

Flipped Classroom Method Application Case Study Analysis

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Abstract. The purpose of this case study is to determine student feedback and satisfaction with the flipped classroom. The flipped classroom method was applied for a duration of 15 weeks during the autumn semester of the academic year 2021-2022 at Vilnius Gediminas Technical University in Lithuania, within the Faculty of Civil Engineering, Department of Construction Management and Real Estate. The flipped classroom method was applied to 12 Master's degree students in the Real Estate Management program. During the application of the method, students were addressed in a mixed way (theoretical lectures online, practical work in the classroom). The article presents the theoretical part of the method and also describes the process of applying the flipped classroom method: preparation, development of the lecture plan, selection of tools for working with students, and feedback from students. The SWOT analysis of the case study is conducted. The results of the study show that students positively evaluate the use of the flipped classroom. Students mentioned the following positive aspects: more practice during lectures, flexibility in time and place, permanent and active learning, the possibility to learn at their own pace, to prepare for class, and take responsibility. As negative aspects, students mentioned the following: technical problems, technological inadequacies, lack of time for lecture preparation, previous habits, no adequate video duration, and workload. But it was also a challenge for the teachers: heavy workload (preparation), use of different tools in the application of the flipped classroom, involvement, and encouragement of the students.

Keywords: Flipped classroom, SWOT analysis, student feedback, satisfaction.

1. Introduction

With the rapid expansion of the use and production of information and communication technologies in the 21st century world, the way technological tools are used in education has also changed. Especially in recent years, it has become apparent that educators are

using digital content in learning environments to more effectively benefit from the contributions of technologies. The use of rapidly growing information technologies has taken its place in the learning process from preschool to higher education and is one of the indispensable components of the lifelong learning process. The technology, which was only supportive in the past, had to be fully integrated into the educational processes during the global pandemic period. With COVID-19, developments in educational technology that provide new opportunities to increase student engagement and motivation to learn have become important to active learning. For this reason, researchers and educators, who want to use technology effectively in education, have embarked on a new quest and have begun to use many teaching methods to integrate technology with evolving technology in education (Talan and Batdı, 2020). Although it is not a new concept, the flipped classroom method that has been frequently mentioned recently is one of them. As a result, this method has become one of the preferred methods of educators in the field.

Flipped classroom is an instructional model that has been heavily researched in recent years and often involves the use of technology. This method is very important for both the widespread use of technology and the implementation of digital transformation in education. This method is defined as learning the theoretical part of the course at home, usually online, and completing homework in the classroom (Demiralay and Karataş, 2014; Talan and Gülseçen, 2019). In this way, students actively participate in the learning process in the classroom and use the time allocated for instruction more efficiently (Bergmann and Sams, 2012; Milman, 2012). This creates the necessary environment for students to acquire 21st-century skills (Eser, 2021).

The flipped classroom method, a system that has recently come to the fore worldwide, is an educational model that has emerged within the framework of the blended learning approach. This method, which has traces of structured learning theory, is the educational model that has been on the rise in recent years (Yıldız and Gürşen Otacıoğlu, 2017). Although this method has generally been used in primary and secondary education, it is also an approach that is becoming more popular in higher education. The main goal of this learning approach, which is in line with the current understanding of education, can be described as efficient and effective utilization of time spent in the classroom (Bergmann and Sams, 2012; Roehl et al., 2013; Talan and Batdı, 2020; Tucker, 2012).

Researchers argue that the flipped classroom method is more educationally beneficial. This is because it allows students to review topics at their own learning pace and gives them some flexibility in working with digital resources (Akran and Bayrak, 2020; Uçar and Bozkurt, 2018; Vdovinskienė, 2023). This type of learning gives students more responsibility (Fautch, 2015; Staker and Horn, 2012) and also allow them to work toward acquiring competencies in a specific area. Also, in the flipped classroom method, learners are always actively engaged in the lesson through activities, exercises, and discussions (Singh, 2014). Moreover, they can make learning permanent by providing sufficient time for learning activities in which the learner is active, such as activities, exercises, and discussions (Deveci Topal and Akhisar, 2018; Uçar and Bozkurt, 2018). In addition, since the course is outsourced from the classroom in this learning method, the time and space constraints of the classroom are eliminated and students have the opportunity to prepare for the course by repeating the lecture indefinitely (Şen, 2022; Talan and Gülseçen, 2019).

The flipped classroom method is an effective approach that can be used in both face-to-face and distance learning settings. Through this innovative educational approach learning can be made more personalized. Indeed, there are many studies in the literature showing that this learning approach positively contributes to academic success (Bhagat et al., 2016; Foldnes, 2016; Thai et al., 2017; Talan and Gülseçen, 2019). Furthermore, meta-analyses on this topic show that the flipped classroom approach increases learning success more than traditional learning and teaching methods (Doğan et al., 2023; Talan and Batdı, 2020). Due to this potential contribution, this learning approach can be used at all levels of education. Moreover, when reviewing the relevant literature, it is found that the flipped classroom method is an educational model that can be adapted to all courses in a planned and systematic manner with efficiency and validity (Güç, 2017). Although the number of studies on the flipped classroom method has increased in recent years, it was found that the model is still a new and developing field in the relevant literature and more studies are needed to draw some conclusions about student learning (DeLozier and Rhodes, 2017; O'Flaherty and Phillips, 2015). In this context, the purpose of the current study is to ascertain student feedback and satisfaction with the flipped classroom. During this period, students will be offered a different learning experience with practical work to be carried out in the classroom as well as online theoretical courses. This study will not only present a theoretical framework, but also provide concrete guidance to readers by detailing practical elements such as preparation during the implementation phase, development of the lecture plan, selection of tools to working with students, and feedback from students. This research aims to provide valuable information that will help educators and academics to apply the flipped classroom method effectively. The resulting student feedback and satisfaction data will allow educators to better understand this method and provide students with a more effective learning experience.

2. Description of applied methods and the results

In the 2021-2022 academic year, the flipped classroom method was applied to 12 Master's degree students in the Real Estate Management program for a duration of 15 weeks during the autumn semester at Vilnius Gediminas Technical University, located in Vilnius, Lithuania, within the Faculty of Civil Engineering, Department of Construction Management and Real Estate. At the beginning of the study, students were informed about the advantages and expectations of the method and were encouraged to participate. The subject taught by applying the flipped classroom method was "Facilities Management" and during the application of the method, students were addressed in a mixed way (theoretical lectures online, practical work in the classroom). Process of application of the method is shown in Figure 1.

The lecture plan could be developed for one month or for the whole semester at once. An excerpt from the lectures' plan is provided in Table 1.

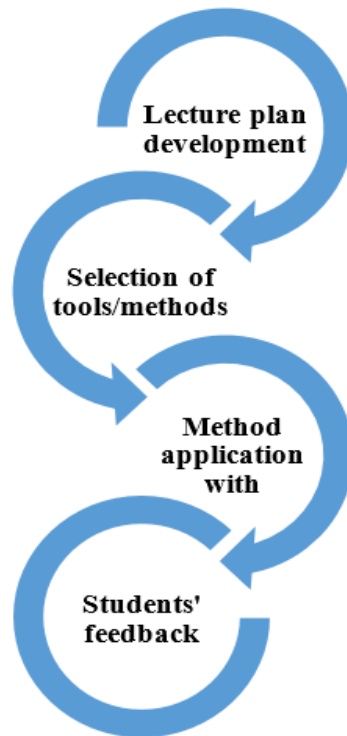


Figure 1. Process of application of flipped classroom method

Table 1. Lectures’ plan excerpt

Date	Subject/Purpose	Activities during the lecture			Student's activities before the lecture	Teacher's activity before the lecture
		Student's activities	Methods/tools	Results		
2021-09-15 16.20-17.55 18.10-19.45	<p>I theme. "Analysis of Facilities Management System in Lithuania and Abroad". We will discuss all the planned works and their deadlines. We will discuss the first topic.</p> <p>A short theoretical supplement of the lecturer on the topics covered.</p> <p>Interpretation of homework assignment.</p>	<p>Students will be prepared in advance for the question. "How can you comprehensively define facilities management?"</p> <p>Discussion of a question in a group using the MENTI tool.</p> <p>Listening to the theoretical part and outlining important places.</p> <p>Understanding the details of doing homework. Divide into groups for homework</p>	<p>Discussion on facilities management activities. Using the MENTI tool.</p> <p>Video review, comparative analysis</p>	<p>Students will gain knowledge about the field of facilities management and work performed, get acquainted with foreign projects and examples of good practice.</p>	<p>Get acquainted with the material of the first topic in the Moodle system and get ready to answer the question: "How can you comprehensively define facilities management?"</p>	<p>Prepare for the theoretical part of the lecture and discussion with students.</p> <p>Preparation of homework assignment.</p>

The next step was to select the proper tools for different lectures' subjects and tasks. All used tools during the fall semester are shown in Figure 2.

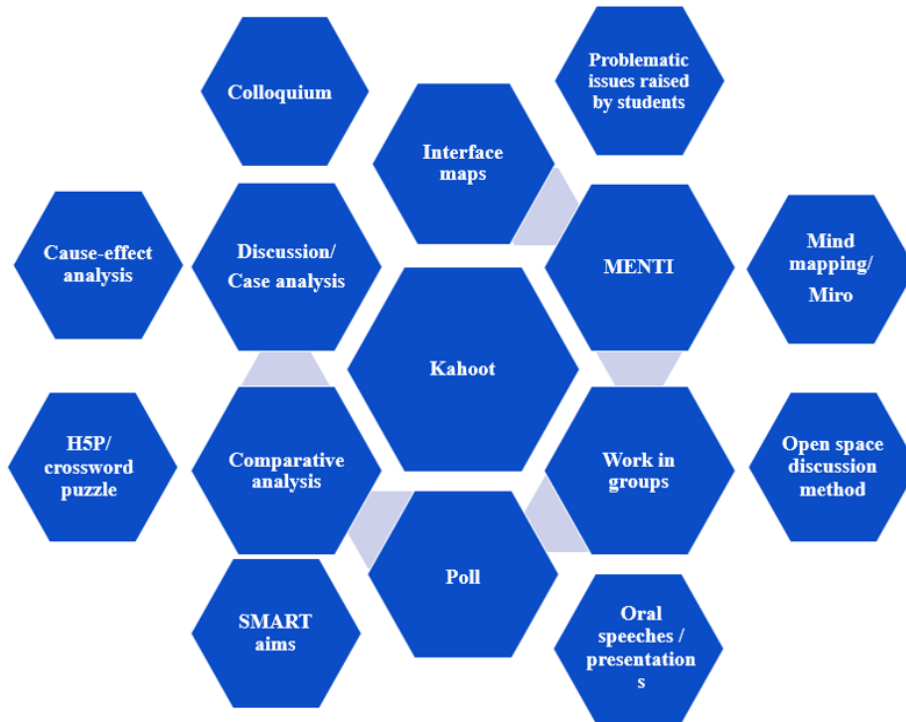


Figure 2. Used tools during the lectures in fall semester

The tools were selected according to the tasks during the lectures and practical works. The applied tools are presented below.

The examples of applied tools are shown below in Figures 3, Figure 4 and Figure 5. For the Mind mapping task each group of students received different topics for the analysis. They had to analyze the topics using the Miro tool. The graphical example shown in Figure 3 was about the needs of the users of the building.

The application of the H5P tool (crossword puzzle) is shown in Figure 4. Students had to fill the crossword puzzle according to the questions asked. The questions were based on the first four topics discussed during the lectures. The crossword puzzle was created in the MOODLE system using the H5P tool in Lithuanian language.

For the assessment of students' knowledge many tools were used, one of them was Kahoot. The students were asked to answer the questions related to the topic 1 "Analysis of Facilities Management System in Lithuania and Abroad". A special feature of the Kahoot tool is that students are given a time limit to answer each question. The first three most likely responding students take prize places. The assessment of students' knowledge of the first topic using the Kahoot tool is shown Figure 5.

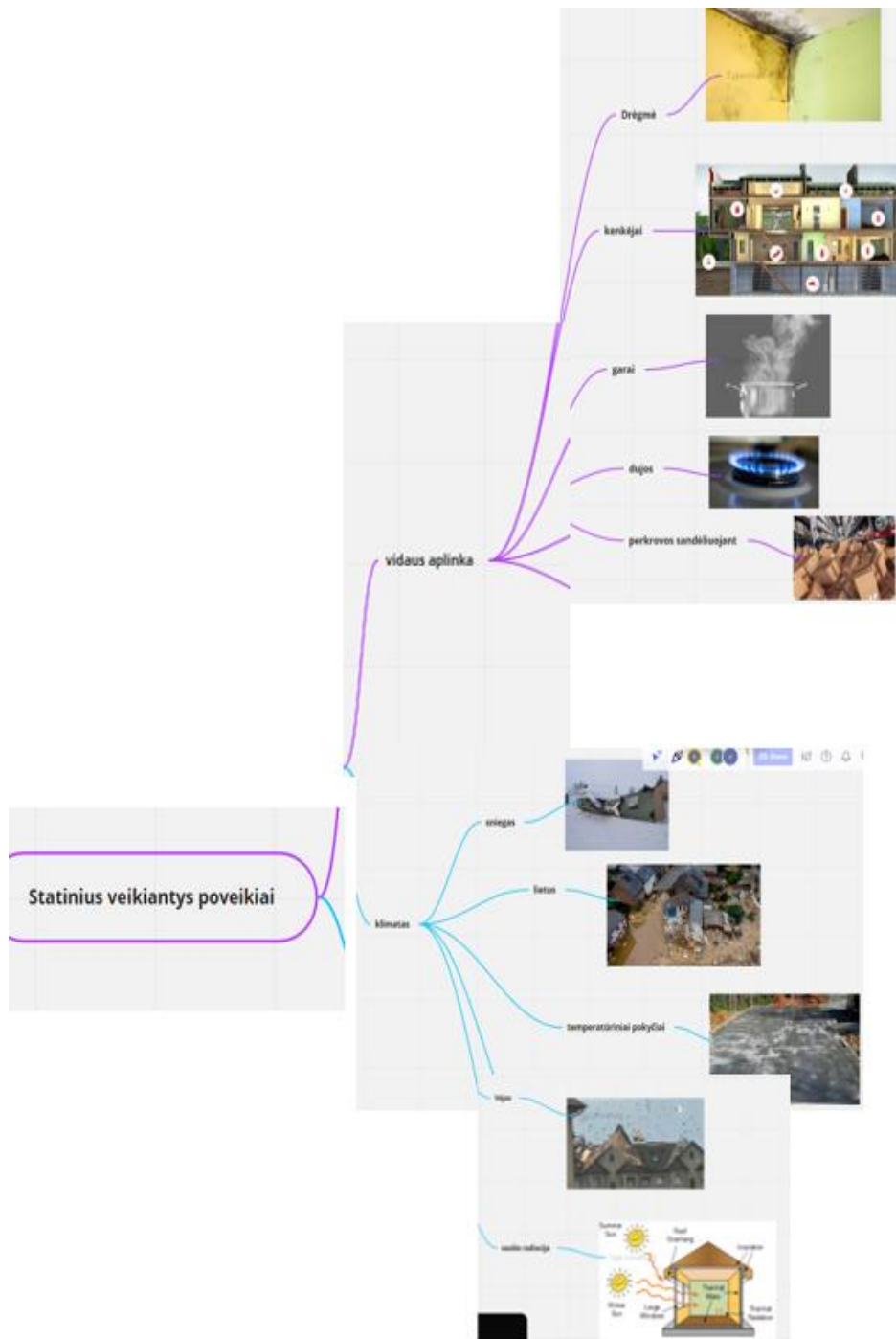


Figure 3. Excerpt of Mind mapping method using Miro tool (the map was prepared in Lithuanian language)

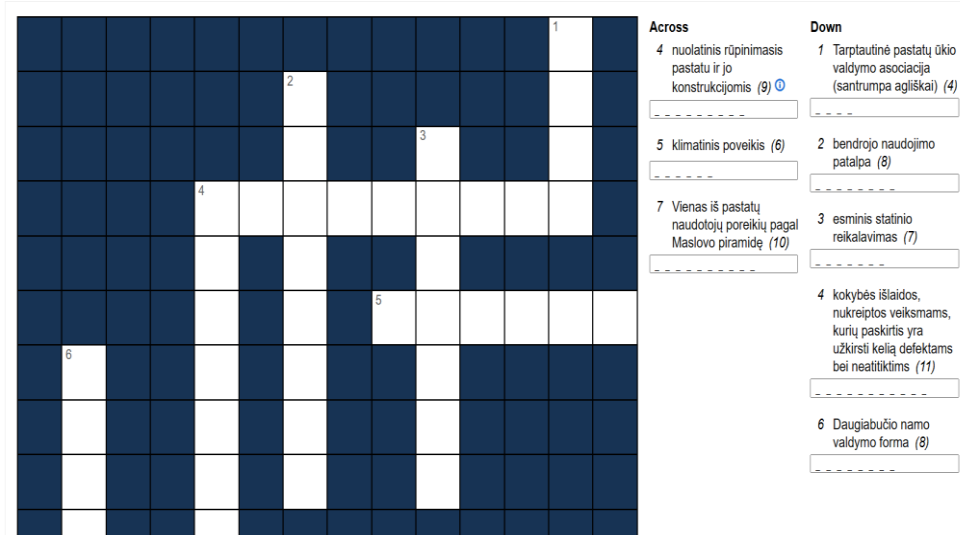


Figure 4. The application of H5P tool (crossword puzzle) in a study process

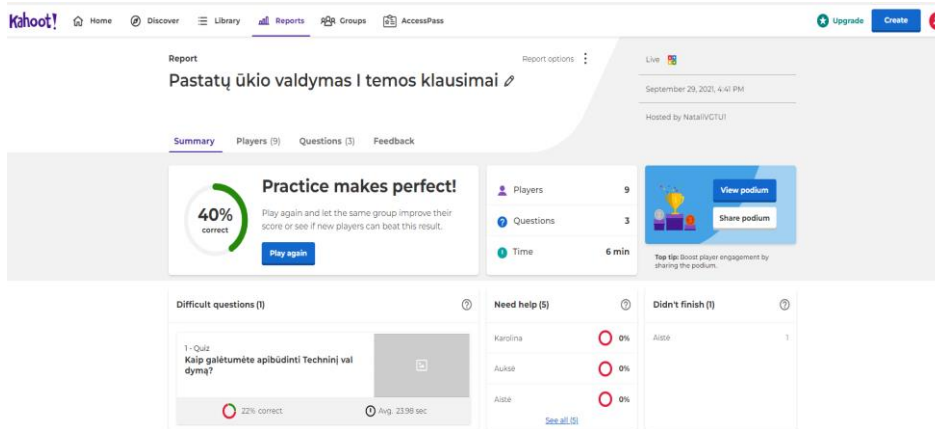


Figure 5. The assessment of students' knowledge using the Kahoot tool

During flipped classroom application, the guest lectures were used additionally. Figure 6 shows the invited lectures and their topics.



Figure 6. The list of invited lectures and their topics

The last and very important stage of the process of application of flipped classroom method was Students' feedback.

Only 10 students from 12 presented their opinions. Students were asked 10 questions. The questionnaire was created in the Moodle system, so that the responses were collected automatically and recorded to the system. The survey was conducted in Lithuanian language. 8 of 10 questions had multiple choices of the responses. Two of ten questions were open about the advantages and disadvantages of the flipped classroom method.

An excerpt from the student survey is given in Figure 7.

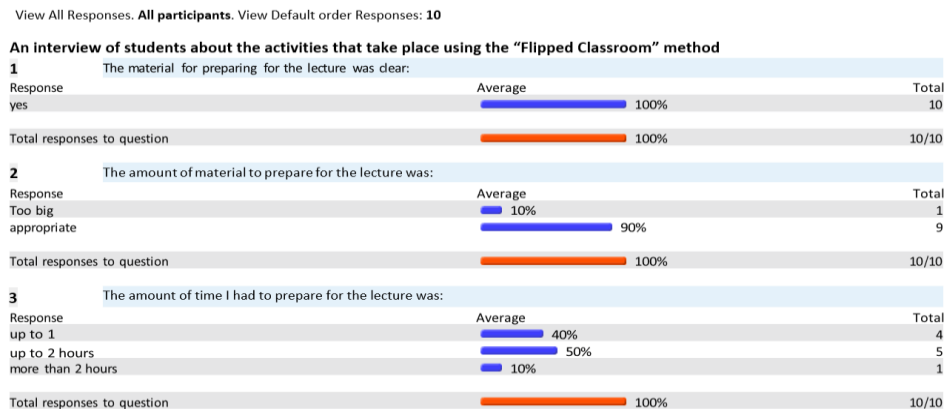


Figure 7. An excerpt from the student survey about flipped classroom method

The first question was about clarity of material for preparing for the lecture. All students' answers were positive (100%). The material was clear. The second question was about the amount of material to prepare for the lecture. 10% of students said, that it was too big, 90% stated that it was appropriate. The third question was about time for preparation for the lecture. 40% of respondents were preparing up to 1 hour, 50% -up to 2 hours, 10%-more than 2 hours. The fourth question asked: Was it difficult to study the material independently while preparing for the lecture? All students answered (100%), that it was easy to study the material independently. The fifth question was about the material for preparing the lecture, was it useful? Positively responded 83% of the respondents (they answered Yes), partly-answered 17% of the respondents. The sixth question asked whether the activities performed during the lecture corresponded to the self-learning material. Positively responded 67% of the respondents (they answered Yes), partly-answered 33% of the respondents. The seventh question asked whether the activities performed during the lecture helped to absorb and better understand the educational material. All respondents responded positively (100% answered YES). The eighth question asked whether the teacher explained incomprehensible places to the student during or after active activities. All respondents responded positively (100% answered YES).

Two of ten questions were open about the advantages and disadvantages of the flipped classroom method. The main *advantages* of the method mentioned by students were as follows:

- ✓ It is possible to study in a way and time convenient for the student;
- ✓ Students are more involved in the lecture. Through communication and discussion, students get the opportunity to get acquainted both with each other and with the lecturer;
- ✓ The information is easier to absorb, given that we are preparing for the next lecture, rather than reading the entire course material right away, so the workload is appropriate and not too much. It's easier to memorize lecture information that you've previously hooked up in preparation for;
- ✓ Lecture material is absorbed faster;
- ✓ It provides an opportunity not only to learn for yourself, but also to teach others;
- ✓ Searching for the necessary information reveals a little more useful information that is needed for other lectures;
- ✓ Self-oriented learning is encouraged.

The main *disadvantages* of the method mentioned by students were as follows:

- During the learning process, there is no teacher nearby who can advise on the issue of concern immediately - you have to wait for a lecture or write and send an email;
- Sometimes it is scary that the group members have already said the brightest and most memorable things about the topic, and fully answered the question that needed to be prepared. And then when it comes time to speak, I won't have anything to add because I don't want to repeat myself;
- Extra stress as you need to be sure to prepare for the lecture before listening to it;
- Takes extra time to prepare for each lecture.

Based on literature review and implemented case study, the SWOT analysis of flipped classroom methods was carried out (see Section 2.1 and Table 2).

2.1. SWOT Analysis

In the next stage of the study, a SWOT analysis was executed to delineate the strengths, weaknesses, opportunities and threats encountered during the implementation process. SWOT is a strategic planning tool that evaluates the internal strengths, weaknesses and external opportunities and threats of an organization or project. This analysis provides a road map for organizations to make strategic decisions by helping them evaluate internal and external factors, evaluate opportunities by using their strengths, and correct their weaknesses (Ünal and Demirkol, 2022).

SWOT analysis has been an important stage in understanding the effectiveness of the flipped classroom method and providing the basis for improving weaknesses (see Table 2). Conducting a SWOT analysis for flipped classroom is a crucial step in the successful implementation and sustainability of this education model. This analysis can guide educational institutions to implement more effective and sustainable flipped classroom.

Table 2. The SWOT analysis of the flipped classroom method

Strengths	Weaknesses
<ul style="list-style-type: none"> -All students are involved in the learning process -Exchange of good practices, sharing of experience and successful practices - Lecture material is absorbed faster -All material prepared using different tools and stored in a system (as Moodle or other) 	<ul style="list-style-type: none"> -More time for students to prepare for the lecture
Opportunities	Threats
<ul style="list-style-type: none"> - The opportunity to develop high quality online resources (using Moodle or other systems) 	<ul style="list-style-type: none"> - The resistance to change of some teachers in the university education - Big investments for university to facilitate the classrooms with special equipment for application of the method

Considering the weaknesses and threats specified in the SWOT Analysis, we can state that:

- ❖ A proactive attitude of the teaching staff is required in relation to the new information and communication technologies used in the educational process;
- ❖ There is a need for adequate funding and equipping of classrooms.

Vilnius Gediminas Technical university giving the teachers and students the support needed to implement the new teaching methods. There are special courses introducing the application of flipped classroom method and support during its implementation with the students.

From the positive aspects and the existing opportunities regarding the implementation of this method, it can be seen that there is a possibility to develop high quality online material (using Moodle or other systems).

3. Discussion and Conclusion

The flipped classroom method, a system that has recently come to the forefront around the world, is an educational model that has evolved as part of the blended learning approach. In this method, instruction is held outside of the school, and homework or other activities are completed in the classroom during class time. In the flipped classroom method, which is based on constructivism, learners are always actively involved in the classroom through activities, exercises, and discussions (Singh, 2014). The flipped classroom method has many advantages and disadvantages. With this in mind, this study aims to determine student feedback and satisfaction with the method, which has been widely researched and increasingly used in recent years.

Using the mentioned method there are advantages and disadvantages for both participating parties in the process: students and teachers. As can be seen from the presented case study, in general the students liked flipped classroom method and named such advantages as:

- possibility to study in a way and time convenient for the student;
- greater involvement in the lecture;
- the possibility to share the knowledge and teach others.

Parallel to the results of this study, it was found that students had a similar positive opinion of the method in many studies in which student opinion was considered. For example, in the literature, it was found that teaching with the flipped classroom method is student-centered, which makes learning effective and sustainable, freeing it from monotony, and facilitates understanding (Millard, 2012; Özyurt and Özyurt, 2017; Turan, 2015; Yıldız et al., 2017). In addition, the method was found to allow students to learn at their own pace, increase academic success, opportunity to practice more in the course, and create a flexible and fun learning environment (Bishop and Verleger, 2013; Çoruk et al., 2020; Elian and Hamaidi, 2018; Fulton, 2012; Şen, 2022; Talan and Gülseçen, 2019; Turan, 2015). It has been observed in the literature that the flipped classroom method has many positive aspects in terms of education. It can be stated that

the flipped classroom method increases student motivation, supports students' learning processes, contributes to the development of motor skills, harbors the potential to augment students' autonomy during lessons, and exerts a positive effect on student variables in physical education (Andujar and Çakmak, 2023; Østerlie et al., 2023; Talan and Gülseçen, 2019). Hamna and Ummah (2022) observed that the flipped classroom method was more efficacious in enhancing students' science literacy compared to the application of the hybrid learning. In accordance with the findings of Lin et al. (2023), the experimental group, which utilized the virtual reality-based flipped classroom method, exhibited a significantly higher level of proficiency in complex medical skills compared to the control group. Additionally, the experimental group demonstrated elevated levels of learning motivation and self-efficacy. On the other hand, the disadvantages named by students are:

- during the learning process, there is no teacher nearby;
- takes extra time to prepare for each lecture.

The bigger challenge for the university is to prepare the teachers for new teaching methods as well as to install the needed equipment in the classrooms. Similar negative situations related to the method have been mentioned in numerous studies as well. When the negative aspects of the method are examined in the relevant literature, disadvantages such as lack of technical tools, technical problems, additional workload for the teacher are in the foreground (Milman, 2012; Şen, 2022; Turan, 2015). In addition, one negative aspect of the method that literature cites is students must come to class prepared and cannot communicate directly with the teacher (Çoruk et al., 2020; Özyurt and Özyurt, 2017). In a separate study, challenges were highlighted as negative aspects of the flipped classroom method, including encountering technical issues, the inability to upload or download materials, difficulties in accessing pertinent videos, and causing distractions in the classroom (Doğan et al., 2023). Some studies have suggested that the flipped classroom method imposes an additional workload on students and that students may have difficulty completing assignments before class time. It was emphasized that in order to implement this method, the difficulties experienced by students in accessing technology should be eliminated and technological deficiencies should be completed (Talan and Gülseçen, 2019; Wilson, 2023). In order for the method to be used effectively, these negative aspects must be eliminated. In this context, it can be suggested to bring the technical infrastructure to an appropriate level and to adjust the course planning to the course content and the level of the students in order to carry out the method in a healthy way. Since video duration plays an important role in the literature, care should be taken to ensure that the duration is not too long. In order for students to come to the lesson prepared, it is important that the activities before the lesson are not too long. On the other hand, the structure of the courses, the instructional materials used in the course and the presentation infrastructure are very important for academic success (Staddon, 2022).

This research was designed to assess the effect of the flipped classroom method applied to graduate students in the Real Estate Management Program. Results indicate that flipped classroom has a positive impact on student feedback and satisfaction. However, the weaknesses encountered during the application of this model cannot be ignored. Understanding these weaknesses will be an important step in making improvements in future applications. Again, understanding the difficulties encountered

during implementation provides important clues for developing strategies on how flipped classroom can be implemented more effectively and sustainably. Pre-planned technology strategies and alternative content delivery plans can be developed to overcome the challenges of flipped classroom applications. Interactive tools can be employed to enhance student motivation. Additionally, special training programs can be organized for the transition to the flipped classroom to support teacher and student preparation. Researchers can evaluate customized solution strategies to strengthen technological infrastructure and increase student participation. Additionally, researchers can contribute to the continued development of flipped classroom method by sharing best practices taking place in the field.

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