

On-line, face-to-face or hybrid teaching in architectural education?

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ABSTRACT: Face-to-face and on-line teaching are well established modes in architectural education. However, student preferences and opinions are not always sufficiently considered in the assessment of these modes' effectiveness. The main aim of this study was to define a range of criteria for a new, effective mode of architectural education with student input. This study is based on a survey conducted on a group of 52 architecture students at a university in Poland. The group experienced both face-to-face and on-line modes of education in different semesters. The survey questions covered the most important aspects of architectural education. Students were encouraged to express their own opinions and suggest improvements, which informed the SWOT analysis of both modes. The analysis resulted in a proposal for a new hybrid mode of education. The proposal was formulated by combining the strengths and opportunities of both modes with the simultaneous elimination of factors that were labelled as weaknesses and threats. It is an example of a student-centred educational strategy aimed at improving student experience and outcomes.

INTRODUCTION

In the 1840s, Isaac Pitman, an English language teacher came up with a new idea for student engagement in education. He started to send postcards with homework to his students living across the United Kingdom. As soon as the students completed their tasks, they sent them back to their teacher for correction. Pitman's idea turned out to be a great success, and three years later the Phonographic Correspondence Society was founded to deliver the first remote learning courses. In 1873, the first fully remote school started to enrol students from the USA [1].

Distance education lasted through the decades as an alternative to on-campus teaching until recent times. The 2020 pandemic outbreak was a turning point in the history of education. It was undeniably the first time that almost the entire world had been forced to change the way of teaching.

The observation of architecture students at a university in Poland after the change from on-campus to on-line education was the basis for this article. The study reported therein was conducted between the first lockdown (March 2020) and the end of the year 2020. The main goal of this study was to analyse the benefits and drawbacks of on-line teaching methods in architecture, and to formulate a proposal for a new hybrid method of education. A similar approach to on-line tools was presented by Życzkowska and Urbanowicz [2] and, in the Covid-19 situation by Brzezicki [3].

METHODOLOGY

Teaching architectural design is a complex problem. Compared to other engineering fields, it requires perfect student-teacher rapport and almost no laboratory gear. The early stages of design usually involve hand drawing. Depending on the scale of the project, students may use large paper sizes. Traditional, face-to-face teaching is based on the discussion on students' drawings. During the semester, projects are continuously developed by adding and changing drawings and schemes. At the end of the semester, the projects are assessed publicly. Students compare their projects and discuss them with teachers and colleagues. This method of work is common for the majority of classes.

SWOT analysis is one of the most frequently used assessment methods. Although it is usually applied in business-related analyses, it can be also successfully used for decision making in other areas [4]. The method is focused on identifying the favourable and unfavourable features of a particular project, and distinguishing between internal and external factors. Although this methodology has its limitations, especially the lack of hierarchy and relationships between the features listed, its simplicity and clarity make it a useful basis for development planning [5]. In this study, two separate analyses were conducted, one for face-to-face and one for on-line teaching. Then, the conclusions drawn from the SWOTs were used to develop a proposal for a hybrid mode that would combine the benefits of both forms of teaching.

The SWOT analysis carried out by the authors, was based on a survey of students of the Faculty of Architecture at Wrocław University of Science and Technology (FA-WUST) (n = 52 in one group, age 23-24 years). Students in the fifth year of MSc studies anonymously filled in the on-line survey on 14 December 2020. The students had participated in a fully on-line teaching programme since March 2020, due to the Covid-19 pandemic. The survey consisted of 28 questions organised into four categories: technical aspect, sociological aspect, students' impressions and satisfaction with the results. The results of the survey were a key source of data for the analysis described in this article.

RESULTS AND DISCUSSION

Students Responses

The first part of the survey, dedicated to the technical aspect of on-line learning, revealed the scale of the problem, as 87% of the students admitted they had encountered various difficulties during the semester. Their responses are presented in Figure 1. Students drew attention to the variety of used software and their limitations, often hindering work with larger graphic files. An important for didactics, and often unavailable function, is the possibility to draw on a shared screen during classes.

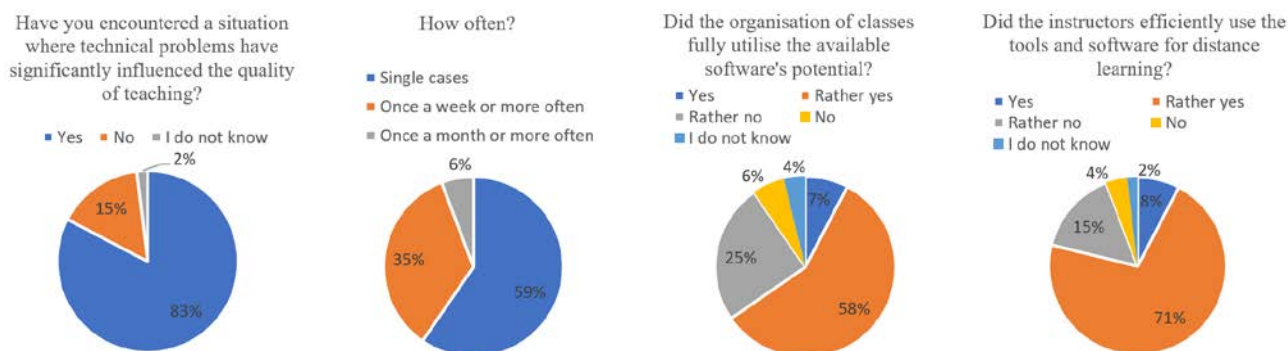


Figure 1: Results of the survey, technical aspect section.

The second part of the survey covered the sociological aspect of on-line learning (see Figure 2). Respondents were asked about their communication issues, relationships with other students and lecturers, and engagement of teachers. The results are presented in the following charts.

The responses to open questions, concerning the students' engagement in on-line classes varied significantly. Approximately 40% of the respondents assessed it positively, while 15% negatively. However, according to the answers, participant engagement was strictly related to the type of class and the way it was conducted. What should be noted is that 25% of the respondents admitted to witnessing a situation in which students used the limitations of on-line teaching for unfair behaviour, such as plagiarism, skipping classes or cheating during examinations.

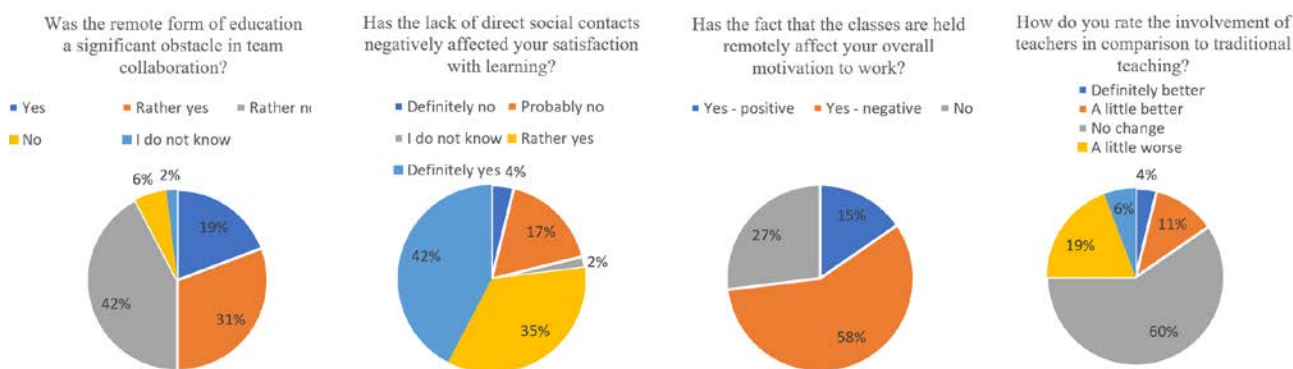


Figure 2: Results of the survey, sociological aspect section.

The next part of the survey was created to collect information about students' subjective opinions and feelings. A significant part of the students stated that on-line learning had a negative impact on their motivation. Moreover, almost 42% of the students described themselves as definitely unsatisfied with on-line learning. However, some of the aspects had a positive reception among the students. For example, a significant majority of the students declared that on-line presentations were less stressful for them. Detailed answers are shown in the following charts (see Figure 3).

Respondents were also asked to list up to three most significant advantages and disadvantages of on-line learning, according to their experience. The most frequently recurring advantages were associated with no need to commute to campus (46% of the respondents) and more effective time management (19%). Students also pointed to the money savings due to the lack of spending on printouts (31%). Other popular answers were as follows:

- Easy access to information and didactic materials shared via on-line platforms - 13% (7);
- The comfort of working in a private environment - 12% (6);
- Higher attendance - 10% (5);
- Getting more sleep - 10% (5).

The lack of face-to-face contact had a negative impact on the learning experience of most students, affecting their physical and mental condition (mentioned by 56% of the respondents). Moreover, technical problems hampered the attendance and co-operation between students and harmed communication and the quality of learning (21%). Other frequently recurring drawbacks mentioned by respondents were as follows:

- Lower quality of reviews received during on-line classes, difficulties in applying corrections to drawings via digital tools - 19% (10);
- Hindered teamwork and contact between students - 12% (6);
- Physical pain (headache, backache) and fatigue caused by prolonged computer work - 10% (5).

Students were also asked to point out elements of on-line learning that were effective and should be, in their opinion, incorporated into the traditional model of teaching. On-line lectures were the most popular answer, mentioned by 46% of the respondents (24). Furthermore, 25% of the students would like to discuss their design on-line during teachers' office hours, and 23% of them would prefer to present their designs in digital form during reviews in class.

Other aspects raised by students were: on-line platforms for didactic materials sharing (15%), designs discussed on the computer instead of printing (13%) and on-line seminary classes (10%). Finally, students were asked about their satisfaction of on-line education, the results of which are shown in Figure 3.

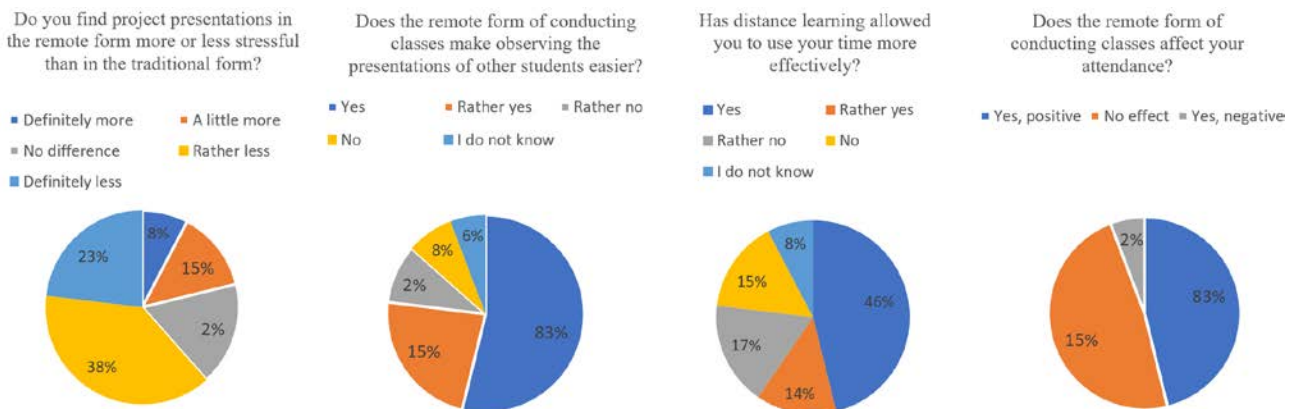


Figure 3: Results of the survey, students' impressions and satisfaction sections.

SWOT ANALYSIS OF ON-LINE AND TRADITIONAL TEACHING

The students' opinions expressed in the survey and discussed in the previous section gave ground for the SWOT analysis presented in Table 1. Answering the questions in each survey section (technical, sociological, impressions and satisfaction), the respondents indicated strengths, weaknesses, opportunities and threats related to on-line teaching methods, in comparison to face-to-face teaching.

Strengths

The conducted strengths analysis revealed two main areas of benefit from the face-to-face teaching mode. The first of them regards the variety of relationships formed during the didactic process. To begin with, the personal rapport between students and teachers increases the engagement and motivation of students, allowing them to find role models and mentors among academics. Face-to-face contact enables a personalised approach and trust-building between teachers and students. Moreover, the relationships established between students facilitate group work and can also benefit them later in their professional life.

The second advantage of traditional teaching is easy to access libraries, laboratories and workshops, enabling the use of professional equipment and software.

On the contrary, the most important advantages of on-line teaching relate to equal opportunities and efficiency. On-line classes are accessible for students with disabilities and special needs, regardless of their geographical location. Furthermore, this mode of teaching allows for a significant reduction in expenses both for the university, in terms of building maintenance, and for students. The relocation to the city, commuting to the campus or printing designs become unnecessary, and those factors with the possibility to combine studies with employment, may make it easier for students from low-income families to continue their education.

Weaknesses

The weaknesses of on-line teaching can be summarised in two areas - technical problems and decreased work quality. Despite the large variety of available software, it is challenging to select the tool suitable for conducting architectural design classes. These limitations can lead some teachers to use multiple software at the same time. Moreover, it is not possible to entirely eliminate problems with the Internet connection, microphones, cameras and other hardware. All of the mentioned obstacles diminish the quality of design reviews and discussions. Furthermore, the lack of face-to-face contact hinders students' teamwork.

On the other hand, the weaknesses of the face-to-face teaching mode relate to location constraints and accessibility. The number and size of student groups have to be adapted to the capacity of university buildings. Finally, face-to-face classes can be a significant barrier for people with disabilities, disorders and special needs, generating unnecessary stress or even entirely preventing them from studying.

Table 1: SWOT analysis of on-line and face-to-face modes of teaching.

	On-line teaching	Face-to-face teaching
Strengths	<ul style="list-style-type: none"> Effective time management by students Cost-effectiveness Equal opportunities for students with disabilities Effective design presentations Easy access to information and didactic materials Increased quality of lectures Less stressful for students Higher attendance 	<ul style="list-style-type: none"> Development of relationships between students, and students and teachers Practical classes and workshops Physical access to laboratories and libraries Possibility of living in the academic community Multiple ways of presenting students' designs: sketches, drawings, printouts, physical models, etc
Weaknesses	<ul style="list-style-type: none"> Hindered teamwork Lower quality of design reviews Negative impact on students' motivation Limited options to draw and apply corrections to designs Lack of unified, standardised software Insufficient skills of teachers to operate on-line education tools 	<ul style="list-style-type: none"> Ineffective time management Costs related to building and equipment maintenance Dependence on the availability and capacity of classrooms Visibility and audibility problems with information presented during classes Limited accessibility for students with disabilities
Opportunities	<ul style="list-style-type: none"> Variety of software and on-line tools available Availability of courses for larger group of students Reduction of social inequalities Possibility to record lectures and additional material created for on-line courses Opportunity to implement innovative forms of teaching Easier international co-operation Possible reduction of corruption and favouritism Possible decrease in university expenses 	<ul style="list-style-type: none"> Possibility of using professional tools and software available on campus Increased motivation to work due to developed relationships between students Possibility of finding contacts, mentorship or employment Possibility of direct teaching assistance
Threats	<ul style="list-style-type: none"> Software, hardware and Internet connection limitations Increased possibility of cheating and unfair students' behaviour Increased risk of physical and mental illnesses among students and teachers Differences in job market opportunities for graduates of the on-line and traditional programmes 	<ul style="list-style-type: none"> Risk of too rarely updating curricula and passing on outdated knowledge Low attendance due to the inconvenient timetable Difficulties in international co-operation

Opportunities

The opportunity analysis was one of the most extensive parts of the conducted SWOT. The face-to-face form of teaching gives students and teachers a significant number of benefits, such as the possibility of using professional tools and software provided by the university. Being a part of the academic community is a great opportunity to find additional teaching assistance, mentorship or even employment. According to the survey, relationships between students are the factor that increases their motivation and efficiency.

Switching to on-line education was a moment to seek new opportunities. Increased access to educational resources and easier contact with teachers were frequently presented as an advantage. On-line education was often mentioned as a more equitable form of teaching. Furthermore, this form of teaching reduces social inequalities and may help students

with an impoverished background to reduce their living expenses. The development of new techniques of communication may become a breakthrough in international co-operation. Exchanging knowledge and sharing experiences will become easier and faster. There is also an opportunity to increase the efficiency of teaching. Students may attend classes in larger groups without limitations, such as the capacity of classrooms.

Threats

Apart from opportunities given by on-line education, numerous threats may affect its quality. The most frequently recurring threats were software limitations, insufficient quality of Internet connection and hardware problems. A frequently indicated long-term threat relates to the potentially limited job market opportunities for students educated on-line. Students fear that employers will favour candidates who graduated from on-campus studies. Moreover, research indicates that students attending classes from home are more prone to mental and physical illnesses.

A PROPOSAL FOR A HYBRID MODE IN TEACHING ARCHITECTURE

The authors' proposal for a hybrid mode in architectural education was developed based on the described survey and SWOT analysis (see Table 1). The hybrid mode can be applied not only in emergencies, such as a pandemic, but can also be used to improve the quality and accessibility of education. As has been demonstrated in previous sections, both on-line and face-to-face modes have their strengths and weaknesses; therefore, their appropriate combination may allow the creation of an effective hybrid mode. The proposal for this mode has been based on the comparison of various aspects of different types of classes with the SWAT analysis' results. This method allowed the authors to indicate which aspect can be conducted on-line without the risk of hindering the quality of the education provided.

Communication between students and teachers, including didactic materials sharing, is an area requiring change and standardisation. The following improvements are suggested based on the research conducted:

- There is a need to indicate a uniform platform for quick and undistracted contact between students and teachers. The platform should not only provide easy contact, but should allow for the organisation of classes. Fast and unlimited file transfer is one of the crucial needs for the review of designs. The choice of the platform should be based on the presence of key functionalities, such as easily accessible option to draw on the presented image. The platform should allow videoconferencing and provide good quality screen sharing.
- Teachers should have access to high-end hardware and high-speed Internet connection to ensure good quality of audio and video connection.
- There is a need to combine real-time lectures, allowing for discussion and questions, with shareable materials, such as recorded parts of the classes.
- On-line file storage can be used to share didactic materials with groups of students.
- Homework and assignments can be collected and assessed via on-line teaching platforms.
- There is a need for introducing an advanced system that will prevent unfair behaviour of students. Existing anti-plagiarism systems may be combined with systematic supervision of students' work.
- Individual meetings with assistants and lecturers during their office hours should be arranged in advance, and most of them can be held on-line via videoconference. This solution would allow for a flexible schedule of meetings, without the need to establish fixed office hours. However, face-to-face meetings should also be available in some cases, especially for students preparing their diploma thesis.

Various types of classes and academic activities require different approaches when developing a hybrid mode (see Table 2). During design classes, students should have unlimited access to the course materials, design requirements, bibliographical sources, etc. Currently, some teachers respond to this need by creating their own, sharing content on Moodle-type platforms or sending multiple e-mails. Despite using advanced technology and tools, face-to-face contact remains the most efficient form of conducting design classes. However, supporting it with on-line education would provide significant benefits to both teachers and students.

Table 2. Suggested mode for different types of classes and academic activities.

Face-to-face	Mixed	On-line
Design classes Workshops Practical courses	Designs reviews Teamwork Student-teacher communication	Lectures Seminary classes Materials sharing

Combining face-to-face contact with on-line communication tools will help students with disabilities or people from remote areas to continue their studies. This technique will allow teachers and students to keep constant contact in case of unforeseen situations, such as cataclysms, epidemics or even everyday emergencies. Activities usually undertaken during design classes can be divided according to the possibility of conducting them on-line. Parts such as initial arrangements, early stages of the design may be moved into the on-line mode. Other parts should be conducted on-line only in case of emergencies as this mode might affect the quality of the education.

Another type of classes is a seminar. It consists of lectures, discussions and students' presentations. According to the survey, the on-line mode of education hinders the level of discussion. There is a need to encourage students to actively participate in on-line classes. Seminars require flawless video and sound connections with the possibility to simultaneously share the content. Results of the survey indicate that students prefer on-line presentations as they find them less stressful. This might be an opportunity to give students suffering from social phobias or anxiety an equal chance to fully participate in the seminars. According to the analysis - it is possible to fully move seminars into the on-line mode with appropriate precautions.

Teamwork is another aspect that is hindered by on-line teaching. It is an integral part of architectural education, developing interpersonal skills and preparing students for future professional work. Moreover, it provides an opportunity to work on broader topics in a limited amount of time. Effective teamwork requires the development of relationships between members of the group, therefore face-to-face team meetings are usually essential. Group projects should be planned to ensure that at least some of the meetings can take place face-to-face.

The reviews of students' designs are organised at least once during every design course. After presentations, students receive feedback from their teachers and colleagues. Moreover, it is an opportunity to analyse other students' designs and learn from each other. According to students' opinions, on-line presentations on a shared screen is the most effective form of performing a review, allowing them to focus on the presented material. However, on-line reviews may be accompanied by physical model presentations or face-to-face discussions. It is advisable to organise the reviews several times during the semester, as following other students' designs during face-to-face classes is less effective or sometimes even impossible.

The most problematic are practical classes. Numerous faculties enrich their architectural education by various workshops and artistic courses, such as sculpture or painting classes. Such activities require constant supervision and teaching assistance, physical teamwork and access to specialist utilities. The attempts of conducting practical classes in the on-line mode generate numerous difficulties that cannot be balanced by on-line learning's advantages. Study trips are a specific type of practical classes, characteristic for architectural education. The experience of being in an architectural or urban environment in person allows for its in-depth analysis from the user's perspective. Such experiences, essential for architecture students, cannot be fully replaced by on-line forms [6].

CONCLUSIONS

The immediate transition from the face-to-face to the on-line mode, due to the Covid-19 pandemic, was a demanding challenge for university education. Nevertheless, relevant conclusions for the future may be drawn from this situation. The development of technology has allowed many areas of academic activity to be transferred to the Internet, without hindering and often with benefits for the quality of education. However, considering the specific character of architecture teaching, the on-line mode of education has its limitations. Therefore, except in emergencies, the hybrid model seems to be the optimal choice.

Based on the survey and SWOT analysis conducted, the advantages of face-to-face and on-line teaching were indicated. The suggested hybrid model combines the efficiency and accessibility of the on-line mode with reviews and teamwork quality of the face-to-face mode. However, it should be noted that each curriculum requires an individual approach to the choice of teaching methods. It is important to take into account the needs and expectations of both teachers and students when selecting a teaching mode. A carefully developed hybrid mode can improve architectural education and positively influence the development of universities.

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