific	Wizz Air is a dynamically growing low-cost airline in Central Europe. The students who solve the case study get to know the company's vision, strategy, and organizational structure in depth during the processing.
Industry specific	As a low-cost airline, Wizz Air is an important player in international aviation. During the processing of the case study, the students can get to know in detail the most important players in the industry - airlines, airports, ground handling companies, and other players.
Economic, social and cultural	The economic, social and cultural dimension of the case study is given by the strong European and Central European presence. When examining possible individual destinations or the increase in organizational size, case managers must also take into account economic, social and cultural aspects.

Table 9: Presentation of knowledge that can be developed during case solving through an example
Source: Author's compilation

The interdisciplinary skills related to the horizontal dimension of the case method can be grouped into four categories, which are related to problem solving (*create*), management (*conduct*), collaboration (*collaborate*) and communication (*communicate*) areas (Figure 14).

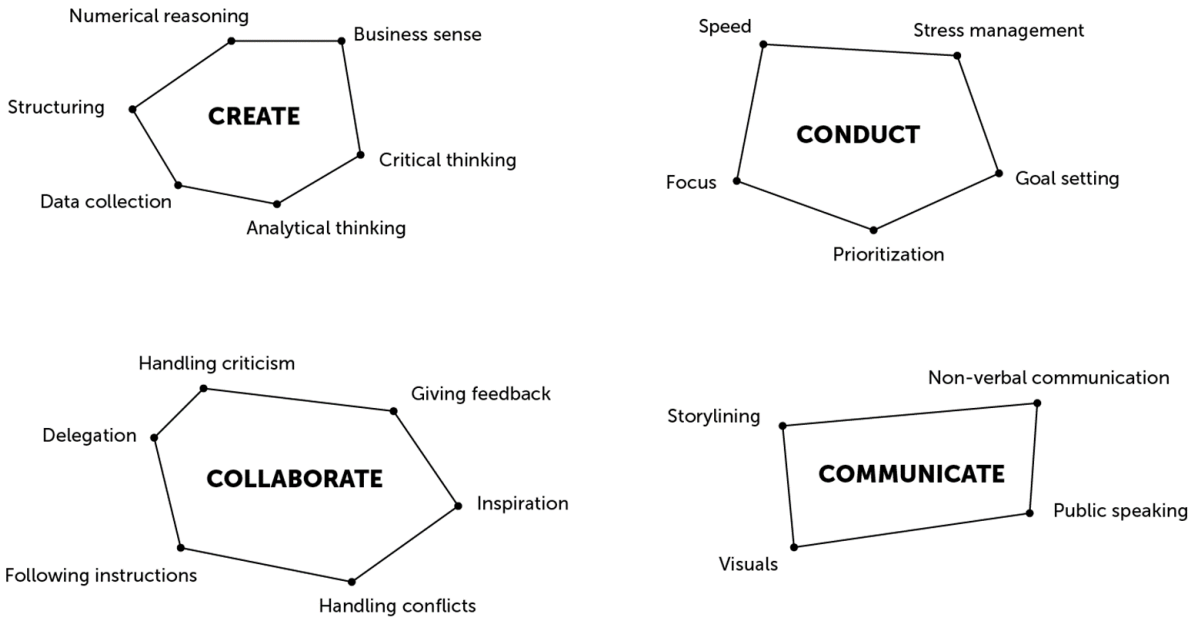

Figure 14: Skills that can be developed during case solving
Source: Ábrahám (2019)

During the case solving, the case solvers have to solve an ill-structured problem. All this means the use of skills such as data collection, analytical thinking, structuring, critical thinking, business sense and numerical reasoning. However, the complexity of the problem-solving process also affects the application and development of other management skills, such as goal setting, prioritization, focus, speed, or stress management management. Solving the problem is often not an individual task, but it is done in a team, in a collaborative way, so the skills related to cooperation represent the third category of the system I defined. Skills such as giving feedback, handling criticism, delegation, following instructions, inspiration, or handling conflicts are related to cooperation. The process of problem solving does not end with solving the problem, as it often has to be communicated to the various stakeholders. Communication is therefore the fourth category of skills, which includes skills such as storylining, visuals, verbal communication and non-verbal communication. The definition of each skill is given in Table 11:

Category	Skill name	Definition
Problem-solving	*Data collection*	The process of collecting and measuring information about target variables in an established system.
	Analytical thinking	A step-by-step approach to thinking that allows individuals to break down complex problems into simple and manageable components. Establishing hypotheses and statements based on a set of information that can then be examined both qualitatively and quantitatively.
	Structuring	Efficient systematization of collected data in order to create an organized whole
	Critical thinking	Objective analysis of the facts to form a judgment. Drawing reasonable conclusions from a set of information and distinguishing useful and less useful details to make a decision.
	Business sense	Agility and speed in understanding and handling a given business situation, using pre-collected knowledge of facts and compliances.
	Numerical reasoning	Ability to quickly and accurately manipulate numbers to quantitatively evaluate a statement or hypothesis.
Management	*Célmeghatározás*	The process of defining precise and realistic goals depending on the available time and resources.
	Priorizálás	The ordering of elements or activities related to the problem-solving process in relation to each other based on their importance.
	Focus	A thinking skill that allows people to start a task without procrastination and then sustain their attention and effort until the task is successfully completed.
	Speed	The time required to perform a mental task.
	Stress management	An individual's ability to understand the causes and feelings of tension or anxiety and to manage them successfully
Collaboration	*Giving feedback*	An individual's ability to provide constructive and timely feedback on the work of others in order to motivate them to further develop or maintain their current motivation and effectiveness.
	Handling criticism	A person who can accept constructive criticism to improve and can withstand the pressure of unfair or frustrating criticism while motivating themselves to work harder and better instead of giving up.
	Delegation	Delegation is the transfer of any responsibility or authority to another person to perform specific activities. The key to successful delegation is determining what, how and to whom to delegate.
	Follow instructions	Accepting and owning tasks assigned by others while maintaining the right balance between individuality and teamwork

	Inspiration	The process of helping others to be mentally motivated to do or feel something, especially a creative activity.
	Handling conflicts	The process of limiting the negative aspects of conflict while increasing the positive aspects of conflict by maintaining a constructive attitude and effective communication.
Communication	*Storylining*	Arranging messages in a logical sequence so that the whole story is easy to grasp and understand, while using only the relevant messages, avoiding unnecessary noise.
	Visuals	Appropriate use of a visual element, such as a film, slide, or model, designed to supplement written or spoken information to make it easier to understand
	Verbal communication	Sharing information between individuals using speech.
	Non-verbal communication	Gestures, facial expressions, tone of voice, eye contact (or lack thereof), body language, posture, and other ways people communicate without using language.

Table 10: Interdisciplinary skills that can be developed using the case method
Source: Ábrahám (2019)

During the processing of each case study, the students therefore spend considerable time with solving the problem, preparing the solution, working in groups, and communicating the solution. Along this process, skill development takes place, since the knowledge acquired earlier or during case-solving is put into practice.

The presented framework consists of knowledge and skills that can be acquired during the case solving. The peculiarity of the framework is that it can be linked to an educational methodology. There are similar frameworks in the literature, such as the "Universal Competency Framework" used by the SHL company for competence measurement (Bartram, 2011), or the one created by Mihály Csíkszentmihályi, embedded in the theory of flow (Csíkszentmihályi, 1990, Buzády, 2017, Fligby, 2023) framework containing 29 management skills.

3.3. Summary: theoretical boundaries of the research topic

In my dissertation, I therefore look at the case method as a teaching method used in business education and skills development. I examine the historical development of the method and the application possibilities primarily from the perspective of a teacher. The theoretical delimitation of my research topic is presented in Figure 15.

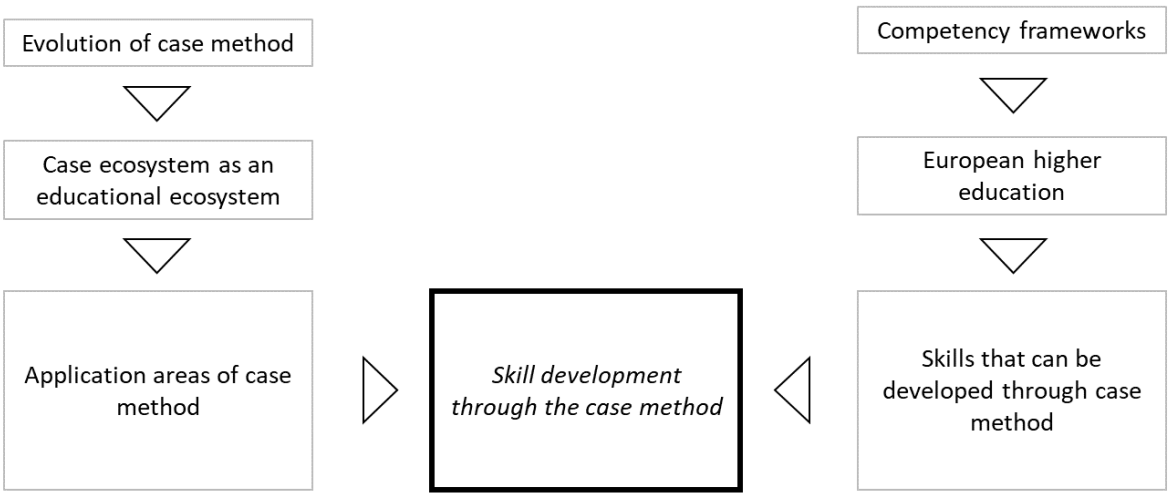

Figure 15: Positioning of the research topic
Source: Author's compilation

The research topic is positioned from two directions. First, through the development of the case method and case ecosystem, various application forms of the method have emerged in the last century. Another thread of the theoretical background of the research topic is the competence frameworks and the higher education qualification framework used in the European Union. My article-based doctoral dissertation is positioned at the intersection of all these and examines the relationship between the case method and skills development.

4. PUBLICATIONS PREPARED AS PART OF THE ARTICLE-BASED DISSERTATION

My article-based dissertation is based on three articles, the published and most recently accepted forms of which are presented in the following chapter without changes in content.

4.1. Top of the pyramid? - Case based education and case competitions

Title	Top of the pyramid? - case based education and case competitions
Authors:	Zsolt Ábrahám - Erzsébet Czakó - Miklós Kozma
Journal:	Budapest Management Review
Status:	Published

Abstract

Case-based education as part of business and management education was introduced by delivering management best practices to first graduate then undergraduate business students in the United States. Case solving today is a wide-spread educational method in business schools around the world. One of the method's main advantages is that it simultaneously develops students' skills in three areas: the application of knowledge in real-world business situations; the ability to perceive business context and connect it with theoretical knowledge; and the development of problem solving and related presentation skills. International academic-based case competitions showcase student performance and signal the quality of their educational background. The Corvinus Business School at the Corvinus University of Budapest (CUB) adopted the US-based business schools case-based education in the 1990s, and since then it has attended international business competitions. This purpose of this paper is to provide a systemic overview of a case-based business and management education, its adaptation for bachelor level programmes and international case competitions in Hungary. The aim is to orient and facilitate further research in this field.

1. Introduction

Today, the case method is widespread in many business schools around the world, is used in undergraduate and master's courses, and is part of management education programs and trainings. In addition to imparting and updating theoretical subject knowledge, their application to real problems, the development of cooperative (collaborative) problem-solving skills and the presentation of problem solving and its results, one of the tools of which is the case method, are becoming more and more important.

The method is not new in domestic business and executive education, however, the scarcity of suitable higher education graduates increases the value of case-based education and the related domestic and international case competitions. In our article, we undertook to put the domestic developments in a historical context after a methodological introduction, and summarize the factors in which the specificities of the case method and related domestic and international case competitions can be grasped. We see that the processes took place organically in the Corvinus University of Budapest, taken as a case, as an example, they are in line with international processes, and ultimately can be considered as a response to the labor market's expectations of education.

The purpose of the first part of our study is to serve as a theoretical and methodological introduction to the subsequent reviews. In this section, we review the most important components of the educational method based on case studies (cases - we use the two as synonyms): what is meant by a case, what is the role of the instructor and students, and what are the main aspects that determine the types of case competitions. Here we also cover the educational opportunities applied in the form of training. In the second part, we present what kind of system we have developed and apply in undergraduate programs for students who lack practical experience to prepare and develop students to solve complex company and management problems, as well as to prepare them to participate in international case competitions. In the third part, we present how the international case competitions for undergraduate students, which became widespread in the 2010s, network the now global higher education, and what lessons they provide for the application of the domestic case method and the organization of case competitions.

It is surprising that although the teaching method based on cases is widespread and there is no field of business where it is not applied, there is little systematizing and overview of

methodological and pedagogical literature related to it, and even less research results. The article mainly draws on these writings in the first part. The second and third parts are based on the experiences of the authors of the article and the sources documented and published over the years. We believe that by placing our experiences in the context of the literature and the development process, our writing can contribute to the domestic research and further development of the case method.

The article is based on several sources that have not been processed in the form of a study. We consider our work to be the result of exploratory research based on these sources and the systematic presentation of our own experiences. In our discussion, we summarized our main professional and scientific claims in the form of findings. On the one hand, the findings enable further research, and on the other hand, surprisingly even for the authors, they outline one of the narratives of the undergraduate case-based education aimed at domestic case competitions at Corvinus University of Budapest.

2. Overview of the case method

The aim of the following chapter is to clarify the concepts related to the case-based teaching method. After defining the case study, we discuss the role of the instructors and the students, and then present what we mean by case study competitions.

2.1. Defining the case study

The case method appeared in higher business education after the founding of the Harvard Business School (HBS) in 1908 (Weaver, 1991). The focus of the method was on real, problem-oriented situations, and complete educational programs and curricula were based on them (Merseth, 1991). In addition to curricula and subject information based on the transfer of lexical knowledge, case-based educational elements focusing on the transfer of practical knowledge and skill development have appeared more and more widely at the master's and then bachelor's level as well (Garvin, 2007).

Instead of the case method, Levin (1995) consistently writes about case-based education, the essence of which is that the curriculum is partially or entirely based on case studies. According to Agyris (1980), case-based education has five components: 1) a relevant problem for the decision-maker, 2) intensive involvement of the students participating in the course, 3) minimal involvement of instructors, 4) freedom of opinion (i.e. there are no right and wrong answers), and 5) drama related to the decision situation. Buzady (2017) compares case-based education to a magic (Rubik's) cube and describes the method in terms of the instructor, student and institutional ecosystem. The domestic literature related to the case method is not yet very mature. There have been no studies or publications examining the topic holistically, so in the following chapter we consider it important to clarify the related basic concepts and place the method among educational methods.

In the international literature, we can find several definitions of case studies, when creating our own definition, we can start from the definitions of two business schools, Harvard and Ivey, which play a leading role in the field of case-based education. Harvard Business School (HBS) "*A case study is an educational tool that introduces students to a critical management problem and provides a springboard for classroom discussions in which participants present and defend their analysis and solution*" (Harvard Business School, 2019). If we take the definition of the Ivey case study as a basis, then the case is a "*real problem and challenge that a company faces during a critical management decision situation. The students who solve the case take the role of the decision-maker, analyze the data available to them, based on which they develop and defend alternative solutions*" (Ivey Business School, 2019a). The two definitions have in common that the concept focuses on business management problems, the decision-making information and situations associated with them, as well as the solution and the related debate.

The focus of the case studies is therefore corporate, business problems and related management decision questions. Levin (1995) considers case studies to be narratives created and contextualized for teaching and learning purposes that examine factual and complex issues. According to Kardos and Smith (1979), a case study has four characteristics: 1) it deals with a real problem, 2) it consists of complex and sub-problems, 3) it contains enough information, 4) it is authentic and believable for the reader.

When grouping the case studies, it is worth starting from the problem to be processed. Based on all of this, the cases can be grouped based on 1) the type of problem, 2) the structure of the problem, and 3) the accuracy of the questioning. Based on the type of problem 1), there are

case studies discussing joint venture strategic problems (e.g. company acquisition) and functional topics (e.g. marketing, financing). The structuring of problem 2) (Bartee, 1973) is also a grouping aspect: in the case of non-algorithmizable, poorly structured problems, the goal is for those who solve the case to create well - or better - structured ones from ill-structured problems. It is the quantity and quality of information available in connection with the problem raised in the case study, the complexity of the problem, and the knowledge of possible solution directions that can determine the structure of the problem. Aspect 3) refers to the explicitness of the questioning. If the case study contains explicit questions, for the students solving the case, asking the question is the point of alignment during the solution. If there are no clear questions related to the case study, the students start processing the case study by identifying the key question and the related problem.

Finding (1): The business case study is built around a strategic corporate problem or decision, and is a document containing the information necessary to solve it. The protagonist is usually personified with a senior company manager with decision-making authority.

2.2. The role of the instructor and students during case study-based education

Booth et al. (2000) highlight the role of case studies in skills development and conceptual and conceptual development. This idea is carried forward by Christensen and Carlile (2009), who in their article emphasize the theory-building feature of the method. According to them, the process of theorizing can be helped by the inductive logical approach and system associated with the method, and the students' ability to theorize can be improved by using case studies.

Umble et al. (2008) name the transfer of subject knowledge as the primary goal of classical, traditional education. There can be several forms of transfer of subject knowledge, the case study method is related to experience-based educational trends, since the focus of each case study is a practical problem of a company represented by a decision-maker. Based on all of this, problem-, company-, industry-, and market-specific knowledge can be distinguished during knowledge transfer through the case method (Ábrahám, 2018a). In addition to the case study, the source of knowledge transfer can be the instructor and other students participating in the course. In the latter case, we are talking about students learning from each other (on a peer-to-peer basis).

Several academic articles deal in detail with the skills that can be developed using the method. While Kreber (2001) emphasizes the development of logical reasoning and intuition skills, Jerrald (2005) focuses on skills related to problem solving, analytical thinking, decision-making, and critical thinking.

It is worth dividing the problem-solving skills into skill groups, in which different competencies appear. During the processing of the case study, a number of skills (e.g. gathering information, analytical ability, calculation skills, structuring ability, critical thinking, synthesizing, decision-making, logical reasoning) can be distinguished, which can be developed with the help of the method. The case method requires an active role from both the instructor and the students, and through this it is suitable for both the transfer of new subject knowledge and the development of problem-solving skills (Ábrahám, 2018b).

The case study solution can also be understood as a process, during which the case solver or their group provides answers to the problems raised in the case study independently or with the guidance of an instructor. A solution independent of the instructor or teacher is mostly realized in the form of case study competitions, while the case study solution based on the instructor's guidelines is a characteristic of case-based education.

2.2.1. The role of the instructor

Many articles deal with the role of instructors and students during the case study-based teaching method (Freeman, 2005; Hammond, 2002; Wood, Bruner & Ross, 1976). In classical classroom education, instructors primarily focus on imparting subject knowledge, and students often assume a passive role (Umble, Umble & Artz, 2008). In contrast, in case study-based instruction, instructors may assume multiple roles (Wood et al., 1976). Dooley and Skinner (1977) distinguished four possible teacher roles based on the applied pedagogical philosophy and educational goal:

1. **Facilitator:** The instructor observes the conversation from the background, does not influence its dynamics with his opinion or value judgment. The instructor assumes that the students are prepared for class and ready to discuss the case study.
2. **Coach**: He actively shapes the course of the conversation with his questions and comments. At the end of the case study, he summarizes the conclusions formed in the room. The instructor assumes a stimulating and motivating role in order to stimulate the classroom discussion.

3. **Quarterback**: Actively controls the course of the conversation, measures the time and, if necessary, asks questions about new topics in order to achieve the set educational goal. The instructor is clearly responsible for the course of the lesson and the discussion.
4. **Demonstrator**: In the case of a lecturer role, the students' presence in class is passive. The instructor is clearly at the center of the lesson, behind which is the assumption that the case study told by the instructor is more effective in terms of teaching.

The roles described by Dooley and Skinner (1977) also represent the four archetypes of case-based teaching. In addition to the pedagogic philosophy and educational goal, the acceptance of the given role depends on many other factors, such as the nature of the case study or the available time.

Finding (2): During the case study solution, the instructor's role is to help students identify problems or clarification, support their problem-solving process, as well as to stimulate classroom discussion of the formulated proposals.

2.2.2. The role of students

Similar to the instructors, the role of the students differs from that of classical classroom teaching during the case study solution, which should be divided into three parts along the educational process (Haywood-Farmer, 2008):

1. *Preparation*: Students should read the case study before discussing the case and prepare for the classroom discussion. If the instructor has defined the question of the case study, the central problem of the case study is identified, analyzed and interpreted based on that. They consider the possible alternatives and the solutions related to them.
2. *Classroom case study solution*: The classroom processing of the case study, i.e. the discussion of individual solutions, can take place in a small group, moderated by the instructor, in a plenary format, or as a combination of these. Regardless of the format, students must actively participate in the discussion of the case, expressing their own opinions and evaluating the opinions and solutions of others.
3. *Role after/before class*: The role after/before class is optional and essential when students present a group solution or that's what they get the evaluation for. After discussing the case, the student can individually reflect on what happened in the classroom, if the case study was worked on in groups, he/she can give and receive constructive feedback to his/her peers.

In case study-based education, the role of peer-to-peer learning is prominent, as it is based on the active participation of the students and assumes conscious attention and reaction on the part of the participants.

Finding (3): The case-based education is based on the preparedness and active participation of the students, where the case solvers also learn from each other (peer-to-peer). Preparing to solve the case and filtering the experiences after discussing the case can also be part of the learning experience.

2.3. Case competitions

According to Wikipedia (2019a), the age of case competitions is much younger than the case-based teaching method. They were formed in North America in the 1980s, and the spread of case-based education and the need to compare students' knowledge between individual institutions may have played a role in this. In case competitions, teams delegated by different educational institutions solve the same case study under controlled conditions. In the competition regulations, the organizers record the range of participants, their qualifications, the available time, and the tools that can be used during the solution. All of this makes it possible to compare student performance in a kind of laboratory setting.

The goal of the case competition is for the participating teams to develop a realistic scenario and action plan for the case company during the preparation period (Rebeiz, 2011). Students participating in the competitions work in independently managed teams (Kunselman & Johnson, 2004), plan the steps and schedule of the solution process, the decision-making mechanisms within the team, and manage the conflicts that arise. After the time to develop the task, the teams present their solution to a professional jury.

Case competitions are both a playful form of learning and a serious professional competition. Several researches have established that, in addition to classroom education (Menna, 2010; Corner et al., 2006), case competitions significantly contribute to the professional development of students and are suitable for preparing students participating in the competition for the expectations of the labor market (Umble et al., 2008).

According to Maier-Lytle, McGuire, and Ehlen (2010), participants in case competitions can (1) acquire specialized knowledge, (2) improve their communication skills, (3) learn to work effectively in a team, and (4) improve their employment opportunities in the labor market.

Based on all of this, the case competition is an event where a predetermined circle of participants, individually or in teams, searches for solutions to a complex, poorly structured problem described in a case study under time pressure.

Case competitions are a complex experience for the participants. In addition to professional development, there are many other benefits for the participants of the competitions. In addition to learning, developing and competing, students can meet representatives of companies and other universities, while companies can hear business development ideas related to the case study and meet talented career starters.

In Hungary, the number of students participating in case study competitions has increased significantly in recent years; in the 2017/2018 academic year, more than 1,700 competitors took part in 39 case study competitions. (Figure 1).

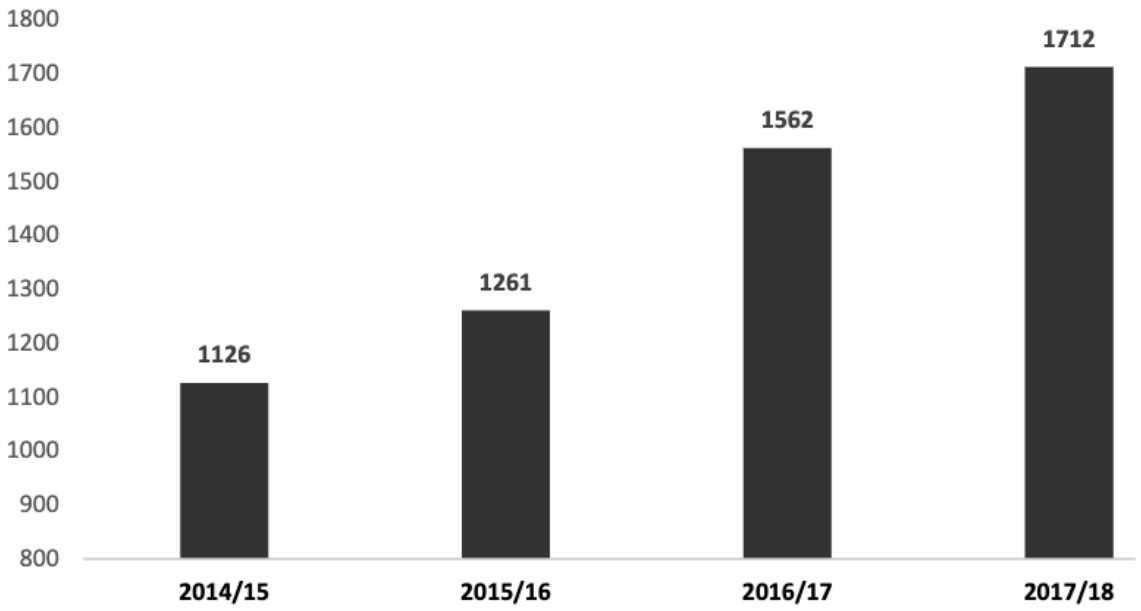

Figure 1: Number of students participating in case study competitions
Source: Ábrahám et al (2018)

2.3.1. Types of case study competitions

Several types of case competitions can be found both domestically and internationally, and it is worth reviewing the most important aspects according to which they can be classified (Ábrahám et al., 2018). The case competitions can be grouped according to three main aspects: according to the participants, the professional content and the organizers.

1. **Participants**:
    a. *Eligibility*: Application for a specific competition can be made by invitation and public application. In the case of invitation-only competitions, the specialists of the institution organizing the competition decide on the number of invitees and the conditions for participation, while the public case study competitions are open to anyone if they meet the participation criteria set out in the competition regulations.
    b. *International background*: According to this, we can distinguish domestic and international competitions. International competitions should be further divided into global and regional competitions. We consider events that have participants from at least two continents to be a global competition. The regional competition takes place between participants from countries in a specific geographic region.
    c. *Qualification level*: refers to what type of program students can participate in each competition. According to this, there can be undergraduate and graduate competitions. The master's (graduate) competitions are a specific group of competitions announced for students of master's (e.g. MBA) programs with work experience. In recent years, case competitions related to secondary school subjects have appeared as one of the secondary school academic competitions.
    d. *Professional background*: There are several case competitions based on the professional background of the participants. These can be aimed at a specific professional field (e.g. marketing, accounting, economic IT, logistics), but there are e.g. also announced for participants in legal training. In this case, the participants are students of different educational programs at different levels.
2. **Professional content:**
    a. *Individual or team*: Depending on whether students or student teams are competing, we can talk about individual and team competitions, as well as single and multi-round events.

b. *Competition format*: In general, we can talk about single and multi-round competitions. There are competitions where the live presentation is preceded by one or more online rounds. The evaluation criteria leading to advancement between the rounds can be located on a wide range.
c. *Time available to solve the case*: Among the competitions there are so-called competitions based on short cases, during which the students have 1, 2, 4, 6 hours to solve the given case study, while the long case studies have 12, 24 or 32 hours to solve the available to participants. The two forms require completely different approaches and skills from the participating students. While speed, quick decision-making and efficient teamwork come to the fore in the case of a shorter time, in the case of a longer case, precision and elaboration are emphasized. A third category consists of case studies that can be solved in 6-12 hours, where speed, quick decision-making, effective teamwork, as well as precision and elaboration appear at the same time.
d. *Focus of the case studies*: the problems to be solved in the given case studies can be general company problems (e.g. growth, company acquisition) or those focused on one functional area (e.g. introduction of a new product, transformation of a logistics system).

3. **Organizers**:
    a. *University organizers*: Case competitions are related to higher education and can be considered academic competitions, students can compete. At that time, the preparedness of the students of the different institutions is measured by competitive comparison, and the organizers of the competitions can be university instructors or student organizations.
    b. *Corporate organizers*: the competitions organized by them became visible in the last decade. In these, aspects related to recruitment and employer branding come to the fore. Corporate organizers include management consulting companies, other employers, and companies specialized in competition organization (Ábrahám et. al., 2018).

Finding (4): Case competitions have increased significantly both internationally and domestically in the last decade. In addition to the traditional academic competitive university case competitions, especially the competitions of company organizers have spread.

3. The case method in undergraduate education

Undergraduate business students participating in the Business Economics Pyramid of the Corvinus University of Budapest are preparing for invitational international university competitions that ask for the solution of corporate strategic cases. In this section, we provide an overview of how the BCE Faculty of Economics developed its system. First of all, we present the factors that could have encouraged the introduction of this method from the end of the 1990s. After that, we will present how the case competition-oriented training appeared, representing a model of the current system of undergraduate education, the overview of which concludes this section.

3.1. Domestic expansion of management science training structures and the case method

One of the most spectacular results of the unification of the European Higher Education Area is the Bologna system, the introduction of the linear higher education system in the member states of the European Union (EU). Its development at the very beginning of the 2000s and its subsequent introduction was a much-discussed concept and solution throughout Europe. Together with the Hungarian higher education institutions, the Corvinus University of Budapest also introduced the linear education system in the fall of 2006, more than two years after the country joined the EU. It is not our job to evaluate this transformation, but it was decisive from the point of view of the topic of our article, so we will discuss it briefly.

The previous higher education practice was different and very diverse in the field of economic sciences in each EU member state (Czakó, 1991 and 1992). Compared to the previous ones, the transition to a linear education system made higher education in the field of management science more transparent and accessible not only nationally, but also between EU member states, according to current experience. In undergraduate education, the English name "business and management" gained space to name the fields of higher education in economics. And although it is worth a separate analysis, we can say that management science has thus qualified as a scientific, university field in the higher education systems of the EU member states. It can be said that it has gained status and rank as a university discipline beyond dispute.

The essence of the implementation of the linear training system in economics is that, regardless of the training places (university or college), each institution could start 3.5-year basic and 2-year master's level programs in our country. The management science majors and their training structure had to meet the criteria represented by the Hungarian Accreditation Committee, in

the development of which the Hungarian representatives of the field also took part starting in 2003. From the point of view of our topic, this resulted in the fact that corporate economics appeared in the educational structure of all business science basic courses. It follows from the logic of the system that basic diplomas must provide a basis for graduates to find employment and enter the labor market.

The introduction of the linear education system at BCE was both new and not. The so-called introduced in September 1988 In the educational structure of the Csáki - Zalai educational reform, basic education (3 academic years, 6 semesters) and professional education (2 academic years, 4 semesters) were also present, as well as the intention that the student could enter the labor market after the basic education (see Czakó 1991 and 1992). However, the basic education at that time was able to provide a much broader foundation (economics, economics, social sciences and methodology) with the aim of being able to base the students' choice and further professional studies. In this system, the students began their professional studies, i.e. economics, after significant theoretical training, hungry for practical problems. In this system, Business Economics in the second year (3rd and 4th semesters) was intended to establish the basis for the choice of business majors (see Chikán 1991; András, Czakó, 2003; Chikán, Czakó, 2018) and to make students interested in them. The management science majors basically imparted master's level knowledge, and the application of case studies, among other things, served the practical contexts of professional knowledge and their application. An example of this is the Business Policy Case Studies introduced in 1991-1992, which are based exclusively on case studies. subject (Czakó, 2003).

The educational reform introduced in September 1988 was coupled with multi-year teacher development involving nearly 100 teachers (Chikán, 2003). The expansion of the use of case studies was partly due to the educational developments supported by the New York Soros Foundation between 1986-90, and partly due to the Central European educational development program of the higher education consortium led by the Harvard Business School between 1992-95. Erzsébet Könczöl, who was in charge of the Business Policy Case Studies subject at the time, participated in a course on the case study method at the Ivey Business School as part of this continuing education opportunity, and passed on the knowledge she acquired there to her colleagues to develop the subject, in which she relied on methodological volumes that have been available and improved since then (see Ivey Business School, 2019b). In retrospect, we can say that the Csáki-Zala educational reform on the one hand resulted in the education of

market economy conform knowledge, and on the other hand, it also contributed to the widespread adoption of case study-based education at BCE.

Finding (5): At BCE (or its predecessor), the adoption and adaptation of market economy-compliant teaching materials was accompanied by the renewal of teaching methodology. In both cases, the development of instructors abroad played a significant role. The adoption of case-based education was dominant in the renewal of educational methodology.

3.2. The domestic appearance of university-based case competitions

There is a welcome increase in the amount of information available on the internet about case competitions, but we do not have a systematic overview of them. That is why we rely on Wikipedia articles and domestic manuscripts (Bakacsi, Czakó, 2003). According to Wikipedia (2019a), in an international context, case competitions originated in North America (United States and Canada) in the 1980s. Out of the 31 invitational case competitions listed, only four competitions were started in the last century, 27 of them started after 2000. According to them, one of the oldest is the graduate case competition of the John Molson School of Business (Canada) in 1981 and the undergraduate competition of the University of Virgina (USA) from 1982. The editors indicate that the Wikipedia article needs improvement. Indeed, the list does not include the Ivey Business School (Canada, London) case competition, which was held for the 30th time in 2019 and is considered one of the most prestigious international undergraduate competitions. These are typically universities or case competitions organized by their schools revolve around the solution and presentation of a comprehensive corporate problem from the perspective of top management. Student teams of four are expected to apply their subject knowledge of several management science topics (e.g. marketing, management, finance, strategy), and from a consultant's point of view, it is necessary to present the solution to the problem in a kind of role-play. The language of the international case competitions is English, which means a special preparation task for teams whose mother tongue is not English.

In the previous education system, up to and including 2010, BCE students participated in undergraduate international competitions, as they did not yet have a diploma. The Strategic and International Management (SIM) course contributed to the preparation of students for international case competitions,

BCE's participation in international case competitions and the domestication of domestic case competitions went hand in hand: in 2019, the University College of Entrepreneurs (EVK)

operating at BCE organized its 20th case study competition (OEV – National Case Study Competition, see Wikipedia 2019b), which the oldest Hungarian-language university case competition. Unfortunately, very few sources can be found about previous competitions. According to our experience, the best teams of previously invited institutions were able to participate in the OEV, and the nature of the case studies and the conduct of the competition show a high degree of affinity with the international case competitions described above. Recently, the competition was expanded to include the use of online tools and became a cash prize, which strengthened the specificity of the corporate case competition in the nature of the OEV. It is believed that the creation of the resources necessary for the organization of the OEV may also have played a role in this.

The introduction of the linear training system brought about a change in participation in international case competitions. The bachelor's and master's levels have been separated in the Hungarian higher education in management science, and compared to the previous training structure, the professional subjects of management science have moved forward in time. The preparation for the previous international case competitions and the participation in them had to be reconsidered: here, too, the preparation for the basic and master-level international case competitions was separated. The preparation for the master level case competitions continues within the framework of the SIM course, and we have created a system for the basic level ones, Business Economics. based on the subject, the Business Economics Pyramid.

Finding (6): The establishment of domestic, university-based case competitions coincided with the expansion of international case study competitions. Those instructors and workshops of instructors who have gained experience in international case competitions. Students who previously participated in international case competitions also became members of the teaching workshops.

3.3. A form of talent management: the Business Economics Pyramid

In the bachelor's degree courses introduced in 2006, the teaching of the subject Business Economics was repositioned and restructured: it was moved from the 3rd semester to the 1st semester as a one-semester compulsory subject. The basic textbook of the Business Economics subject Chikán (1991, 2017) has been continuously renewed, and the methodological and organizational solutions for the teaching of the subject have been continuously developed. The result of the transformation is the Business Economics Pyramid. (For more details, see Czakó

& Kazainé, 2017, and Czakó et al. ed. 2008, 2013 and 2018, sections on the educational profile of the Department of Business Economics).

As can be seen from Table 1, the Business Economics Pyramid is a subject group consisting of compulsory (Business Economics) and three optional subjects (Applied Business Economics, COBE - Case on Business Economics and CIBS - Cases in International Business Strategy), named after the core subject and the 1000+ subjects from one student to 20+ students. The creation and introduction of this subject group was preceded by many considerations. One of them was to develop the study competition system in order to maintain the attractiveness of the compulsory subject taught in the 1st semester. (See Czakó, 2006; Havran et al., 2013; Juhász & Kozma, 2003; Kozma & Stocker, 2008; Szalay, 2018 on the development of academic competitions involving more than 100 students in the first year). From the point of view of our topic, we highlight that there was a change related to basic education in the spring of 2006, the so-called naturalization of a live case in the second round. The essence of this is that a company gave the problem that the 30 or so participants worked on individually to reach the finals, and in the finals the 10 best solutions were presented to a jury made up of company representatives and representatives of the preparatory teaching team. With this solution, the format of the case competitions was practically adapted, and the goal was that, in addition to applying their knowledge, the most outstanding students could also improve their presentation skills in Hungarian, and those presenting in the finals could try out the professional attitude of consultants.

	Vállalatgazdaságtan, nappali alapszak	Üzleti gazdaságtan, tavaszi félév	COBE – Cases on Business Economics, tavaszi félév	CIBS – Cases in International Strategy, őszi félév
2018/2019	1274	199	74	24
2017/2018	1288	223	92	24
2016/2017	1440	172	87	19
2015/2016	1306	204	93	20
2014/2015	1333	221	75	16
2013/2014	1372	216	98	20
2012/2013	1301	261	103	20
2011/2012	1105	219	68	20
2010/2011	1083	344	92	20
2009/2010	1114	263	82	22
2008/2009	1098	263	71	36
2007/2008	1055			
2006/2007	923			

Table 1: Pyramid subjects and student numbers of Business Economics (2006–2019)
Source: BCE Neptun

Finding (7): The development of the number of students represented a significant pushing and pulling force for the development of a subject group and methodology that gives the most interested students the opportunity to increase their knowledge and develop skills above the average, i.e. it can contribute to student talent development. Case-based education was an adequate form of this in the basic course.

Directly after the compulsory subject, in the 2nd semester, Business Economics is taught. a subject that we taught for the first time in the spring of 2008, and its purpose is to make the students apply more areas of knowledge to problems related to larger subject areas, to establish and develop their skills in group work and in Hungarian presentations, and the lectures give an insight into the operation of successful domestic companies. A note was also prepared for the subject, edited by a member of a team that won first prize in an international case competition (see Kopányi, 2013).

The subject COBE - Cases on Business Economics taught in the 3rd semester was also introduced in the spring of 2008. This subject is bilingual from the outset and aims to increase students' knowledge and develop their skills in English-language professional vocabulary and English-language presentations. Originally, the subject would have been a prerequisite for the last elective. However, we have noticed that the students' level of preparation in English is getting higher and higher, and that many of them do not continue their studies in the last subject, but there are those who can join without the COBE subject. Those who do not continue their studies at CIBS "continue learning" at various domestic and international case competitions, which indicates that the opportunities provided by company case competitions, often with cash prizes, have increased significantly. This phenomenon encouraged us to organize a case competition in English at the end of the subject in 2016 with the participation of the four student teams that achieved the best results in the seminars. With this, COBE students can taste the atmosphere of the case competitions, increase their experience and develop their skills in the field of competition. Thanks to our regional international relations, the case competition concluding the COBE course has become international. (For more information, see Kozma et al., 2018.)

Finding (8): At the end of the decade following the start of the basic training in 2006, case competitions organized by companies appeared, which target basic students for recruitment purposes. Talent management has increased in case-based education with the aim of supporting employment.

CIBS - Cases in International Business Strategy, which was taught for the first time in the fall of 2008, will be taught in the 4th semester. The essence of this is that the students in teams of 4 present the solutions of the English-language case study that they have prepared in the meantime, every two weeks, to a jury made up of instructors and company professionals, including former SIM and CIBS course graduates. The format of the classes has adopted that of international case competitions, and this subject also concludes with a case competition (CIBS final). The traveling team, with whom the preparation for the international case competitions will continue in the spring semester. According to the plans, and basically due to financial resources, we selected only one team until 2014. A change happened in the spring of 2015, when a student team applied for support in preparation, because they applied for a European international case competition in the colors of the university, where they were accepted. As a result of the student initiative and the growing university resources that can be used for international case competitions, we are preparing 3-4 teams for international case competitions from 2016, and from 2017 this teaching work takes place in the form of a course. (For more information, see Kozma et al., 2018.)

4. Lessons learned from international case competitions

In the third part of our paper, we present the purpose and form of the international case competitions, which were still considered rare in the 1990s, today, and the development of the students' skills. We report on our experiences and the lessons that can be applied both in the main education and in the organization of case competitions, and finally about the first domestic international invitational case competition, which we organized in 2019 in line with our mission.

4.1. International appearances linked to the Business Economics Pyramid

Most international competitions are organized once a year, so it takes a relatively long time, 4-5 years, for the profile of a competition to emerge clearly for the local community (Bakacsi &

Czakó, 2003; Damnjanovic et al., 2018). Likewise, it takes quite a bit of time for a university participating in international case competitions to present itself to the community if it has recently joined the competitions.

Table 2, compiled on the basis of Annex 2, shows that from 2009 we gradually joined the world of international case competitions with a basic, general business strategy focus. For a long time, it was only possible to obtain funding for participation in one competition per year, and later, starting in 2015, the prepared teams participated in more and more competitions, 2-5 per year (Czakó et al., 2013; Kozma et al., 2018).

The high point of participation in international case competitions is undoubtedly the first places, especially in those competitions in which participating teams came from at least 3 continents and can therefore be considered a global competition. In addition, the Champions League (Champions Trophy) was also a milestone in the history of our appearances.

	Versenyt rendező egyetem	Összesen, **2009-2020.**
1	Richard Ivey Business School, Kanada	4
2	Marschall School of Business, USC, USA	2
3	McGill University, Kanada	1
4	Copenhagen Business School, Dánia	1
5	National University of Singapore, Szingapúr	2
6	Rotterdam School of Management, Hollandia	5
7	Maastricht University, Hollandia	3
8	University of Florida, USA	4
9	University of Auckland's Business School,. Új Zéland	1
10	University of Belgrade, Szerbia	1
11	Queensland University of Technology, Kanada	1
12	Georgetown University, USA	1
13	BI Norwegian Business School, Norvégia	1
	Összesen	**27**

Table 2: Performances of the BCE Institute of Business Economics at undergraduate-level, general strategy-focused case competitions (2009-2020)
Source: Czakó et al. (2013) and Kozma et al. (2018), own collection

A development of strategic importance in the period between 2009-2016 was that we laid the foundations for long-term cooperation with other universities in our region active in the world of case competitions. As a result, from 2017, teams from Serbia and Romania came to our COBE and CIBS home tournaments, and in 2018, one of our teams also participated in the local tournament of the University of Belgrade. It was also a step forward that, starting in 2017, we had the opportunity to nominate the most capable students to more than one basic competition if possible and justified (Kozma et al., 2018).

Participating in international competitions is a clear motivational factor for students: they can see how their own knowledge compares to that of students from the world's best universities, and it is also a unique experience in terms of their future employment in the eyes of future employers (Ábrahám, 2018b; Damnjanovic et al., 2018).

4.2. Characteristics of international case competitions

Our participation was primarily focused on invitational international case competitions organized by universities (Bakacsi & Czakó, 2003; Kozma et al., 2018). The universities that accept the invitation decide within their own competence the composition of the four-member student team. This is typically the responsibility of the instructor traveling with the team who acts as an accompanying teacher and mentor among the preparatory instructors. The competitions are global, mostly 12-24 teams from different continents of the world participate.

Before 2010, it was typical for case competitions to have a single, longer case written in detail, but in the last 3-5 years it has gradually become typical for students to solve several cases in a competition, in different time frames (Ábrahám, 2018b; Damnjanovic, 2011; Damnjanovic et al., 2018). If several cases, usually two cases, are the subject of the competition, the jury and the mentors (accompanying teachers, trainers) can get to know the students' knowledge more thoroughly, and the selection of the best-performing team can be more well-founded. If the students are given a different time frame to solve the different cases, they expose themselves to a different kind of test.

Another feature of multi-case competitions is that between the solutions of each case, the students have the opportunity to process the experiences of the current case solution and

presentation, and based on the lessons learned, they can approach the solution of the next case with a refined approach. In such competitions, the instructor present with the students also has a greater role, as a mentor who can give quick help and feedback to his team both mentally and professionally before the next competition (Damnjanovic et al., 2018). As a result of all this, multiple-case competitions place a greater burden on the students, over a longer period of time, and any problems that arise (for example, in the team's cooperation) can be remedied during the competition.

Finding (9): Global case competitions are increasingly organized to solve multiple cases, which gives student teams a more complex challenge. The reason for this is partly the fact that the level of knowledge and skills of the participants is becoming more balanced, and in this context, the effort to evaluate the performance of the students as thoroughly as possible.

In the world of information abundance, students work on their own computers in most competitions, and it is allowed to use the information, databases and diasemas they have gathered in advance at home during preparation. This increases the viability of the competition as it simulates a consulting situation where professional consultants can also build on many existing resources in their work. The challenge is primarily the efficient and targeted processing of information, as well as the quick finding and professional presentation of a solution. It is not typical nowadays that it is not allowed to use any additional information other than the information provided to the students in the case description. But sometimes they can't even use a computer, they only have paper and stationery to develop and present the solution. In such a case, the students' prior preparation is focused on conceptual knowledge and presupposes greater experience in conducting analyzes and presentations. The richness of thought, the idea, then takes on a greater role compared to detailed elaboration. In the competition, the role of the instructor with the students is transformed, and the students need to be supported in a mentoring role.

Presentations are given by teams of four in a 10-20 minute time frame, during which the jury (with rare exceptions) does not interrupt them. This is followed by the question-and-answer phase, where the jury asks short, quick, factual questions to the student team, trying to reveal the depth behind the presented solution and the consistency of the problem solution. In the last 2-3 years, the presentation solution has also appeared, where the students sit at a conference table and summarize the essence of their solution in 5-10 minutes, simulating a consultant-client meeting with the jury, and then learn the details in an interactive question-and-answer

session . This solution strengthens the consulting atmosphere of the competition. There is also a difference between the two presentation formats in that teams presenting in front of a wide audience can place more emphasis on a convincing presentation that supplements the content with a number of meta-communication tools, while in the case of teams presenting around the discussion table, the content and the presentation of professional analysis are given a greater role .

The expectations of the jury, which includes both corporate, practicing professionals and university lecturers, are approximately known to the contestants. In principle, every solved case contains a clearly formulated problem and related questions to which the students must answer. The solution is based on analysis, and in addition to the idea, the detailed demonstration of feasibility is highly emphasized in the evaluation. It is increasingly common for people who have previously participated in case competitions to be included in the jury, which makes the jury's expectations more predictable for the presenting students.

Finding (10): "live cases" of a few pages are spread at the competitions, supplemented by presentations by company managers, and an edited collection of up-to-date company and industry information is also given as an appendix. The reasons for this are partly due to rapid changes in the availability of information dictated by digitization, and partly to the needs of corporate partners who are looking for ideas for their practical problems in exchange for sponsorship.

4.3. International case competitions as learning experiences

In multi-case, multi-round international competitions, the students' theoretical preparation plays a greater role, as the cases within the competition usually offer multiple problems, so knowledge gaps are also more easily revealed. Mental preparedness (e.g. time pressure, bonding with team members) and the maximum concentration needed to solve and present several cases also gain more importance in this type of case competitions. (Damnjanovic et al., 2018).

In some competitions, the names of the companies presenting cases in the competition are made public in advance, so the students can have up to a month to gather targeted information during their preparation. This increases the possibility of students' institutions to access databases, and there are significant differences in this between individual universities.

Finding (11): Among the student skills, the purposeful simplification of usable information and complex problems stands out, as well as psychological preparation and learning ambition, which skills are needed due to the more complex structure and system of expectations of the competitions.

The cultural intelligence of student teams is especially necessary in international case competitions. Emotional intelligence is related to this, as quickly understanding the jury's way of thinking and adapting to it is of prime importance, especially during the question-and-answer phase of the presentation (Damnjanovic et al., 2018). Company managers with different professional backgrounds can sit on the jury (those coming from the fields of finance, marketing, logistics, etc.), and there is also a big difference in their preparation, it is possible that they have little background knowledge of the content of the case.

Finding (12): The basic international team competitions require the application of functional (marketing, finance, etc.) knowledge in the areas of management science to problem solving; breaking down complex problems into parts and analyzing them in detail (analytical skills), then synthesizing these parts and giving a short, clear oral presentation and reasoning (presentation skills, supported by demonstration tools). It seems that it is necessary to handle the strict assignment of roles within the previously formed team that fits the case solution more flexibly.

4.4. Key lessons for education and preparation

etween 2009 and 20115, it was only possible to send a team to one international competition per year, which made it possible to get to know the expectation system of the rapidly developing international case-solving environment and to follow the trends (Czakó et al., 2013; Kozma et al., 2018). During this period, the English language skills of our students needed significant improvement, and in the genre presenting to a larger audience, it was a clear disadvantage, especially in the English-speaking environment.

After 2015, in line with the globally increasing activity, we had more opportunities to participate in international case competitions, and by this time more and more universities were involved in international case competitions, both in terms of the number of participating teams and the number of organized competitions. Among the institutions committed to the case study, multi-threaded relationships have developed between the students, former students, the

preparatory teachers/mentors and the organizing professional leaders. These international relations increasingly stimulate learning, knowledge sharing and development.

Our own learning also accelerated in this area, and we became embedded in the network of instructors of the international case competitions: we got to know the key players of the international case-solving community, the professionally responsible instructors responsible for the competitions and the trainers and mentors who bring stability to the network based on the international case competitions. Their opinion about individual competitions and teams is a guideline from the point of view of which university is invited to which competition and which university accepts the invitation of which organizer. This also stimulated the spread of the culture of learning from each other. While e.g. the 2009-2015 Our experience in the period between Partly, technologically, sharing has become easier, partly due to increasingly frequent competitions and performances, the stakes of protecting one's own know-how by restricting access have decreased.

Since 2009, we have gradually had a more and more comprehensive and nuanced picture of why it is worthwhile to maintain and even increase our activity in this international case-solving community. The time, attention and other resources spent on preparation and participation are valuable not only for the students participating in the competitions and the instructors who prepare them, but also for the wider university community. On the one hand, the victories presented from time to time increase the institution's international reputation and prestige, and on the other hand, the professional reputation of the instructors is gradually built within the teaching community (Damnjanovic et al., 2018).

Finding (13): The role of the preparatory teaching team goes beyond preparation for international case competitions: its importance is decisive in monitoring international trends, taking over and sharing experiences. The search for internationally common solutions is becoming a characteristic of honing the elements and methodology of preparation for case competitions.

4.5. The experiences of the 1st Central European Case Competition

In 2019, as a result of several years of preparation, the first Hungarian international case competition by invitation was organized by the Budapest Corvinus University and Case Solvers, a company founded by former students who graduated from the CIBS course after 2008, with the aim of spreading the culture of case solving globally. Teams from 16 leading

universities of international case competitions from three continents of the world took part in Budapest. The organization of the competition was based on several conceptual considerations.

The international case competition has a regional focus, insofar as we formulated the goal that the corporate problems and industry environment typical of the Central European region play a role in the formulation of the cases to be solved. According to our approach, although each country in the region does not necessarily justify the development of a special theme for the competition, the region as a whole, both in size and in terms of its characteristics, can already present characteristics that can give the competition an independent identity globally. In addition, we also aimed to support the involvement of universities in the region in the international case-solving community based on professional, organizational and cost aspects.

Based on our own experiences presented, we made it a top priority that the participants and organizing students and instructors could learn from each other, and that the competition would provide a platform for this as well. We communicated this goal in advance and formulated participation in it partly as an opportunity and partly as an expectation to the participating teams and their mentors.

We organized two case competitions, in which both cases were treated as "separate competitions", i.e. the best solutions to both cases were awarded first place, and we deliberately did not announce an overall winner. The leisure programs were organized both on the first day of the competition and on the day between the two alternative days, and with this we tried to provide a space for building relationships and exchanging experiences in an informal atmosphere, both between students and instructors.

At first hearing, the mentors of the participating teams were skeptical that we invited them to a professional discussion organized in the form of a World Café, but in the end they expressed their joy about the initiative, because we shared its conclusions and main findings with them before the end of the competition (Ábrahám et al., 2019) . In the framework of the World Café, we discussed with the mentoring community what success criteria there are in preparing for and participating in competitions and who has good practices in the field.

Our innovative solution in organizing the judging won recognition, in the framework of which we brought transparency to the preparation of the jury: the mentors of the competing teams could personally participate in the forum, where the jury was informed about the aspects and process of the evaluation, as well as the related good practices and expectations. . In line with

the realization of the learning goal, which is an essential element of the concept of the Central European Case Competition, each team had the opportunity to consult with the jury after the decision-making and to receive feedback on their performance. With this personal feedback, we aimed to support everyone's learning.

Finding (14): It is difficult to select the best among the teams that come to international case competitions more and more prepared, therefore transparency in the evaluation of performances is decisive in terms of the legitimacy of the competition and the satisfaction of the participants.

5. Summary and conclusions

We believe that research related to the application of the case study method for educational purposes and the measurement of its results can contribute to the development of case-based education and training in management science. We wanted to contribute to this in three areas with our article presenting domestic case study-based education and the development of case study competitions. On the one hand, we wanted to give a comprehensive picture of the case study-based teaching method and its latest trends in the first part. On the other hand, we presented a form of talent management based on case study-based education, the Pyramid of Business Economics, which also undertakes preparation for international case competitions. And thirdly, we systematized and presented the experiences gained at the international case competitions in the basic course, in order to give others ammunition for education and preparation for international case competitions. By formulating the findings of the qualitative descriptive genre based on case studies, we tried to make it debatable for others and worthy of further research.

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4.2. Mapping problem-solving competencies and talent management strategies for universities

Title	**Mapping problem-solving competencies and talent management strategies for universities**
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Abstract

The role of business schools is changing, there is an increasing need for competency mapping and tailor-made, competency based talent management strategies. This paper introduces the results of a competency mapping project which was conducted at Budapest Business School in 2020 among the first year students. The paper investigates two research questions: *Based on the problem-solving skills, what are the key characteristics of the first-year bachelor students at Budapest Business School?* and *What talent management strategies can be developed for the specific clusters?* As a result of a cluster analysis, three clusters were distinguished, based on the measured problem-solving skills of the students. The paper proposes a framework for talent management strategies for the Laggers, Unpolished Diamonds and Drivers who are describing students with different levels of problem-solving skills. Direction of upskilling and type of incentives are representing the two dimensions of the Talent management strategy mix which has the following four categories: 1) Extracurricular rewards, 2) Tutoring & catching up, 3) Perform-or-punish system, 4) Up-or-out system. Talent management strategies have to consider the skillset of the students, in order to fill the existing skill gap. This requires specific tutoring and catching up services for the Laggers. Drivers are highly motivated students whose motivation and talent management should build on extracurricular rewards, such as student associations, case competitions or student scientific conferences. Unpolished diamonds are hidden gems in each business schools, who may provide extraordinary learning curves as part of their university studies.

1. Introduction

The role of business schools is changing, besides knowledge, skills and competencies are becoming more and more important in the business world (Comyn and Brewer, 2018). Business schools have to tackle new challenges. On the one hand, the need for improved learning experience and gamified learning solutions is increasing, on the other hand employers are drawing attention to a deepening skill gap (McNamara, 2009). There is a growing interest on how workplaces develop and use skills and how work-based learning can be integrated into the various educational settings (Comyn and Brewer, 2018).

This paper presents the key findings of a research project at which aims to map the key problem-solving competencies of first-year students and provide potential talent management strategies for the specific clusters. The paper investigates the following three research questions: 1) *Based on the problem-solving skills, what are the key characteristics of the first-year bachelor students?* 2) *What talent management strategies can be developed for the specific clusters? 3) How can course administrators tailor the course design to the different talent management strategies?*

The main findings of this paper are based on primary research which was conducted in September, 2020 at the Faculty of Finance and Accounting at the Budapest Business School. Based on the anonym competency and demographic data of 546 students, three clusters were identified with a Hierarchical K-means clustering method. The three outlined clusters were linked with a talent management framework, called talent management strategy matrix.

Section 2 provides a literature review on the main findings of cognitive studies and sociology about competency development and socialisation. CASE SOLVERS' Skill Universe of problem-solving, competency framework is also presented at the end of the chapter. The third section of this paper is introducing the context and the model behind the research, while the fourth is presenting the main results of the cluster analysis. The fifth section is introducing the talent management strategy matrix which is based on the direction of upskilling and type of incentives. The matrix describes four different categories of talent management which may be applied by business schools as part of the course design and student services activities.

2. Literature review

The development of the academic research and literature on problem solving skills and cognitive capabilities dates back to the first decade of the 20th century when psychologists started to investigate the question: why someone is more suitable for certain tasks than others. Alfred Binet and Théodore Simon published the Binet-Simon test in 1905, which measured the mental age of school children (Kaufman, 2009). This test is considered as one of the predecessors of the IQ tests. The first tests were applied in education and military. This changed with the development of organizational development and human resource management, when scholars started to investigate the characteristics of talent and the source of outstanding job performance. Traditionally, academic performance and knowledge were considered as the main predictors of outstanding job performance. This approach was challenged by David McClelland who evolved the definition of competencies.

2.1 Development of cognitive studies

The theory of personality investigates the relationships between a person's unconscious motives, self-schema and observed behavioral patterns (McClelland, 1951). McClelland (1973) presented a dataset through which he demonstrated that the traditional achievement and intelligence scores (e.g. IQ) may not be able to predict job success. What is required according to him is to profile the exact competencies necessary to perform a given job. This can be achieved by using a variety of tests. Based on McClelland's findings Spencer and Spencer (1993) defined competencies as skills and abilities acquired through work experience, life experience, study or training.

According to Boyatzis (1982), maximum performance is believed to occur when the person's capability or talent is consistent with the needs of the job demands and the organizational environment. Expertise and experience (1), knowledge (2) and assortment of basic cognitive competencies (3) are considered as threshold competencies. Boyatzis (1982) also identified three clusters of competencies which are differentiating the outstanding performance from the average. He distinguished cognitive competencies (e.g. systems thinking), emotional intelligence (e.g. self-awareness, self-management) and social intelligence (e.g. social awareness, relationship management) as the three clusters of key competencies.

Salovey and Mayer (1990, pp. 188) defined emotional intelligence as ‘the ability to monitor one's own and other people's emotions, to discriminate between different emotions and label them appropriately, and to use emotional information to guide thinking and behavior’. Emotional intelligence is twice as much important than the practical and cognitive competencies (Goleman, 1998). Emotional competence is considered as a learned capability based on emotional intelligence which results in outstanding performance at work (Goleman and Boyatzis, 2017). Goleman and Boyatzis (2017) identified four domains and competencies of Emotional Intelligence: *Self-awareness* (emotional self-awareness) (1), *self-management* (emotional self-control, adaptability, achievement orientation, positive outlook) (2), *social awareness* (empathy, organizational awareness) (3) and *relationship management* (influence, coach and mentor, conflict management, teamwork, inspirational leadership) (4). These domains and competencies consist of 12 EI competencies which are considered as learnable capabilities.

Katz and Kahn (1986) grouped the competencies into four different categories: technical or functional (1), managerial (2), human (3) and conceptual (4). Carroll and McCrackin (1988) used three main categories for competencies: 1) Core competencies to form the basis for strategic directions (Hamel and Prahalad, 1994), 2) Leadership or managerial competencies to lead people and the organization and 3) Job-specific functional competencies to perform a particular job role.

2.2 The Iceberg model of competencies

Spencer and Spencer (1993) was building on McClelland’s work on competencies and developed the Iceberg model of competency levels (see Figure 1.). The model distinguishes visible – above the waterline – and hidden – below the waterline – elements of competency. Skills and knowledge are the most visible and thus the most easily changeable components of competency. Whereas, personality traits, motives, social values and self-concept are such behavioral components that are hidden, but in fact these are driving one’s performance.

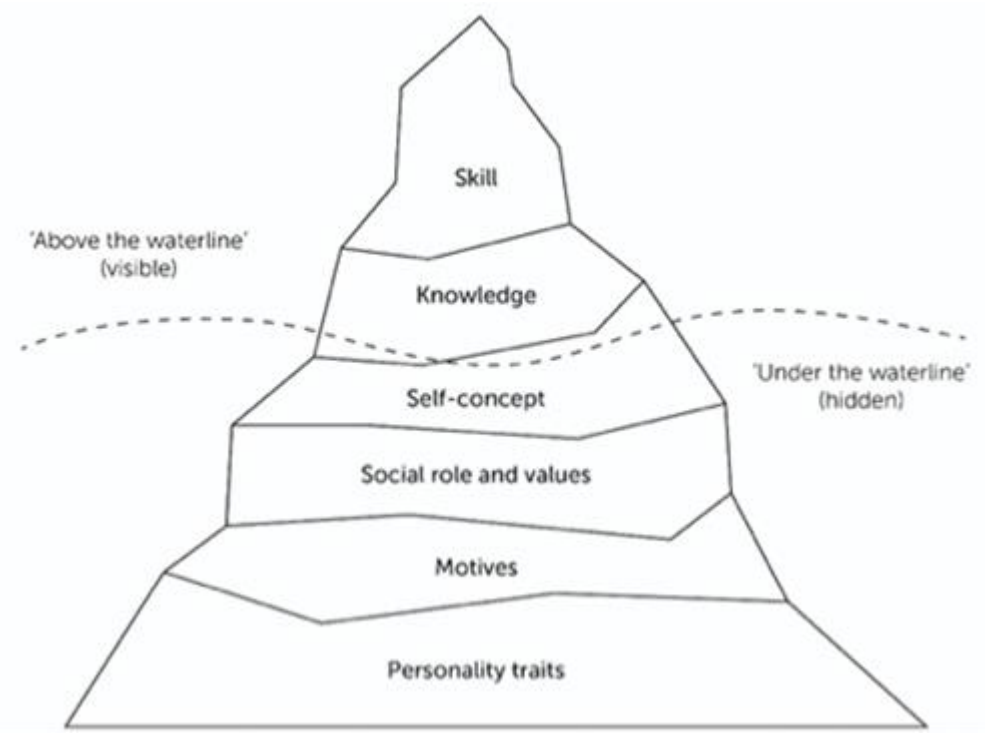

Fig. 1 Iceberg model of competency levels
(figure courtesy of Spencer and Spencer, 1993)

Spencer and Spencer (1993) identified the following six levels of competency in the Iceberg model:

1. *Personality traits*: Physical characteristics and consistent responses of an individual to situations or information.

2. *Motives*: Psychological factors that drive a person's behavior into a certain direction.

3. *Social role and values*: Values which are considered as important in a certain social status.

4. *Self-concept*: The way how an individual sees him or herself.

5. *Knowledge*: The state of understanding a set of factual information related to a certain field based on former education or other experience.

6. *Skills*: A developed ability of using knowledge gained in advance to solve a problem in a particular situation.

Although, this paper aims to present a general problem solving framework and a holistic skill universe which is based on a simulated work experience, it is essential to understand the context, background and levels of competencies. The Iceberg model provides a holistic approach on the different levels of competencies.

2.3. Work based learning

Levy et al. (1989) investigated the link between learning and the expectations of working requirements. They identified (1) structural learning in the workplace, (2) on-the-job training and learning opportunities and (3) off-job learning opportunities as the three key components of the link between learning and workplace roles.

From a higher educational perspective, the link between learning and work consist of the learning at work and learning through work. Learning at work relates to trainings and development developed in-company. As part of this trend, universities started to give credits for in-company courses as part of their curriculum. In case of learning through work, the learning derived from work experience itself. Such experiential learning (Kolb, 1984; Kreber, 2011) can be combined with instructor led learning (Comyn and Berwer, 2018).

Darche et al (2009) describe engagement in the workplace, connection of the workplace to the classroom, reflection in the classroom and assessment of learning as the four key components of work-based learning. According to researchers, people learn more effectively through activities and practices. Uleanya et al. (2020) emphasized the importance of learning by doing.

Today there are various formats of work-based learning. Each of these work-based learning experiences are using the workplace or the real work to provide students with the knowledge and skills that will help them connect school experiences to real-life work activities. Work-based learning experiences may include the following activities (WINTAC, 2022): (1) job shadowing, (2) career mentorship, (3) career related competitions, (4) informational interviews, (5) paid internships, (6) non-paid internships, (7) practicum, (8) service learning, (9) student-led enterprises, (10) simulated work experiences, (11) paid work experiences, (12) non-paid work experiences, (13) volunteering and (14) workplace tours.

The tool is used in this research is simulating a work experience for business students. According to WINTAC (2022) Simulated Work Experiences are work-based learning activities that stimulate work in any field. Online simulated enterprises are learning activities which are used in business to simulate how to set-up or run a company. As part of the learning experience, students have to determine the nature of business, its products and services (Darche et al., 2009).

2.4. Work-integrated learning

According to Uleanya et al. (2014), the urge for people to learn through doing or practice led to the rise of 'Work Integrated Learning'.

Jonsson at al. (2014) interpret the meaning of work-integrated learning with a very similar focus to work based learning. Work-integrated learning includes (1) placements, (2) internships, (3) field work, (4) sandwich year degrees (a degree which involves a placement year usually after the second year of study), (5) job shadowing, and (6) cooperative education (Ponikwer and Patel, 2021; Jackson, 2015). Ponikwer and Patel added the Game-Based Learning Activity to the main categories of work-integrated learning.

2.5 Socialisation & talent management

No individual can withdraw from the process of socialisation, which ensures that we become full persons of responsibility and full members of the society. Newborn babies are coming into the world as biological organisms with animal needs. Babies are gradually transforming into social beings who learn how to act and feel as a member of society. This molding process is called socialisation and provides sustainability in our society and culture. (Avinun and Knafo-Noam, 2014)

Socialisation is a lifelong learning process and it consists of the complex processes of interaction through which the individual learns the habits, beliefs, skills and standards of judgment that are necessary for his effective participation in social groups and communities.

Socialisation is mainly twofold, we can distinguish primary- and secondary socialisation. Primary socialisation refers to the process where the child becomes socialised through the family in the early childhood years (Giddens, 2003). This highlights that the key agent in the process of primary socialisation is the family. According to Parsons the internalisation of

culture assists in the continuity of one's culture. He also argues that the personality of the child is molded in accordance to his culture and setting. In this sense, the family produces the culturally and socially necessary type of personality (Giddens, 2003).

Secondary socialisation includes the role played by other social agents such as education, workplaces or peer groups. Mead and Piaget both emphasized the importance of peer relationships. According to Piaget the peer relationships are more democratic than the parent-kid relationships. People of the same age and interest influence individuals' views and behavioral patterns for example at workplaces (Giddens, 2003). When it comes to secondary socialisation, the involvement of the family is loosing from its importance since other social agents or agencies take up the prominent role.

This paper tests the correlation between primary and secondary socialisations through a Simulated Work Experience. This links the work-related socialisation with the family and high school related socialisation elements and aims to define distinct talent management strategies based on the different clusters.

Due to the complexity of talent management, there are numerous talent management models in the academic literature. According to Davidson (2009), a good talent management model is simple, based on relevant assumptions, constituted by well defined mechanisms and components, sees the behavior as a process and has a practical implication in education and science. Tannenbaum (1986) identified five factors which facilitate talent: general ability, special aptitude, non-intellectual requisites, environmental support and chance. Mönks and Renzulli identified three key drivers of talent (Mönks, 1992). While the family sets basic values and foundation for lifelong learning, teachers act as eye-openers, peers are catalyzing the talent. Czeizel (1997) defined talent as the interaction of heredity and environment. Czeizel’s four rings represent four factors which are based on different genetic traits: general intelligence, specific mental endowments, creativity, and motivation. These factors are influenced by environmental aspects such as family, education, peers and society.

Family and higher education related elements of the research provide additional insights and describes the results of the Simulated Work Experience.

3. CASE SOLVERS' Skill Universe

The problem-solving skills can assess via the case method (Ábrahám, 2019). The case method as a teaching method has been the most widely applied and successful teaching instrument to come out of the Harvard Business School (HBS), and it is used today in almost all MBA and Executive Education courses there, as well as in hundreds of other top business schools around the world. Large corporations often apply the case method by assigning their own challenges in the form of a case which is to be solved by university students (Yannis, 2017).

Learners, the case solvers have to analyze and find the root cause of the described problem. Once all the key aspects of the phenomena are explored, they need to interpret their findings. Case-based business education has five key components: 1) abstraction, 2) roleplay, 3) collaboration and 4) time pressure, 5) ill-structured problem (see figure 1). Abstraction and role play allow the students to put themselves in the position of a decision maker, develop imagination and abstract thinking, while collaboration and time pressure enable them to develop their collaborative problem-solving skills under time constraints. These four factors together with the ill-structured problem describes the complexity of a case (Kardos and Smith, 1979; Ábrahám, 2019).

Case method is a problem-based teaching method which similarly to the work-based learning, links to the experiential learning theory. Thus, the Simulated Work Experience was based on the case method as the assessed skills were based on a business problem or case which was embedded into a real work environment. Different application formats of the case method such as case competitions, online case simulations, are closely linked to the main categories of WBL.

This problem solving skillset is called CASE SOLVERS' Skill Universe (See Figure 2). The Universe metaphor is correct as the whole problem solving skillset consists of skill categories and skills. The skill categories are called constellations, while the skills are considered as the stars of the Universe.

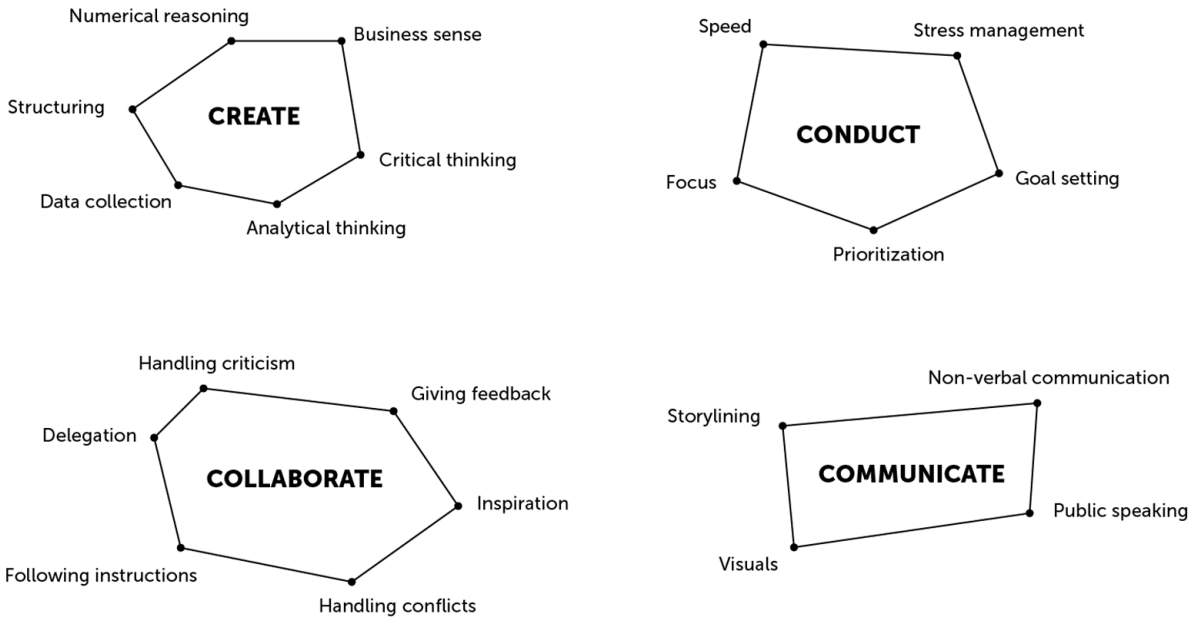

Fig. 2 Elements of CASE SOLVERS' Skill Universe
(figure courtesy of Ábrahám, 2019)

CASE SOLVERS' Skill Universe consists of 4 main constellations which was assessed through Simulated Work Experiences: *Create, Conduct, Collaborate* and *Communicate.* These skill categories are the four main success factors of case solving. Each constellation consists of skills which could be developed through the case solving activity. Individuals are *Creating* a solution by intellectually solving the case. As the working environment has changed dramatically in the past decades, knowing the right solution is not enough, students and employees should be able to work under time pressure with strict deadlines. *Conduct* refers to this aspect of problem-solving. In most of the cases, problem solving is not an individual activity, the case solvers need to *Collaborate* with others. This constellation covers all aspects of working with others. As the amount of information increased and the people's attention span decreased significantly, the right *Communication* became crucial in problem solving.

4. Model & methodology

The Simulated Work Experience-based competency mapping project was started in 2017 to provide a real, work-based online solution for case solving and competency mapping for the first-year students of the university. The simulation is focusing on the first-year students, since mapping the entry competencies of the freshers was an important objective behind the project.

As they solve the business case in the first month of their university studies, the impact of university is negligible, while the influence of the primary and secondary socialisation is clearly measurable.

The assessment tool is using the case method for skill mapping when it puts the students into a Simulated Work Experience. Tool is based on an ill-structured, real-life problem of a festival company; the students had to manage this project under time pressure.

The students had to solve the online case as part of their mandatory business economics class and were receiving scores based on their simulation performance. The primary learning objective for the students was to solve the main business case and give advice for a virtual client. The skills were assessed on the job.

The measured skills (see Table 1) are the elements of CASE SOLVERS' Skill Universe and were selected carefully in-line with the selected case study. Five measured skills - data collection, analytical thinking, structuring, business sense and numerical reasoning - are traditional problem-solving skills. Delegation is a control variable which is part of the Collaborate category within the universe. Storylining and Visuals are an essential part of the communication competencies and elements of the Communicate category.

Skill name	**Skill definition**
Data collection (DC)	The process of gathering and measuring information on targeted variables in an established system.
Analytical thinking (AT)	A step-by-step approach to thinking that allows individuals to break down complex problems into single and manageable components. Making up hypotheses and statements based on a set of information which then can be examined qualitatively and quantitatively.
Structuring (ST)	Arranging the collected data effectively in order to form an organized whole

Business sense (BS)	Keenness and quickness in understanding and dealing with a "business situation" using pre-gathered knowledge of facts and correspondences.
Numerical reasoning (NR)	Ability to deal with numbers quickly and accurately in order to evaluate a statement or hypothesis quantitatively. This contains questions that assess your knowledge of ratios, percentages, number sequences, data interpretation, financial analysis and currency conversion.
Delegation (D)	Delegation is the assignment of any responsibility or authority to another person to carry out specific activities. The key to successful delegation is identifying what, how and to whom to delegate.
Storylining (SL)	Lining of messages in logical order to make the entire story easy to grasp and understand while using only the relevant messages avoiding unnecessary noise.
Visuals (V)	An item of illustrative matter, such as a film, slide, or model, designed to supplement written or spoken information so that it can be understood more easily

Table 1 Definitions of measured skills
(table courtesy of Ábrahám, 2019)

The demographic data are self-declared by the students. The collected data may be grouped into two major categories: forces of socialisation, which describe the influence of family and education (see figure 3). Variables which describe the influence of the family are the number of siblings, parents educational background and other factors which describe the family, while the variables which are linked to the educational background are high school specialisation, languages, admission scores, form of studies and other factors which indicate the level of education provided by the highschool.

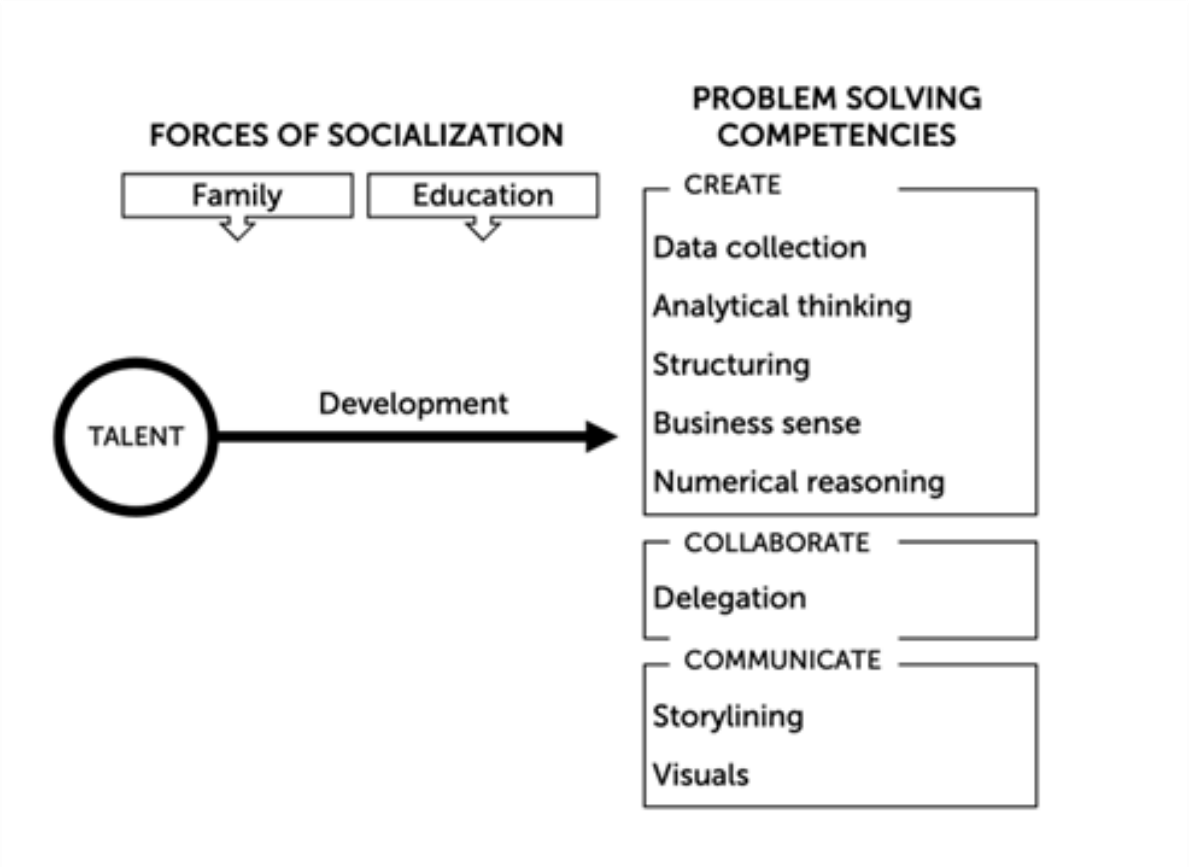

Fig. 3 Problem-solving clustering model
(figure by authors)

764 first-year students participated in the business economics course at the Faculty of Finance and Accountancy of Budapest Business School in 2020 fall. 71% of them, 546 people filled the anonymised demographic survey and participated in the research on a voluntary basis in-line with the ethical and GDPR rules and guidelines of the partner institutions. The dataset consists of 546 records and each record has 23 self-declared demographic data, 8 skill scores and the overall score. The 23 self reported demographic data are linked to the primary (family) and secondary (high school education) socialisation environment of the students.

5. Cluster analysis & results

There were three main goals of the cluster analysis. First, to determine the right clustering method, which provides a holistic understanding about the sample. Second, identify the main clusters based on the skill development performance of the students in order to recommend them different talent management strategies. Finally, the described clusters can provide a more

detailed context about competency and skill development linked to the different groups of students.

To determine the ideal number of clusters, we used the R package NbClust for most of the methods we tried. As the analysis was built on unsupervised machine learning, the quality of the selected method was based on the generally accepted metrics, such as Silhouette, connectivity and Dunn-index. The clustering method is ideal if the connectivity level is low as it means that the overlap between different clusters is low. High cohesion describes the homogeneity of a cluster, it shows that the records within a cluster are similar. Dunn-index describes the density and distance of clusters.

Several clustering methods and options were tested, including but not limited to: K-means, K-medoids, Hierarchical, Hierarchical K-means, Fuzzy, Model based, Density-based. The main metrics and indices used to determine the viable clustering methods were Dunn index, connectivity score, and average silhouette width along with the silhouette plot.

Clustering method	**Silhouette widths**			**Connectivity**	**Dunn-index**
	Min	Mean	Max		
(1)	-0.0527	0.2061	0.4442	181.3	0.1162
(2)	-0.3210	0.1763	0.5490	121.4	0.1239
(3)	-0.0639	0.2187	0.4579	101.7	0.0838

Table 2 Clustering evaluation metrics
(table by authors)

Table 2 shows the three methods with the best clustering results based on the selected clustering evaluation metrics: 1) Hierarchical K-means clustering excluding Overall score, 4 clusters, 2) Hierarchical clustering including Overall score, 4 clusters, 3) Hierarchical K-means clustering including Overall score, 3 clusters. After the comparison of clustering results with the demographic data the “Hierarchical K-means clustering including Overall score, 3 clusters” method was selected for cluster creation (see Figure 4).

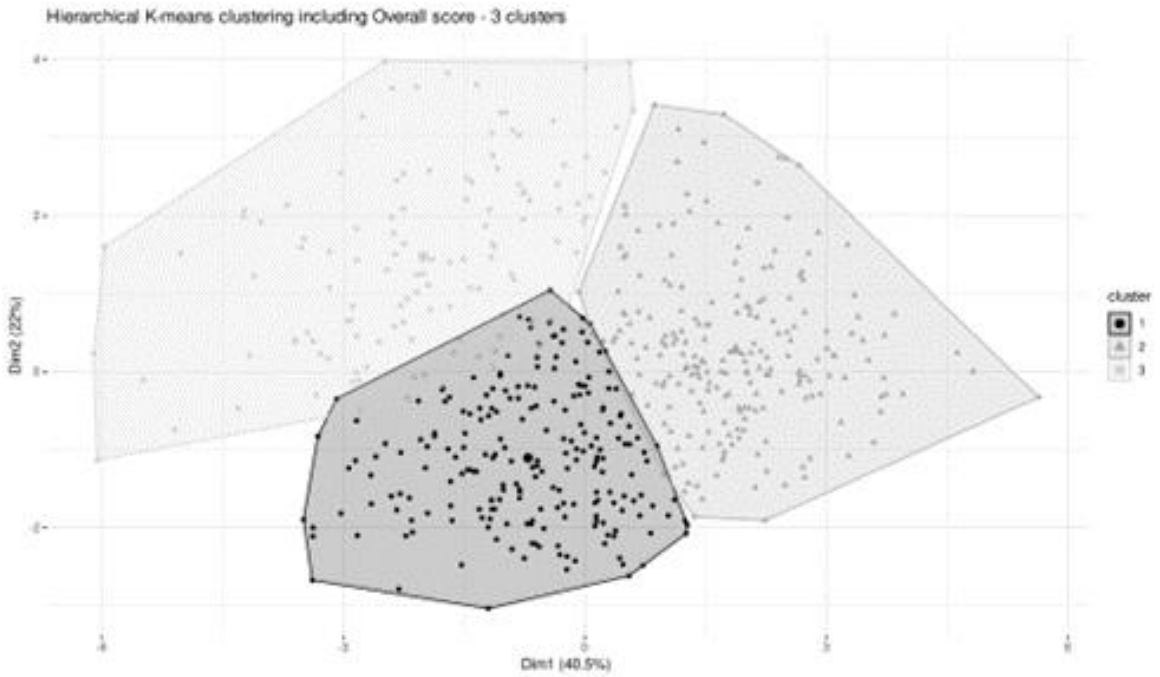

Fig. 4 Hierarchical K-means clustering including Overall score, 3 clusters
(figure by authors)

The cluster evaluation was based on the following metrics: silhouette, connectivity and Dunn-index. The resulting clusters are well-separated with high cohesion. The first clustering method (Hierarchical K-means clustering excluding Overall score) underperformed in each metrics, while the second and third had methods performed better in various metrics. The silhouette plots and connectivity scores showed that method (3) performs the best on the dataset. Although the compactness of the clusters is weaker in case of the third (Hierarchical K-means clustering including Overall score, 3 clusters) clustering method, low connectivity and wider cluster silhouettes are preferred over a higher Dunn-index in this case.

Cluster name	**Description**

The Laggers	This is a group of students with weak problem-solving and communication skills. The scores are the lowest in each skill category. Most of them are single kids with the lowest educational background of their parents. They ranked the highest the quality of their life and marked that they have a supportive family. This group has the highest proportion of paid students and they attended high schools with low expectations. They marked that they were attending extra classes in order to get better grades. They have the lowest application score in the sample.
The Unpolished Diamonds	Problem-solvers with strong delegation skills and diverse skillset. Relatively strong problem-solving skills with weak communication and structuring skills. Although they have an emotionally supporting family, the education is financially not supported. This group had the highest proportion of students whose studies are supported by the state. According to this cluster, their high school had medium expectations and quality requirements. They did not take any extra classes and did not participate in competitions. Besides these, they had relatively good scores at the application.
The Drivers	Good problem-solvers with good communication skills. They are relatively highly scored in each measured skill. Their parents are highly educated, their family is actively supporting them both in terms of emotional and financial support. Educationwise, they attended good high schools with high expectations from the teachers. They were the most active in competitions during their high school studies. The average application score of this group was the highest in the sample, 397 on average out of 500.

Table 3 Cluster descriptions

The three identified clusters (see Table 3) describe the problem-solving skills of the first year students at BBS. The best performing students (see Table 4) in The Drivers cluster represent 22% of the total records. The Unpolished Diamonds are the students with good problem-

solving skills but relatively weak communication skills. This group of students, which represent 39% of the total population, has significant potential in talent management. The Laggers are students, who have significantly lower problem-solving skills. They represent the 39% of the students who participated in the research.

Clusters	Overall	DC	BS	NR	AT	ST	D	SL	V
The Laggers	24.01	22.1	28.7	20.5	19.0	17.9	17.4	18.7	13.4
The Unpolished Diamonds	34.4	33.2	39.8	40.1	42.3	16.5	56.4	16.4	19.6
The Drivers	42.6	33.2	43.6	36.7	35.5	54.4	42.2	54.5	32.1

Table 4 Cluster centers[1]

Talent management is crucial for any educational institution for two main reasons. First, finding the top performers and providing them extracurricular activities in order to further increase their intellectual and practical performance. This group of students represents a pool which may have a significant impact on the institution's competitiveness. Secondly, students with lower performance require special talent management strategies which focus on the root cause of the low performance. With such talent management initiatives, the potential churn of these students can be avoided. Curriculum and course design have to take into consideration the main characteristics of the different learner groups.

Talent management strategies may be classified through two dimensions: direction of skill development and type of incentives. Upskilling may tend towards gap filling and talent management. Gap filling focuses on decreasing the difference between the required knowledge, competencies, skills and the actual performance, while talent management is building on the strengths of the students and its objective is to build additional skills and capabilities on top of the required ones.

The proposed talent management strategy matrix (see Figure 5) has four categories: 1) Extracurricular rewards, 2) Tutoring & catching up, 3) Perform-or-punish system, 4) Up-or-out system.

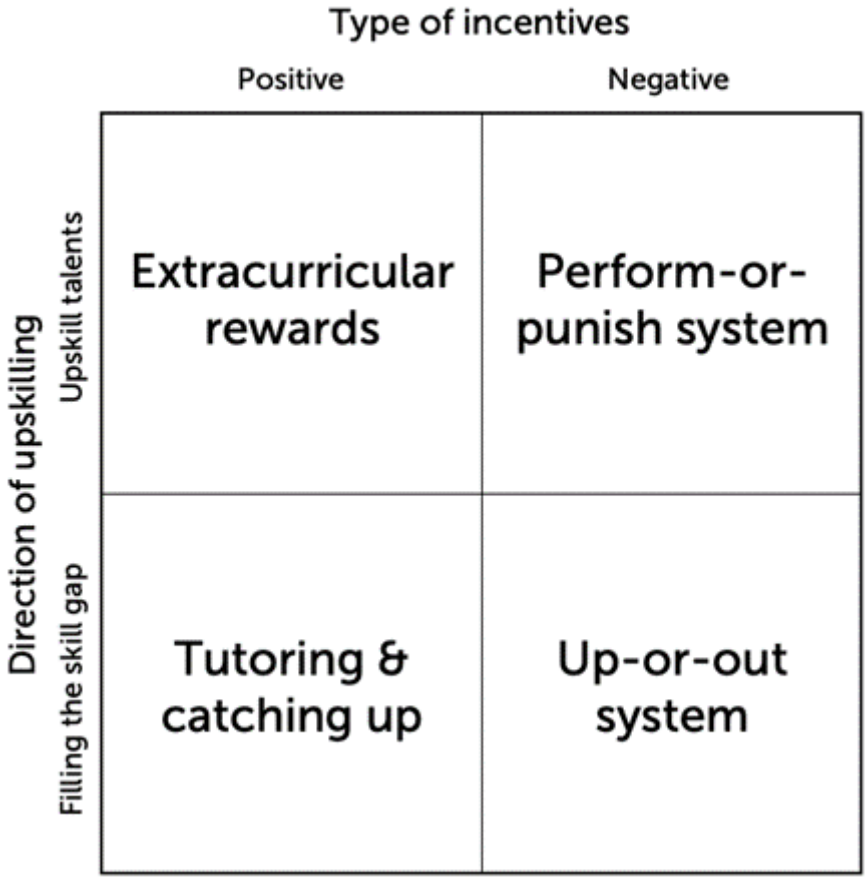

Fig. 5 Talent management strategies based on direction of upskilling and type of incentives (figure by authors)

Extracurricular rewards have numerous appearances, but the common denominator is the reward factor which is based on an extraordinary performance. This positive incentive can be built on both intrinsic and extrinsic motivation of students (deCharms, 1968; Lepper and Greene, 1978). *Intrinsically* motivated behaviors are defined as ones for which the reward is the satisfaction of performing the activity itself. Intrinsic motivation thus represents engagement in an activity for its own sake (Deci, 1971). *Extrinsically* motivated behaviors are performed to receive something from others or to avoid certain negative outcomes. It is

engaging in an activity to obtain an outcome that is separable from the activity itself (deCharms, 1968; Lepper & Greene, 1978). Motivation and the perception of reward differs from student to student, but there are initiatives which may trigger and fulfill the learning and development needs. Student competitions, scientific conferences as associations (see table 5) may build on both intrinsic and extrinsic motivation of the students.

Educational institutions, universities can provide an institutional reward system. Most universities are giving extra credits for the extracurricular activities (see Table 5) in order to promote them and motivate students to participate. Some of the extracurricular activities are financially supported by the business schools in the format of scholarships. This, Extracurricular rewards-based approached can applied in curriculum and course design, when the scoring system behind a course takes into account the students' performance on other WBL events such as student competitions, business projects and other formats.

Activities	**Description**
Case competitions	Case competitions are special forms of gamified learning platforms where students can learn about a company, develop their problem-solving skills, compete, and win special prizes. Students have to work in a team under time pressure and present their solutions about an ill-structured business problem for a professional jury (Ábrahám et al., 2021; Ábrahám et al., 2019; Corner et al., 2006; Maier-Lytle, 2010; Menna, 2010).
Student Scientific Conference	Scientific Conference which aims to develop the students' research and academic writing skills. Students are selecting a research topic and writing a scientific research paper for the Student Scientific Conference (Koloszár et al., 2021; Szabó, 2019; Szalmás, 2021, Czakó 2006).
College for Advanced Studies	College for Advanced Studies are special form of the informal education besides the university studies. These institutions are mainly built on three key pillars: professional work, community, and social responsibility. Students in their micro democratic communities are learn how to take responsibility, make decisions, strive for excellence, work and live together (Chikán and Ilyés, 2016)

Table 5 Extra-curricular activities to gain knowledge and develop problem-solving skills (table by authors)

Tutoring & catching up is a tool which may be used for filling the skill gap between The lagger and the median students. This is a positive incentive which is aiming to find the root cause of

the low performance. Personal mentoring may have different formats and settings depending on the development objectives and other infrastructural aspects. The root cause of low performance may be linked to various factors such as learning difficulties, lack of time, motivation, and different priorities of the students. A personal coach can help the students to explore and reflect on the problem. In case of first year students, an entry-level competency mapping can act as an early warning system in order to explore potential personal issues and prevent their escalation.

Tutoring and coaching can a separate module within the curriculum or integrated into a course. As tutoring and coaching requires significant additional time, the curriculum has to motivate the students with elective credit scores.

Perform-or punish systems are aiming to upskill talents through some negative incentives. As extracurricular activities are highly built on the individual's free will, these forms of incentives are limited. Negative consequences may be linked to the not appropriate behavior in extracurricular activities such as case competitions and conferences. Some universities developed a curriculum which is based on different tracks. These tracks collect courses which are interconnected and built on each other. The student’s access for tailor made extracurricular actions such as company visits or granted competition participation may depend on the course performance.

A more radical incentive is the *up-or-out system* which links low performance with some negative consequence. This approach is normally linked to a well measurable and comparable performance indicator such as GPA. In general, the up-or-out type of incentives has a grace period and different levels. The up-or-out can be for example about a student club membership, tuition, or the overall student status.

The elements of the talent management strategy matrix are constituting the talent management mix of an educational institution. These elements can complement and replace each other. Universities and other talent management institutions can decide about the different talent management incentives based on their strategic priorities. These strategies are deeply linked with the curriculum and course design. Universities have to motivate students for active participation and tailor their service portfolio to their specific needs. To activate students and maximize the learning experience, students have to be able to combine the core curriculum with the personalized talent management offering of the university.

6. Main conclusions

After analysing the competency and demographic data of 546 students, 3 clusters were identified based on 8 skills and the overall scores. The Laggers, The Unpolished Diamonds and The Drivers are three different groups which require different types of talent management services in order to maximize their talents. To find the best talent management mix, this paper recommends linking the output of competency mapping with the talent management initiatives.

In case of The Laggers, universities should fill the skill gap with a tutoring system, which can both help the lagger students to catch-up and reflect on the individual's needs. The tutoring services can be provided by the university as part of student services, or by other external parties, professional companies. The Laggers considered as the most sensitive target group. Student services, course instructors and career advisors have to recognize if someone struggles. Simulated Work Experiences can act as early warning systems to avoid drop out and provide instant insights and feedback to the students. This early warning system should be built into the whole curriculum and appear on a course level.

The Unpolished Diamonds are the hidden treasures of each educational institution. They are students who have strong cognitive capabilities but cannot utilize and/or express their full intellectual potential. Faculty members have a crucial role to identify the Unpolished Diamonds and show them examples and the potential development opportunities such as student associations and other extracurricular activities. Understanding existential and mental barriers of the students is the cornerstone in this case. Extracurricular rewards, tutoring or coaching may be the most adequate strategy for this student cluster.

The Drivers are the top performing students of the business school, thus the universities should offer extracurricular activities to them as soon as possible. As these students are consciously seeking the opportunities, the university has to become a first mover who offers extracurricular activities to them. As fresh students they need to be informed about the extracurricular services of the educational institution. The Drivers are the target group of different student communities such as College for Advanced Studies where they can grow and develop as a business professional. Through these student communities, universities can provide additional services which prepare them for (case) competitions and student scientific conferences. In terms of the

formal curriculum, special courses with limited number of selected participants can provide additional preparation and learning experience to this group.

Negative incentives in talent management should be treated with caution. Their application should be limited into specific, extraordinary cases and these incentives should provide enough room and time to change the behavior and foster the learning and development objectives of the individual.

Besides the personal development and maximization of the students' intellectual potential, there are further benefits of using competency mapping consciously in any kind of business school. Competency mapping and a well-balanced talent management mix increases the market value of graduate students on the job market. The competency mapping can be linked with the recruitment funnel of companies who are seeking for talents. The tailor-made talent management mix can improve the retention and talent attraction to the graduate and post graduate programs offered by the business schools.

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[1] DC: data collection; BS: business sense; NR: numerical reasoning; AT: analytical thinking; ST: structuring; D: delegation; SL: storylining; V: visuals.

4.3. Application of case method in the Hungarian public education

Title	Application of case method in the Hungarian public education
Authors:	Zsolt Ábrahám - Domonkos Erőss
Journal:	Educatio
Status:	Published

Abstract

The paper reviews the application of the case method in Hungarian public education through a specific framework. The research answers two key research questions: first, which subjects in the national curriculum can adopt the case method, and second, how can this adaptation of the new teaching methodology be implemented in Hungary? Six subjects or groups of subjects were studied using the evaluation framework containing seven assessment criteria. Hungarian literature, history, geography and the so called value-based subjects (ethics or divinity and ethics) are the most suitable for the application of the case method in public education

Keywords:
case method, public education, case-based education

Introduction

The case method was first used at Harvard University's Faculty of Law, and after the founding of the Harvard Business School in 1908, it began its conquering journey. In the past century, the method has been integrated into the world's most prestigious business courses, and it has also been adopted by other fields, such as medical, civil service, legal, and psychological courses. The educational relevance of the method can be considered relevant from two points of view. On the one hand, the digital possibilities of education necessarily induce changes in public education as well, so the methodological review of current education curricula has become relevant. On the other hand, in recent years, in addition to the development of subject knowledge, the development of students' problem-solving skills, which is one of the focal points of the case method, has emerged as a growing need from the direction of the labor market, education policy, and higher education.

The purpose of the study is to examine the applicability of the case study method in Hungarian public education through an evaluation framework developed by the authors. Accordingly, it seeks answers to two questions: firstly, in which of the subjects taught in primary and secondary education can the case study method be effectively applied, and secondly, how can case-based education be introduced into domestic primary and secondary education.

The study first presents and summarizes the most important features and peculiarities of the case method, and then examines its application possibilities in Hungarian public education. Finally, it also describes two possible ways to apply the methodology in education.

Overview of case method

Definitions, groupings and roles

Definition of terms such as case study and case study method is necessary to present the case study methodology.

To define a case study, we use Harvard Business School's definition as a basis, according to which "a case study is an educational tool that introduces students to a critical management problem and provides a springboard for classroom discussions in which participants present and defend their analysis and solution." (Harvard Business School 2019)

According to Ábrahám and his co-authors (2021), when grouping case studies, the problem to be processed can be a kind of starting point, the cases should be grouped based on the type of problem, its structure, and the accuracy of the questioning. In relation to the type of problem, company-wide and functional problems can be separated, while the structuredness should be examined along the lines of well- and poorly structured problem types introduced by Bartee (1973). In the case of well-structured problems, the possible solution paths are known, while in the case of poorly structured problems, the complexity of the problem and the quantity and quality of available information make the problem-solving process difficult. During the examination of questioning, we can distinguish between case studies with explicit questions and those where there is no specific question and the problem-solving process begins with the identification of the problem and the discovery of the fundamental causes (Ábrahám–Czakó–Kozma 2021).

The case study method is a teaching method in which the learned concepts are transferred partially or entirely through case studies. According to Argyris (1980), the method is made

unique by the importance of the processed problem, the involvement of the students, the minimal participation of the lecturers, the free clash of opinions, and the drama related to the given question or problem. The methodology can therefore be applied to virtually any problem area.

The case study methodology can be used in many forms. These include, for example, the discussion of a summary of the solution to a specific problem area, the joint solution of a case study written with a focus on a problem, or the deep analysis of a poorly structured problem based on data and the preparation of its solution. The use of different forms depends on the purpose and characteristics of the topic to be processed.

Compared to the traditional form of education, an important feature of the case study method is the special role of the instructor and the student. In contrast to traditional forms of education, the case study method relies heavily on the involvement of students and the teacher is not the sole possessor of knowledge. Dooley and Skinner (1977) examined the case study method from the perspective of different pedagogical approaches and educational goals, during which they distinguished four teacher roles: 1) facilitator, 2) questioner, summarizer, 3) manager, 4) lecturer. In practice, these roles are constantly changing, the instructor assumes all four roles within an hour. The main difference compared to the classical teaching role can be summarized as, while in that the teacher primarily imparts knowledge, the case study methodology teacher facilitates the active learning process.

The role of students is also different from the classic role. In the classic student role, the preparation for the class is usually spent acquiring lexical knowledge and homework from the previous course material, while in case of the case study methodology, the students primarily deal with problem solving, solve the case study in preparation for the given class, and, where appropriate, also do group work (Ivey Business School 2022, Buzady 2017).

Efficiency of the method

The efficiency and effectiveness of the case study methodology as an educational methodology can be examined in several ways. On the one hand, by examining the careers of students who graduated from institutions that use the method, and on the other hand, by examining the effect of the method on learning, learning outcomes and satisfaction.

Many studies have been conducted on the effectiveness of the case study methodology (Krupat el al. 2015; Bonney 2015; Reed-Brunson 2018). According to the research of Krupat and his co-authors (2015), the results of the final exam of the students studying with the case study method were not significantly better than those of the students in the control group, but at the same time, the performance of the students who previously performed below the class median improved significantly. The students rated the method as experiential and were more satisfied with the lesson than their peers in the control group. The research also confirmed that the smaller the work was done in groups, the more active the students were.

The evaluation framework of the case method

The case study method appeared in Hungary in the 1990s, for the first time in business training (Ábrahám–Czakó–Kozma 2021). In the last decade, the number of business case study competitions has increased significantly (Ábrahám et al. 2018), adding that most of them are aimed at students participating in higher education. At the same time, Case Solvers[1] has been continuously organizing historical and business-themed case study competitions for high school students since 2014. The professional career of students participating in international case study competitions is significantly helped by participation in competitions (Ábrahám–Czakó–Kozma 2021; Damnjanovic–Mijatovic 2017; Damnjanovic–Proud–Milosavljevic 2021).

Table 1: Dimensions and criteria of the evaluation framework

Category	Criteria	Description
Class dimension	*Problem-based (P)*	During the discussion of the lesson material, a poorly structured problem can be identified, through the processing of which the students master the theoretical material related to the topic.
	Compleyity (C)	The problem at the center of the case study is sufficiently complex and can be broken down into sub-problems.
	Information (I)	The case study presenting the topic of the lesson contains relevant information of the right amount and quality for problem solving.
	Decision-based (D)	A decision-making situation and the decision-maker related to the given situation can be clearly identified in connection with the class case study.
Subject dimension	*Difficulty (N)*	The difficulty of mastering the course material related to the subject. The more difficult a course material is, the more the case method supports students' learning.
	Suze (M)	The size of the curriculum defined in the framework curriculum. The more knowledge the students have to acquire within the subject, the more difficult it is to apply the case study method within the framework of the given subject, since the instructor is obliged to transfer a large amount of lexical knowledge.
	Objectivity (O)	Subject objectivity means the weight of subjective, value-based factors related to the subject. The more objective a subject is, the less relevance the use of the case study method has, since problem solving based on different opinions cannot prevail.

During our research work based on document analysis, we reviewed the goals and content elements designated by the 2020 NAT framework curricula, and then selected the subjects that form the basis of our investigation. When defining the list of subjects that forms the basis of the analysis and evaluation, we kept two aspects in mind. On the one hand, the subjects appearing in the assessment should accompany the entire public education, and on the other hand, some problem-solving process should be connected to the selected subjects. Based on all of this, the basis of our study was Hungarian literature, mathematics, history, geography, natural science subjects (biology, chemistry, physics), as well as value-based subjects (religion, morals, ethics). The authors of this study evaluated each subject on a scale of 1-5 based on the criteria defined in the evaluation framework. The obtained point values are the arithmetic average of the points given by the evaluators. During the evaluation of the subjects, history, geography, and value-based subjects received the highest score in relation to the applicability of the case study method, where the method can be applied almost entirely. It can be partially used for literature, while the method cannot be used for natural science subjects, biology, chemistry and physics, as well as mathematics. The results of the evaluation are summarized in Table 2.

Table 2: Applicability of the case study method in the case of individual subjects

Subject	**Class dimension**				**Subject dimension**			**Total**
	P	**K**	**I**	**D**	**N**	**M**	**O**	
History	5	5	5	5	4	1	4	**29**
Geography	4	5	5	5	4	3	3	**29**
Value-based subjects	5	5	3	5	2	4	5	**29**

Natural science subjects	5	5	4	1	5	3	1	**24**
Hungarian literature	4	5	4	3	4	1	5	**26**
Maths	5	5	5	1	4	1	1	**22**

Note: P=Problem-based, K=Complexity, I=Information; D=Decision-based, N=Difficulty, M=Size, O=Objectivity

History can prove to be a very good field of application. Historical leaders typically find themselves faced with poorly structured problems that can be broken down into subproblems. Sufficient information is available thanks to extensive historical works and textbooks, and it is possible to choose from a number of tough decision situations. Active learning can help students memorize, but the large amount of course material can challenge teachers to find time to use case studies.

Similarly to the history subject, poorly structured problems can be identified in the geography curriculum, and in many cases these questions strongly resemble classical business case-solving, in which national economic decisions are often processed with case studies.

The ethical and philosophical questions of value-based subjects also offer good material for the application of case studies. The discussion of these questions is by definition an interactive process, which the curriculum can support with the knowledge material of the given ethical, religious or moral trend.

In the case of literature, recognition of the context and the narrative of the author and the reader play a prominent role. Since an important part of Hungarian literature education is the analysis of literary works and their placement in a historical context, certain topics and problems can be investigated using the tools of the case study method. If we look at literary works, poems, short stories, and novels as a kind of case study, and build questions and tasks around a problem defined in relation to the works, then the method can be partially applied in the field of literature education.

Mathematics at the level of public education consists of well-structured problems that can be broken down into smaller units and solved using some mathematical operation. However, due to the nature of the decision-making situation and the nature of the subject, it is not possible to clash different opinions during problem solving. Although students often use the mathematical tool system during case solving to support their analysis and proposed solution, the case study method cannot be used in mathematics education due to the lack of a decision-making situation.

In the case of natural science subjects, i.e. biology, physics and chemistry, we came to the conclusion that the method is not, or only limited, applicable, since the teaching material defined in the curriculum is based on specific, well-defined problems.

Based on all of this, it can be concluded that during the teaching of Hungarian history, geography, and value-based subjects, there are problem- and decision-based situations on which the case study method can be successfully built. In the future, the presented model can be further expanded with new criteria and categories, as well as with all the subjects belonging to the framework curriculum.

Opportunities in Hungarian public education

For the widespread dissemination and successful implementation of the case study methodology, the current Hungarian educational structure needs to be transformed at many points. During our research, we collected the steps necessary for the introduction and based on these, we identified two different scenarios. The two scenarios build on each other and complement each other.

Partial introduction

The partial introduction means the introduction of certain elements of the case study methodology into public education, primarily focusing on three areas: group work, problem solving and presentation. Of course, these methods are already partly part of Hungarian education, but they are not its structural basis. The different lessons, especially in elementary school and high school, are mainly about the teachers' transfer of knowledge and the assessment of students' lexical knowledge. The introduction of these elements can be implemented with minimal curriculum changes and training.

Complete transformation

Under the full transformation, we mean the full introduction of the case study methodology into Hungarian public education and certain areas of it. This requires the development of case studies prepared for specific areas, a significant curriculum transformation and training. It is advisable to start the introduction with the most relevant subjects (Hungarian literature, history, value-based subjects).

A broad survey of application areas and gaps is first essential for implementation. To do this, on the one hand, the current situation must be explored with the help of in-depth interviews, quantitative analyzes and international best practices, and on the other hand, the national framework curriculum must be reviewed in sufficient depth - i.e. further refining the evaluation criteria system presented in the current study - from the point of view of the applicability of introducing the case study methodology. After that, with the involvement of critical external experts and teachers, the case study methodology could be incorporated into the framework curriculum, the case studies and the detailed implementation plan could be prepared. For a full-scale implementation, it is also necessary to define the goals, continuously measure the results and continuously improve the program.

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[1] Case Solvers is a startup company founded in 2012, which aims to train and develop problem solving through the case method (see www.case-solvers.com for more details).

5. SUMMARY AND CONCLUSIONS

The following chapter summarizes the answers to the research questions, as well as their relationship with the articles that form the background of my article-based dissertation. With the help of the article-based dissertation format, during the preparation and writing of the articles, as well as the feedback process, I had the opportunity to constantly reflect on the research questions and the results obtained. I present the main conclusions related to the article-based dissertation in the following parts of this chapter.

5.1. Conclusion of the research

My doctoral dissertation and the related research significantly contribute to the higher education, scientific community, students and employees, as well as employers regarding the relationship between skills development and the case method. The article-based doctoral dissertation, examined the application of the case method in the field of skills development. The main question of the research sought to answer "*What are the application forms of the case method in the field of skills development?".*

The introductory article of my article-based dissertation written jointly with Erzsébet Czakó and Miklós Kozma, "*Top of the pyramid? Case-based education and case competitions*" seeks to answer the question, "*How do case-based education and international case competitions contribute to skills development?*" The key question of the second article, entitled "*Mapping problem-solving competence and talent management strategies for universities*", is "*How can the case method be applied in the field of skill mapping and student talent management?*" The third article of my dissertation, which is entitled "*Application of case method in the Hungarian public education*", revolved around the question "*What are the potential applications of the case method in Hungarian primary and secondary public education?*" The article-based dissertation and the research behind has the following nine key findings:

Finding #1: Historical development and evolution of case method

The case method stands on the solid philosophical foundations of the American pragmatism. Until now, the case method had six phases (Ábrahám, 2023) - (1.) philosophical foundations, (2.) birth of a teaching method, (3.) early years of Harvard Business School, (4.) expansion of

the case method, (5.) the new era of business schools and (6) outside the classroom. - of development.

Finding #2: Nowadays a case ecosystem has developed

Today there is a case ecosystem that is an educational ecosystem with its own stakeholders, learning community and interactions and interdependencies between the actors (Ábrahám, 2023).

Finding #3: Case method map to illustrate the main application forms of case method

The case method has four main application forms based on the learning environment and outcomes. Case discussions are the traditional classroom based format of case processing, while case assignments are normally linked to the presentation format. Extracurricular case discussions are the non-classroom formats of case solving, while case competitions are case presentation-based contests where students are competing with each other.

Finding #4: Case instructors, talents and the companies are the drivers in case-based business education

The introduction of case-based education at Corvinus University of Budapest was driven by those lecturers, who met with the case method outside Hungary (Ábrahám, Czakó and Kozma, 2021). They built case-based education in the form of case-based courses (Dooley and Skinner, 1977). Talents who were willing to take extra efforts were pulling the system together with the companies who started to recruit the top performer students.

Finding #5: The case competitions are becoming more complex and aiming to simulate real business problems

The case studies of the Business Economics Pyramid and the Central European Case Competition show that the complexity of case competitions is increasing as there are more multiformat competitions, which are dealing with live cases. Teams should adapt to these trends, thus they need more flexibility in terms of background knowledge and case-solving skills (Ábrahám, Czakó and Kozma, 2021).

Finding #6: Students can acquire new knowledge and can develop their problem-solving skills through case solving

Case solver students can acquire new problem-, functional area-, company-, industry- and country- specific knowledge through a case study. They can develop 21 skills during case solving. These skills can be organized in four categories: problem solving (*create*), project management (*conduct*), collaboration (*collaborate*) and communication (*communicate*) (Ábrahám, 2019; Ábrahám et al. 2023).

Finding #7: The case-based assessment identified four different talent management for universities

Four different talent management can be outlined based on the type of incentives and direction of upskilling. Extracurricular rewards are upskilling talents and give positive incentives to them. Tutoring and catching up is also a positive incentive to fill the skill gap. Perform-or-punish and up-or-out systems are mainly dealing with negative incentives for the students (Ábrahám et al. 2023).

Finding #8: Class and subject based criteria system can evaluate the applicability of the case method

There is an evaluation system which can assess the applicability of case method in primary and secondary public education. The framework has seven evaluation criteria (Problem-based, Complexity, Information; Decision-based, Difficulty, Size, Objectivity) which can be organized into class and subject categories (Ábrahám and Erőss, 2022).

Finding #9: History, geography and the value-based subjects fit the best to the case method in primary and secondary public education.

Based on the defined evaluation framework, history, geography and value-based subjects got the highest scores (29-29-29 scores), while mathematics and science the lowest (22 and 24 scores) (Ábrahám and Erőss, 2022).

Figure 16 illustrates the summary and conclusions of the research through the nine key findings.

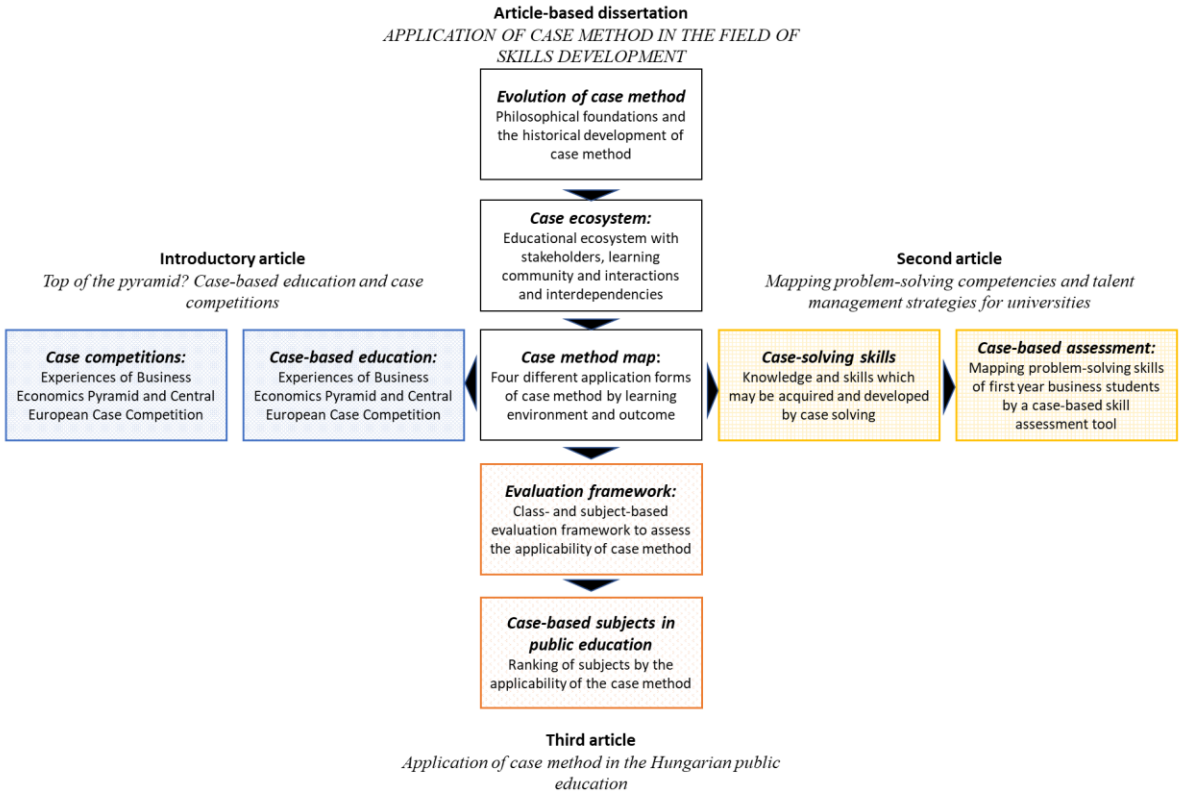

Figure 16: Summary and conclusion of the research
Source: Author's compilation

5.2. Scientific contribution

My PhD research's scientific contributions has two layers (see Figure 16.). First, the research and the article-based dissertation in general provides a general framework (definitions, form of application, skills to develop through case method) for understanding the relationship between skills development and business education. The dissertation provided a historical overview (6 phases of development) of the case method and introduced the concept of the case ecosystem. As a second dimension it presented the current state of the European Competency and Qualification Frameworks and linked it with the case solving skills.

The second layer of the dissertation's scientific contribution are made by the articles behind this paper-based dissertation. Each article had its own research questions and research methodology. The questions and methodology behind the papers were carefully designed and selected to provide a comprehensive investigation of the main, pre-defined research question.

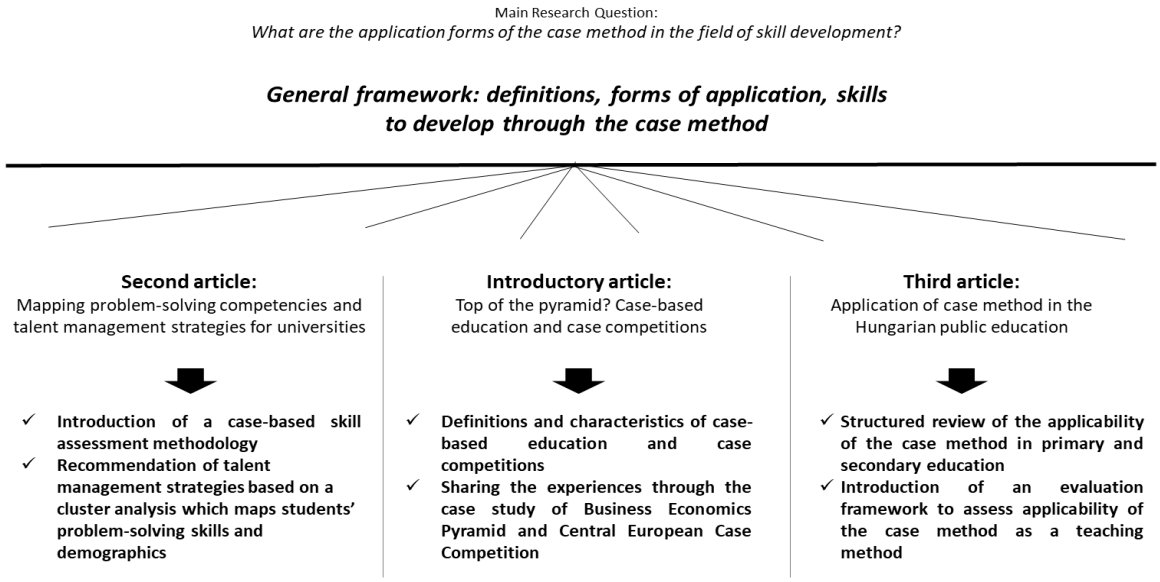

Figure 17: Contribution to scientific community
Source: Author's compilation

The introductory article contributes to the scientific community in two ways. First, the presented general definition and theoretical framework adequately introduces and organizes the most important concepts related to the case method, and on the other hand, it summarizes the experiences related to international case competitions through the case study of the Business Economics Pyramid. It gives a summary about domestic and international best practices for talent management specialists, educators and case competition advisors.

The second article was using a case-based online simulation to map and assess the problem-solving skills of first year students at the Budapest Business School. The article has significant contributions in three main areas. First, the online case-based skill assessment is a novel tool in both the scientific and teaching community. Secondly, the talent clusters that were created based on the measure problem-solving skills and the students' demographic characteristics, can be the bases of further research in this field. Lastly, the identified talent management strategies can contribute to the development of business education in the direction of quality and personalized development of the curriculum.

The third article of the dissertation has significant value for the scientific community by investigating the relationship between public education and skills development, as well as for teachers working in primary and secondary education. On the one hand, it proposes the application possibilities of the case study method along the subjects included in the National

Core Curriculum, and on the other hand, it makes recommendations to policy makers for the partial and full introduction of the case method as a secondary school teaching method.

5.3. Further research directions

During my research work in recent years, I have investigated several topics related to the case method. Among these topics there are currently three key areas that are connected to additional research and publication activities which are not covered by this dissertation. My other research activities related to the research topic are summarized in Table 11.

Research topic	**Introduction of research activity**
Evolution of the case method and the operation of case ecosystems	The research reviews the philosophical foundations and evolution of the case method and is based on the processing of international academic literature. The paper will examine two research questions: 1. How has the case method developed over the past 100 years? 2. Can case-based business education be considered as an educational ecosystem? Planned delivery of the publication related to the research: 2023 fall
Advisors' Café: the perspective of the competition advisors	Since 2019, Case Solvers and Corvinus University of Budapest have organized the Central European Case Competition, an international, invitation-only case competition. The competition is attended by international teams from business schools that use the case method and have an extensive international case competition track record. The research elaborates the results of the workshops based on the word café methodology that have been organized 5 times at the CECC international competitions since 2019. Planned delivery of the publication related to the research: 2024
The appearance of case method in external communications of business schools	The planned research examines the appearance of the case method in the external communication of business schools. The first round of consultations related to the research has started with the Future of Higher Education Research Center at the Budapest Business School. Planned delivery of the publication related to the research: 2024

Table 11: Additional research activities related to the research topic
Source: Author's compilation

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