

What works in online education: Best practices from four EU countries

Mahyar Mohammadi¹, Jussi Kasurinen² and Maria Paasivaara³

¹LUT University, Lappeenranta, FI-53850, Finland

²LUT University, Lappeenranta, FI-53850, Finland

³LUT University, Lappeenranta, FI-53850, Finland

Abstract

COVID-19 can be considered the leading factor in the global transition towards online education. When the COVID-19 pandemic hit the globe in the first months of 2020, several universities and other institutes of higher education faced the challenge of transforming their activities from campuses to online environments. In some organizations and disciplines, the transition was smooth. In some other programs, several pitfalls and problems were discovered. It can also be argued that the activities are easier to digitalize in some educational domains than in others. On top of these considerations, some students have requests and needs that the services must fulfil to succeed. In this article, we look at student survey results from four different European Union countries and their universities to study what works in online education from their point of view, what difficulties online education and blended education approaches still have, and how the students from these different countries find the online education to perform against the at-campus approaches. This survey aimed to identify students' social and technological challenges and provide guidelines on the key benefits and major roadblocks to the successful implementation of online education. While the severity of the global pandemic is settling down, how should the institutions view online education compared to at-campus activities? What is the role of blended or online learning, and what makes online education work?

Keywords

online education, blended learning, best practices, software engineering, online tools, online course, systematic mapping

1. Introduction

Technology plays a significant role in education, particularly during pandemics. It contributes to the teaching and learning process.[1] During the COVID-19 pandemic, the implementation of the teaching and learning process has shifted from in-person instruction to Blended and online learning. However, many students face different challenges during blended learning, even at higher education levels.[2] The university education community took an unexpected but mandatory step forward in introducing online education when the COVID-19 pandemic hit almost all countries simultaneously in the first half of 2020. In worst-case scenarios, degree programs had to migrate to online platforms practically overnight, without the chance to prepare the teaching infrastructure, or the teachers themselves, with the tools or competence

to perform in the long-distance education ecosystem. In some discussions, the transition to online-only education coined even the concept of "university-as-a-service" [3]. Even if the need to transition pedagogically to online ecosystems wasn't that radical in most organisations, it needs to be emphasised that the pandemic was a major event shaping up the educational approaches; now that online environments exist, there is a new need to discuss their role in the university education. The COVID-19 pandemic might be winding down, and the opportunity to go back to campus and have face-to-face events is an opportunity, but was there something we could keep from the long-distance infrastructure the pandemic brought us? Is it necessary to go back to the pre-pandemic teaching methods, or would adopting some of the practices from online education to our normal teaching infrastructure be beneficial?

This paper investigates the best online education practices at selected universities in target countries, including Finland, Germany, Hungary, and Spain. The survey is a part of the Erasmus Training Faculty on Blended Learning (FABLE) project funded by the European Commission. FABLE's goal is to assist higher education teaching staff in designing and implementing blended learning programs that fully utilise the benefits of this approach. The FABLE project seeks to achieve the following objectives: Developing a knowledge bank to better recognise the requirements and expectations of students and trainees

TKTP 2023: Annual Symposium for Computer Science 2023, June 13-14, 2023, Oulu, Finland

✉ mahyar.mohammadi@student.lut.fi (M. Mohammadi);
jussi.kasurinen@lut.fi (J. Kasurinen); maria.paasivaara@lut.fi
(M. Paasivaara)

🌐 <https://linkedin.com/in/mahyar-mohammadi/> (M. Mohammadi);
<http://www.jussikasurinen.net/> (J. Kasurinen);
<https://fi.linkedin.com/in/maria-paasivaara-5699273/>
(M. Paasivaara)

🆔 0009-0001-5533-6869 (M. Mohammadi); 0000-0001-9454-8664
(J. Kasurinen); 0000-0001-7451-7772 (M. Paasivaara)

© 2023 Copyright for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).

CEUR Workshop Proceedings (CEUR-WS.org)

on the one hand and professors, educators, and trainers on the other, in terms of blended learning and blended learning training. Creating and evaluating a technique for transforming in-class courses into blended learning courses that use the benefits of this type of teaching, including a guide to distance learning technologies. Designing, building, and deploying a tool to teach faculty about blended training to assist them in designing courses for blended learning. Preparing a white paper to assist educational systems in steering the digital transformation of their teaching through effective performance metrics. The method combines face-to-face teaching, live videoconferencing, online accessible recorded courses, micro-learning, and online self-training. [4]

The purpose of the survey was to study online education issues from students' perspectives and discover what students think is potentially challenging or difficult in their studies and what they believe is the best solution for their online courses. We wanted to see whether there was anything comparable happening in education and how students from various cultural backgrounds, school systems, and colleges perceive online education in general. The objective was to create knowledge and ideas about improving our work and suggestions about technical obstacles.

2. Background

After COVID-19 broke out, the educational system transformed into online instruction; as a result, blended learning emerged as one alternate strategy to meet educational activities at all levels. The teaching and learning process will benefit more by incorporating online learning with other learning elements [2]. Numerous studies investigating instructors' and students' perspectives and expectations of online learning have been conducted due to the COVID-19 pandemic [5]. During the COVID-19 epidemic, studies and learning phenomena presented findings on various concerns and focuses. It is important to understand and examine the degree of adaptability toward integrating the new learning mode in this new normal setting of virtual teaching and learning [5]. The technical and legal procedures for adopting online learning and the infrastructure enabling its access and delivery had to change swiftly due to the COVID-19 epidemic. Considerable resources have been invested, and methods established to link students with course activities and materials, promote communication between instructors and students and handle online learning administration. At the same time, many people still struggle with access. As a result, greater access and possibilities to online education have been established, and the next era of online education adopters has a clear path ahead. [6] The use of technology in the classroom is increas-

ing, and the opportunities for boosting student learning are endless. Blended learning can increase options for learning by integrating the most acceptable practices of in-class education with the most effective online tools. However, more studies are needed to determine the optimal way to create and apply this new learning base. [7] If blended learning is conducted in a well-planned and systematic manner, it may combine the benefits of the conventional teaching-learning process with the ICT-supported teaching-learning process [8]. The current trends in Blended Learning show that the number of papers on BL is increasing, indicating the subject's value and the need for further research. BL increases inclusion and access for those who cannot pay to study; besides, it improves the outcomes of those who already have access to other resources, among other benefits mentioned by various researchers. [9] Students want meaningful interactions before, during, and after sessions, whether in-person or online. Students attribute their satisfaction mainly to the personality and quality of their teachers. They consider assistance to be comprehensive that include both academic and non-academic components. The differences among various forms of assistance are seen as arbitrary and even harmful. Instructors that provide every type of help those students may seek are valued by them. [10] Regarding students' challenges in blended learning, the most challenging are social challenges, such as low motivation, poor socialising, and high procrastination. Regarding faculty perspectives on the benefits of online teaching to students in various countries, 43% of survey participants in Finland say there is no difference between online/blended learning and traditional education. The survey results demonstrate that 46% of students are satisfied with BL [11]. Several papers claimed that the students' satisfaction levels are around 40-55% including satisfaction level of students at Delft University of Technology (TU Delft) 41.3% [12], students satisfaction level in six European universities 46% [11] and satisfaction level of undergraduate students enrolled at a public university in Greece 54% [13]. The best practices identified by the teacher-respondents were the preparation of video lessons, online quizzes and tests, the use of the Learning Management System (LMS), the accessibility of asynchronous teaching materials for all students, taking into account differences in the availability and speed of the students' internet connections, and the availability of activity after lessons. [14] While courses are structured in the blended learning model, students in soft disciplines do better than classmates in complex fields. Therefore, to develop the most efficient blended learning courses, discipline distinctions should be taken into account. Furthermore, after adjusting for gender and past learning accomplishment, the findings show that clear objectives and expectations, material quality, and interactive learning strongly influence students' performance. These crit-

ical aspects represent the effort of teachers' assistance, feedback, and facilitation, despite their statistical non-significance in the study. [15] The takeaway points after covid 19 outbreak highlight the need for some practices regarding online education. Quick and short notice shift to online education is not the same as planned online education. To tackle such a situation, 1. The lectures need to be supported. 2. Management should also be dynamic by considering the following points: weekly webinars, centralising licenses for tools, allowing space for piloting tools, and a guide for tools that aren't GDPR-authorized or approved. 3. Online social components or social learning environments should be provided. [16]

3. Research Method

The paper aims to investigate online education best practices from four EU countries. In the first part, We carried out a systematic mapping study to classify and summarize the existing information concerning the research questions. Planning, performing, and reporting were three steps of our systematic mapping study. The second part is the survey study.

3.1. Systematic Mapping Study

The process of discovering, classifying, and analysing existing literature relevant to a certain research topic is known as a systematic mapping study. [17] This technique provides a structure for many published research reports and outcomes while methodically exploring and categorising studies on a particular research subject. [18]

3.2. Research Questions

The research goal is to answer the following research questions (RQs):

- RQ1. What are the students preferred methods of study?
- RQ2. What do students want to do during course participation?
- RQ3. Which online studies tools are the best from students' viewpoint?
- RQ4. What do students consider the three most important benefits/advantages of online/blended courses?
- RQ5. What do students consider the three most important problems/disadvantages of online/blended courses?

4. Results

4.1. Literature Review Results

Students' perspectives regarding online/blended learning were studied in the papers from 2022 and newer. The papers are searched through Google Scholar, including

"online learning students challenges", "online learning students opportunities", "students learning perspective", and "students learning viewpoint".

4.1.1. Preferred Styles of Studies

There are notable variations in the satisfaction levels between two groups of online and face-to-face students in undergraduate and postgraduate at the Master's level at the University of Leon, School of Engineering ($p = 0.019847 < 0.05$). Upon examining the average scores, it becomes evident that the face-to-face group exhibits higher satisfaction levels than the group of students compelled to participate in online learning. [19]

Virtual education emerged as a solution to ensure the continuation of teaching and learning during the global pandemic. Although students acknowledge the value of digital tools and learning platforms, the face-to-face experience is generally more fulfilling. [20]

Looking at it from the perspective of the university students' performance for a Science, Technology, Engineering and Mathematics (STEM) related module, 54% believe that they prefer the experience of face-to-face instruction to online learning, and the majority would not suggest using this novel online intervention in academic settings in the future. [21]

Instead of relying entirely on online or traditional learning methods, 75% of the students and faculty members at the University of Sharjah chose a hybrid approach that included face-to-face and e-learning techniques. [22]

Undergraduate students at the University of California San Diego (UCSD), 36 percent of respondents agreed, 28% neither agreed nor disagreed, and 36% disagreed with the statement "Generally satisfied with the online learning experience". [23]

Students at a private university in Indonesia, Universitas Medan Area (UMA) said online education did not meet expectations like traditional education. [24]

4.1.2. Preferred Course-Related Activities

The primary challenge to online learning for undergraduate students at Al-Aqsa University is the lack of face-to-face connection with professors and fellow students. Online communication was somewhat challenging because everyone has various circumstances, making it challenging to determine the best time for students to communicate with classmates and instructors. [25]

Challenges with learning and self-regulation in an online learning environment for university students from Croatian faculties are a direct and indirect outcome of the pandemic's perceived lack of academic social contacts. Students with fewer academic social contacts also have more trouble learning and controlling their behaviour when studying online. [26]

4.1.3. Applied tools for online studies

The significance of Moodle as an online learning platform at Sultan Qaboos University (SQU), Oman, was emphasized in this study. Moodle is widely adopted as an LMS and effectively addresses instructional challenges, thereby enhancing the overall quality of the learning experience for students. [27]

Most students agreed regarding the well-structured nature of teaching materials and the implementation of diverse learning strategies to facilitate student comprehension at the Indonesian Language and Literature Education Department of Musamus University, Indonesia. [28]

For some students at seven large public universities across the U.S, one notable change was the absence of reliable internet access previously accessible on campus. In one student's case, the internet connection issue was specifically linked to their instructor. [29]

According to the students at a private university, Universitas Medan Area (UMA), Indonesia, learning Microsoft Office is simple and important for online learning. [24]

4.1.4. Most important benefits of online/blended learning

Flexibility

Many students at seven large public universities across the U.S discovered the value of having additional personal time due to reduced daily obligations. This increased personal time resulted in students reporting improved well-being and happiness. Furthermore, having more personal time enabled students to achieve a greater life balance. [29]

Flexibility in terms of location and timing has been seen as the main advantage of blended learning, according to 77.2% of the students and faculty members at the University of Sharjah. [22]

Easiness

According to most students at a private university, Universitas Medan Area (UMA), Indonesia, the online computer practicum is simple to use, beneficial for learning, and easy to access. [24]

Schedules

Some students' responses at seven large public universities across the U.S highlighted schedule disruptions and the loss of their regular daily routines. While some students established and stuck to new routines effectively, others struggled with this adjustment. [29]

4.1.5. Most important problems of online/blended learning

Lack of contact

A number of students at seven large public universities across the U.S mentioned experiencing a "lack of access to university resources" that were typically available to them on campus. These resources, which students considered crucial for their academic progress, included instructor guidance and support, tutoring services, peer interaction and collaboration in group work, research opportunities, laboratory experiences, internet access, and other academic resources. [29]

Regarding the students and faculty members at the University of Sharjah, the quick adoption of e-Learning negatively affected users' socialisation and mental health, with 55.6 percent of users saying this had happened. Additionally, 71.6% of respondents indicated that their academic performance and grades had declined. [22]

Lack of interactive

The interaction between teachers and college students at Chinese universities benefits learning outcomes and mediates those outcomes through psychological conditions and learning engagement. Additionally, psychological environment and learning engagement have a chain-mediating effect on the teacher-student interaction influence mechanism that influences students' learning outcomes. [30]

Over 50% of the responses from students at seven large public universities across the U.S indicated that students experienced negative affective or emotion-related outcomes that hindered their academic success. Many students reported decreased productivity due to distractions and inadequate learning environments. As mentioned by students, a lack of motivation was frequently accompanied by difficulties in maintaining focus and productivity. Additionally, several students highlighted an increase in workload for their online classes. [29]

Because of their inadequate contact, students find it difficult to interact with the instructor in online learning at a private university, Universitas Medan Area (UMA), Indonesia [24].

Communication Issue

Most students at the Indonesian Language and Literature Education Department of Musamus University acknowledged that they were encouraged to ask and answer questions, and the feedback provided on their work was deemed highly beneficial. The suggestion emphasizes the importance of lecturers proactively engaging with students and assessing their circumstances before commencing online instruction. [28]

Undergraduate students in mid-2021 in Bandung, Indonesia most often reported negative experiences are

dizziness from prolonged computer use and communication issues with coworkers. It's interesting to note that the respondents also mentioned unpleasant aspects of their living situations, such as distraction from other tasks at home and outside noise. [31]

Technical

Some students at seven large public universities across the U.S mentioned a rise in technology usage due to the shift towards online education. This increase in technology use was described as more screen time, more time online or on platforms like Zoom, and increased usage of phones or laptops. Students expressed that technology enabled them to stay connected with loved ones and facilitated their learning process. [29]

For undergraduate students at the University of California San Diego (UCSD) unreliable WiFi was the most common technical problem. Unreliable WiFi is experienced "Often" or "Always", according to 20% of students. Unreliable WiFi impacts students' online learning "Never" or "Rarely," according to 45% of students, while 35% report that this problem occurs to them "Sometimes,,". Unreliable devices are the next typical technology issue that students encounter. A bad physical environment impacts students' online learning for 32% of the respondents "Often" or "Always." Platform problems with Gradescope, Canvas, and Zoom were present but less frequently reported. [23]

For the duration of online classes at Al-Aqsa University, the unpredictable nature of the internet only allowed for one-way contact of undergraduate students with instructors. Other students complained that hearing their teachers clearly and continuously was challenging. [25]

4.2. Survey

The survey focused on students participating in institutions and their online learning tools and online education experiences. LUT University collected the data and organized the design and data collection instruments. The English version was done by LUT, and if the universities needed a localized version of the questionnaire, the translation was done by themselves. 108 submissions were received, the majority of which were from Germany, Finland, and Hungary. There were also responses from the United Kingdom, France, and a few other nations in the English version of the survey, which was subsequently complemented by 64 contributions from the Spanish questionnaire. Overall, around 170 students responded to this questionnaire. Most participants, 52%, were typical university students, first-time students pursuing their first university degree, and 30% were non-traditional university students, indicating they are pursuing extra courses, non-degree education, or something else. However, almost all students in the Spanish version of the question-

naire were 100% long-distance students, but the majority of participants in the English version were at least participating in some campus activities. To investigate if there were any meaningful differences, the traditional student survey from full-time students in the English survey and adult education part-time students in the Spanish survey were compared separately. That indicates that the survey results are about the English survey participants, who include students from Germany, Finland, Hungary, the United Kingdom, and France.

4.3. Survey facts

The first section includes details about the participants. The total number of respondents was 108.

There was quite an even gender distribution. 56% of respondents were female, 41% male, and 3% did not want to disclose.

As is common for university students, the vast majority of our students were between the ages of 20 and 30, 78%. Other groups include 6% 18-20, 10% 31-40 and 6% over 40 years old.

Among various degree programmes, 48% of 107 students were pursuing a Master's degree, and it was their first Master's degree. 29% were only pursuing a Bachelor's degree, and 17% already held a master's or bachelor's degree but were continuing their education, either because they changed jobs or wanted to pursue a double degree or something similar, figure 1.

- Bachelor's degree program for a first degree
- Master's degree program for a first degree
- Bachelor's or Master's degree as a second or other degree
- Other degree type

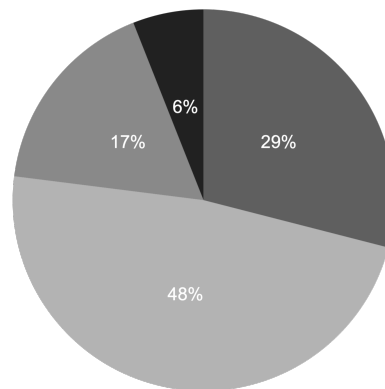


Figure 1: Respondents by degree program.

Surprisingly, this question asks how large the percentage of studies are now available online. 36% of students stated having few to no online activities, 0 to 20%. And

combining these other groups together, more than half of these students are expected to spend at least half of their time on campus, figure 2. Although it has been the trend for a few years now to talk just about online studies, statistics for the EU reveal that having only online courses or a semester's worth of digital online activities is not the norm [4].

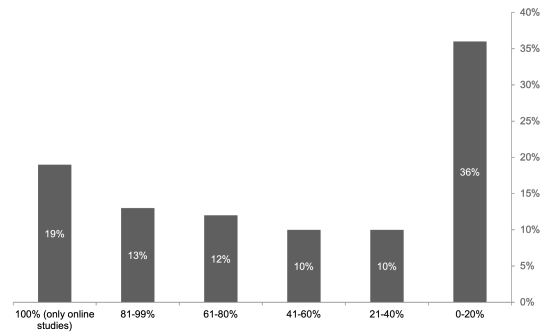


Figure 2: Current degree programs studies are done online or long-distance studies.

The main areas of study were business and accounting, engineering, computer science and others. Forty-four percent of respondents were students in business and accounting, 26% in engineering, 3% in social sciences, 15% in computer sciences, and 12% in other fields.

Eighty-three percent of respondents were full-time, and 17% were part-time students.

36,5% of respondents were studying in Germany, 23,4% in Finland, 22,4% in Hungary, 11,2% in France, and 6,5% in other countries, figure 3.

4.4. Survey results

4.4.1. Preferred Styles of Studies

The first questionnaire is designed to determine how students desire to learn. What is their preferred method of study? Are they even interested in studying online? What do students expect from campus if they are interested in online studies? What kinds of events or activities do they wish to attend? If students are offered the option of taking online classes instead of face-to-face or on-campus courses, they may not decide to do so. Even the exercise and tutoring sessions were very contentious. Because 3.0 is the exact midpoint of the 1 to 5 scale. The important for the future design of courses and work is that even though we might consider online education and online activities very positive development, it creates the teachers and the students from the schedules, the strict structuring of the course and the work week and these sort of things, it's actually not that liked. Stu-

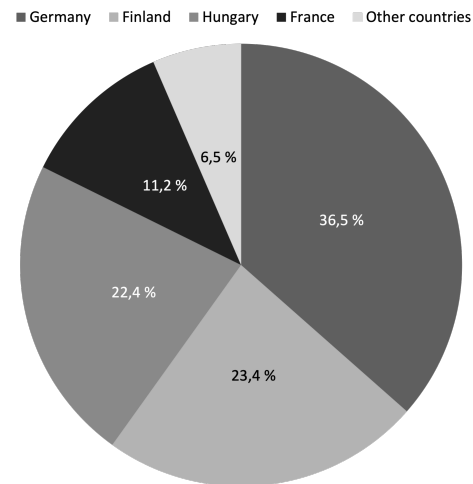


Figure 3: Respondents by country

dents who fit the typical stereotype do not favour online learning over on-campus learning. The findings do not show that online is worse than on campus. It simply states that students do not prefer online education to on-campus education. The average 3.5 for exercises and tutoring events, 3.4 for lectures, and 3.8 for on-campus vs online-only programmes indicate that students who are currently in totally online education like it, but it is not a huge deal for them. Or, if they could attend a similar programme at a nearby university or institution, they may prefer to do so. Campus activities and teaching events are only a small part of the campus experience. The social aspect of studying at university is an important aspect of education or studies at university, such as meeting new people, creating social networks, making connections to companies and all the other things. First-time students might not necessarily see online education as a benefit.

The tools for attending online teaching events received the highest ratings. The tools worked well enough for the students, and various possibilities were available. The technologies for attending online exercises, such as Zoom, Teams, submitting tools and managing the courses, were all familiar to the students (average score 4,4). The students prefer online tools for presentations instead of presenting at face-to-face events (average score 3,6).

Most questions failed to reach strong bias and differed from the generally neutral position. For collecting students' submissions and these sorts of things, online environments work wonderfully from the teaching perspective. Still, students don't necessarily find online courses that are automatically better than traditional on-campus ones. It is the responsibility of the professors to ensure

Table 1
preferred styles of teaching average score (scale 1-5)

Statement	Avg. score
(1) If able to select, I prefer online courses in general over face-to-face or at-campus courses.	2,9
(2) If able to select, I prefer online lectures over face-to-face or at-campus events.	2,9
(3) If able to select, I prefer online exercises and tutoring sessions over face-to-face or at-campus sessions.	3,0
(4) I find using the tools to attend online teaching sessions and course events easy to use (for example, Zoom or Teams).	4,4
(5) I find using the tools to submit and manage course assignments easy to use (for example, Moodle, Kahoot or Blackboard).	4,1
(6) If I have a course-related question, I prefer to contact the teaching staff with online tools.	3,7
(7) If I have to present my work at a course, I prefer using online tools to give my presentation.	3,6
(8) If I need help with my personal assignments, I prefer attending online tutoring sessions rather than face-to-face or at-campus sessions.	3,0
(9) If I work in a team project, I prefer to have online meetings instead of face-to-face or at-campus meetings with my team.	3,0
(10) I prefer pre-recorded lecture videos over scheduled live streams or at-campus lectures.	3,1
(11) If able to select, I would select a fully online degree program over a face-to-face or at-campus degree program.	2,5
(12) I prefer working with self-set deadlines and open schedules than with several short-term (weekly) schedules and deadlines.	3,4

that the course functions content-wise or that the tools are used wisely so that it truly presents and operates as a coherent thing.

The respondents rated the twelve statements regarding preferred styles of teaching on a scale of 5, (1) strongly disagree, (2) disagree, (3) neither agree nor disagree, (4) agree, and (5) strongly agree. The average score is 3,3. The highest average score is 4,4, mentioning that the tools to attend online teaching sessions and course events are easy to use. All the statements' ratings can be found in Table 1.

4.4.2. Course-related activities

The other questionnaire asked about the importance of these course-related activities. The goal was to understand what students desire, what they want to accomplish, and what they do during course participation. Tak-

Table 2
Course-related activities average score (scale 1-5)

Statement	Avg. score
(1) Ability to take notes during the presentations	4,0
(2) Discussions with other course participants	3,8
(3) Live events (streamed events or live lectures)	3,6
(4) Having Quizzes and other audience-participation mechanics.	3,5
(5) Ability to ask questions from the lecturer	4,2
(6) Ability to ask for help from teaching assistants	4,0
(7) Ability to select my own participation schedules for events and sessions	3,8
(8) Courses allow me to meet my peers	3,9
(9) Courses give me a reason to get out of the house/ go visit the university campus	3,6
(10) Predefined schedules to manage time between other courses and/or work.	3,9

ing notes (average score of 4,0), asking questions from the lecturer (average score of 4,2), and seeking assistance or support from the teaching assistant (average score of 4,0) are among the most important aspects of participation in lectures. Furthermore, the course allows me to meet my classmates (average score 3.9), demonstrating that participation or opportunity to attend campus for the university experience and social aspect is essential. The students also desire the option of selecting the event they participate in. Yet, regardless of how the courses are structured, they must be able to contact the teaching staff.

The students rated the ten statements regarding the study or course-related activities on a scale of 5, (1) not important, (3) neutral, no opinion, and (5) most important. The average score is 3,8. The highest average score is 4,2, mentioning that the ability to ask questions from the lecturer is the most important matter for the students. All the statements' ratings can be found in Table 2.

4.4.3. Applied tools for online studies

Another questionnaire asked which tools are the best or which tools work. The various types of online conferencing software, Zoom, and Teams, with an average score of 4.7 out of 5, demonstrate that all these solutions work. It makes no difference which video conferencing or documentation tools are utilised as long as they are systematic and the tasks are easy enough for learners to become familiar with the system. Video lectures, online documentation, and other learning platform tools are useful and accessible to students. According to the survey results, the online participation tools or their usability are not a problem. Students can utilise the tools

Table 3
Utilizing digital learning tools average score (scale 1-5)

Statement	Avg. score
(1) Audience participation and polling tools	3,3
(2) Instant messaging tools	3,6
(3) Learning management systems (Moodle...)	4,0
(4) Online programming environments (Codegrade, Codecademy...)	2,1
(5) Online libraries (IEEEExplore, ACM Digital Library...)	3,0
(6) Online video conferencing tools (Zoom, Teams...)	4,7
(7) Social media or cooperation platforms (such as Slack, Discord...)	3,0
(8) Peer review tools	2,7
(9) Technical software environments (3D Studio, Blender, Visual studio, Unity3D...)	2,2
(10) Online file or data repositories (Github, Sharepoint...)	3,1
(11) Online document tools (Google Docs et al., Overleaf, Office 365...)	4,3



Figure 4: Most important advantages of online/blended learning based on survey results

and prefer online tools over face-to-face activities.

The students rated the eleven statements regarding applied tools for online studies on a scale of 5, (1) unfamiliar, never used, (5) very familiar, used on all courses. The average score is 3,3. The highest average score is 4,7, mentioning that students are familiar with and use online video conference tools such as Zoom and Teams in all courses. All the statements' ratings can be found in Table 3.

4.4.4. Most important benefits/advantages of online/blended courses

The next open question concerned the three most important benefits or advantages of online/blended courses. The word cloud indicates that flexibility, easiness, and schedules are the three most significant learning characteristics. It does not matter whether the learning event is live, streaming, or recorded if communication channels are available. The important thing to remember is that the communication channel exists. Students may interact with educators, ask questions, show their work, and receive feedback. According to the survey results, having access to teaching staff is the most crucial feature of course arrangements. Online courses enable students to work while learning and contribute from a long distance. (figure 4)

4.4.5. Three most important problems/disadvantages of online courses

The next open question was regarding the three biggest problems or disadvantages of online/blended courses. The word cloud indicates that the three most significant learning problems are lack of contact, interaction, and communication issues. It is not enough to simply have a Moodle forum. To emphasise successful online education or successful online courses, an appropriate online channel or online activities, as well as interaction with students so that students feel they are being looked after, are required. (figure 5)

4.4.6. Preferred online course

The last open question was regarding the preferred online course. Because the word cloud provided no meaningful results, we used qualitative open coding to analyse these responses. (1) Online courses should still contain schedules, deadlines, and structures, preferably at least a recommended schedule, so students do not have to estimate how much work and time is required. (2) There is the option to interact with the lecturer or other participants, but there is no requirement. (3) The university has specified workspaces, and the course websites are properly arranged. These systems, such as Teams, Zoom, and Slack, are functional. (4) Finally, the streaming software and environment do not matter as long as it's kept clear and simple, such as Kahut, Mentimeter, and other interaction tools.

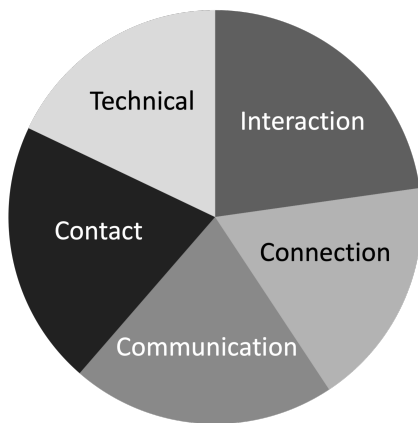


Figure 5: Most important disadvantages of online/blended learning based on survey results

4.5. Survey observations

The general observations from the survey are as follows: (1) One of the best practices is limiting the number of tools to a minimum. (2) Creating both longer theory lectures and short tutorial videos is a waste of effort. Choosing one and staying with it can be more efficient. (3) Groups that prefer to participate online are less active in all course areas than those who attend on-campus events.

4.5.1. Access to teaching staff

First, students emphasised the issue of access to teaching staff. Lectures and other events can be live or recorded if access to teaching personnel is provided. Furthermore, while there may be online or compass exercise groups, having access to teaching staff to assist students is more important.

4.5.2. Motivation and social aspects of online participation

The students considered the difficulties of making social contacts and interacting with classmates important concerns since the campus experience includes interaction, working with and meeting other students.

4.5.3. Open schedules may lead to lack of discipline

The teacher should at least show the basics of how this course should be done and the schedule for successfully

completing this course. The schedule may be clear to the teacher but not the students or the students may lack the expertise or motivation to manage the time appropriately.

4.5.4. Considering the audience

The students do not necessarily choose a flexible schedule, do-when-ever approach, or online course. Communication, collaboration with peers, and access to teaching personnel are all key aspects of education. Even among long-distance adult education students, some prefer on-campus teaching.

5. Discussion

5.1. Summary and Discussion of the Main findings

5.1.1. RQ1 - Students Preferred Styles of Studies

The survey results indicate Typical stereotyped students do not choose online learning over on-campus study. The results do not demonstrate that studying online is worse than on campus. It only says that students do not favour online learning over classroom instruction. According to the average ratings of 3.5 for exercises and tutoring sessions, 3.4 for lectures, and 3.8 for on-campus vs online-only courses, students now enrolled in completely online education appreciate it but don't think much of it. The campus experience is made up of a lot more than just academic activities and gatherings. A significant part of education or studying at university is the social component, which includes meeting new people, building social networks, connecting with businesses, and doing other activities. Online education might not always be seen favourably by first-time learners.

The literature review results point out that it is clear that the face-to-face group is more satisfied than the group of students required to take online courses [19]. Students see the value of digital tools and learning platforms, but they typically find face-to-face interactions more rewarding [20]. 54% of students prefer face-to-face education to online learning [21]. Students said online education did not meet expectations like traditional education. [24]

Considering the survey and literature review results, the students would prefer face-to-face learning slightly to online learning.

5.1.2. RQ2 - Students Preferred Course-Related Activities

The survey findings suggest that the most important aspects of lecture participation are taking notes, asking the lecturer questions, and requesting the teaching assistant

for help or support. Additionally, the course provides the ability to interact with classmates, illustrating how important it is to have the chance to visit campus for the university experience. Additionally, the students want to decide whatever activity they participate in. However, they must be able to contact the teaching personnel regardless of how the courses are set up.

The literature review results indicate that the main challenge with online learning is no face-to-face interaction with teachers or other students [25]. Additionally, students with less academic social interactions struggle more to learn and maintain discipline when doing online coursework [26].

According to the survey and literature review results, interaction with the lecturer and classmates is essential.

5.1.3. RQ3 - Applied Tools for Online Studies

The survey's findings indicate as long as the tools are systematic and the tasks are simple enough for learners to understand, it doesn't matter which video conferencing or documentation technologies are used. Students can access resources on learning platforms, including video lectures and online documentation. The usability of the online participation tools is not an issue. Students can use the tools and favour online activities over in-person ones.

The literature review results claim that Moodle is a commonly used learning management system (LMS) that successfully deals with instructional difficulties, improving the overall quality of the educational experience for students [27]. Most participants agreed on the well-structured quality of instructional materials and the use of various learning techniques to aid student comprehension [28]. From the students' perspective, learning Microsoft Office is easy and crucial for online learning [24].

Considering the survey and literature review results, the streaming software and environment do not matter as long as it's kept clear and simple.

5.1.4. RQ4 - Most Important Benefits of Online/Blended Learning

The survey findings indicate flexibility, easiness, and schedules are the most significant advantages or benefits of online or blended classes.

The literature review results reveal that many students discovered the value of having additional personal time due to reduced daily obligations. Having more personal time enabled students to achieve a greater life balance [29]. Flexibility in terms of location and timing has been seen as the main advantage of blended learning [22]. The online computer practicum is simple to use, beneficial for learning, and easy to access [24]. Some students'

responses highlighted schedule disruptions and the loss of their regular daily routines. [29].

According to the survey and literature review results, flexibility, easiness, and schedules are among the most important advantages of online/blended learning.

5.1.5. RQ5 - Most Important Problems of Online/Blended Learning

The questionnaire findings indicate the three most significant learning problems are lack of contact, interaction, and communication issues.

The literature review results show that many students reported the "lack of access to university resources" they would otherwise have on campus. The direction and support of the teacher, tutoring services, peer interaction and group work, research opportunities, laboratory experiences, internet access, and other academic resources were among the resources that the students felt were essential for their academic success [29]. The quick adoption of e-Learning negatively affected users' socialisation and mental health, with 55.6 percent of users saying this had happened [22]. The interaction between teachers and students benefits learning outcomes and mediates those outcomes through psychological conditions and learning engagement [30]. Many students mentioned that they experienced negative affective or emotion-related outcomes and decreased productivity due to distractions and inadequate learning environments that hindered their academic success [29]. Because of their inadequate contact, students find it difficult to interact with the instructor in online learning [24]. Most respondents acknowledged that students were encouraged to ask and answer questions, and the feedback provided on their work was deemed highly beneficial. Proactively engaging lecturers with students and assessing their circumstances is important before commencing online instruction [28]. Respondents most often reported negative experiences are dizziness from prolonged computer use and communication issues with coworkers [31].

Considering the survey findings and literature review results, lack of contact, interaction, and communication are the most significant learning problems.

6. Conclusions and summary

COVID-19 might be the driving force behind the global online education shift. As the COVID-19 epidemic hit the world in the first months of 2020, various colleges and other institutions of higher learning were confronted with the difficulty of shifting their programs from campuses to online environments. In this paper, we examined student survey results from four different European Union countries and their universities to determine what works in online education from their perspective, what

challenges online education and blended education approaches still face, and how students from these different countries perceive online education to perform in comparison to on-campus approaches. The study aimed to study online education issues from students' perspectives and discover what students think is potentially difficult in their studies and what they believe is the best solution for their online courses. The open survey items and the numerical data acquired from the conducted surveys generally all provide similar findings. One key point is that online courses are not necessarily unviable in any studied educational domain. There was no evidence found regarding some areas of education that can or cannot use online education, so there is always the option of going online, but there are a few fundamental guidelines or observations from the data that are useful, including providing access to teaching staff, considering the social aspects of online participation, clarifying the course schedule, and considering the audience. As technology continues to evolve, blended learning will likely become an essential approach to education. Further research can be conducted to explore the advantages and disadvantages of online/blended learning across different contexts and student populations to prepare a guideline for online/blended learning adoption in the education system.

References

- [1] B. Biantoro, Exploring the integrations of mall into english teaching and learning for indonesian efl students in secondary schools, *Celtic: A Journal of Culture, English Language Teaching, Literature and Linguistics* 7 (2020) 102–117.
- [2] I. Istiqomah, The students' perceptions on using blended learning for english learning during covid-19 pandemic, *Journal of English Language Teaching and Linguistics* 6 (2021) 307–317.
- [3] B. Kang, How the covid-19 pandemic is reshaping the education service, *The Future of Service Post-COVID-19 Pandemic, Volume 1: Rapid Adoption of Digital Service Technology* (2021) 15–36.
- [4] Eurostat, Interest in online education grows in the eu, *Eurostat* (2021) 36–44.
- [5] A. Yani, English teachers' perception on the quality of online learning during covid-19, *Journal of English Language Teaching and Linguistics* 6 (2021) 471–486.
- [6] B. A. Kitchenham, D. Budgen, O. P. Brereton, Using mapping studies as the basis for further research—a participant-observer case study, *Information and Software Technology* 53 (2011) 638–651.
- [7] I. Stavtseva, I. Kolegova, Innovative technology in blended learning: general english course design and its implementation for university students, *Вестник Южно-Уральского государственного университета. Серия: Образование. Педагогические науки* 12 (2020) 51–61.
- [8] K. L. Dangwal, et al., Blended learning: An innovative approach., *Universal Journal of Educational Research* 5 (2017) 129–136.
- [9] S. Serafim-Silva, R. G. Spers, L. Vázquez-Suárez, C. P. Ramírez, et al., Evolution of blended learning and its prospects in management education, *International Journal of, Evolution of Blended Learning and its Prospects in Management Education* (January 14, 2022). Serafim-Silva, S., Spers, RG, Vázquez-Suárez, L., & Peña Ramírez, C (2022).
- [10] A. Armellini, V. Teixeira Antunes, R. Howe, Student perspectives on learning experiences in a higher education active blended learning context, *TechTrends* 65 (2021) 433–443.
- [11] M. Mohammadi, Current trends of blended and hybrid learning: case study: Fable project (2021).
- [12] A. Cervone, J. Melkert, L. Mebus, G. Saunders-Smits, Push or pull students into blended education: A case study at delft university of technology, *International Journal of Engineering Education* 32 (2016) 1911–1921.
- [13] M. Giannousi, N. Vernadakis, V. Derri, M. Michalopoulos, E. Kioumourtzoglou, Students' satisfaction from blended learning instruction, in: *Tcc, TCC Hawaii*, 2009, pp. 61–68.
- [14] I. Lopez, J. E. Valdez, J. A. Villanueva, W. L. Balonquita, J. Flores, Readiness in adopting a blended learning approach in science: challenges encountered and breakthroughs (2021).
- [15] M. H. Vo, C. Zhu, A. N. Diep, Students' performance in blended learning: disciplinary difference and instructional design factors, *Journal of Computers in Education* 7 (2020) 487–510.
- [16] N. Wahls, G. Dijkstra, G. Ouwehand, Blending your education: Lessons learned during covid (2022).
- [17] M. Salama, R. Bahsoon, N. Bencomo, Managing trade-offs in self-adaptive software architectures: A systematic mapping study, *Managing trade-offs in adaptable software architectures* (2017) 249–297.
- [18] K. Petersen, R. Feldt, S. Mujtaba, M. Mattsson, Systematic mapping studies in software engineering, in: *12th International Conference on Evaluation and Assessment in Software Engineering (EASE)* 12, 2008, pp. 1–10.
- [19] R. Martínez-García, F. J. Fraile-Fernández, G. Búrdalo-Salcedo, A. M. Castañón-García, M. Fernández-Raga, C. Palencia, Satisfaction level of engineering students in face-to-face and online modalities under covid-19—case: School of engineering of the university of león, spain, *Sustainability* 14 (2022) 6269.

- [20] A. Ojeda-Beltran, D. D. ORTEGA-ÁLVAREZ, E. A. BOOM-CARCAMO, Análisis de la percepción de estudiantes presenciales acerca de clases virtuales como respuesta a la crisis del covid-19, *Espacios* 41 (2020) 81–92.
- [21] A. Sofroniou, B. Premnath, Comparison of online learning during the covid-19 pandemic against the traditional face-to-face learning experience for a stem related subject, analytical mathematics, *Journal of Education, Society and Behavioural Science* 35 (2022) 1–14.
- [22] E. Mushtaha, S. A. Dabous, I. Alsyouf, A. Ahmed, N. R. Abdraboh, The challenges and opportunities of online learning and teaching at engineering and theoretical colleges during the pandemic, *Ain Shams Engineering Journal* 13 (2022) 101770.
- [23] B. Hollister, P. Nair, S. Hill-Lindsay, L. Chukoskie, Engagement in online learning: student attitudes and behavior during covid-19, in: *Frontiers in Education*, volume 7, Frontiers Media SA, 2022, p. 851019.
- [24] S. Sutrisno, A. H. Lubis, A survey on online computer practicum during the covid-19 pandemic: Students' perceptions, *Int. J. Res. Rev* 9 (2022) 372–379.
- [25] H. Abuhassna, F. Awae, A. H. Alsharif, N. Yahaya, S. Alnawajha, Understanding online learning engagement and challenges during covid19: Qualitative evidenc, *International Journal of Academic Research in Progressive Education and Development* 11 (2022) 651–661.
- [26] T. P. Ivanec, The lack of academic social interactions and students' learning difficulties during covid-19 faculty lockdowns in croatia: the mediating role of the perceived sense of life disruption caused by the pandemic and the adjustment to online studying, *Social Sciences* 11 (2022) 42.
- [27] T. S. Amer, A. S. Al Musawi, A. A.-N. Muhammad, Higher education students' perceptions of e-learning quality., *Journal of Education and e-Learning Research* 9 (2022) 71–78.
- [28] N. L. S. Habeahan, S. M. R. Leba, W. Wahyuniar, D. B. Tarigan, S. I. Asaloei, B. R. Werang, Online teaching in an indonesian higher education institution: Student's perspective, *Int J Eval & Res Educ* ISSN 2252 (2022) 8822.
- [29] I. Sharaievska, O. McAnirlin, M. H. Browning, L. R. Larson, L. Mullenbach, A. Rigolon, A. D'Antonio, S. Cloutier, J. Thomsen, E. C. Metcalf, et al., "messy transitions": Students' perspectives on the impacts of the covid-19 pandemic on higher education, *Higher education* (2022) 1–18.
- [30] H.-L. Sun, T. Sun, F.-Y. Sha, X.-Y. Gu, X.-R. Hou, F.-Y. Zhu, P.-T. Fang, The influence of teacher-student interaction on the effects of online learning: based on a serial mediating model, *Frontiers in psychology* 13 (2022).
- [31] D. Prasetyanto, M. Rizki, Y. Sunitiyoso, Online learning participation intention after covid-19 pandemic in indonesia: Do students still make trips for online class?, *Sustainability* 14 (2022) 1982.