Eszterházy Károly Catholic University

Doctoral School of Educational Sciences

Olga Csillik

Applying the ecosytem model for understanding teacher efficiency

Summary of Doctoral (PhD) Thesis

Supervisors: Dr. habil. Iván Falus DSc

Dr. Éva Bodnár PhD

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Topic and structure of the dissertation

The aim of my dissertation is to examine the problem of teacher effectiveness by developing an analytical framework for a seemingly simple question, and to try to consider the teacher in higher education as part of an ecosystem: to define the system in which it is worth thinking about his or her effectiveness, and to explore the expectations and demands that the actors of this ecosystem have of him or her. Thus, my aim is to explore the context-dependent criteria of effectiveness of the university educator and thus to develop an analytical framework that can help the thinking of educators, institutions and administrators.

The dissertation is divided into two parts: the first part (chapters 1-3) serves to explore the literature, and in the second part (chapter 4) I set up an ecosystem model and through it I try to identify the criteria of an effective university educator in that ecosystem.

Thus, in Chapter 1, I will examine the concept of effectiveness or pedagogical effectiveness in general in order to clarify the complexity and context-dependence of the concept and to provide a clear conceptual framework for empirical research.

In Chapter 2, I present the results of studies on effective teachers - distinguishing between studies in public and higher education, highlighting differences between teachers' and students' perceptions, and presenting the methods and teaching strategies that have been found to be effective in empirical studies. I then (in Chapter 3) review the context and environment in which we can think about effectiveness in the world of education. For this, I draw on the ecosystem model. After describing the actors in the model and the relationships between them, I describe the ecosystem models that have emerged in relation to education and higher education and that help to make sense of the current status of universities in relation to the economy and politics. I will select the one that is best suited to be used to explore the characteristics of an effective teacher in a particular institution and identify the elements of the model that will be the focus of the analysis of this subfield.

In Chapter 4, I will explore the elements that might constitute this ecosystem through a concrete example, the Corvinus University of Budapest. For me, the question of whether or not we can formulate expected teacher characteristics based on the presentation of the different parts of the ecosystem was a very interesting one. Can environmental factors, institutional characteristics, provide sufficient input to the image of an effective teacher or not? Can we formulate a picture of an effective teacher after all this or not? Thus, in my thesis, I considered it very important, after having explored the literature, to present in detail the environmental factors, because my hypothesis is that they determine the image of an effective teacher at least as much as the institutional expectations. Also in Chapter 4 we present our research on effective teachers, where we seek to answer the following research questions:

- What qualities do students consider important for an effective teacher to have?
- Do students on different types of courses think differently about what makes an effective teacher? Does their gender influence their perception?
- Do lecturers of different types of courses think differently about effective teachers?

The study uses quantitative (questionnaire, Q-sorting) and qualitative (structured interview with reflection map, associative group analysis) methods.

The study was conducted in traditional, methodologically innovative, training-like, flipped classroom, blended and online courses.

My thesis is thus an experiment on whether or not the ecosystem model can or should be used in thinking about teacher effectiveness. I am not concerned with measuring teacher effectiveness and efficiency, nor do I aim to examine what makes one teacher more effective than another. I am merely trying to explore what seems to be effective in today's university, for today's Generation Z students, based on the opinions identified in the studies and the expectations and needs of the ecosystem stakeholders.

Theoretical foundations, directions and main concepts of the problem under study

Efficiency

The concept of efficiency is mainly understood and defined in economics, but it is also used in many other fields, including education. From an economic point of view, it can be understood at the level of the individual/economic agent, or at the level of an institution, community (group) or society. It is a relative concept, not an absolute concept of efficiency.

The concept of efficiency is understood by all disciplines as the achievement of maximum results with limited resources. In economics, technical efficiency is understood in terms of the firm production function. In the analysis of the economics of education, the aggregate production function can also be written up for education. It can be used to interpret the factors and resources that contribute to the output of education. It is estimated systematically using the results of available empirical studies.

Different types of efficiency can also be interpreted and estimated in the context of education, depending on the focus of the analysis, the limiting factor and the target variable (Salerno, 2003). Thus, we can talk about technical efficiency, cost efficiency, economic efficiency and efficiency of teaching-learning processes.

When analysing educational efficiency, the focus is on knowledge capital, and at the centre of examination the focus is on how the factors that determine the formation of knowledge capital determine individual capabilities and the differences in these capabilities. In addition to the quantity of factors, there is a growing focus on quality (Hanuschek & Woessmann, 2015), and one focus of research is on the teacher, the role of the teacher, and teacher effectiveness. The rise of a management approach to higher education is increasingly concentrating on the issues of effectiveness and quality, forcing universities to create their own understanding of effectiveness (often by rethinking how they have operated in the past).

The effective teacher

In this paper, we reviewed research on effective teachers (in general, in public education, in higher education, separating studies of students and teachers). The results suggest four categories of characteristics of an effective teacher: subject knowledge, pedagogical knowledge, methodological knowledge, personality traits. Subject knowledge is the knowledge provided by the subject area. Pedagogical knowledge includes all that is taught in psychology and pedagogy courses at universities and colleges (Falus & Orgoványi-Gajdos, 2021). The category of technological knowledge includes knowledge about traditional teaching tools such as books, chalk and

blackboard, and more advanced technologies such as digital tools and technologies (Mishra & Koehler, 2006). In the literature on effective teachers, the teacher's personality is emphasized as a determining factor, "the teacher's personality and basic personality traits have always been considered of great importance" (Falus & Orgoványi-Gajdos, 2021). We have therefore added the category of personality traits to these three knowledge domains.

An important finding of the review of theories on effectiveness and studies on effective and good teachers was that it is not possible or worthwhile to interpret the issue of effective teachers in isolation, since effectiveness is context-dependent: the way it is thought about is determined by the context. As the context changes, the ideas about what makes an effective teacher need to evolve. However, we have found that studies fail to define this context, and that research on effectiveness often does not examine the issue in a complex way, but only focuses on a single phenomenon (e.g. students' perceptions of effective teachers). Thus, we have attempted to develop an analytical framework for this issue, to examine the problem of teacher effectiveness, and to try to see the teacher in higher education as part of an ecosystem: to define the system in which it is worth thinking about his or her effectiveness, and to explore the expectations and demands that the actors in this ecosystem have of him or her.

Ecosystem

The concept of ecosystem, which has spread from the field of biology, was first used by botanist Arthur G. Tansley in 1935 (Cameron, 2019). In his interpretation, an ecosystem is a unit of nature that connects a living community to its environment or habitat. An ecosystem is therefore a system of interconnected, cooperating, co-evolving organisms in a given environment. There is a multi-directional cooperation between the participants that implies a common purpose. One of the key drivers of their development can be the intention to achieve this goal (Granstrand, Holgersson, 2020.) In terms of forms, cooperation can be individual, group, institutional, sectoral, regional, national and international (Inzelt, 2004).

Educational ecosystem

An educational ecosystem is a living system that can ensure high quality learning, that functions effectively when it is based on mutual trust, i.e. when there is a shared value or norm that all partners understand and accept. All parts of the ecosystem: policy makers, managers of educational institutions, teachers and other participants in the education system must interact and support each other. Learner-centred thinking is also reflected in the context of educational ecosystems, clarifying the concept as learning ecosystems. In this way, it is emphasized that in this type of system, learner autonomy, adaptation to individual differences and customization prevail rather than strict control (Atif, Bard & Maamar, 2010).

Educational ecosystems are composed of living and non-living components. The non-living components include formal and informal learning environments, infrastructure, technology, learning tools and books (Zhao & Frank, 2003). Teachers, students and parents are important living entities in the school, interacting in the system and responsible for their actions and knowledge construction (Keiny, 2002). Transformations and changes in one part of the ecosystem have effects on the other parts. For example, the way a teacher teaches affects the way students learn and work.

All educational ecosystem models view educational institutions as members of a complex system, deeply embedded in the environment. Consequently, the educational ecosystem is particularly affected by social processes. When changes occur in society, such as migration in and out of

society, an ageing population or the emergence of new technologies and new types of jobs, the system needs to be able to adapt to change and to accommodate overall ecosystem reforms. This also means, among other things, that education must adapt to the current and future needs of students (Bovill & Bulley, 2011).

Universities are also part of an ecosystem. In order to explore the components of this ecosystem, it is necessary to consider the role of universities and to take into account the context of the institution, i.e. where it is located in the network and what role it plays in the ecosystem (Király, 2019).

The ecosystem of Corvinus University of Budapest

The starting point for our modelling was the assumption that we can define the ecosystem of the Corvinus University of Budapest, its actors, the relationship between them, and that based on the description of the actors we can formulate the characteristics of an effective teacher in each case, and that the sum of these characteristics, when stacked on top of each other, will give a complex and coherent picture of an effective teacher, which reveals more about how a teacher can be effective in a given institution rather than only considering the needs of individual segments.

The macro level is represented by the different subsystems of education, which are linked to overarching national strategies such as national curricula and assessment systems, and strategies for public education, higher education and lifelong learning, which include the understanding of knowledge and learning. They also provide teachers with pedagogical, methodological and technological recommendations and support.

The effective functioning of the macro-level requires flexible cooperation between sub-systems, a smooth flow of information and the existence of comprehensive national strategies that are agreed and seen as legitimate by all actors and that provide a common basis for action.

By the meso-level of the education ecosystem, we also mean the sub-systems, i.e. organizations and institutions (schools and universities), operating at the macro-level, with their own structures, cultures and forms of governance. At the meso-level of the ecosystem, the non-living components include infrastructure, technology, books (Zhao & Frank, 2003), and the multifaceted formal and informal learning environment and context (Barron, 2004). Teachers and students are important living entities in educational institutions, interacting with each other and with other components of the ecosystem, and are responsible for their actions and knowledge construction. Transformations and changes in one part of the ecosystem have an impact on the other parts.

Learning can be understood at the micro level of the ecosystem, i.e. at the level of individuals (students and teachers). This is represented by the life experiences of individuals, their individual differences and their learning histories, and on the learner side, non-formal education is also an important part of this. The extent to which learners can access and progress in the education system, i.e. the effectiveness of the micro-level ecosystem, depends not only on them, but also on how the learning environment supports learning.

In this dissertation, we have attempted to fit this three-level ecosystem model to the Corvinus University of Budapest, to identify the actors at each level, the relationship between them, and to

formulate the characteristics of teacher effectiveness that may result from the actors' expectations and needs.

In our interpretation, the macro-level of the ecosystem of Corvinus University of Budapest, the broadest environment, is represented by:

- labour market expectations,
- trends that determine the functioning of higher education,
- thinking about knowledge and learning
- demographic environment,
- generational characteristics of learners,
- all of these are reflected in the overall national strategies, which in our case is *Fokozatváltás a felsőoktatásban*.

As we can see, at the macro level, we find abiotic actors according to Reyna's (2011) interpretation.

In the context of labour market expectations, we have reviewed studies of employers and employees by major organizations such as OECD, World Economic Forum, ManpowerGroup, McKinsey (ManpowerGroup, 2022 World Economic Forum, 2014, Whiting, 2020, https://www.oecdskillsforjobsdatabase.org/index.php#FR/_, Manyika et al, 2017). Based on the skills and projections expected there, we have formulated what these expectations mean for teachers.

- In designing its courses, it plans learning activities that develop the soft skills and generic competences currently expected by the domestic and global labour market and projected for the near future, such as social skills, basic skills, verbal skills, creativity, problem-solving, decision-making skills, emotional intelligence, cognitive flexibility.
- It prepares students to adapt quickly and flexibly to changing labour market needs in the longer term.

In our model, the macro level includes the trends that determine the functioning of higher education. The EDUCASE Horizon Report 2021 (Pelletier et al, 2021) provides a detailed analysis of the social, technological, economic, environmental and political influences on the learning and teaching work in higher education institutions, describing short, medium and long-term trends for institutions and their staff (managers, policy makers, educators). What is written in the 2021 Report can be summarized in the following teacher characteristics:

- He/She is committed to sustainable development and environmental protection.
- Accepts that online education is bringing educational institutions together at a global level. Open and inclusive towards other cultures.
- Ability to work from a distance/ (distance learning and other teaching tasks online).
- Equipped to manage the growing digital divide in the learning-teaching process.
- Accepts that mental and health issues can impact on higher education. He/She listens to its students. Seeks help from professionals if detects mental or health problems.
- Is open and receptive to technological innovations. Uses digital tools and technologies appropriately in the teaching-learning process.
- Designs didactically well-thought-out blended courses, teaches in blended courses.
- Takes into account the possibilities of learning analytics when planning courses and lessons. He/She sets assessment points with these in mind.

- Interprets the results of learning analytics and incorporates them into her courses.
- Keeps in mind legal and ethical issues related to learning analytics.
- Accepts that there is more than formal learning.
- He/She is open to the development of flexible, interdependent micro-curricula at institutional level.
- Able to shed light on the interrelationships between courses.
- Is aware of the legal framework for open access learning materials and tools.
- Knows where to find reliable, quality open access learning materials and tools.
- Designs and produces open access learning materials for their courses.

Thinking about, theories and knowledge of knowledge and learning at the macro level. Learner-centered education (Weimer, 2013), which builds on individual needs, wants and learning characteristics, and constructivist learning theory (Nahalka, 2002), which sees learning not as a transport and transfer of knowledge, but as an active, internal construction of knowledge, think differently about the teacher, his/her role and tasks than previous theories. Thus the effective teacher:

- Is aware of the individual needs and requirements of learners.
- He/She knows and uses communication strategies appropriate to his/her role as a facilitating teacher.
- He/She knows and uses activity-based methods in his/her teaching that are adapted to the learners' level of knowledge and individual needs.
- As an expert, she creates a learning environment that facilitates and supports the knowledge construction processes of the learner at the centre of the learning process.
- Mapping the content and mobility of pre-existing knowledge elements in learners' knowledge systems.
- Helps learners to situate a given problem within a larger, more general conceptual framework so that it can be solved in new situations.
- Supports learners' knowledge construction through real-life situations and contexts.
- Is able to present new knowledge in a variety of approaches.
- He/She strives to introduce concepts as early as possible due to the maturation period.
- He/she strives to differentiate, thereby developing individual learning pathways.
- Encourages pupils' self-evaluation.

The functioning of higher education institutions is largely determined by the demographic environment, which is one of the macro-level elements of our model. The changes in the demographic environment (changes in student numbers, changes in the living situation and socio-economic status of students, increasingly heterogeneous student population) require a redefinition of quality and efficiency, taking into account the views of students, student communities, teachers and the academic world (Henard & Leprince-Ringuet, 2008), and the modernization of learning strategies, learning management procedures and methods used in the teaching-learning process. In our analysis, we have examined data from the KSH (Hungarian Central Statistical Office) on higher education in Hungary in 2021, the EUROSTUDENT VII survey (Hámori et al, 2021), the *Magyar Fiatalok* 2020 survey (Pillók et al, 2021) and the latest drop-out data (Demcsákné & Huszárik, 2020).

Based on their findings, it appears that an effective teacher:

- Accepts that learners are diverse in their abilities, personalities and life situations.
- He/She knows the tools to identify and measure individual differences (important for his/her teaching). They can take these into account when planning and organizing the teaching-learning process.
- He/She is familiar with learning organization procedures, methods and learning activities that enable a heterogeneous group of students to acquire their intended competences effectively.
- Adopts the practices of his/her institution in relation to the work of students in the context of learning.

Most university students are now Generation Z. In recent years, theoretical and empirical research has led to a growing body of knowledge about them, and our daily practice has provided us with more and more experience. The general opinion among teachers is that most of them do not meet the traditional student image and teaching expectations. In order to know how teachers can work effectively with them, we reviewed research on Generation Z in the following areas: how they are affected by societal changes, what they are generally like, what characterizes their use of digital tools and their relationships, what methods and learning activities they prefer, and what expectations they have of universities. All this has led to the following picture of effective teachers:

- Explores students' prior knowledge, individual differences and preferences.
- Provides opportunities to develop individual learning pathways, supports personalized learning.
- Facilitates the development of students' self-directed learning.
- Pays attention to learners' mental health.
- Provides a motivating, stimulating learning environment.
- Creates an atmosphere of confidence in the classroom.
- Uses activity-based methods.
- Teaches 'video-clip style': taking into account that learners can focus on a task for about 7 minutes.
- She explains clearly.
- Provides opportunities for observation and experimentation.
- Introduces real problems into lessons.
- Links learning to practice.
- Provides opportunities for students to share their work.
- Designs group work: using individual and group sub-tasks to create a framework for collaboration.
- Gives precise, detailed instructions for assignments and courses.
- Provides challenging but achievable tasks.
- Thoughtfully integrates digital tools into the teaching-learning process.
- Strives to provide immediate feedback.
- Is accessible outside the classroom.
- Flexible in learning and assessment.
- Ready to help students in learning how to manage their time.

In the original model of the three-tiered educational economics, the macro level reflects the overall strategies for education, which serve as a guide for institutions. In the case of higher education in Hungary, the *Fokozatváltás a felsőoktatásban középtávú szakpolitikai stratégia 2016* sets out the objectives, which have been translated into teacher characteristics as follows:

- He/She has both teaching and research functions.
- Active in Teaching, publishing and research activities.
- Participates in mobility programmes.
- Teaches in an international context.
- Flexible in adapting courses to the changing student population, their needs and characteristics.
- Responds to the changing demands of the labour market when designing courses and lessons.
- Takes an active role in catch-up programmes, thereby reducing the drop-out rate.
- Mentors students.
- Understands learning outcomes-based thinking and can plan courses in this spirit.
- Has a rich repertoire of methodologies.
- Teaches with a project and results approach.
- Focuses her courses on the acquisition of practical skills.

The meso-level of the educational ecosystem is understood as a macro-level representation of the institutional level. Our starting point is that the macro-level interpretation of the conditions (demographic environment, labour market expectations, generational characteristics), trends (trends shaping higher education, research findings on learning and teaching) and strategies (*Fokozatváltás a felsőoktatásban*) is reflected in the Institution Development Plan and the Corvinus Teaching Excellence System supporting teacher development at Corvinus University of Budapest. These two documents provide the framework within which the notion of effectiveness and, through it, of effective teachers within the institution can be interpreted in the following ways:

- Collaborats with corporate and institutional partners.
- Understands and can design courses in the spirit of learning outcomes-based thinking.
- Takes into account student, employer and former student expectations and feedback in training and course development.
- Participates in catch-up and talent management programmes.
- Has a comprehensive knowledge base in her field of expertise, which is constantly updated and renewed.
- Has a caring, supportive and helpful attitude towards students.
- As an innovator, he/she is open to new professional and methodological innovations.
- Provides constructive feedback to help students develop.
- Values collaboration with colleagues and students alike.

The micro level is the level of individuals, and is therefore made up of biotic actors. In higher education, it is the level of teachers and students. Their perceptions and expectations are influenced and shaped by the macro and meso levels. The macro level can be influenced, for example, by teachers' perceptions of knowledge and learning. A teacher with a teacher-centred approach and a learner-centred approach may have different perceptions of what makes an effective teacher. In the case of learners, trends can have a major impact on the way they think about effectiveness: for

example, learning analytics can help them to develop individual learning paths. The meso-level can clearly define effectiveness for teachers: the organisational culture, the leaders, the expectations of the institution, the goals set out in strategic documents, can all outline the profile of an effective teacher. What an institution expects from students in terms of teacher evaluation has an impact on the micro-level of the students.

At this level, too, we can observe counter-directional processes, although they are undoubtedly of little decisive importance. Biotic actors at the micro level can influence the meso and macro levels through their needs, expectations and opinions. What they understand by effectiveness, who they consider to be an effective teacher, is clearly reflected at the meso-level.

At the micro level, qualitative and quantitative methods were used to investigate the specific participants in the teaching-learning process, students and teachers, in order to find out how they perceive effective teachers. We sought to answer the following questions:

1. What qualities do students consider important about an effective teacher?
2. Does their gender influence their perceptions?
3. Do lecturers of different types of courses think differently about effective teachers?

The study uses quantitative (questionnaire, Q-sorting) and qualitative (structured interview with reflective interview, associative group analysis) methods.

The study was conducted in traditional, methodologically innovative, training, flipped classroom, blended and online courses.

Research question 1: What qualities do students consider important in an effective teacher?

The following time points, sample and instruments were used:

Spring 2018	Corvinus University of Budapest students (N=394)	a 38-item shortened version of the 109-item questionnaire
2019-2021	Corvinus University of Budapest students (N=1042)	associative group analysis

Our research shows that students generally think that effective teachers are:

- Empathic with students.
- Helpful and supportive.
- Student-centred thinking.
- Kind and considerate.
- Communicates with students in a clear and understandable way.
- Attracts the attention and interest of students.
- Is interested in his/her field.

Research question 2: Do students on different types of courses think differently about what makes an effective teacher? Does their gender influence their perception?

The studies were carried out at the following times, on the following sample and with the following instruments:

2019-2021	Students of Corvinus University of Budapest (N=1661) about effective teachers in relation to each type of course (traditional, methodological innovation, flipped classroom, blended, online)	Q-sorting, with a 34-question questionnaire
2019-2021	Students of Corvinus University of Budapest (N=1042) in general and in relation to the different types of courses (traditional, methodological innovation, training, blended, online) about effective teachers	associative group analysis

The results are:

An effective teacher in traditional courses:

- Kind and helpful.
- Has a high level of pedagogical and methodological knowledge.
- Is helpful and friendly.
- Prepares well for the course.
- Gives interesting and enjoyable lessons.
- Explains the material in a clear and understandable way.
- Uses digital tools in the classroom.
- Demonstrates exercises and experiments.
- Gives practical examples during the lessons.
- Rarely uses group tasks, activity-based methods.
- Does not need to give independent opinions to students.
- Gives students varied, activity-based tasks.
- Attracts and maintains the attention of male students.
- Helps male students to emphasize the point.
- Makes the course interesting and playful for male students.

An effective teacher in courses using innovative methods (through methodological innovation):

- Kind and helpful.
- Nice and friendly.
- Innovative in teaching.
- Plans his courses well.
- Is innovative in his teaching.
- Conducts his classes in a focused and decisive manner.
- Uses learner-centred methods.
- Uses group work.
- Links learning to practice.
- Encourages students to express their opinions.
- Uses a variety of methods to teach students.
- Makes the curriculum interesting and playful for male students.

An effective teacher in flipped classroom courses:

- Uses exercises in class.
- Uses exercises to help students get the point across.
- Gives students varied, activity-based tasks.
- Provides students with varied and challenging activities.

An effective teacher in training:

- Comes to the training prepared.
- Listens to the participants.
- Responds flexibly to what is happening.

An effective teacher in blended courses:

- Develops close relationships with students, even off-campus.
- Helps, supports and empathizes with students.
- Friendly, caring and supportive.
- Gives group tasks to students in class.
- Makes sure to maintain the attention of the students.
- He/She makes the lessons interesting and playful for the students.

An effective teacher in online courses:

- Supportive, helpful, kind and attentive.
- Is concise, clear and easy to understand.
- Attentive, clear and informative.

Research question 3: Do instructors of different types of courses think differently about what an effective teacher is?

The study was conducted at the following times, with the following sample and instruments:

Autumn 2018	Teachers at Corvinus University of Budapest about effective teachers in general and in relation to specific course types (N=10)	mind map, causal mind map	Do teachers of different types of courses think differently about what makes an effective teacher?

The results are:

According to the trainers, in general, effective teachers are those who:

- Have a high level of professional knowledge.
- Possess High level methodological, pedagogical knowledge.
- Characterised by a learner-centred mindset.
- Able to differentiate her teaching according to the individual differences of students.
- Activate students.
- Plan his courses well.
- Pay attention to the maturity of students' work.
- Give clear, good lectures.
- Use digital tools in her teaching.

An effective teacher in a flipped classroom course:

- Uses digital tools in lessons.
- Plans the courses.

An effective teacher in courses using innovative methods:

- Pays attention to appearance and presentation style.
- Uses humor in the class.

Finally, we attempted to fit the commonly expected teacher characteristics identified in our ecosystem model into Mishra and Koehler's (2006) TPACK model. Thus, we have categorized the expectations from the different levels and actors of the ecosystem so far according to the knowledge domains related to teaching, hopefully placing the teacher at the centre of our ecosystem. We have attempted to interpret our results within this conceptual framework by listing, in addition to knowledge, the skill- and attitude-related expectations articulated for each domain. Moreover, as we have established in the processing of the literature on effective teachers in Chapter 2, the teacher's personality cannot be overlooked as an important factor. Thus, in our case, this has been identified as a separate element.

Content Knowledge refers to the lexical knowledge of the subject to be learned or taught, current theories and views on the subject matter.

In our ecosystem model, we were able to identify expectations for lecturers who teach effectively at Corvinus University of Budapest that were purely related to professional knowledge: having a high level of professional knowledge, keeping it up to date, maintaining professional contacts and publishing their scientific results.

Pedagogical Knowledge is an in-depth knowledge of the learning-teaching process, a general knowledge that does not support the teaching of specific knowledge.

Based on our results, the general pedagogical knowledge of an effective teacher at Corvinus University of Budapest includes learning theories, changing learner preferences, individual differences of learners, methods and tools to explore them. He/she has a rich repertoire of methods, assessment and knowledge of pedagogical planning.

Pedagogical and Content Knowledge is understood as the learning organization procedures, methods, planning and concrete implementation of learning activities, and methodological knowledge of the subject, which are adapted to the given professional content and knowledge. According to the analyses carried out in our ecosystem model, the effectiveness characteristics formulated for the teachers of Corvinus University of Budapest cover the entire learning-teaching process. In the context of pedagogical-professional knowledge, pedagogical planning, raising attention, informing the learner about the learning objective, recalling prior knowledge, presenting new knowledge, multifaceted analysis of facts and processes, conceptualisation, systematisation and recording, feedback, and measuring and evaluating performance are all relevant to specific pedagogical situations (Nagy, 1993).

Technological Knowledge refers to the knowledge of traditional (textbook, blackboard) and digital teaching tools, the skills needed to use and apply them, the ability to learn and adapt to new technologies. In the BCE ecosystem, technological knowledge alone was found in only one case: the teacher is open and receptive to technological innovations.

Technological, professional content knowledge is knowledge about the interrelationship between technology and professional content, which, in addition to knowledge of digital content and resources that fit the content, is also about how the use of technology can change professional content. This area has also been underemphasised and has only been highlighted in relation to the use of open access learning materials and tools.

Pedagogical Technological Knowledge is knowledge about the technologies and learning environments that can be used in the teaching-learning process. Looking at the expectations of an effective teacher, we can see that when pedagogy is linked to technology, the field is valorised. In our case, in addition to the thoughtful use of digital tools in the teaching-learning process, the linking of pedagogical and technical knowledge is most often about exploiting the potential of learning analytics.

Technological, Pedagogical Technological Content Knowledge is about professional, thoughtful, constructive teaching supported by technology that goes beyond all three components. This complex knowledge, which requires the coordination of knowledge areas, is also included, albeit not in large numbers, in the expectations. This was most evident in the creation of the learning environment.

As indicated when the TPACK model was presented, it primarily represents knowledge areas. However, as we have reviewed the literature on effective teachers, it has become clear that the

personality of the teacher is also a determinant when we think about effectiveness. In our study of the BCE ecosystem, we also encountered expectations that did not fit into any of the domains because they were related to the teacher's personality, or competencies that stem from personality. Therefore we had to include a separate category at this point.

The significance of the dissertation, lessons learned and directions for further work

In this dissertation, we have attempted to explore the problem of teacher effectiveness by developing an analytical framework, and to consider the higher education teacher as part of an ecosystem: to identify the system in which his or her effectiveness is worth thinking about, and to explore the expectations and demands that the actors of this ecosystem have on him or her. Our aim was to understand the context-dependent criteria of university teaching effectiveness and thus to develop an analytical framework that could help the thinking of academics, institutions and administrators. We identified the macro-, meso- and micro-level actors of the three-level ecosystem of Corvinus University of Budapest and described the characteristics of an effective teacher there. We then examined the identified characteristics of effectiveness according to a different approach: we attempted to fit them into Mishra and Koehler's (2006) TPACK model. In this way, the teacher characteristics, the expectations of the teacher, could be identified from two perspectives: at which level of the ecosystem they appear as expectations and to which domain of knowledge they are related to the teacher's work.

The expectations and teacher characteristics that emerged as a result of our analysis are extremely diverse. It would of course be unrealistic to expect teachers to meet all of them. However, I believe that the ecosystem model is a suitable tool for exploring seemingly simple issues in complex settings. It would be worthwhile for each institution to define its own ecosystem model, identify its actors and their expectations, and then for teachers to create their own ecosystem, selecting the elements that are relevant to them, thus defining the expectations that would help them to become more effective.

In my opinion, this method could be used to explore further issues, such as who is a good learner, who is a good leader in higher education. So this method could be a good tool for all stakeholders in higher education to analyse the problems that arise.

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