

IMPROVING THE METHODOLOGY FOR THE DEVELOPMENT OF PROFESSIONAL TRAINING OF STUDENTS BASED ON TEACHING ATOMIC PHYSICS USING DIGITAL TECHNOLOGIES

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<https://doi.org/10.5281/zenodo.7985034>

Annotation. Education process which belongs to computer-assisted laboratory studies are considered one of the most difficult problems of higher education institutions. The subject of practical subjects in technical higher education institutions is complex and mainly requires explanation or demonstration in computer laboratory. These science topics emphasize on the use of observational skills, namely that students need to see the process in action and connect the theory more closely to reality. However, attitudes of students towards practical works are often negative because they don't give effect in laboratory work and this may reflect the notion that there is not clear purpose for practical assignments of student in the laboratory.

The main purpose of this study is considered to study the effectiveness of active learning activities in the field of "Development of mobile application" on the basis of science program of Google Classroom's computer engineering specialty. In this research, a set of questionnaires was distributed to 100 students who enrolled in groups which teach "Development of mobile application". The Technology Acceptance Model (TAM) was used to organize the relationship between the factors which were identified in the data analysis and the effectiveness of the learning activities. The results show that the majority of students are satisfied with the Google Classroom tool which is provided in class which all rates are above average. Rates is particularly good in areas such as comfortability of access, acceptable utility, communication and interaction, teaching and student's satisfaction with learning activities in the Google Classroom.

Keywords: Google Classroom, Web 2.0 tools, Mobile applications, Distance learning, Teaching and learning.

I. INTRODUCTION

In the XXI century, a new era of development in human civilization, namely, the era of information society has begun. It is characterized by the rapid development of information and telecommunications, the rapid spread of information technologies, the globalization of social development processes, the international communication environment, the formation of education, communication and production, and the development of the infosphere. The organizational and technological basis of the information society is considered the global information network - the Internet.

The organization of the learning process in distance learning can be done on the basis of the following stages:

- (1) Identifying course objectives. It is determined what knowledge (topics, science, and others.) should be imparted and who should be taught.
- (2) Choosing teaching methods. During the learning process, it is necessary to diagnose the level of knowledge and skills, as well as to identify sources and methods of testing.

- (3) Development of methodological requirements for teaching materials. It is necessary to determine the methods and volumes of imparting new knowledge.
- (4) Development of timetable of classes. It is important to divide the whole course into several modules, and determine what knowledge the student should have after completing each module.
- (5) Organizing monitoring of the educational process.
- (6) Planning inspection processes,
- (7) Planning students' independent work,
- (8) Preliminary evaluation of the results of learning process;
- (9) Software of identifying and analyzing results [1].

Google is a popular Web 2.0 tool which offers many interesting features and applications. It has few pedagogical and organizational capabilities due to its many built-in features which offer many other Web 2.0 tools, social and technological capabilities. Google Classroom is a new tool which was introduced in 2014 by Google Apps for Education. This tool makes it easier for teachers to quickly create and edit assignments, provide effective remote interaction from distance and communicate easily with their students [2].

The current traditional teaching method is considered teacher-centered training, speakers use visual tools in the form of presentation slides, boards, and visualizers. Learning activity in the computer science lab includes four main types of practical works: exercises, experiments, demonstrations and research. Therefore, the current traditional method is not convenient to use in teaching computer engineering sciences. The topic of the most practical lessons, such as "Development of mobile application" emphasizes on the use of observation skills which are mainly explanatory or demonstrative in computer lab, namely students should see the process in practice and link theory closer to reality.

However, attitudes of students towards practical works are often negative because they don't give effect in laboratory works and this may reflect the notion that there is not clear purpose for practical assignments of student in the laboratory. Teaching in computer labs at universities is often criticized that a person deprives the opportunity to think and create personally due to a lack of time for instruction. For example, the subject "Development of mobile application" is only four hours per week at the undergraduate level.

The Technology Adoption Model is recommended in analyzing the effectiveness of active learning activities for the subject "Development of mobile application" in Google Classroom in this article.

II. MAIN PART

Distance education is a unique didactic system which includes the purpose, content, students, teachers, teaching methods, tools and forms of teaching. However, despite all the possible changes, the "teacher" - "a person who gives education" is considered the most important link in ensuring the efficiency and quality of the learning process.

Distance education as a new form of education, by its very nature, leads to the emergence of a new form of teacher, often called a tutor. Many universities do not currently have an official position as a tutor (the conceptual advantages of distance learning are its modernity and evolution), and the main subject of the article is that a teacher who acquires distance education technologies, is called a "Distance education tutor". We clarify the definition of "Distance education tutor" ("Distance education teacher - a teacher-consultant who performs his or her duties through distance access"): "Distance education tutor" has distance learning technologies and provides students with psychological, pedagogical, methodological, and organizational support [3].

Distance education continues to grow and play an increasingly important role in higher education of Uzbekistan. In this rapid growth, a number of researches on the effective organization of distance learning began to emerge. Processes show that effectively organized distance learning does not significantly differ from the learning outcomes achieved through teaching in traditional education [4].

TAM was developed by Davis to explain computer use behavior. This system has two important features: comfortability of use (CU) and perceived benefit (PB) [5]. Saade, Nebebe, and Tan emphasize the importance of university student participation for successful e-learning systems and therefore the need to assess behavior of admissions of students. They suggested that TAM is a robust theoretical model, its validity can be extended even in the context of e-learning [6].

Teachers or students should also be aware that "Development of mobile application" in Google classroom environment and the application concepts related to them, the teaching and organizing process is beneficial because of the comfortability of use of the Google classroom. The task which is to inform teachers and students about its future use in the workplace and to make sure that it is easy for students to use it if necessary, is given.

The Google classroom can be enhanced as a pedagogical/cognitive tool which is focused on the teacher and the students under his or her supervision, answering questions from the outside, dialogue, and helping to focus on the group which think creatively. Traditional teaching is understood teaching which is not supplemented by computer programs. Using the Google classroom develops high-level thinking, problem-solving skills, and supports all processes which are required in this period of information technologies.

The online environment is intertwined with feelings of social solidarity, social connection, and groups cohesion [7]. Social presence creates the conditions for the development of this commitment and groups cohesion. On the other hand, the presence of teachers is significantly related to the perseverance of students as it affects social existence [8]. The factors which lead to loss are complex, all of them point to a lack of social and academic integration as a key factor. Academic integration, namely, the level of students' satisfaction with intellectual development, less depends on the method of communication than on social integration.

As a result of studying literature, it is determined that the Google audience is necessary in teaching and learning, especially in the process of studying a computer lab, for example, asking questions; studying books and other sources of information in order to see what is already known; planning inspections; review known data using tools (computer software) for data analysis and data interpretation; offering answers, explanations, and predictions; conveying the results and conducting observations [9].

The object of this research is students who are taught subject "Development of mobile application" and are studying Computer Engineering direction. A simple random selection was used to select the sample for using the random selecting method. The debriefing includes demographic data, five approximate variables, and questions about student satisfaction. Demographic questions covered gender, marital status, curriculum, and average indicators on the Internet.

The own efficiency scale of Internet which was developed by Eastin and Larose, was used to develop the questionnaire tools [10]. All components were measured using a five-point nominal scale from 1 (strongly disagree) to 5 (strongly agree). This tool was initially tested by experts for the accuracy of its composition before distributing. Specialists were selected on the basis of online teaching and teaching experiences. Some minor changes were made on the basis of their recommendations, including changing words, deleting elements, rewriting sentences, and changing element numbers. Subsequently, experimental researches were conducted to ensure its

reliability. The 30 students who were studying the subject "Development of mobile application" attended. The results show that the Kronbach alpha is greater than 0,9. Data were analyzed using two descriptive statistics and a summary statistic.

According to the debriefing, it is observed that the majority of students are men, it is evaluated that participation of boys are high in the high interest in computer engineering in Uzbekistan and education. It is seen that female respondents are (18%) and male respondents are (82%) with a relatively high percentage (Figure 1). The 97% of respondents on decision-making is students, 3% is statistics of external participants.

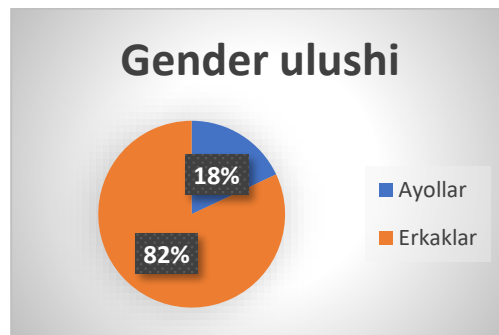


Figure 1: Gender share

The question by Likert type about the average frequency of access to the Internet in debriefing in order to determine the level of use of information and communication technologies (ICT) among respondents. Five answer options are given as shown in Figure 2. Most (80%) respondents use the Internet several times a day, and (20%) respondents use the Internet many times a day. This means that all of respondents know how to use the internet and web applications.

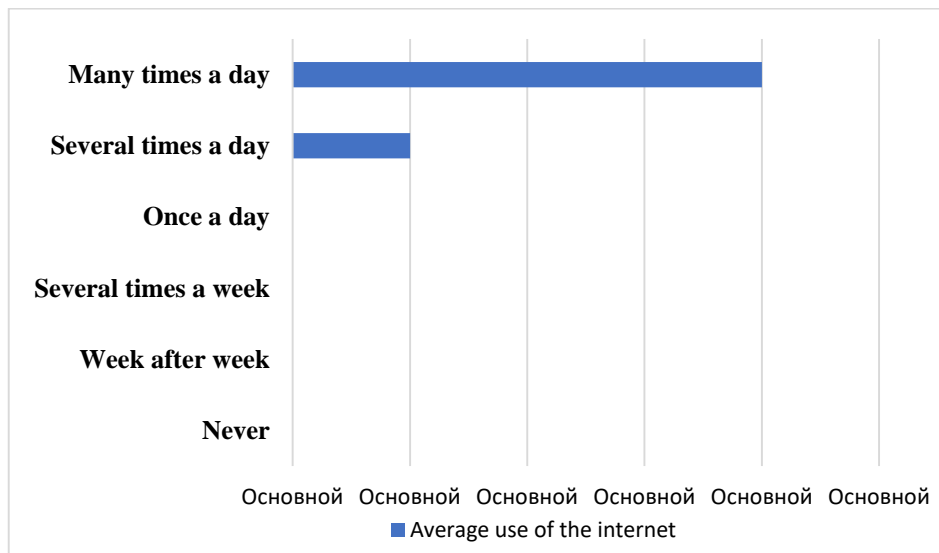


Figure 2: Average use of the Internet

Table 1

Average evaluation of comfortability of use for each component

Factor	Components	Average grade
Comfortability to access	Access to Google Classroom	4.45
	Using course materials	4.39
	Sending and accepting tasks	4.52

	Taking tasks	4.55
	Managing the system	4.24
	Easy to understand the system	4.39

According to Table 1, all grades are above average and the assignment of the task component which is average 4.55, is the highest indicator. Participants strongly agreed that using Google Classroom in their classrooms facilitated the assignment process. The lowest average value corresponds to system navigation component 4.24. Participants were dissatisfied with the relative complexity of managing the system compared to other variables. Therefore, the speaker should pay more attention to help students with the necessary materials to move easily in the system.

Table 2

Average evaluation for each component of perceived utility

Factor	Components	Average grade
Acceptable convenience	The quality of educational activities is very good.	4.24
	A great environment for social interaction in the Google classroom lab lesson (for speaker-students and student-students)	4.30
	Google classroom helps me to complete the assignment in less time.	4.33
	The course sessions helped me to review issues, evaluate new ideas, and put what I learned into practice.	4.27
	The comments which are given by the speaker are useful.	4.42
	The Google classroom rating system helps me to monitor my performance and understand the current topic which is being discussed.	4.24
	Goals, ratings, and evaluation are agreed upon using Google Classroom.	4.27

According to Table 2, all grades will be above average indicator. The component of opinions which are given by the teacher was rated with average of 4,42. Respondents strongly agree that the speaker's testimonials are very useful in terms of the usefulness of the Google Classroom. Then the lowest average grades are given to the learning efficiency component and the Google Classroom assessment system, each of them is equal to average of 4.24. This result indicates that the respondent does not agree that the quality of education and assessment system in Google Classroom is useful compared to other variables, but the grade 4.24 indicates that this component is still useful on average.

Table 3

Average evaluation for each component of communication and interaction

Factor	Components	Average grade
Communication and interaction	I felt comfortable talking through this environment for this activity	4.24
	The teacher helped that the course participants are interested and participate in effective discussions.	4.39
	I felt comfortable interacting with other participants of this activity.	4.21
	During this event, my point of view was recognized by other participants.	4.33
	Speakers work diligently in teaching and explaining through the Google classroom.	4.42
	The speakers are friendly and you can easily communicate with them.	4.61

According to Table 3, all grades are above average, the average highest grade is 4.61, namely, the speakers are friendly and can be easily communicated. Participants strongly agreed that the speakers were friendly and could easily communicate with them. Then the lowest average value is 4.21, and this is considered to interact with other participants in this activity. This shows that the participant thinks that it is more inconvenient to interact with other participants in the virtual world than with other variables. Therefore, the speaker should pay more attention to create the interactive online learning platform in order to actively have online learning.

Table 4

Average evaluation of the received indications for each component of delivery.

Factor	Components	Average grade
Delivery of instructions	The teacher gives clear instructions on how to participate in studying this course.	4.45
	The teacher provides clear information about important dates/times for the learning activity.	4.42
	The teacher clearly states the important topics of the course.	4.39
	The teacher helps to the course participants in performing their duties.	4.36
	The teacher gives his/her opinions, it gives me opportunity to better understand the content of the lesson.	4.33

According to Table 4, all grades are above average and they are shown by the highest indicators. The instructional component on how to participate in the course's learning activities is clearly indicated with average grade 4.45. Respondents strongly agreed that the teacher should give clear instructions on how to participate in the learning activities of the course in understanding the lesson. The lowest average grade is 4.33 and this indicates opinion of the teacher, it allows me to better understand the content of the lesson. This shows that the respondent did not agree that the speaker should make opinion during the teaching process which would allow for a better

understanding of the lesson content. Therefore, it is recommended to use the alternative method to improve understanding of students.

Table 5

Average evaluation for each component of student satisfaction

Factor	Components	Average grade
Student's satisfaction	I achieved my personal goal through this implemented tool.	4.22
	I recommend applying this learning method to other relevant disciplines.	4.34
	The Google classroom is my first choice in active learning compared to any other method.	4.10
	I like Google Classroom as learning initiative and motivator which increases my motivation.	4.16

According to Table 5, all grades are above average and the average highest score is 4.20. Participants actively participated in promoting Google Classroom as active learning tool and recommended to use it in other relevant classes. The lowest average value is 4.08, it corresponds to query - Google classroom is my first choice in active studying compared to other methods. This shows that the Google classroom is the last choice for respondents to actively study when compared to other methods in Google classroom. However, a grade 4.08 still indicates that this component is beneficial on average.

CONCLUSION

It is shown that students are satisfied with Google Classroom, and therefore its effectiveness as active learning tool in this article. Scientific researches show that we are constantly identifying tools that lead to greater student satisfaction through demographic observations, surveys, analysis, and analysis of teaching methods. This approach, in turn, helps to train online teachers by methods and to project educational support programs which allow students to succeed in the online environment. It is important that Google classroom tools are not only a useful application tool, but also they are very important in teaching and learning the subject "Development of mobile application". Most importantly, this environment is considered an excellent pedagogical tool which improves to learn the subject "Development of mobile application".

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