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Chapter

Reshaping Blended Learning after the COVID-19 Period in Higher Education

Tamás Köpeczi-Bócz

Abstract

The tragic situation caused by the COVID-19 epidemic also became the biggest experiment in higher education. We sought the answer to the challenges arising at University of Tokaj with a higher education pedagogical experiment. The experiment was based on the practice-oriented design of cooperative learning, which was implemented through the joint project work of groups of different ages. The research question at the center of the experiment was whether the learning effectiveness of the groups participating in the experiment changed as a result of the completely on-line training during the COVID period. Based on deductive logic, the conclusion can be drawn that students active in the COVID period can be effectively educated within the “blended learning” methodology with an online-dominant training organization of up to 80%. The so-called COVID groups do not belong to a uniform age group, but to a group of students with the same history. In higher education, it is advisable to use the effect of the “spontaneous experiment” caused by the global tragedy of COVID as soon as possible, so that within the “blended-learning” method, the ratio of contact (classroom) and online training is between 20% and 80% we approximate to.

Keywords: blended learning, University of Tokaj, cooperative learning, intergenerational training, community service learning, learning effectiveness, Bloom’s taxonomy, deductive reasoning

1. Introduction

In Hungary, one of the consequences of the COVID-19 epidemic was that in March 2020, each university’s Epidemiological Operational Coordinating Board issued a message to the staff. The content of this was to slow down the spread of the new coronavirus epidemic by radically reducing the number of personal meetings. Therefore, in the work of the universities, the conditions for online education were simultaneously created and the personal presence of operational processes was reduced to a minimum. At that time, more than 200,000 students were studying full-time courses at higher education institutions in Hungary. More than 80,000 students chose the part-time and online education forms of higher education, of which only 4000 studied the online education form. These conditions lasted until May 2021, but even then
there was only a hybrid organization of education in the country that kept physical presence to a minimum.

This tragic situation also turned out to be the biggest experiment in higher education [1], since the teachers and students communicated with each other only on electronic educational platforms.

On August 1, 2021, the University of Tokaj was founded as a new university in Sárospatak, Hungary, which defined itself as an agricultural and economic-oriented university on a 150-year-old educational science-oriented university campus. The University’s vision is to become a knowledge provider platform for the region that utilizes cutting-edge knowledge locally, while developing and making the region’s results accessible at the domestic and international levels, thus contributing to the development of the region’s ecosystem. These goals are also formulated in the university’s Institutional Development Plan (IDP). Along with the expanding educational offer of the newly founded university, it also faced several higher education pedagogic challenges.

In the year of its founding, the University of Tokaj focused on the following two challenges:

1. Students of different ages and life experiences must be organized and taught in a unified group.

2. It must introduce educational methods that support its economic and viticulture-oriented training offer.

In this chapter, we show how a new university, which organized its educational activities after the shock caused by the COVID-19 period, answered the two challenges with an experimental method. The experiment is a practice-oriented new approach to cooperative learning [2], which was realized through the joint project work of groups of different ages. The learning effectiveness of the groups participating in the experiment changed as a result of the completely online training during the COVID period. The experiment also laid the foundation for our further developments related to intergenerational education according to the first challenge.

The different age characteristics also induced a new innovative approach to the organization of the university’s educational services. The higher education institutions of small towns the size of Sárospatak perform important community service learning (CSL) tasks [3], which is why the campus community is more important here. Within the framework of intergenerational higher education [4], older students can more effectively and better compensate for the shortcomings of their IT and language skills, while younger generations can get to know the work organization solutions and work culture of their chosen field more directly. The best field for intergenerational training experiments is company training, which we studied to organize individual student groups [5]. The intergenerational approach results in an improvement in the quality of education for students (of any age) and an increase in the efficiency of the university. In the experiment, mostly young students participating in higher education vocational training, as members of the project groups, and older students participating in master’s programs with wider life and work experience, as project group leaders, formed study groups. The evaluation and further experiments are planned and implemented based on the results also included in the chapter.
2. Scientific background of the educational experiment

The basis of our educational experiment is to be found in countless educational methodological innovations. Our first starting point was the development of ICT (Information and Communication Technologies) tools. This technological innovation has been used in education for more than 20 years, the primary goal of which was to make access to information faster and more colorful. Later, this goal gradually changed, while at the beginning it was limited to performing the tasks of school administration support systems (managing data sheets, records) and educational organization databases (diaries, curriculum, timetables, etc.), by now it has already wormed its way into many classrooms. In the beginning, it prepared the lesson preparation, then it served to make the illustration and education more colorful, and it serves to this day [6]. Equipping the classrooms with VCRs and televisions significantly improved the visualization of course content, and later computers, projectors, and interactive whiteboards enhanced the learning experience.

We can say that the development of ICT brought a breakthrough in the methodological renewal of education. In recent decades, the strategic goal system of higher education has developed together with the technological and methodological innovations of the education sector. Today, the main goal of using ICT tools in higher education is to use technology to make the learning process in increasingly heterogeneous groups more successful [7]. Primarily by supporting differentiated teaching, increasing students’ attention, increasing their endurance, and maintaining their motivation, and secondly by supporting their academic progress with various database services [8]. So technology is just a tool that provides new opportunities. During the COVID period, access to technical literature in electronic format and the appearance of video teaching materials increased perceptibly.

The experiment was based on experiences gained at another, former university (Corvinus University of Budapest) by my research group. These experiences were gathered during the COVID period, from which new phenomena were discovered, but of course, no general research findings could be made. One of our findings was that the COVID period has seen a greater emphasis on video-based educational solutions. In designing our pedagogical experiment, we investigated the relationship between the pedagogical preparation of the lecturers and the video-based teaching method used.

The row numbers in the six columns of Table 1 show the individual teaching competencies and the rows with four letters represent the instructional video methods used by the lecturers during the COVID period. Where the teaching competency is found, 1 point is given for the video method. We defined the assessed teaching competencies based on common elements that can be identified in the practice of 10 countries [9], as follows:

1. getting to know some of the students;
2. getting to know student groups;
3. planning pedagogical processes;
4. management of the educational process;
5. evaluation of the pedagogical process;
6. communication, relationship with the participants of the pedagogical process.

The video is below in terms of execution we found categories during the period under COVID:

A. full lesson video recording or streaming,
B. short production of instructional and presentation videos,
C. presentation by voiceover,
D. other: classic classroom, practical example solved on the blackboard.

The study shows that the production of short instructional videos required the most pedagogical work, but none of the video methods was suitable for getting to know individual students. To achieve this, it was necessary to use support systems that are available in the university environment. Practically, we chose from platforms that are already proven in correspondence education, in particular Coedu, CoSpace, Google Classroom, Microsoft Teams, and Moodle.

The choice of platform was based on the theory of programmed education. Skinner formulated in his 1954 work “The Science of Learning and the Art of Teaching” that an activity that is reinforced is much more likely to occur in the future than one that is not followed by reinforcement. He developed his linear programming technique by validating this psychological principle. We also built our methodological experiment on the principles of programmed education. These principles are as follows: assigning tasks in small logical steps, activating students, as learning is most effective when students are actively engaged, constant feedback, which also serves to maintain motivation, and practice, which helps to ensure that the studied material is long-lasting [10].

The flexible frameworks developed by IT professionals made the practical utilization of these theoretical results widely available. The implementers of the nearly 70-year-old “programmed educational theories” have received a new and effective tool. Based on our judgment and experience, Moodle is the platform that best meets the needs of a higher education institution.

With Moodle, we can get a technological background with which we can create a unique curriculum and use cooperative and adaptive tools.

<table>
<thead>
<tr>
<th>Identified teaching competencies</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Altogether</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application of video elements during COVID</td>
<td>A</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>3</td>
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<td></td>
<td>D</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

Table 1.
Cross-evaluation of six teaching competencies and four video production methods (own editing).
The use of ICT tools is closely linked to blended learning (BL). Blended learning’s educational history goes back more than half a century. As BL developed, it became clear that these systems are suitable for educational organization tasks, so they became an integral part of education. Previous studies have shown that the classroom experience can be enhanced by using ICT tools, so this model has been used in higher education together with various ICT-based tools, including Moodle, for more than 10 years. Blended learning strategies combine the best elements of online and offline education, increase student engagement and also learning, and online activities improve efficiency, which over time lectures read to a reduction in face-to-face education [11]. As we wrote, BL combines the advantages of online and classroom education; however, the literature does not address the exact ratio of this.

We have observed that before 2019, the proportion of classroom-based instruction and online individual preparation was typically around 80–20%. However, during the coronavirus epidemic, higher education completely “moved” to the online space. From the second half of 2021, the COVID restriction on higher education in Hungary was lifted, allowing education to return to the university campus. COVID gave a big boost to those higher education institutions where BL already existed, as these students had a competitive advantage and were not new to “home office learning.” The majority of experts [11] also see BL as the direction that will determine the future of education. This assertion is supported by the Horizon Report 2022, which points out that hybrid forms of education will become more widespread and replace traditional forms of education, not because of necessity, as during the epidemic of the coronavirus, but because it will be the new trend [12].

On this basis, we organized the educational experiment in such a way that 20% of the activities were classroom activities, which were primarily limited to organizing knowledge and clarifying practical questions related to the implementation of the group project. The other 80% were online activities such as planning, knowledge acquisition, group and task organization, control, evaluation, and reflection that were documented in the Moodle system.

3. Presentation of experimental education

3.1 The participants

The “educational experiment” took place at the Department of Entrepreneurship Development of the University of Tokaj-Hegyalja, with the involvement of students studying at three different levels of education: students participating in the higher education vocational training (HEVT) in viticulture and enology (11 students), in the bachelor's degree in viticulture and enology engineering (3 students), and in the master's program in business development (5 students). The education covered a total of five subjects: R + D + I Basics, Business Innovation, Project Management, Tender and Project Management, and Applied Research Methodology. Students in the Entrepreneurship Development master’s program (MSC) studied innovation, project management, and research methodology subjects. The subjects were taught by two lecturers. The individual subjects and training groups are shown in Table 2. The increased class loads and the teaching of many subjects with similar content at different levels provided the starting point for the experiment. In the essential part of the experiment, in which cooperation and teamwork were also evaluated, a total of 16 students, who studied in master's programs and higher education vocational
programs, took part. The students participating in the bachelor’s program were only affected by the reflected classroom part of the education.

### 3.2 Applied teaching methods

As a preliminary adjustment, the students received online course material for each course on the Moodle interface of the department, which helped all students learn the basics of the subjects. In the case of the innovation and management subjects, the preparatory materials ended with an online test, the minimum score of 70% was the condition for the students to be able to participate in the lessons. In the case of the research methodology course, the students received weekly and biweekly online lessons and assignments before the contact class.

To improve understanding, the contact hour part of the blended learning method was followed by online learning, during which lecturers and students deepened their knowledge together using cooperative learning methods. During the contact hours, groups were formed to work together on a joint research project. In total, three groups of six students were formed, each group consisting of two MSC students and four HEVT students, mixed male, and female. The groups were managed by MSC students within the framework of the project management subject. The innovation subject provided the content of their joint project, thus becoming a research management project, the purpose of which was to investigate a realized innovation. The students also received support for managing and implementing the task with the help of the BL method and Moodle within the scope of the research methodology subject.

Based on the programmed education theory, the task implementation was divided into three different elements, control points, during which the students received feedback and suggestions regarding the sub-tasks and results that had been implemented up to that point. Furthermore, each student had to keep an activity log of his weekly activities in Moodle.

The students received grades for the projects, differentiated, and in the case of innovation and project management subjects, an online exam followed, which was also included in the evaluation. The exam questions did not ask about the students’ lexical knowledge, but about their practical knowledge. The number and difficulty of the questions differed for the different training levels. For the exam, the students could rely on the shared basic knowledge uploaded in advance, what was said in class,

<table>
<thead>
<tr>
<th>Trainings</th>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic knowledge</td>
<td>Business innovation (5 credits)</td>
</tr>
<tr>
<td></td>
<td>Project management (2 credits)</td>
</tr>
<tr>
<td>Tender and</td>
<td>Applied research methodology (5 credits)</td>
</tr>
<tr>
<td>R + D + I (2 credits)</td>
<td></td>
</tr>
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| Winegrower HEVT    | x                                             |
| Viticultural       |                                               |
| engineering BSC   |                                               |
| Business development | x               |
| MSC                | x                                             |

Table 2.  
*Student participation in subjects (edited by myself).*
and the differentiated curriculum for each training level uploaded after the personal meeting.

We examined the success of the students’ cooperation and group work with a questionnaire. The cognitive skills model of Davier and Halpin [13] and the interpersonal trust model of McAllister [14] and the cooperative research of Mátyás Bánhegyi and Balázs Fajt [15] helped in formulating the questions. At the beginning of the semester, we filled out an input questionnaire consisting of classic Likert scale-type questions (15 questions in total) with the students, which examined the students’ attitude toward group work, taking a role in joint work, and joint problem-solving. These 15 questions were included in the final questionnaire at the end of the semester in the same way, which was supplemented with additional questions related to the use of the department’s Moodle system. We asked students in what way did this system help them to cooperate and achieve the tasks, and how much keeping the activity diary encouraged them to complete the tasks. The final questionnaire was supplemented with three open questions requiring long answers, which asked about intra-group communication, group efficiency, and value creation. Finally, the investigation concluded with an in-depth interview with the two MSC leaders of the three groups, in which both the project implementation and the group work were evaluated.

3.3 Cooperation between students

The students implemented their research management project in groups of six. Each group consisted of two students participating in the master’s degree in business development and four in the higher education vocational training in viticulture and enology. A total of three groups worked on one project each, which examined a realized winemaking innovation. Students with different attitudes and knowledge participated in the groups. It was necessary to create a minimum knowledge base for the group participants, since if they do not have adequate background information, their participation in the group work may differ in that case [16]. This was the purpose of the course material uploaded to Moodle, the related knowledge test, and the contact course. The advantage of learning in mixed groups is that the division of work between students starts. The participants had different skills and knowledge. In the present project, the viticulturist and oenologist students represented the specialized expertise related to viticulture and oenological innovation, while the MSC students in business development were in charge of the economic competencies. Previous studies have shown that teamwork is most successful when everyone focuses on exploiting their strengths during implementation. During group work, the participants move out of their comfort zone, while at the beginning the individuals feel confused or lost, as a result of the knowledge sharing, they feel smarter and more suitable for the task, so in the end they forge into a well-functioning team [16]. Knowledge sharing and communication within the group started increasingly during the work, which mostly took place through the forum created in Moodle, but the students also used other channels, such as Messenger groups, Skype meetings, telephones, and e-mails. The initially weak interpersonal and cognitive trust also began to strengthen. Cooperation was essential for successful work, as the students were faced with an open-ended problem, the solution of which was unfeasible on their own. It became clear from the student answers that during the group work the HEVT and MSC students felt equal and were helpful to each other. The willingness of the students to cooperate increased more and more, they began to trust each other’s
knowledge more and more, and the group leaders were more courageous in entrusting
tasks to the other participants.

The HEVT students also revealed that the MSC students helped them understand
the innovation topic, and some also considered the MSC students as mentors.

Although based on the answers to the questionnaire, the group work worked well,
it became clear during the interviews with the group leaders that the groups of six
proved to be large. In the majority of the groups (in the case of two groups), there
were one or two people who behaved recklessly. To eliminate this, it is recommended
to reduce the group size to four people.

The most delicate part of group work is always the evaluation. How should lec-
turers evaluate students? Should each member of the group receive the same grade, or
should there be differentiation based on something? During our investigation, it was
particularly difficult to develop the student evaluation, since students at several
training levels had to be evaluated in several subjects. We did not want all group
members to receive the same grade for several reasons. On the one hand, we wanted
to filter out stowaways, and the students’ responsibility and knowledge requirements
were not the same. MSC students had to get grades in three subjects, while HEVT
students only had to get grades in one. In the case of the project management and
innovation subjects, both active participation in class and the end-of-semester exam
are included in the final evaluation. Furthermore, a large part of the grade was given
by the research assignment to be submitted. In the case of the applied research
methodology subject, active class participation, Moodle lessons, and tasks belonging
to the lessons, as well as the submitted thesis, were the subject of the evaluation,
which was evaluated separately in terms of the three subjects (project management,
innovation, and research methodology). In addition, the student groups also reflected
on the completed research, and each group prepared a short evaluation of the com-
pleted work of another group, which was an additional help in preparing the evalua-
tions. In addition to the activity diaries, the in-depth interviews with the project
managers helped to assess the work of the group members.

3.4 Moodle system efficiency

The most important platform for teaching and learning activities was Moodle.
Through this, the students received the preliminary study materials and lessons, the
knowledge verification tests, and the end-of-semester exams. Furthermore, most of
the cooperation took place on this interface, the submission of partial and final tasks of
the project, and the lecturer’s feedback took place here. The interface was also used to
document the entire semester’s student work and lecturer feedback and evaluations.
Moodle has proven in many cases that it effectively supports the creation of individual
curriculum, and cooperative and adaptive learning. So we can say that an educational
framework with many possibilities effectively supports learning and serves as a col-
laboration interface, and last but not least, it makes it easy to monitor and measure the
evaluation of learning activities. Previous studies [17] also prove the effectiveness of
Moodle as a learning management system. A system that increases student motivation
also serves to develop skills that do not belong to the given course or subject (e.g.,
collaboration, text writing) and improves the general performance of students [17].
Moodle has several incentives and disadvantages, from both the teacher’s and the
student’s side, which are reviewed in Figure 1. Among these, we would like to present
those that were supported by our investigation.
From the student’s perspective, keeping the forum and the activity diary clearly enhanced independent and group work, and study materials, assignments, and tests were easily accessible to them. Some technical problems arose for students who had not previously used any content-sharing system, but this was always resolved in time by the quick support of lecturers and fellow students. However, the students experienced the continuous fulfillment of deadlines as an additional burden. During the in-depth interviews, it became clear that if the deadlines for the tasks had not been so tight, the groups would have tended to procrastinate the tasks. With the help of the partial tasks and their submission, the students were able to schedule the tasks better and did not leave the entire task solution until the end of the semester.

Moodle system also had many advantages from the teaching point of view. The teaching materials did not have to be shared with the students one by one, and they were always available to the students after uploading them. The design of the tests was a lengthy process, as we did not want the question bank of the system to contain only true-false or multiple-choice questions, but questions that would allow us to actually measure the students’ knowledge based on their mastery of the practical benefits of the subject. However, after preparing a sufficient number of questions, the system essentially generated individual tests for the number of each student, which was corrected immediately, so that the students also received immediate feedback and the lecturers could see the results achieved. The Moodle system made it possible to modify the course and the assignment during the semester in accordance with the student’s needs.
4. Results of the educational experiment

By combining the evaluation of the subjects, the students had to carry out a joint large-scale research project in group work. The age of group members was between 21 and 55 years. The cooperation readiness of the students also improved a lot within the unknown intergenerational group, and group cohesion was formed by the end of the task. The students’ answers at the end of the semester revealed that they show a greater inclination toward group work than at the beginning of the semester, although many would prefer individual work instead of group work at the end of the semester. However, by the end of the task, the students clearly saw that during group work, the best results are achieved if everyone does their part to the best of their ability during tasks. The answers to the questionnaire at the end of the semester and the interviews showed that apart from one or two stowaways the communication within the group was good and clearly increased as the deadline for the final submission of the assignment approached.

In addition to improving the cooperation skills of the students, the “educational experiment” also brought multiple results. In the field of innovation, both MSC and HEVT students gained theoretical knowledge and practical experience. However, the MSC students needed to share their knowledge and experience with the HEVT students, so according to Bloom’s taxonomy pyramid, which can be seen in Figure 2, both HEVT and MSC students reached a higher level of knowledge development.

During the semester, the master’s degree students in business development acquired the appropriate theoretical knowledge related to the innovation course, which knowledge they had to apply in practice during the project task. However, in addition to practical application and theoretical knowledge, knowledge was also transferred during the mentoring of HEVT students. The HEVT students acquired theoretical knowledge during the course, which they understood with the help of the

Figure 2.
Students’ learning results based on Bloom’s taxonomy (source: [18]).
course materials, class consultation, and the MSC students, and were also able to apply
it in practice during the project assignment.

It is also clear from the student answers that the project task clearly helped the
understanding and practical application of the R&D innovation subject. Among the
student comments regarding the organization of the training at the end of the semes-
ter, in no single case was there a critical formulation of the online environment that
would have been related to the lack of classroom education. The students described
the organization of education in this form (20% classroom, 80% online) as flexible
and effective.

In the case of project management and applied research methodology, the master's
degree students in business development could test the knowledge acquired and
mastered during the research project in the form of independent research, thereby
reaching a higher level in the Bloom taxonomy pyramid.

With our deductive reasoning, we can draw a conclusion (K) based on the
premises (P) below.

Based on the experiment, the premise (P1) can be stated that students who have
learning or working experience in an online environment can be effectively taught
within the blended learning methodology with an online dominant training delivery
rate of up to 80%.

The clear premise of the 2021/2022 academic year (P2) is that during the COVID
period, all active students have learning or work experience in an online environment.

Based on the deductive logic, it can therefore be concluded (K) that students active
in the COVID period can be effectively trained within the “blended learning” meth-
odology with an online dominant training delivery rate of up to 80%.

It can also be concluded that the fully online-based training during the COVID
period improved the learning outcomes of the groups participating in the experiment,
as evidenced by the fact that in all age groups and training objectives, students
acquired higher competencies than those set out in the training and outcome require-
ments of the given training.

5. Conclusions and recommendations

During the “educational experiment,” it was revealed that with our method certain
subject knowledge was transferred more effectively to different target groups and a
higher level of knowledge integration was achieved based on the Bloom taxonomy.
This improvement was thanks to Moodle, which provided us with effective support.
On the one hand, it served as a venue for project work, where students could cooper-
ate and share knowledge with each other. On the other hand, during the exam tasks
and tests measuring knowledge before the contact class, it made it possible to create
tasks that, based on Bloom, did not help the lexical, but practical use, so the students
can apply and pass on the acquired knowledge.

Furthermore, it can be said that the cooperation skills have strengthened among
the group participants. In one group, the cooperation within the group worked very
well from the beginning to the end, in the other two groups, the project leaders
complained about one student each because of rude behavior, but the communication
within the group showed a developing trend in them as well.

The study clearly showed that the six-person groups proved to be large, and in the
following, it is necessary to maximize the number of groups to four. In this case, more
tasks would be assigned to each student, but it would also significantly reduce truant
behavior. It takes a whole semester to complete the project assignment, so the assignments must be handed out during the first third of the semester, and contact hours must be held during the first third of the semester. Due to the longer time interval, however, it is necessary to introduce more sub-tasks and checkpoints, as it was also revealed from the student responses that they would tend to procrastinate.

For the students to feel at home in similar projects and group tasks, it is necessary to involve several subjects and lecturers. With the help of this, the students could have a similar task every semester. If we look at the higher-volume project tasks at the training level, the students can also prepare a portfolio-type final thesis for completing the given course, so completing a project task serves a much more serious purpose than obtaining a semester grade in a given subject. For these higher-level training and subject revisions, the university must have an organization that provides professional assistance to the given lecturer and specialists.

The so-called COVID groups are not a single age group, but a group of students with the same history. In higher education, the impact of the “spontaneous experiment” caused by the COVID world tragedy should be exploited as soon as possible by bringing the proportion of contact (classroom) and online training within the blended learning method closer to 20–80%.

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