

The Success of Online Education from University Students Perspective

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Abstract: The changes of recent decades in the context of the rapid development of technology also necessitate the transformation of the learning environment and digital changes. This switch, as a result of Covid19, has meant a sudden move from so-called “digital education” worldwide overnight, affecting the structural, planning and implementation process alike. In order to achieve successful learning, it is necessary to monitor the effects on students and instructors, and to look back on online education with the success of the next school year in mind. One side of this is the student side, the experiences and feedback, the importance of which is now even more appreciated. The research is looking for an answer to how the students experienced the unusual, completely online learning, what their opinion is about the solutions provided by the university and the lecturers, how they evaluate the role and preparation of their teachers. The main question is how much they consider purely online lessons, lectures to be a big challenge, what they think is successful and why, how they see the role of their teachers. The implementation of methodological solutions and variety is also a question. Knowing the results, based on student opinions and own experiences, the study formulates suggestions for increasing future efficiency not only for Covid19 or similar periods, but for digital and online education in general and for the longterm.

Keywords: online and digital education; teacher and learner-centered methods; auto-enography; teacher’s role/attitude

1 Introduction

1.1 Basic Concepts

First of all, it is advisable to clarify the related basic concepts.

- Distance education: "Distance education is a form of training based on guided independent learning that replaces the regular personal contact between the instructor and the student for most of the learning time with

various learning tools (distance education textbook, guides, multimedia learning materials, etc.)." [1] The training time is divided, mostly self-study, but the student participates in the consultations. The teacher takes on a helping and supporting role, which is not a negligible motivational and success factor, that is, the success of learning also depends on the teacher's attitude. The training time is shared, mostly self-study, but the student participates in the consultations. The teacher is helpful and supportive, i.e. the success of learning also depends on the teacher's attitude.

- Digital-based learning: self-learning activity takes place, for which some kind of computing device is used. The source of learning can be a multimedia tool, simulation, interactive task.
- eLearning: independent learning takes place in the form of training based on a web-based IT network. In a broader sense, this includes all training that uses some kind of IT tool to support learning. The teacher and the students communicate electronically, typically there is no personal teaching.
- Blended learning: similar to eLearning, but in practice there is an example of personal consultation taking place at most a few times according to the student's needs, requests or the teacher's determination.
- mLearning: learning using mobile devices. Knowledge or starting sources for learning are uploaded to the devices with the help of various applications. It is actually a mobile device extension of eLearning.
- Digital learning or digital distance learning: a simplified form of the previous ones realized in distance learning, online. Multimedia devices, electronic educational packages, nowadays several cloud services can be connected to it, the access is wider, from anywhere, even from mobile devices, via telephone. [2]
- Online education: implementation of virtual and Internet-based education, application of several technological solutions - computer, smartphone, virtual classroom, use of digital collaborations. [3]

It deserves a special mention that digital and online education appear as synonyms for each other and in some cases under the name of digital pedagogy, as György Molnár calls it, and perhaps this term sums up the complex interpretation approach most relevantly. [4]

1.2 The Online Education in Hungarian Education

In Hungary, digital education was introduced overnight (from Thursday evening to Monday morning), first in primary and secondary schools. The transformation of public education into distance education caught Hungarian teachers unexpectedly and unprepared, just like their colleagues around the world. Until the

spring of 2020, distance learning was primarily more important in higher education and vocational training, but the majority of teachers working there also faced a serious challenge. Even the more experienced ICT users had to deal with the change brought about by the different learning environment, different teaching conditions, different learning and teaching tools and methods, and especially with the need to teach differently. It was questionable whether the proven and successful methods in full-time education will also work in distance education and if so, how, not to mention the teacher-student relationship, while the participants are the same. A Dutch research recalls a similar situation, according to which the 8-week school closure in the spring has such a harmful consequence, which is similar in strength, as if the students were almost completely absent from education. [5]

Another complicating factor is the lack of time, not to mention the fact that school activities and the learning-teaching workflow cannot be transferred exactly one-to-one to the digital work schedule. However, the circumstances forced the participants of the education to do so, which essentially resulted in the fact that online education did not actually take place (at least for a while), rather we can discuss Internet-supported individual learning at home.

For at least partial realization, an opening and a turning towards the teachers is necessary, i.e. the role of attitude is decisive. The OECD PISA research results show that digital education is not only a matter of material and asset conditions, but requires preparation, knowledge, and skills on the part of both students and teachers. [6, 7]

According to the author's field observations, one of the many examples of solutions was the involvement of public workers in several settlements, in other cases the teachers or pedagogical assistants themselves organized and took the packages and weekly worksheets compiled by class and subject to the cultural community places of the settlement (cultural center, etc.).

1.3 The Online Education in Higher Education

Higher education has a little more time, one week left for the transition to online education. Similar difficulties occurred here as well, mainly among students studying in the correspondence work schedule, but the majority of the problems were of a different nature. Rather, it is of a methodological and personal nature, and the first difficulty is that the students had to use several platforms, since there was not always a uniformly defined platform within the training within an educational institution, or time to quickly coordinate the platforms. [8]

Higher education generally continued to use the existing and previously problematic Learning Management System (LMS) infrastructure. With the help of applications, they mainly made video conferences possible, following the classic educational style. However, the limits of the systems prevented optimal operation,

the necessary conditions for education were incompletely realized. "As a result, fully integrated systems and their associated methodology could not be created, although new combinations of existing solutions undoubtedly created new opportunities." [8]

The digital model was therefore able to be realized in the sense that the learning and teaching activities were carried out relying on the Internet and online interface, optimally with the help of software applications available to everyone. Planning and implementation and the meeting and relationship between students and instructors have been transferred to a digital space, where the boundaries of the university classroom and subjectivity, the home, have been placed in the same space. New status, new positions were created, new points of identification, interactions and solutions had to be found on a different communication channel. The cultural software phenomenon formulated by Balkin, which interprets social processes and communication between people in an unusual but feasible space, seems to be coming to fulfilled and fruition. [9]

In this approach, we can interpret it so that the individuals participating in online education are present as "cultural software" and in this social and communication environment they convey cultural information, knowledge, and opinions to each other. Thus there will be value boundaries, disagreements and agreements. The author believes that this is also a new space and opportunity for cultural diversity and joint learning and cooperation. Although Barkin mentions the problems of understanding different views as the remnants of older problems, in the author's practice the possibility of moving in the direction of positive change is more prominent.

1.4 The Online Education at Óbuda University

The digital form of education was not new at University of Óbuda, as a technical university, programs were already used on various interfaces. The use of Neptun is basically in the subject and student register and it is the evaluation interface, and the Moodle framework is the place to complete course materials, instructor presentations and assignments. What has changed in the newly created situation is the platform for communication with students, which has been moved from the largely face-to-face education to the Microsoft TEAMS interface. In the beginning, this was not uniform, several people did not keep their lessons, lectures, others try to continue teaching on different platforms, such as skype, discord, or - like myself at the request of students - they recorded it with repeat students via Zoom. Later, Moodle's Big Blue Button was also added to the options. The university leaders had to make quick decisions. The communication interface was also unified, and ensuring continuity required the patience and quick action of both the instructors and the IT staff.

In general, we can state that a very close cooperation was formed in order to maintain education, and it is thanks to this that the transition to digital distance education was able to be realized in a few days - following the immediate actions of the rector and dean, deadlines and the quick response of the instructors. So the launch was successful. The first problem was that the necessary tools for the realization of digital education were not available everywhere, neither on the teacher's side nor on the student's side. The university also had to solve this, which sometimes did not go smoothly. An example can be mentioned asking the teachers about the necessary tools, which they could not provide quickly in all cases, as this certainly has an economic and organizational side.

The preparation took place in the following steps:

- Selection of a suitable educational platform, which at first could be freely chosen by the lecturers, but recommendations were sent, and there was also a platform chosen based on student suggestions.
- According to the central trend and the rector's instructions, the use of specific platforms has become institutionally defined in a uniform manner.
- The provision of digital tools for teachers has started, the needs and tools already available from all teachers have been collected.
- Preparation of written and video information for the use of the software centrally, with the involvement of the IT staff.
- Organization of webinars to prepare the use of different platforms. This was particularly useful for the majority, but many found it difficult to engage or there was too much information to learn at once. It was easier to use with the written instructions.
- Preparation of a digital education plan in a uniform template - in the form of central and individual instructors.
- Preparation of digital curriculum schedules by teachers in a few days.
- Elaboration of assessment forms by the teachers broken down by subject and writing precise instructions and information for them in a few days.
- Preparation of digital teaching materials, revision of previous teaching materials or elaboration of new ones.
- Start of online education at the times according to the original timetable: creation of TEAMS groups, notifications, information to students and access to the given course group.
- Holding online lessons and lectures, closing the semester and exam results, mid-semester grades.

In the first days, due to the increased load, testing of educational platforms began. Information exchange between students and instructors began, groups were formed and the sharing of knowledge developed rapidly, and the groups and study

material banks of each subject became available. The use of the platforms was assisted by the technical and IT support with descriptions and videos, and the students presented these with the help of each other and, if necessary, the instructor. Not only the teachers participated in the creation of the study material banks, they also asked for and received help in many cases.

The semester started and continued, and the next academic year continued in a similar way, remaining online, including school practices. Our pedagogical practice, led by the author, was strongly developed for face-to-face education, and due to lack of time, we did not prepare the rethought, reworked concept for distance education beforehand. The new 1st-semester students starting their pedagogic practice and the university instructor-practitioner, as well as the relevant school departments and their teaching colleagues, were far away from each other in space and time. The primary purpose of the professional practice at school is to establish the professional development of the candidate teacher, the first encounter with one's own role as a teacher. A particularly important goal is to develop competencies that contribute to becoming a teacher and to awareness of one's own identity as a teacher. Without real situations, students, and a real school, this task becomes almost elusive, so it is not an easy task as a university instructor to help them experience the complexity of teacher roles.

As a teacher of pedagogic subjects and as a teacher in practice, I myself also had difficulties with the transfer to the online space. As support and encouragement, I brought forward the relevant parts of certain pedagogical subjects (e.g. didactics), as well as additional knowledge not included in the curriculum, and I made concessions regarding the number of hours of participation and the duration and content of the individual lessons. The exercises were successful, the initial difficulties were replaced by trust and a common exchange of opinions, which the students later thanked in separate letters. This way my idea of online cultural diversity and learning together/from each other has worked.

2 The Research

2.1 Objectives

The problem is currently one of the most important issues in education, so all information and experience can be useful and forward-looking. The research seeks an answer to how the teacher candidates experienced online distance learning, what difficulties they had to face, what help they received, and what they lack in order to successfully complete the requirements and exams.

The main question is how much of a challenge the participants, instructors and students consider digital tools and purely online classes to be, what they think are advantages and disadvantages, what they consider successful and why. It is also a question of the training and digital competences of the instructors, the methods used, their effectiveness and popularity. The research affects the support provided/received in online education, the amount and difficulty of the tasks, as well as in which areas more support is needed. The research seeks answers and formulates proposals for increasing efficiency in the future, not only for the duration of Covid-19, but also for the long-term.

2.2 Hypotheses

- 1) Thanks to their digital competence, the engineers, engineering and technical teacher students were easily involved in online education.
- 2) The digital competences of teachers/lecturers were weaker than students.
- 3) The methods used by instructors are teacher-centered, primarily based on presentation and explanation, and are less interactive.
- 4) The evaluation method is primarily quantitative and summative.
- 5) Students in online education received less support and more tasks than in face-to-face education and the learning experience was not as strong and effective as classroom education.

2.3 The Circumstances of the Research and the Informants

The research begins in the 2019/20 academic year and continues in the 2020/21 academic year. The participants are students of various years of Óbuda University Kandó Kálmán Faculty of Electrical Engineering, Ágoston Trefort Center for Engineering Education engineering, engineering teacher and technical teacher training, as well as engineering students not participating in teacher training, who choose pedagogy subjects as optional subjects to fulfill their mandatory credits. Some of the students started their studies before Covid in the context of face-to-face education, but continued and completed them online, in the current semester or, in many cases, later. It is a relatively small population that had to cope with situations such as teaching practice or learning optional subjects, without any significant prior knowledge and practice. Data collection was done quantitatively and qualitatively. The questionnaire intended for students was filled out by 324 respondents. The majority of students take part in correspondence courses; several already have teaching experience. However, another part of the students have no teaching experience, are beginners in the teaching profession, or have not yet decided definitively to become a teacher in addition to the engineering career. However, they may have important professional experience in other fields, such as IT.

The average age of the interviewed students is 37.93 years. 64.7% of the respondents are already practicing teachers, and 57% of the entire sample works in vocational training. Despite the fact that the average age of the respondents is almost 40 years (and most of them belong to the 40-49 age group), 26.6% have one year of teaching experience or less, and 39.7% have taught for up to 5 years. (Table 1)

Table 1
Student's educational experiences

Years of teaching experience	Respondents (%)
0	26,6
1-5	39,7
6-10	20,1
11-15	4,4
16-20	2,3
21-25	1,8
26-30	5,1

Most of the students therefore have little pedagogical knowledge, they see education from the student's point of view, but there are colleagues who have been working at the school for a long time. In the latter case, the majority is from an older age group, generally the younger ones. The questions, conclusions, and suggestions formulated here can be useful in general and for specific cases, or for a national survey, but also for the analysis of educational platforms. The research is currently continuing by interviewing several students, planning to involve other institutions. In this study, we highlight the results that affect the practice of university education and contribute to practical teacher training.

2.4 The Quantitative Research Side

The fastest way to approach students was to ask the own groups opinion. I used a self-edited Google Forms questionnaire due to ease of availability and filling. In a small group, mainly studying computer science, the students completed a trial test, commented on the questionnaire, which was then distributed, in which the students also helped (forwarding, sharing on Facebook, etc.). This method seemed to be faster than contacting teaching colleagues through the university, and thus we can expect to get a layer that is perhaps smaller in number, but more reliable in its answers, which provides the sample.

The questionnaire is divided into several units. Most of the questions are one-question measurement scales ranging from 1-5 or 1-4 between the two extreme values. After the demographic data, the first part asks about the rate and method of participation in online education: keeping classes, digital teaching materials,

assignments. The second part of the questionnaire focuses on the student-teacher relationship: the forms, frequency and quality of contact, what the teachers could (or couldn't) help with due to the peculiarities of distance learning. In the third part, you can talk about general experiences, looking for answers to how the students experienced learning, school pedagogical practice, in which areas they felt successful, and in what they experienced failure. There is also the opportunity to answer open-ended questions, which is justified due to the extraordinary nature of completely online learning. It seems that the subjective "data" is telling and it is important to supplement the objective data with these, it is necessary and worthwhile to find out about the subjective feelings of the students in all situations, but especially in extraordinary situations. Some of the results of this are also mentioned.

2.5 The Qualitative Research Side

The qualitative side of the data collection is observation, continuous communication with the students, and the use of the auto-ethnography method combined with reflections on mobile phones or other platforms, forums. The specific method of cultural anthropology, the experience of participant observation, provided the qualitative basis, which I practiced several times during fieldwork in Africa. Its relevance here is that it helps create the crossing of distance frames and the realization of seeing from the other side. An important aspect here is what kind of relationships you can establish with the members of a particular community coming from outside. In this case, this community is the student group. [10, 11]

The novelty of auto-ethnography lies in the fact that it views all research as having a biographical nature (from a methodological point of view), on the other hand, its peculiarity is that the researcher can involve others through his own feelings, experiences, and stories, and make others speak and, more broadly, to find systemic connections. [12] The method also helps to reflect on one's own role, it is like analyzing an intersubjective communication situation. In light of this, it becomes easier to change the activity, the processing method, continue and change tasks and explanations during education. Thinking about the success of the method experienced in the previous face-to-face classes, I also applied it during the online education and shared my own thoughts and experiences to inspire the students to make observations. This is how I managed to encourage them to consciously observe their own experiences and learning. According to all of this, I interpret the online education space as a cultural evolution, in the lessons held in TEAMS groups, using the forum, chat and curriculum placement and assignment functions provided by Moodle. I developed the concept of a new space for cultural diversity and joint learning and cooperation, which includes the further development of social skills and soft skill elements. Based on this, I planned, organized and coordinated my university lectures and classes and formed the relationship with the students.

3 Results

3.1 The Digital Competences of Students and Teachers

ICT knowledge, material conditions, and internet access show a changing picture, which can partly affect the success of online learning. However, only a small proportion of the students have poor IT skills, the majority are at least well or definitely familiar with the use of digital opportunities. (Figure 1)

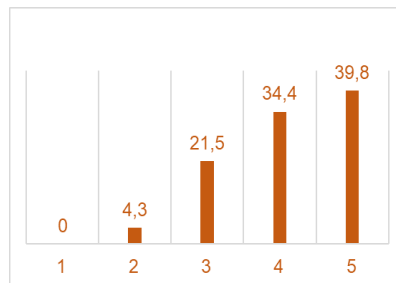


Figure 1
Student's IT proficiency

Most of the students are familiar with one or two or more forms of digital learning. Mostly e-learning courses. Previously, and during online education, they used the e-learning system often weekly (45.2%), but at least monthly (32.3%), and according to their statements, they learned from the slides and presentation materials prepared by the teachers in addition to completing extra tasks. Hypothesis 1. was thus proven to be realistic. (Figure 2)

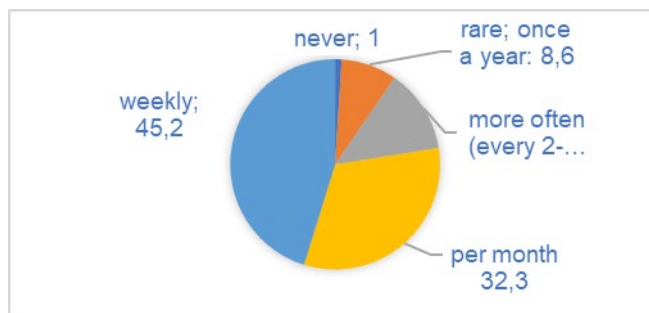


Figure 2
Frequency of e-learning earlier

Another indicator of satisfaction is the general digital preparedness and communication of the lecturer-teachers. The majority of students, 89%, thought this weak, and only a few percent marked it as good or excellent. The almost

unanimous opinion may be related to the results collected in a qualitative way, that some of the instructors did not keep all their lessons and at the beginning of the attendance education, they did not inform the students about how they would continue learning, on what platforms, when the lectures would be held, or incomplete was the communication and the given information. (Figure 3)

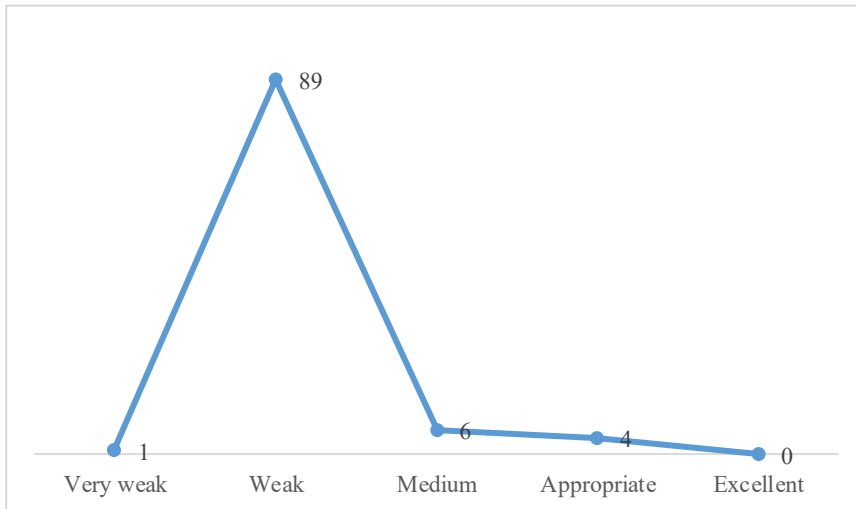


Figure 3
Digital preparedness and communication of teachers-lecturers

67% of students are not satisfied with the availability of instructors and the quantity and quality of contact and communication with students. They believe that the instructors are not helpful and attentive enough, they just give their lectures and expect the students to prepare alone even in the more difficult subjects. Thus, Hypothesis 2. was also confirmed.

3.2 Evaluation of Online Semesters Generaly

A significant number of students do not think the quality of online education is adequate overall, and consider it worse than face-to-face education. On a scale of 1-5, where 1 is the worst, 54.5% would give a 2 rating, 15.7% a 3, while only 5.3 would give a 4 on a 5-point scale. (Figure 4)

Expressed in one word, the feelings related to online education partially reflect the previous, 13 out of 24 statements refer to a negative opinion, but we see a slightly more nuanced picture on this issue during the qualitative research. (Figure 5 Word cloud)

3.3 Teaching Methods, Evaluation and the Involvement and Activity of Students

The involvement of students is one of the biggest challenges, and it is determined by the role and attitude of both participants. For the majority of the students, the learning experience is that the lecturers did not know or did not strive two-way communication, and those teachers who did the same during attendance teaching were able to mobilize them.

Of course, there may be a lack of tools in the background, but the qualitative research shows that many students felt this new way of interactivity in communicating with the teacher to be unusual and sometimes unpleasant. Several people expressed that it was uncomfortable to speak in front of the group and they were especially frustrated that the lessons were mostly audio and video recorded. For those who find it difficult to communicate two-way anyway, their frustration increased even more, because the personal absence and influence of the teacher and peers gave more room for uncertainty. The teacher's tone and communication were mentioned several times. One of the students described the general feelings of loneliness and frustration as follows: "We are left to our own devices and we are expected to learn things that the teacher tells us in advance that 80% of the group will fail. We don't even get a word of encouragement, they don't even know who I am, what I'm like, they don't believe that I'm learning a lot. Here, in this class, I like to get involved because here I am not just a Neptun code."

The research results show that the variety of teaching methods has decreased, and teachers have been less creative. The instructors preferred to stick to traditional, face-to-face teaching methods in the digital space, even during online education. They preferred the most classical methods, by which they were probably educated themselves, and which are most prevalent in university education. Only a few used the new type of methods, which better induce student activity, both during the face-to-face and online semesters. (Fig. 6)

Teaching methods and solutions have decreased, and students encounter one-sided teacher-centered, lecture-based methods in almost every class. Lecturers gave presentations most often, and the preferred method was explanation, which was known and encountered during distance education in almost 100% of cases. Common methods include illustration, which the students said in the qualitative research was part of the presentations in most cases. The next is the individual work, which mainly means homework and various assignments to be submitted by deadlines, readings, and home processing of a part of the curriculum.

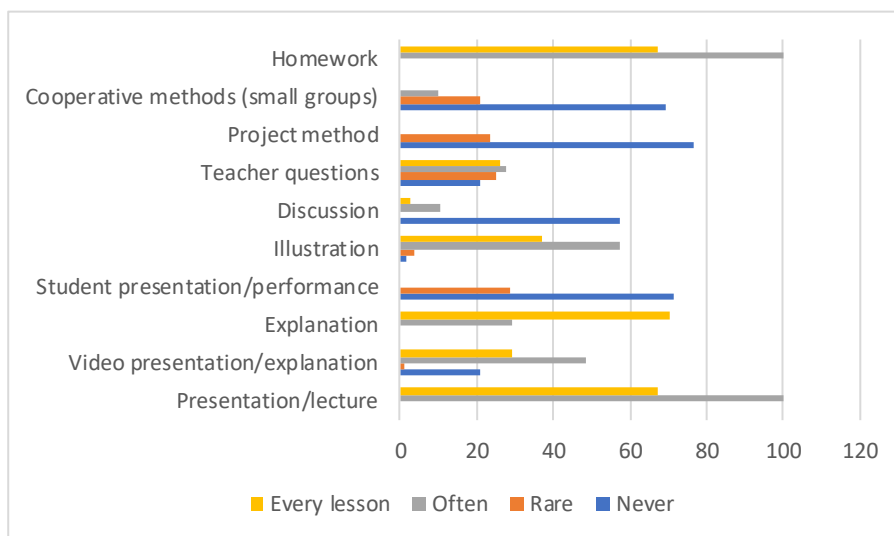


Figure 6
Frequency of use of certain teaching methods

Project tasks supporting the students' joint work took place the least, cooperative learning in small groups were encountered only in a negligible proportion. With the help of qualitative methods, it turns out that there are examples of the use of interactive methods in a few subjects and even fewer instructors, practically the same teachers use the same methods continuously. It becomes clear that the majority of respondents are dissatisfied with the teacher's one-sided communication and miss exploratory-discovery, research-based learning.

The students also relate the learning atmosphere to this, they express that it was difficult to keep their attention during the several hours of online lectures, they felt even more monotonous than classroom lectures. The majority of teachers did not try to involve them in their own learning and did not ensure more active participation. In their opinion, this is a lack of preparation and a question of determination, which should be changed. Hypothesis 3, supported by these results, was also confirmed.

From the point of view of the evaluation, it is worth noting that online testing is perceived as better than an exam, but in many cases they think the time frame given is insufficient and feedback is missing. Related to this, according to 87% of the respondents, the vast majority of evaluation methods are one-sided and summative, meaning that even with the online background, the traditional classification and numerical evaluation form remained. Other forms of evaluation occur only in the case of some instructors. (Figure 7)

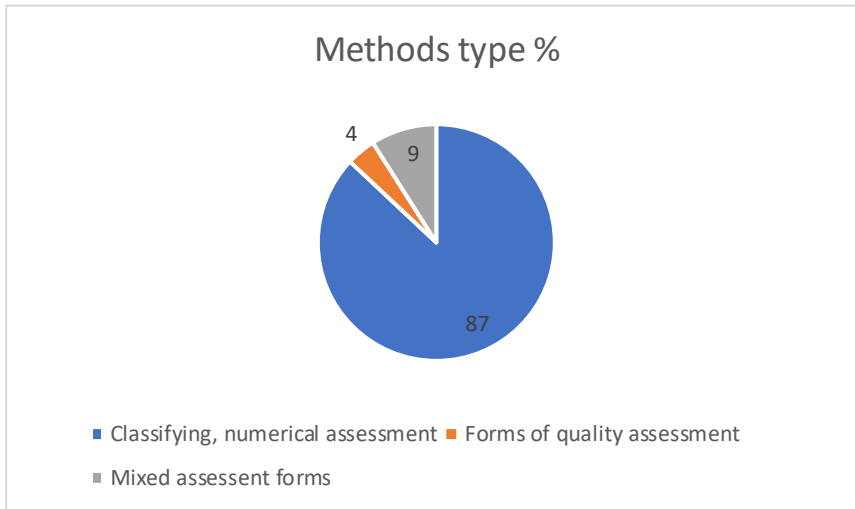


Figure 7
Proportions of assessment method types

Forms of classification and numerical evaluation were point-percentage tests and tasks, similar type of closed-door papers with closed questions, and single-answer questions and tasks typically defined in exam questions. The practical tasks were also largely aimed at repeating one-way, templated learned knowledge elements, and the students found them less of a creative opportunity. Qualitative forms of assessment, such as text assessment or well-founded, organized self-assessment and peer assessment (group work assessment), hardly occur, and the combination of different forms of assessment is also in low proportion. The evaluation method was, therefore, primarily quantitative and summative, which confirms the 4th hypothesis.

3.4 Student Workload and Support

Most of the responses, 72%, confirm that the transition to online education significantly influenced the learning process. This means difficulties in time planning and scheduling, an increase in study time (67% spent more time on it) in parallel with the increase in tasks (92% consider the tasks given too many). (Figure 8)

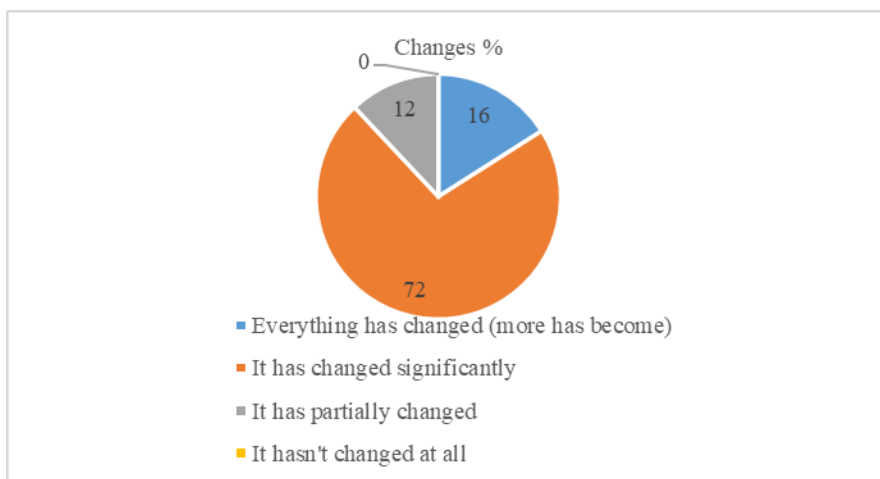


Figure 8

Changes in the ratio of tasks and individual work at home

Multiple loads, sometimes 3-4 times, have been reported. The students found the written or video course materials and the tasks to be completed too many. There was a subject from which a larger amount of assignments had to be sent to the teacher every week. The students were given auxiliary materials, case studies, and technical articles as homework, which they were also able to process in a longer time than average and with more investment of effort. In other subjects, it was just the opposite, the instructor hardly kept in touch, he or she called the students only to the exams.

The students also mentioned the deadline of the assignments as a stress factor. In the Moodle framework, for example, the deadline for availability and completion can be set, for which notifications are received, so this practical setting option becomes a tension-causing factor.

The students' participation in class also changed, it became a higher proportion according to their own admission and also from the perspective of the instructor. They were less likely to be absent from video conferences, group discussions and assignments than before in classroom settings. They have not exited the interface before, which is common, and even more common if they are in a hurry to another class or location. The background of this may be the phenomenon of confinement, or the transformation of time management and the omission of other activities, such as work, entertainment, individual programs. Connecting from home is also straightforward in many cases. Perhaps the controversial statement applies to this situation: "Information can be found on a computer, but the transmission of knowledge between generations can only be ensured by contact between people." [13]

67% of the students consider the difficulties of time planning and scheduling and the increase in study time to be problematic and too much. During the qualitative research, they say that it is almost self-training and that more time is needed for effective learning. At the same time, the respondents find the increase in the amount of tasks very problematic. 92% consider the tasks to be completed during the semester to be too many compared to the previous ones. This is attributed to the fact that the instructors want to ensure continuous learning and ensure that the students are not wasting their time. (Figure 9)

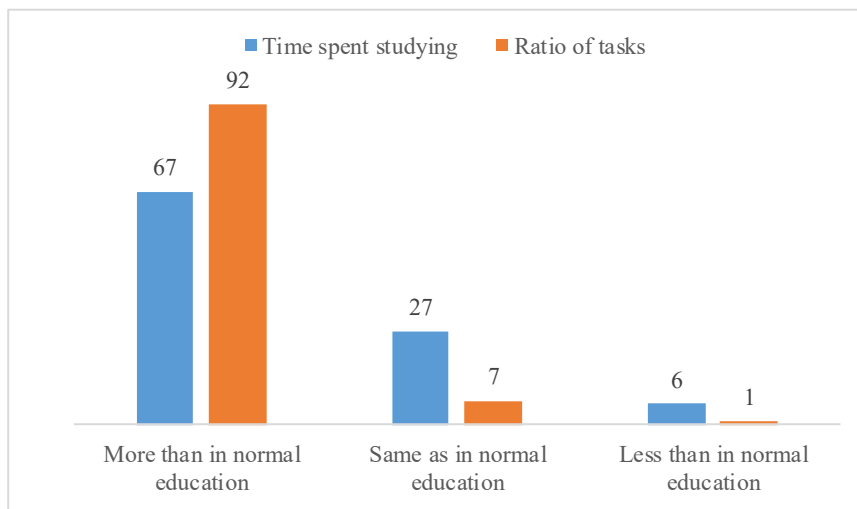


Figure 9

The ratio of study time to tasks

According to the students' statements, several teachers issued the assignment, but did not send feedback or merit evaluation. The assessment involved entering the grades, but no individualized feedback was given. According to 89%, the deficiencies in the holding of classes and the deficiencies in the online preparation of the instructors are weak. Overall more tasks were assigned to the students, for which they received little support. This supports hypothesis 4.

The results of some studies are similar in the sense that the students already had digital skills and that the instructor's teaching style has a motivational effect. However, there are differences, such as the positive effect of Covid awareness on institutional/faculty preparedness and students' willingness to participate, but it is important to prepare both sides for participation in online education. [14] Alea et al. similarly recommend that educational institutions review their approaches to e-learning policies during the pandemic and in general. [15] Some research points to the impact of the positive experience and quality of online learning on student satisfaction [16, 17] According to another study, the personal perception of e-learning influences the intention to participate in e-learning. We agree with many

others that one of the biggest challenges is the methodological and tool use readiness of teachers, that the old models do not adapt to changes and that in the future the factors that motivate students and teachers must be examined and prepared for a similar situation. [18, 19, 20]

Conclusion and Suggestions

The purpose of the study is not to comprehensively analyze the experiences of online education worldwide, but it tries to contribute to the successful implementation of the practice. The suggestions should also be considered in general, not only during a pandemic, but for adapting to digital education in general. They affect the whole of education, and in general, teacher training and the interpretation of the teacher's role. They should definitely be considered when preparing for an emergency situation. The results of the research show that digital education is not only a matter of material conditions, but requires preparation, knowledge, and skills on the part of both students and teachers. In many cases, the material conditions are incomplete, but their existence alone does not ensure successful implementation without the other side. In light of this, the creation of the following conditions is necessary and recommended for changes:

- **Material and environmental conditions:** knowledge and regular, daily use of digital tools is essential for the implementation of digital education. Where students or higher education students and teachers do not routinely use the devices, digital education is hindered. If certain skills, such as flexible switching, adaptation to the use of new platforms, or interpretation and understanding are incomplete, learning becomes slower. At the same time, the availability of tools and the skills and frequency of use are related, obviously skills cannot be developed in the absence of tools, and replacement is difficult even if the tool is provided. Tool and supporting preparations are therefore necessary.
- **Personal conditions:** the basis of successful learning is ensuring the unity of the external and internal environment. The immediate environment of the individual is the microenvironment, which, if it is not supportive of learning, will lack the atmosphere in which the individual's independent learning develops. Learning to learn therefore requires microenvironmental conditions, a supportive atmosphere that can create time, space, and a calm location. The attitude and receptiveness of smaller groups, such as school and university groups and teachers, is decisive, and in this the instructor has as important a role as the group mates. In order to fundamentally change the teacher's attitude, teachers should receive basic pedagogical and psychological preparation and master the supporting facilitator role instead of the traditional chair-centered role interpretation.
- **Learning organization and methodological knowledge:** since students do not have the same skills, the process must be supported from several sides. According to the principles of constructivist didactics, teaching also means

shaping learning environments. At the center of the learning process is the process of knowledge construction, the construction of one's own knowledge. It is the task of the teacher to create the learning environment, which means a system that integrates all important influencing factors. [21, 22] Although everyone creates their own mental model in order to understand their experiences and new information, the teacher's involvement is essential, which should appear precisely at those points when the process gets stuck. This requires proper contact and continuous interaction during learning. The knowledge-centered learning environment is not conducive to the mobilization of existing knowledge and the development of metacognition. The constructivist methodology therefore prefers a variety of learning sources, independent and collective ways of thinking in the spirit of variety. The various types of information and their collection can be most effectively realized through cooperation, pair or group work, so that each student can find different points of view, develop their own knowledge and, at the same time, control. Individualized research and other tasks, project-based learning, student presentations, and the teacher's question-explaining method also maintain learning motivation. They can only acquire the knowledge defined in the goals with various forms of work and methods, and only in this way can they acquire the skills necessary for social activities. For this, it is necessary to prepare the supporting methodology of the instructors, to update the knowledge and practical elements.

In conclusion, we have to agree that "if we want to change something, we depend to a large extent on (prospective) teachers changing their thinking - and therefore our thinking as teacher educators". [23]

In summary, in the words of György Molnár, "we must emphasize that the transformation of the teaching-learning process is much more important and significant than education". It is, therefore, necessary to make the framework flexible, reinterpret the teaching profession and role, renew the methodology and develop digital knowledge. [24]

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