Determination of the Use of Internet of Things Technology in Educational Settings among University Students

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Abstract—Internet concepts intended in this study were to determine the use of technology in educational environments, such as internet of things, among university students, which is a longitudinal distance education course of university students continued through the platform during the pandemic, given that it will become an advantage for them concerning the objects of Internet technology. It is seen that many methods are used in the study. Periodically, the study was prepared by applying it in the fall semester of 2021–2022. A total of 488 volunteer university students who are continuing their education participated in the study. In the study, 3-week online education was provided to university students. In the study, the 'Internet of Things' measurement tool developed by the researchers and compiled by experts in the field was sent to the students. The data collection tool used in the study was delivered to the students participating in the study by online method and then collected. The analysis of data was carried out using SPSS programme, frequency analysis and *t*-test. The results obtained were added to the study accompanied by tables and comments. At the end of the study, it was concluded that the students participating in the study had a high use of internet of things technology in the educational environment.

Keywords—internet of things for university students, distance

1 Introduction

Physical objects on earth connecting to the Internet by remote access sensors are known to provide remote control; other sources of data that are generated by combining the values found in the Internet environment, and thus services are provided [7]. The meaning of objects was observed in expressing some issues with the integrity of the Internet, particularly along with the increase in WiFi and 4G wireless Internet access, anytime and anywhere located, which gave meaning to this environment of distance education and information and communication systems [13]. Web servers with such propagation, although they give rise to new meanings and emotions, new ideas of the objects of the hottest Internet nowadays, are known to have policy concerns in

information and communication technology [2]. In the last 10 years, from the Internet to evolve into consideration and the new generation, known as the Internet of objects, this is the last you what internet business, distance learning, from the word application, but in recent years the wide use of the internet, which allows, together with the very rapid consumption of fibre optic cable infrastructure and smart devices, the Internet of the future and gaining momentum is defined as fattening and this new concept of internet is no longer 'the Internet of objects, referred to as' [5]. Although space articles have been studied and some data have been taken into account, only 1% of objects in the physical world are interconnected by the Internet. The unconnected 99% actually seems to indicate that the concept of 'connected worlds', which has not yet been fully implemented. With 2.5 billion people online in 2020 and 37 billion of new objects connected with each other, it is predicted that in the coming years the internet of things interconnected with objects, devices and sensors will be increased [15]. In addition to the use of Internet of Things technology in various fields, which has qualified and beautiful meanings and is also used in education and is shown at the beginning of technologies that will guide the future, it is inconceivable that it will not be used in traditional face-to-face educational environments and open and distance learning systems. In this context, a current situation analysis covering various aspects ranging from the distribution of academic research on the Internet of Things by years to educational use areas is carried out with this study [8] [17]. It is necessary to know these things by considering some terms when using the Internet of Things as follows:

- Person-to-person communication means allowing individuals to stay in touch through an object/electronics.
- Person-to-object communication refers to the communication of people with the device for the purpose of obtaining special information. It also includes the fact that objects can be accessed by people with remote access.
- Object-to-object communication involves objects communicating with other objects or with a non-human device to access information [16].

It is known that the internet of things can be physical devices and products as well as logical notifications and resources. Technically viewed, radio frequency identification tags placed on objects, such as a sensor device and sensor communicating over the Internet by the Internet system of objects with each other and the environment it creates, in a sense, refers to the remote training [6]. In order for distance education and training activities to be carried out outside the student and teachers' location and also in different places and times from each other, a learning management system is required [12]. These systems are expressed by the concept of a learning management system. Although there are many definitions made for OYS, it is known simply as learning management system, a set of content environments that ensure the delivery of various learning resources to students and the management of learning processes, learners and teachers assume various responsibilities and roles in the learning management system [14].

1.1 Related research

Rodney (2020), in the year of the work carried out on students, sought to analyse the potential impact of the internet on education of objects, and as a result, education policymakers and educators of instructional design, curriculum development and school leadership for the planning and organisation of the change in the modes have reached the conclusion that it is practical [10].

In the study conducted by Fragou et al. (2020), computing, mobile computing and the internet of things (UMI) are widely used in various application fields. To date, methods and techniques for the application of these technologies in real-life situations have continued to appear; however, their use in educational settings with a focus on current applications has not been largely studied [3]. Here, the relevant literature and present evidence gaps and promising and important research is to analyse systematically since, and as a result, all levels of Education, analysis, context, and relevant actors, methods and digital tools, too, are significant challenges for the provision of mobile and ubiquitous learning approaches including active learning and computer in the domain of existing objects, they have concluded that reveals important characteristics of educational applications on the internet.

Gilman et al. (2020), in the year of the work carried out on a college campus in long-term real-world objects, used the internet to investigate the challenges of deployment, and as a result, the space from the data analysis by using the infrastructure developed by conducting various activities as you interact with students using adapted to these environments and the infrastructure developed using this technology for the next generation of data by using the space you interact with various studies that can be carried out from the analysis as they achieved [4].

From the studies in this section, it is seen that the internet of things technologies benefit students and they are adapted to this field. In this context, the purpose of the research is designed.

1.2 Purpose of the study

Depending on the problem situation, the aim of the study is to determine the use of the internet of things technology in educational settings of the students involved in the research. In this context, answers to the following questions have been sought within the research:

1. How much time do the students participating in the research devote to distance education?
2. What is the usage time of internet of things technologies of the students participating in the research?
3. What is the purpose of using the internet of things activities included in the study?
4. What are the views of the students on internet of things technologies and distance education according to the gender variable?
5. What are the opinions of the students who participated in the study about distance education and internet of things technologies after the study?

2 Method

This section of the identified research is considered important. It is mainly known to determine how the main theme will be in the research. In this context, it is expected that the method used will be distributed equally with the problem situation. In this section, the collected statistical data are formed.

2.1 Research model

When the research model is focused on, it is seen that it is used by applying it as a quantitative research method. It is seen that this model is the preferred method in many studies, and in this study, a quantitative research method was used. It is known that the quantitative research method consists of the wide reception of the universe, as well as the events and phenomena that have taken place from the life that has been lived up to this time [14]. In this section, which is considered as a research study, gender and use cases are described according to variables after determining the use of Internet of things technology in educational settings by university students with the help of quantitative research method and determining the use cases of applications.

2.2 Working group/participants

The participants of the research, which focused on time, are college students from various universities in Kazakhstan who volunteered participated in the research. A total of 488 volunteer university students participated in the study. Recently, it was observed that questionnaires and data collection tools were sent to students from a virtual environment, and this model was used throughout the study.

Gender. In this section of the study, the differences of the participants participating in the study according to their gender are given in Table 1.

Table 1. Distribution of primary school students according to the gender variable

Gender	Male		Female	
	F	%	F	%
Variable	248	50.82	240	49.08

In light of the information obtained in the research, it is seen that there is information according to the gender variable. In this context, the gender variable data of the students participating in the study are presented in Table 1. In this context, it is seen that 50.82% (248 people) were male university students, while 49.08% (240 people) were female university students. In the gender section, the findings reflect the actual gender distribution.

Distance education usage time of the university students participating in the study. In this section, the distance education usage times of the students participating in the research are discussed and examined, especially about spending time in the Internet of things environment, and presented in Table 2.

Table 2. The distance education usage time of the university students participating in the study

Time Allocation	1–2 Hours		3–4 Hours		5 or More Hours	
	F	%	F	%	F	%
Variable	104	21.33	170	34.82	214	43.85

In this section, the status of the time devoted by students participating in the study to distance education is examined and detailed information is presented in Table 2 in detail. When the table is examined, we can see that 21.33% (104 people) stated that they had devoted time to distance education for 1–2 hours, 34.82% (170 people) stated that they had devoted time to distance education for 3–4 hours and, finally, 43.85% (214 people) stated that they had devoted time to distance education for 5 hours and above.

Time process of using internet of things technologies of the students participating in the research. In this section, the time periods have been categorised by examining the usage processes related to internet of things technologies for students participating in the research and detailed information has been shown in Table 3.

Table 3. Time process of using internet of things technologies of the students participating in the research

Internet of Things	1–2 Hours		3–4 Hours		5 or More Hours	
	F	%	F	%	F	%
Variable	130	26.64	111	22.74	247	50.62

The status of the students using internet of things technologies and how much time they take is examined. In Table 3, it can be seen that 26.64% (130 people) of the students expressed using 1–2 hours of their time on Internet technologies, 22.74% (111 people) expressed using internet technologies in the range of 3–4 hours and, finally, 50.62% (247 persons) expressed devoting over 5 hours to Internet technologies. It can also be seen that majority of the students devoted more than 5 hours of their time to using internet of things technologies.

Class status. In this section, the class information of the study group of university students was examined and detailed information is given in Table 4.

Table 4. Distribution of university students according to their class status

Class	2. Class		3. Class		4. Class	
	F	%	F	%	F	%
Variable	138	28.28	160	32.79	190	38.93

When the class information of the students included in the study is focused on, it is seen that the numerical values are divided into groups and shown in the appropriate place. As for the class frequencies, 28.28% (138 persons) are in the second year, 32.79% (160 pupils) are in the third year and, finally, 38.93% (190 people) are in the fourth year. This was observed of the classes in the month of December. This section shows the actual graph of the numerical content in the distribution section as a group of values.

2.3 Data collection tools

The data collection tool in the research it is noted that some of the data were to be processed, this data is important to form the data collection tool, it is also a tool created by the workers, the problem of data collection in accordance with the state of objects to increase the importance of distance education and internet technologies has been examined by experts. The topics in the content of the data collection tool were created in accordance with the internet of things and distance education, and it was called the 'internet of things' measurement tool. In addition, a personal information form was prepared by the researchers and applied to the students included in the study. In order to increase the reliability of the measurement tool developed and to correct the inaccuracies, it was shown to some experts and the relevant changes were also made to the data collection tool.

1. Demographic data totality: here, a large amount of information is applied and requested in order to determine the students' information, such as gender, distance education election times, internet of things election times and classroom information.
2. Internet of things data collection tool: A 5-point Likert-type data collection tool was prepared to be used in order to obtain information about the 'distance education' and 'internet of things' opinions of the students participating in the study. From the data collection tool considered, 19 items were used out of 23 items and 4 options were removed after experts' opinions. The opinions of primary school students on the two factorial dimensions, i.e., 'distance education' and 'internet of things', were applied to the students participating in the study. The Cronbach alpha reliability coefficient of the measurement tool as a whole was calculated as 0.88. The measurements were in the range of 'strongly disagree' (1), 'disagree' (2), 'I'm undecided' (3), 'agree' (4) and 'strongly agree' (5). The data collection tool was sent by email to the students participating in the research and was collected online.

2.4 Application

In this section, for students who participated in the research, distance education and virtual classrooms and spaces that are called illustrates these environments designed to experts, Kazakhstan and several student volunteers who continue their education in college classes in the region designated 488 Ms teams video conferencing and live events with the help of the Sakai learning management system is scheduled to prepare for the object classes on the technology of Remote time in learning technologies and use cases, Sakai Learning Management System Application Programme prepared by MS teams and training was arranged for them in the area of this activity on the environment, as part of the application included in the study over a live event called the sizes of objects and the students surveyed synchronous model of internet technologies for the education of the material to be presented is targeted. The 3-week training as part of the students participating in the study conditions of the objects in their daily lives merge Internet technologies, terms of use and also how often they have different training techniques, applications to practice and the process of distance education model of objects in the Internet of course, live classes 'distance education', 'Internet of things' etc. such information was provided to the students as a live event and information about this area was

shared and the students were asked to participate in the event every week. After 3 weeks of training, the measurement tool was collected; thanks to the online survey tool, it was transferred to the SPSS programme by coding it in the environment of calculation programmes.

2.5 Analysis of data

The findings in the study were updated and obtained with the help of analysis programmes. Numerically, frequency (f), percentage (%), mean (M), standard deviation (SD) and *t*-test were considered and patterned and added to the research.

3 Findings

The study discusses the results of the poll on the concepts of distance education and internet of things. The findings are also discussed in combination with each of the comments given in the tables in this section.

3.1 Purpose of using the internet of things activities by the students participating in the research

According to the researchers, the purpose of using the concept of internet of things technologies has been investigated and examined and related information has been added.

Table 5. Purpose of using the internet of things activities by the students participating in the study

Department	Learning		Self-development		Other	
	F	%	F	%	F	%
Variable	241	49.39	201	41.18	46	9.43

Nowadays, it is known that students developed themselves with technology, Internet activities, work and detailed information of the objects given. In light of this information, 49.39% (241 people) stated by 'learning', 41.18% (201 people) stated by 'self-development' and, finally, 9.43% (46 people) stated other fields. In this context, it can be said based on Table 5 that most of the participants chose the 'learning' option and turned to it in accordance with the problem situation according to the problem situation of the research.

3.2 Internet of things technologies and distance education opinions of the students participating in the study according to the gender variable

In this section, some information according to the concept of gender was researched and examined. In this context, the internet of things technologies and distance education views of the students participating in the study according to the gender variable are examined and detailed information are added and presented in Table 6.

Table 6. Students' views on the internet of things technologies and distance education according to the gender variable

	Gender	N	*M*	SD	Df	t	p
Internet of things and distance education	Male	248	4.47	0.37	488	0.288	.577
	Female	240	4.41	0.26			

According to the concept of gender, applications were made to the information of the students included in the study. The internet of things and distance education opinions were examined and related information was collected. In this research, it was seen that there were no significant differences according to the gender criterion and its numerical value was reached [$t(488) = 0.288$, $p < .05$]. In addition, students' internet of things and distance education status opinions are examined, and the average score of male students was $M = 4.47$ compared to female students, while for internet of objects, the opinions regarding the situation and distance education was $M = 4.41$. In this context, it is seen that the values of male students are higher than female students included in this study.

Table 7. Post-study opinions of university students participating in the research on distance education and internet of things technologies

No	Opinions	*M*	S
1	I am interested in the activities I receive with distance learning	4.42	0.76
2	I was interested when I first saw the internet of things technology	4.34	0.69
3	I have been waiting with excitement for 3 weeks at this event, which I took with distance learning	4.34	0.94
4	I can say that I find the objects of these trainings meaningful for internet technologies	4.24	0.85
5	I find the topics I study with the Internet of things simpler and more understandable	4.24	0.94
6	I have never had any difficulty in participating in Internet of things technologies	4.28	0.96
7	I was able to easily access every material through the distance education learning management system	4.24	0.78
8	I have never had any difficulty in registering for the distance education learning management system	4.35	0.65
9	I am looking forward to using internet of things technologies with distance learning	4.36	0.57
10	I have never had any difficulty accessing the electronic exams on Sakai	4.29	0.68
11	I think that Sakai learning management system is designed for teaching software that students can use	4.38	0.68
12	I was able to participate in all events on Sakai from anywhere on the clock	4.40	0.52
13	Creating a space for myself on the Sakai learning management system has increased my interest in internet of things technologies	4.32	0.62
14	I also transfer these activities that I have received with Internet of Things technologies to my friends	4.27	0.67
15	I find Internet of Things technologies useful and effective for my field	4.34	0.71
16	Being in designed educational environments makes me feel like I am in knitting education	4.35	0.7
17	Each given material allows me to better prepare for events in the coming weeks	4.24	0.52
18	Sharing files in these environments allows me to exchange files with other friends in the environment and correct my mistakes	4.14	0.62
19	I would be happy to see these two technology concepts in my other courses	4.27	0.62
	Overall Average	4.30	0.70

3.3 Post-study opinions of university students participating in the study on distance education and internet of things technologies

After the training given to college students, the opinions of those participating in the study on distance education and internet of things technologies are examined and detailed information about the views is shown in Table 7.

In Table 7, the opinions of students related to study of the object after training on internet technologies and distance education are noted. Although it carries a different meaning, each answer after the training of the students who participated in the research is viewed with a high value. The most obvious expression was 'I was able to participate in all activities on time from anywhere Sakai' (M = 4.40). It can be seen that each value in the research is evaluated separately and added to the table. Among these statements, it was found that 'Being in designed educational environments makes me feel like I am in knitting education' (M = 4.35) is another phenomenon. Students' opinions of the two fields are high, with agree and strongly agree chosen. 'I would be too happy to see these two technologies, the concepts of my other classes' and 'objects of my friends too I'll tell about the events that I took with internet technologies' had the same value (M = 4.27). 'I am looking forward to using internet of things technologies with distance education' (M = 4.36) and 'I have been waiting with excitement for 3 weeks at this event 'I received with distance education' (M = 4.34) had high numerical values. In addition, 'I find the subjects I study with the Internet of things simpler and more understandable' (M = 4.24) had a high value, and finally, when the overall average is considered, it has a value of M = 4.30.

In Table 7, the two areas that students have a high opinion of their time are productive environment to communicate with their friends and time they are having when there is a problem they could solve. In this context, it can be said that the numerical findings in Table 7 constitute a positive meaning and that the groups of participants participating in the study are also based on the findings that the internet of things and distance education courses are good and positive.

4 Discussion

Abdel-Basset et al. (2019), in the year of the Internet of objects in the work they have done, in life, in favour of an individual's life and is committed to organisations that provide a huge variety in the productivity of smart training is intended to highlight whether creating a process and as a result also of vital importance in our daily lives and make efficient and effective decisions for the benefit of their students to the [1]. The results regarding the role of the internet of objects are achieved. In this context, the aim of the research objects of this value and meaning when combined with internet technologies while providing the benefit of students reached the conclusion that it is seen that technology is a step ahead, always keeping one step ahead of these two values, and technologically students and teachers can be said to make sense.

Shaikh et al. (2019), in the year of the work they have done what they have done in their research in their own countries for higher education institutions based on the acceptance and adoption of internet technologies in the design of the objects sought,

and as a result, business objects that have a significant impact on the main outcomes of the adoption of the internet of consideration and in-depth analysis, showing that the application is heavily used compared to all the other applications they achieved very little [11]. The results of the field of distance education benefit are also emphasised. In this context, this value when combined with the results of the research distance education and the internet of objects are also included in the research as an advantage for the students is seen as the result of that is close to this value. In this context, the training of generation Z in this process, on the concepts of object technology and distance education for individuals, teachers and students, can be said to be beneficial for future generations.

Developments in information and communication technologies (ICT), in the research conducted by Mircea et al. (2021), stress that the education system is accompanied by changes in all areas of life, including smart objects and the necessity of a training environment helps and attempts to explain the concept of the internet, and as a result, business objects with smart technology concepts information technology and universities contribute to the development of both theoretical and practical terms of the users of these technologies, namely the education of the students will keep them a step ahead [9]. In this context, it is seen that the results of the research have been reached that the concepts of distance education and technologies of objects are used very often, it can be said that when these two values are combined, educational methods will develop as educational technologies for the next generation.

It should be noted that these two topics are integrated with technology and should be patterned accordingly, if the research developed and conducted in the discussion section is taken into account, so it is thought that positive feedback and outputs can always be given to students in the research. In addition, it is among the expectations that the research will be repeated and will contribute to this problem situation.

5 Conclusion

When the results are considered, it is seen that the number of participants came first. It is seen that 488 students participated in the research, and it was also concluded that these students studied at various universities in Kazakhstan. It is known as an advantage that the number of students is more than sufficient. Another result of the research is that the students participating in the study were examined in the situation of devoting time to distance education, and as a result, it was concluded that they devote time to distance education for a maximum of 5 hours and more during the day. This value brought the students one step closer to the concept of object technologies. Another result of the research is the study of how much time the students participating in the study devoted to internet of things technologies during the day, and this result is found to be 5 hours and above, it seems that this value and the previous value of the research combine to reveal the totality of meaning.

Another important result of the study is that nowadays technology students develop themselves by the objects held in front of their eyes. It is known that internet activities, students work and detailed information of the objects have been investigated and in light of their intended use of internet technology, most objects of learning and

self-development, it is seen that a conclusion is reached. Another value of the research is that according to the concept of gender, applications were made to the information of the students included in the study, the Internet of things and distance education opinions were examined and related information was collected. It has been concluded that there is no significant difference according to the gender criterion in this study, and it is also observed that the opinions of male and female students participating in the study are high. The final conclusion included in the study after the research of students of the objects were examined and related to internet technologies and distance education to work as a result the opinions of all activities on time that one can participate from anywhere in Sakai fortunate, designed to be within formal education, they feel like the environment, education, the concepts of the two technologies, they want to see in other classes, of objects with distance education impatient to use internet technologies, receiving an education more understandable issues with the Internet of objects they found, and this time they are having their time in a productive environment to communicate with their friends, when there is a problem they could solve, now waiting for next week with a lesson in taking pleasure in this environment a very positive outcome is reached, it is seen that they work.

Finally, in light of these technologies, it is seen that the students participating in the study are studying decently, while it is among the expectations that such research should be planned in the future, and it has also been concluded that the use of the internet of things by university students in an educational environment is high.

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