RS Global Journals

Scholarly Publisher
RS Global Sp. z O.O.
ISNI: 0000 0004 8495 2390

Dolna 17, Warsaw, Poland 00-773
Tel: +48 226 0 227 03
Email: editorial_office@rsglobal.pl

JOURNAL	International Journal of Innovative Technologies in Social Science
p-ISSN	2544-9338
e-ISSN	2544-9435
PUBLISHER	RS Global Sp. z O.O., Poland

ARTICLE TITLE	RESEARCH ON DELIVERING OUTCOME-BASED LEARNING THROUGH BLENDED LEARNING METHODOLOGICAL TOOLS
AUTHOR(S)	Damchaasuren Khorloo, Otgonbayar Tseveen
ARTICLE INFO	Damchaasuren Khorloo, Otgonbayar Tseveen. (2024) Research on Delivering Outcome-Based Learning Through Blended Learning Methodological Tools. *International Journal of Innovative Technologies in Social Science*. 1(41). doi: 10.31435/rsglobal_ijitss/30032024/8106
DOI	https://doi.org/10.31435/rsglobal_ijitss/30032024/8106
RECEIVED	02 February 2024
ACCEPTED	09 March 2024
PUBLISHED	12 March 2024
LICENSE	This work is licensed under a **Creative Commons Attribution 4.0 International License.**

RESEARCH ON DELIVERING OUTCOME-BASED LEARNING THROUGH BLENDED LEARNING METHODOLOGICAL TOOLS

Damchaasuren Khorloo
Department of Engineering Cartography, School of Civil Engineering and Architecture, Mongolian University of Science and Technology

Otgonbayar Tseveen
Department of Engineering Cartography, School of Civil Engineering and Architecture, Mongolian University of Science and Technology

DOI: https://doi.org/10.31435/rsglobal_ijitss/30032024/8106

ARTICLE INFO

Received 02 February 2024
Accepted 09 March 2024
Published 12 March 2024

KEYWORDS

Blended Learning, Assessment, Self-Monitoring Chart, Task Performance.

ABSTRACT

As societal development progresses, the burgeoning demands and expectations for individualized education are on the rise. This necessitates a nuanced shift in educational policies and methodologies to cater to the evolving needs of learners. In recent years, there has been a discernible shift from teacher-centered learning to learner-centered learning. Consequently, the paramount concern lies in optimizing the efficacy of training methodologies. This study aims to investigate the potential of enhancing students' learning interest and engagement through the application of blended learning methods. The objective of the research is to systematically compare the outcomes, advantages, disadvantages, and identify the key areas for further improvement.

Citation: Damchaasuren Khorloo, Otgonbayar Tseveen. (2024) Research on Delivering Outcome-Based Learning Through Blended Learning Methodological Tools. *International Journal of Innovative Technologies in Social Science*. 1(41). doi: 10.31435/rsglobal_ijitss/30032024/8106

I. INTRODUCTION.

Education constitutes a dynamic process that extends beyond the mere transmission of knowledge and skills to encompass the cultivation of proper upbringing, attitudes, opinions, and concepts among students. It serves as a continuous support system, fostering and advancing their learning activities. Within the current educational policy framework, meticulous planning underpins the instructional approach. This entails the deliberate consideration of what to impart to students, the proactive preparation and development of content, strategies for effective delivery, and the subsequent formulation and implementation of methodologies to evaluate the knowledge and skills acquired throughout the course. Sadly, it is evident that professionals trained through conventional methods may fall short of fulfilling contemporary market demands, leaving a significant gap. Consequently, various innovative ideas are surfacing to align education and its quality with the requisites of modern society. One such proposition involves the adoption of an results-based education system.

II. THEORETICAL SECTION.

In the mid-1990s, American scientist William Spady played a pivotal role in advancing the theory of outcome-based education. He characterized it as a system that directs and organizes education

towards prioritizing essential outcomes, ensuring that every student can successfully apply what they have learned to achieve their post-learning aspirations [1].

This theory encompasses all educational activities, including curriculum design, lesson instruction, and knowledge evaluation, with a concentration on the ultimate outcomes of the educational process. Given its applicability across all levels of the education system—elementary, middle, and higher—it is aptly termed outcome-oriented education [6].

The educational theory and methodology known as "Outcome-Based Education (OBE)" or "Outcome-Based Education (UDSB)" was introduced in the mid-1990s in the United States, Australia, and South Africa. Subsequently, in the mid-2000s, countries including Canada, Taiwan, and India adopted this approach. More recently, nations such as Japan, Korea, Singapore, Turkey, England, Hong Kong, Malaysia, and Vietnam have initiated the implementation of this methodology in their education systems. As of today, numerous countries worldwide have embraced Outcome-Based Education [6].

The implementation of outcome-based education theory has been under discussion in our country's higher education system, and initial steps have been taken to enact these changes. [6].

To achieve quality and practical outcomes, it is imperative to center our attention on learning and teaching activities. Comprehensive support for students is essential to facilitate the acquisition of knowledge, skills, and attitudes in alignment with the program's objectives. Furthermore, enabling each student to choose their preferred learning method is crucial. Attempting to employ a uniform training approach for all students is unlikely to yield the intended outcome [1].

This embodies the core principle of student-centered learning. Providing each student with the opportunity to pursue studies in that direction, instilling the belief that they can attain their goals post-graduation, holds the potential for a majority of students to succeed and realize their desired outcomes.

Learning activities are categorized into knowledge, skills, and attitudes concerning outcomes, commonly expressed as competencies or learning outcomes [4]. The educational institution predefines the knowledge, skills, attitudes, results, or competencies that students are expected to acquire within the curriculum. It oversees all aspects of evaluation, culture, and management related to the teacher's teaching methodology, lesson content, schedule, organization, learning environment, materials, and knowledge, with a focus on these predetermined outcomes [1].

Within the curriculum outcomes, "Problem-solving ability" and "Independent learning ability" have been identified as crucial elements. These are further delineated by breaking them down into specific criteria. Subsequently, all lessons and activities are centered around these criteria, fostering continuous development [6].

Problem-solving skills encompass several key components:

- Identification of problems
- Proposition of solutions to address problems
- Selection from available options
- Explanation of the rationale behind the chosen solution [6]

Self-learning/ independent learning skills includes;

- Articulating personal learning preferences and areas of interest
- Strategizing and executing individualized learning plans
- Reflecting upon and refining one's learning processes
- Executing tasks with a commitment to quality from initiation to completion
- Effectively communicating one's ideas to others [6].

As per a study conducted by Harvard University scientists, approximately 85% of the efficacy in any undertaking is attributed to the attitude towards work and personal development skills, with only around 15% contingent upon the domain-specific knowledge and abilities [6].

Michael Prince, a professor at the University of Victoria in Canada, asserts that active learning necessitates purposeful and meaningful engagement, prompting students to contemplate their actions.

His research demonstrates that active learning not only enhances student engagement but also contributes to long-term learning outcomes [2].

Given the notably positive impact of active learning on the learning process, the key question that arises is how to effectively support this activity in an online environment.

In universities within developed countries like the United States, Japan, Korea, Australia, and the European Union, collaborative teamwork is extensively employed in online learning. Students perceive team collaboration as crucial for their learning and future professional endeavors [3].

Examining the experience of utilizing active learning methods in the online context at the University of Toronto, Canada, the institution set forth the following objectives [2].

- Identification of key considerations in online teaching.
- Formulation of strategies to foster student engagement in online learning.
- Integration of active learning techniques with specific educational technologies.
- Provision of facilitation for online learning, including supplementary resources for enhancing instructional design and EdTech proficiency [4].

From the perspective of schoolteachers engaged in online instruction, it becomes evident that emphasis should be placed on strategic focal points. These include selecting alternatives that effectively stimulate students' activity and interest, leveraging the latest technological advancements, and organizing activities to create an environment that is conducive to students' learning and user-friendly.

The advent of information technology has ushered in an era of electronic training, online learning, and distance education in our country. As these modalities have become integral aspects of our educational landscape, a continuous and deliberate effort is imperative to discern the precise actions necessary for the benefit of students. Drawing from extensive years of research, it is incumbent upon us to ascertain the technologies and methodologies best suited for enhancing the quality and effectiveness of education. The focus should extend to understanding the implementation mechanisms, comparing outcomes from established teaching methods, and exploring and adopting valuable alternatives to further enrich the educational experience.

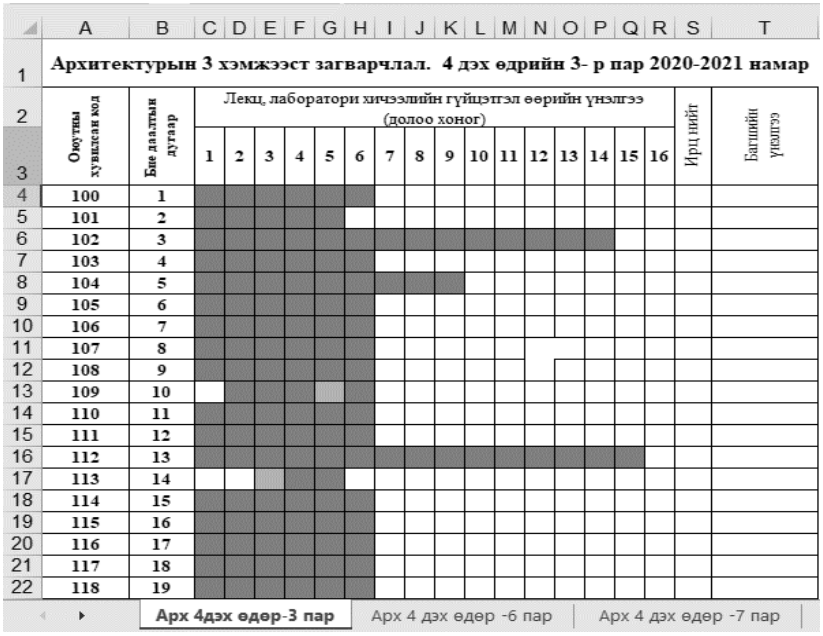
As briefly noted in the preceding report and article, the integration of traditional classroom training with online instruction, commonly referred to as Blended Learning on the international stage, affords students the chance to access well-organized and comprehensive knowledge [5]. This research focuses on investigating methods for offering active and effective learning opportunities for students in the online environment.

III. RESEARCH DETAILS.

In this study, the developed courses were deployed on various platforms, including the MUST e-learning website, Google Classroom, Google Forms, Office 365-Teams, Facebook, and Moodle. The deployment involved a combination of distance learning and blended learning methods.

During web-based training, instructors can upload their prepared lessons onto the platform and disseminate them to students. In the fall semester of the 2020-2021 academic year, the course on 3D Architectural Modeling (A.AR328) was conducted. A total of 126 students enrolled in the day class participated in this course. The implementation of active training in an online environment resulted in increased student interest and a heightened acquisition of knowledge. Furthermore, a comparative analysis was conducted to assess the challenges, advantages, and disadvantages encountered in comprehending the subject.

Throughout the research period, I consistently evaluate outcomes by administering surveys to students both at the commencement and the conclusion of the course, facilitating a comparative analysis of their responses.

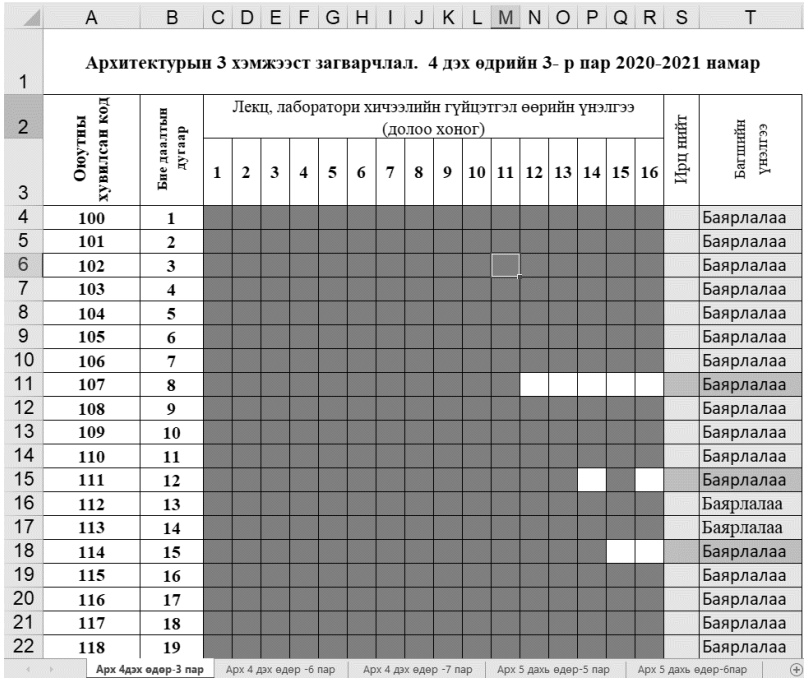


Архитектурын 3 хэмжээст загварчлал. 4 дэх өдрийн 3- р пар 2020-2021 намар

Оюутны хувилсан код	Бие даалтын дугаар	Лекц, лаборатори хичээлийн гүйцэтгэл өөрийн үнэлгээ (долоо хоног) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Ирц нийт	Багшийн үнэлгээ
100	1																		
101	2																		
102	3																		
103	4																		
104	5																		
105	6																		
106	7																		
107	8																		
108	9																		
109	10																		
110	11																		
111	12																		
112	13																		
113	14																		
114	15																		
115	16																		
116	17																		
117	18																		
118	19																		

Арх 4дэх өдөр-3 пар | Арх 4 дэх өдөр -6 пар | Арх 4 дэх өдөр -7 пар

Picture 1. Self-evaluation template uploaded in the Google drive for students to self-evaluate their understanding of the lessons.



Архитектурын 3 хэмжээст загварчлал. 4 дэх өдрийн 3- р пар 2020-2021 намар

Оюутны хувилсан код	Бие даалтын дүгаар	Лекц, лаборатори хичээлийн гүйцэтгэл өөрийн үнэлгээ (долоо хоног) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Ирц нийт	Багшийн үнэлгээ
100	1																		Баярлалаа
101	2																		Баярлалаа
102	3																		Баярлалаа
103	4																		Баярлалаа
104	5																		Баярлалаа
105	6																		Баярлалаа
106	7																		Баярлалаа
107	8																		Баярлалаа
108	9																		Баярлалаа
109	10																		Баярлалаа
110	11																		Баярлалаа
111	12																		Баярлалаа
112	13																		Баярлалаа
113	14																		Баярлалаа
114	15																		Баярлалаа
115	16																		Баярлалаа
116	17																		Баярлалаа
117	18																		Баярлалаа
118	19																		Баярлалаа

Арх 4дэх өдөр-3 пар | Арх 4 дэх өдөр -6 пар | Арх 4 дэх өдөр -7 пар | Арх 5 дахь өдөр-5 пар | Арх 5 дахь өдөр-6пар

Figure 2. A table for students to evaluate their acquired knowledge uploaded to Google drive (at the end of the term).

During the fall semester, lectures for this course were delivered through distance learning, while the laboratory component was conducted through a hybrid model, combining both in-person and online modalities. In the virtual environment, electronic video lessons and PDF files containing course content were pre-uploaded to the e-learning section of the must.edu.mn website, as well as on Teams and Facebook, with dedicated groups created for each class. All e-video courses were

meticulously designed to cater to the needs and interests of learners, ensuring ease of comprehension through self-paced exercises, assignments, and self-challenge questions, thereby minimizing complexities in the learning process.

A. Using lean methods and self-assessment for self-directed online learning.

To foster active learning in the online environment, a table for assessing students' comprehension levels after reviewing the content has been uploaded to Google Drive (see Figure 1). This enables students to self-assess the knowledge acquired during their lesson, while providing the instructor with a tool to consolidate and summarize each student's comprehension and understanding through the table.

It was observed that certain students exhibit the capability to engage in independent study at their discretion, progressing to subsequent lessons to reinforce acquired knowledge if desired (see Figure 1). Upon examining the tabular data in Figure 1, a comprehensive overview of all students' self-assessment is available after a span of 6-7 days following the lesson. The instructor guides the students in the self-evaluation process, including instructions on coloring the cells in the Excel table. For instance, if the content is thoroughly understood, it should be indicated in green, moderately understood in blue, and poorly understood or not understood in brown.

From the data presented in Figure 1, it is evident that among the 19 students surveyed, those with the code 102 engaged with the lesson content up to the 14th week, while those with the code 112 extended their study to the 15th week, self-assessing a comprehensive understanding. Conversely, students coded 109 reviewed the content during the initial 7 days, and those with code 113, who did not study lessons in weeks 1, 2, and 6, evaluated their comprehension as moderately understanding the content in the third 7-day lesson. Contrastingly, some students completed the entire course within the initial 7 days, self-evaluating their comprehension as satisfactory. A proactive approach to addressing issues arose by reaching out to students who did not attend or exhibited a poor understanding. This involved engaging with the student to ascertain reasons for non-attendance, arranging face-to-face meetings outside of regular class hours to discuss challenging topics, utilizing online chat for communication, and providing guidance for a more thorough study of the lesson content. The outcomes of these interventions are illustrated in Figure 2.

In line with the tabular data in Figure 2, by the semester's conclusion, students with codes 109 and 113, as previously mentioned, assessed their understanding of the lesson after consulting with the teacher regarding missed sessions and areas of confusion. Notwithstanding, with the exception of students with code 107, who did not complete the final 5 lessons, and students with codes 111 and 114, who failed to finish the last 2 lessons each for specific reasons, all other students rated their knowledge, affirming a comprehensive understanding of the lesson content.

Implementing an open self-evaluation table had a positive impact on both the engagement and knowledge acquisition of each student. This approach proved effective, as students who were initially lagging witnessed the progress of their peers. This observation served as an incentive for them to actively participate in lessons to avoid falling behind.

Given this perspective, if certain students express a desire to independently pursue further study of the course content, it is advisable for the teacher and the school to consider providing support. In practical terms, if a student expresses such interest, the teacher can monitor their progress, administer an examination, and if the student successfully completes the course, the teacher may consider acknowledging this dedication through incentives, such as course exemptions or exam waivers.

B. Improving learning outcomes by fostering collaborative teamwork amongst the students.

As per the curriculum of the lesson, below 4 individual assignments are given to the students to strengthen their understanding and knowledge (Table 1).

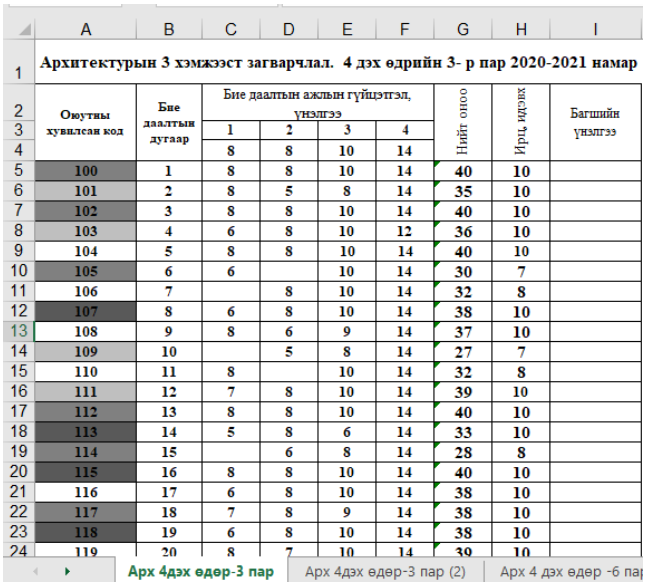
Table 1. Evaluation criteria of the individual assignments.

Week #	Topic	Score
3..6	AutoCAD, drawing "Geometric construction" in 2D environment	8
5..9	AutoCAD, Building plan drawings	8
9.. 12	AutoCAD, 3D building modelling	10
12..16	REVIT, creating a 3D model house projects	14

The first, second, and third homework assignments are designated for individual completion after students have thoroughly reviewed the course content. Subsequently, the teacher proposes that the fourth homework assignment be accomplished collaboratively in teams comprising 4-6 individuals. The progression of these assignments revealed that certain students faced challenges in comprehending tasks when working individually. Some students exhibited delays in understanding, leading to suboptimal performance or non-completion due to misunderstandings. Upon evaluating the outcomes of the initial three homework assignments, it was observed that certain students (specifically, students with codes 101, 103, 107, 113, 116) incompletely finished some of the assignments. Additionally, there were instances where specific students (coded as 105, 106, 109, 110, 114) did not complete one of the assignments at all, as illustrated in Figure 3.

Conversely, in the team-based assignment, members allocated tasks according to the assigned options and executed their respective responsibilities. Additionally, they engaged in knowledge and skill-sharing, providing explanations and teaching completed work to one another. Consequently, all students successfully completed the fourth task (see Figure 3). Notably, six students opted to complete the fourth task individually, as there was no stringent requirement to do it in groups.

Figure 3 illustrates the students who collaborated as a team to accomplish the fourth task, color-coded for clarity. For the completion of the fourth assignment, no pre-existing data was provided. Instead, students were encouraged to engage in independent thought and create a model house using the Revit program, adhering to specific dimensions outlined in the task (a free model house with one to two floors, sized between 6-10 meters). In the collaborative team environment, students utilized communication platforms such as Teams, Facebook, Google Meet, and Zoom to interact with each other and share their screens.



	A	B	C	D	E	F	G	H	I
1	Архитектурын 3 хэмжээст загварчлал. 4 дэх өдрийн 3- р пар 2020-2021 намар								
2	Оюутны хувьлсан код	Бие даалтын дугаар	Бие даалтын ажлын гүйцэтгэл, үнэлгээ				Нийт оноо	Ирц, идэх	Багшийн үнэлгээ
3			1	2	3	4			
4			8	8	10	14			
5	100	1	8	8	10	14	40	10	
6	101	2	8	5	8	14	35	10	
7	102	3	8	8	10	14	40	10	
8	103	4	6	8	10	12	36	10	
9	104	5	8	8	10	14	40	10	
10	105	6	6		10	14	30	7	
11	106	7		8	10	14	32	8	
12	107	8	6	8	10	14	38	10	
13	108	9	8	6	9	14	37	10	
14	109	10		5	8	14	27	7	
15	110	11	8		10	14	32	8	
16	111	12	7	8	10	14	39	10	
17	112	13	8	8	10	14	40	10	
18	113	14	5	8	6	14	33	10	
19	114	15		6	8	14	28	8	
20	115	16	8	8	10	14	40	10	
21	116	17	6	8	10	14	38	10	
22	117	18	7	8	9	14	38	10	
23	118	19	6	8	10	14	38	10	
24	119	20	8	7	10	14	39	10	

Арх 4дэх өдөр-3 пар | Арх 4дэх өдөр-3 пар (2) | Арх 4 дэх өдөр -6 па

Figure 3. Table template showing assignment performance evaluation.

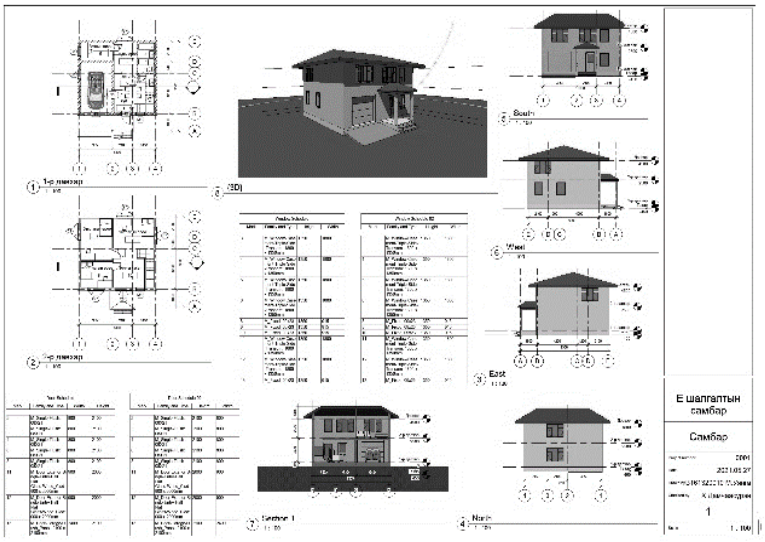


Figure 4. A sample of individual student-completed homework.

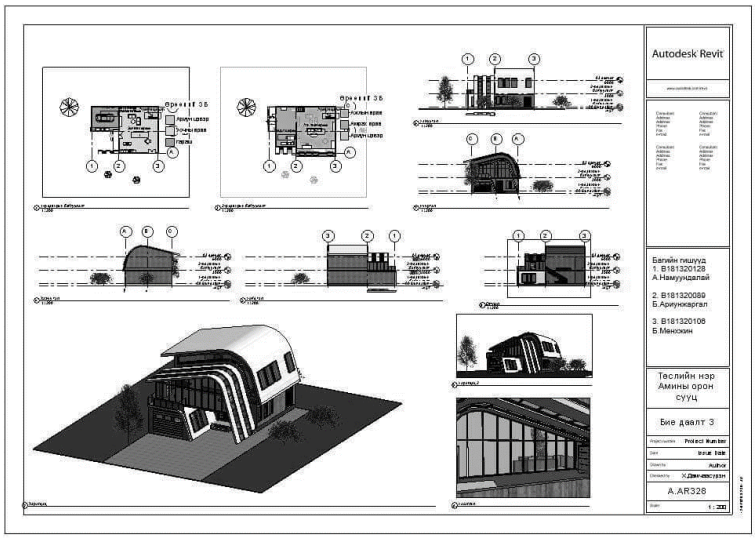


Figure 5. Model of homework completed by students as a team.

In the comparative analysis between team-based and individual homework completion, it is noteworthy that team-generated work frequently demonstrated superior model development and encompassed more comprehensive content. Teams often supplemented their work by incorporating additional information obtained from the Internet (see Figures 4 and 5). Consequently, teamwork not only facilitates enhanced knowledge acquisition and individual development but also fosters mutual learning among students. This collaborative approach extends beyond the confines of the course content instructed by the teacher. It is evident that engaging in team-based activities in an online environment creates enriched opportunities for training and active learning.

C. Leveraging Active Learning Approaches for Enhanced Comprehension in Online Lectures.

During the fall semester of the 2021-2022 academic year, the lecture for the 3D Architectural Modeling course was conducted online, with over 80 students participating in a single class (grouped in teams). While this approach allowed for the involvement of a large number of students simultaneously,

many faced challenges in directly reflecting on the lesson and articulating their understanding. The limitations stemmed from variations in students' environments, the reliability of the devices they used, and, at times, insufficient internet speeds.

To address this challenge, lectures were meticulously prepared and uploaded in the form of videos using a screen recording program. This approach offers students the flexibility to review and study the lesson at their own pace. Additionally, students can assess their acquired knowledge through tests prepared on Google Forms. In the event that a student encounters difficulty in understanding a particular section, they have the option to revisit the lesson and delve into the content further. This method contrasts with traditional classroom teaching, where missing a course session for any reason often results in difficulty understanding the lesson and completing assigned tasks, leading to falling behind classmates. Upon concluding the lesson, students may encounter challenges in fully grasping the subject matter, leading to dissatisfaction and hindered ability to teach the lesson to others. Regardless of whether the course is delivered through traditional methods or online platforms, the effectiveness of organizing the course is discerned through certain indicators. Praise and encouragement are offered when the course content is uploaded online, and indicators of successful comprehension are observed when students fully understand the content of the course.

In the latest assessment, 126 students evaluated their own understanding of the lecture delivered by the teacher. Notably, 104 students (82%) rated their knowledge as good or better, while 22 students (18%) assessed their knowledge as average (see Figure 6). Thus, through the individual upload of course content in the online environment, guidance for each student to access it, and the promotion of active interest in learning with encouragement and support, the potential for improving learning outcomes is evident.

IV. RESEARCH OUTCOME.

By implementing the strategies to engage students in the 3D Architecture Modeling course, there has been a remarkable increase in the students' knowledge levels. It can be discerned that all students now possess at least 80% of the knowledge expected to be conveyed in the course. For this specific lesson, weekly assignments are distributed through chat, and students review and submit their drawing files. In cases where students require clarification or have questions, communication takes place outside of regular school hours using platforms such as Teams and Facebook chat, facilitating advice and instructions. The collaborative approach has significantly contributed to the effectiveness of the training.

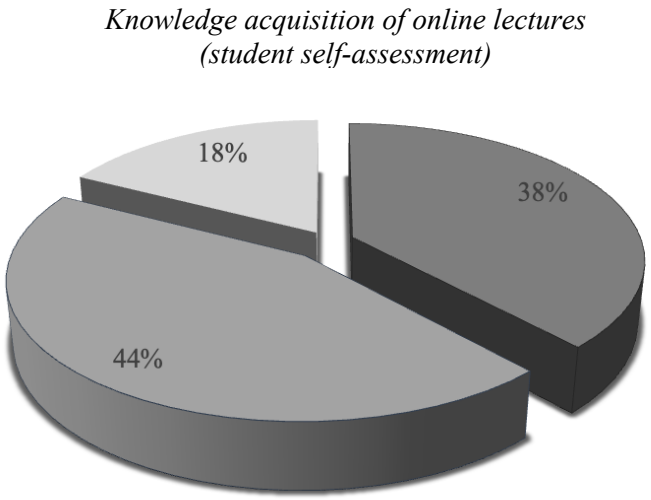


Figure 6. Diagram showing percentage of knowledge mastery of lecture course when active learning method is used in online environment.

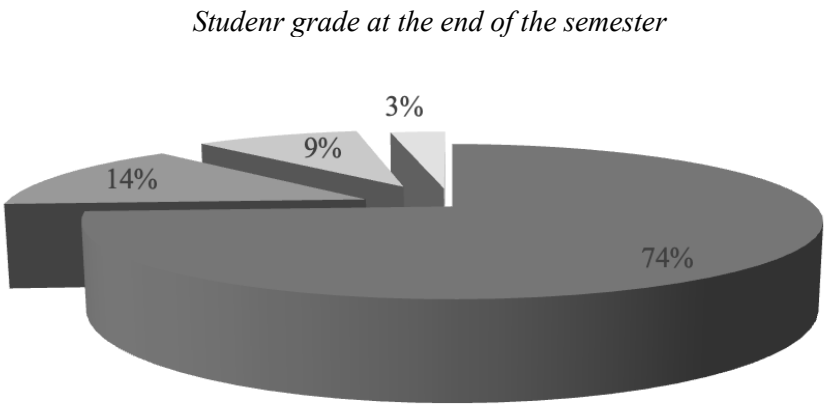


Figure 7. Learning outcomes when using active learning methodological tools.

Figure 7 illustrates the grades assigned by the instructor to the students at the end of the semester. From this standpoint, the alignment between the students' self-assessment of their knowledge and the teacher's evaluation serves as an indication of the training's effectiveness.

The implementation of activities, including regular assessment of students' assignments and notes, rewarding active participation through points tied to online access, and fostering teamwork, has resulted in a gradual increase in students' active interest. This, in turn, has contributed to a significant improvement in their knowledge and learning outcomes.

CONCLUSION.

Indeed, effective online teaching requires careful planning to actively engage students and enhance learning outcomes. In contrast to previous years, where simply uploading course materials online was insufficient to ensure student understanding and participation, the current approach involves thoughtful planning and adherence to teacher standards.

Recognizing the shortcomings of the earlier method, the emphasis now lies in proactive strategies, such as regular checks on assignments, incentivizing active participation, and encouraging teamwork. These measures contribute to increased student interest, improved knowledge retention, and ultimately better learning results. This shift highlights the evolving nature of effective teaching methodologies in the online education landscape.

Indeed, it is imperative for every teacher to contemplate and implement strategies to actively engage students in online classes. However, it's crucial to acknowledge and address the challenges that arise during distance learning. Some notable challenges include:

- Limited Internet Access: Many students may lack sufficient internet network supply, data, and the capacity of their equipment, leading to issues with meeting the technical requirements.
- Technical Requirements: Courses that involve specific software programs may necessitate students to have access to a desktop computer or a notebook with specifications that meet the course requirements.

Addressing these challenges, such as limited internet access and specific technical requirements, is crucial to alleviate significant difficulties faced by students. A comprehensive solution to these shortcomings would significantly enhance the feasibility of enabling effective online training.

REFERENCES

1. CDIO Initiative Materials.Eunice Goh Shing Mei., Choo Keng Wah. “Flipped classroom learning”; page 516. Wei Wei., Mingyuan Xie. “Leveraging active learning tools in Programming Lab”, page 358-364, 2019.

2. M.J. Prince. (2004). “Does Active Learning Work? A Review of the Research.” J. Engr. Education, 93(3), 223-231.
3. Teichler, U., & Janson, K. (2007). The professional value of temporary study in another European country: Employment and work of former ERASMUS students. Journal of Studies in International Education.
4. Felder, R.M. (2009). “Active Learning: An Introduction.” ASQ Higher Education Brief, 2(4), August.
5. Publication of Science Research Papers, MUST (Mongolian University of Science and Technology) 2021.
6. http://obe.edu.mn/page/69.