Embedded Selforganizing Systems

Learning IoT Course Using Web Platform Technology

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Abstract— **The IoT market of Kazakhstan is, to some extent, the heir to technological solutions that have been actively developing in the republic for more than a decade. Improvements in devices allow them to hear, see, think, and sometimes act. Today, with the development of this technology, special courses in this area have begun to be introduced. Thus, the traditional model of university education is changing. The article presents the technology for organizing project-based learning IoT course on the basis of the Faculty of Information Technology. L.N. Gumilyov at the Eurasian National University. Based on the analysis of scientific, methodological and regulatory articles, a structural model for organizing IoT course training through web technologies. In the course of studying the IoT course from various educational platforms, students encountered various problems and found solutions to them. As a result, we have created an educational platform for learning IoT. In the educational platform, the participants learned to apply theoretical knowledge to solve real problems in practice and gained an unforgettable team experience.**

Keywords— **IoT (Internet of Things), education, platform, curriculum, educational platform, teaching method.**

I. INTRODUCTION

Nowadays, the Internet of Things has begun to influence our lives, including education and work. The Internet of Things is a concept that defines two or more devices that are interconnected and connected to the Internet so that they can be con- trolled distantly. The Internet of Things makes our daily tasks easier and more cost [1]. Self-study course IoT students can use educational platforms that carry a lot of practical and theoretical knowledge. Studying the IoT course using educational plat- forms allows the teacher to achieve educational goals by attracting knowledge from other areas (programming, physics, mathematics, mechatronics, electronics, etc.) and use it in the educational process [1]. An analysis of learning through educational platforms in the context of digitalization [2-3] showed that the teaching method should not be considered in the form that exists in traditional pedagogy. The format of the organization of

the teaching method needs to be changed taking into account modern digital tools. This article presents the experience of organizing a learning method using educational platforms for learning IoT. Based on the analysis of scientific, methodological and regulatory documents [4-15], an educational platform for studying the IoT course was systematized, which determined the need for structuring educational activities in accordance with educational platforms for studying the IoT course (Fig. 1).
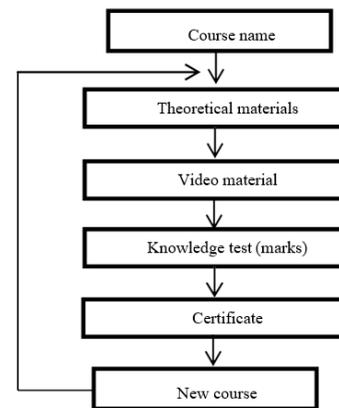

Fig. 1. Algorithm structure teaching

There are many more open educational platforms on the Internet, but we only looked at popular and frequently used platforms. Having analyzed the pluses and minuses of educational platforms, we noted that the algorithm and teaching methods are the same practicallyfor them (Fig. 1).

II. RESULTS AND DISCUSSIONS

The study was conducted by a questionnaire using Google Form. The study involved undergraduates and students majoring in "Smart-City", Computer engineering. 75 students and undergraduates participated in the study. When compiling the questionnaire, we indicated 4 main questions, the answers

to which should reveal the most important aspects of the use of educational platforms. You can see the questionnaire questions in Fig. 2

В какую платформу вы пользуетесь *

○ Coursera

○ Интуит

○ Udemy

○ другое

Как закрепляете в платформе теоретическую материал по курса IoT *

○ закрепление нету

○ закрепление виде тестов

○ закрепление виде письменных вопросов

Как проверяется практические навыки по курсу IoT *

○ закрепление нету

○ практические задание прикрепляем в платформу

○ практические задание закрепляем виде тестов

○ практические задание закрепляем письменно

○ Другое

Как сдаете контрольные задание для получение сертификата *

○ сдаем проект

○ сдаем тест

○ сдаем письменные ответы

○ другое

Fig. 2. Questions questionnaire

During the study, it was determined that the majority of students use the Coursera educational platform, since the certificate of this platform can be useful for employment (Fig. 3).
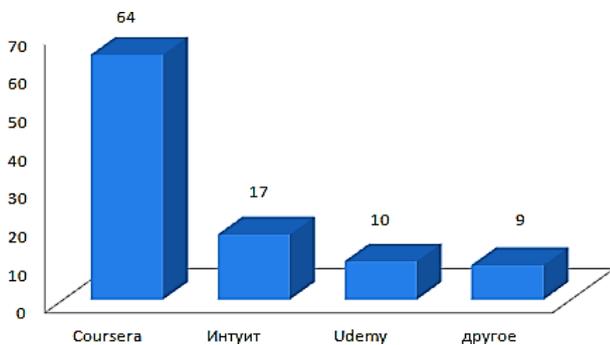

Fig. 3. The result is the use of educational platforms

After processing the questionnaire data of the respondents, it was found that the consolidation of the material passed by the students is not carried out (Fig.4).

The analysis of the answers to the third question showed that, despite the students completing the test tasks, they do not form practical skills (Fig. 5).
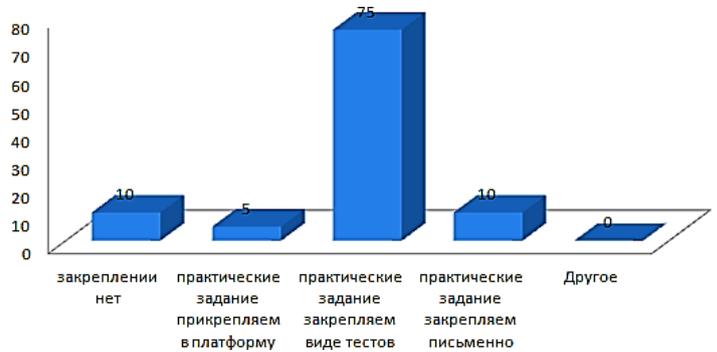

Fig. 4. Result of the second question

Fig. 5. Result of third question

The overwhelming number of answers to the last question indicates that the measure of measuring the level of practical skills on educational platforms is the successful completion of testing. However, we believe that this is absolutely not enough for an objective assessment of the practical skills of the student (Fig.6).
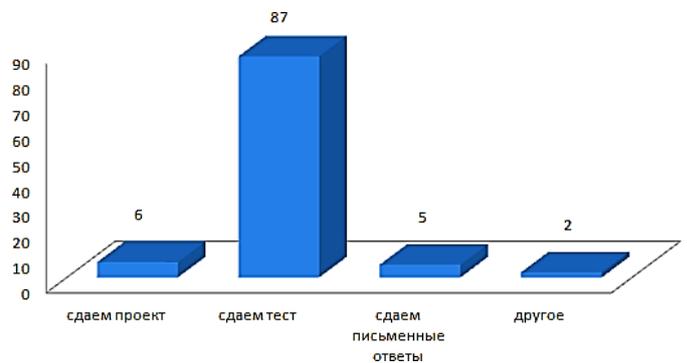

Fig. 6. Result of the security question

And what we want to say by this is that any information that is related to learning will eventually become a skill, skill or knowledge for the student. Thomas Aquinos formulated the definition of skill in the category of quality. Soviet psychologist N.A. Bernstein described in detail in his scientific works

the stages of the for- mation of motor skills. N.A.Bernstein wrote the definition for the term skill in such a way that these are automated components of a person's conscious action that are de- veloped in the process of its implementation [8].

If a student cannot write program code or use equipment when performing laboratory work, then this indicates that he does not have the necessary skills.

As a result of our research, we concluded that students studying additional courses on online educational platforms consolidate theoretical knowledge, but do not acquire practical skills.

To overcome the violation of the learning paradigm of trainees identified here, we propose the following algorithmized solutions to this problem, it is shown in Fig. 7.
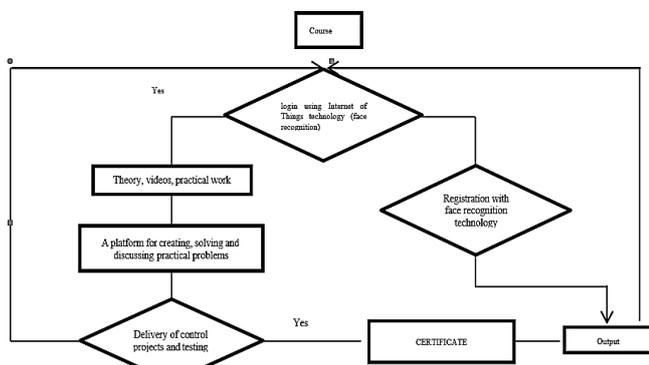

Fig. 7. Algorithm of using with IoT

The difference between this algorithm and those used in existing online edu- cational platforms is that after successfully passing the test for theoretical mastery of the topic, the user is invited to perform laboratory and course assignments in a virtual environment. With the help of laboratory and course assignments, the user fixes and trains practical skills.

The second difference of this algorithm is the facial recognition system. Woody Bledsoe, a professor at the University of Texas, provided the first facial recognition experiment in 1960 [9]. We added this system to identify students. This increases the level of security that all theoretical and practical tasks provided are per- formed by a registered user.

The algorithm for teaching methods that we propose gives us the opportunity to improve the following factors:
- theoretical part;
- practical part;

-knowledge check – here we used automated generation of test questions from the database, which is offered to us in the article by A. Omarbekova and A. Zakirova [7].
- checking the spellings of the code;
- creation of projects;
- take of certificate.

III. CONCLUSION

In the course of the study, it was determined that the existing educational platforms do not increase the practical

skills of students. Since in our specialty we need to raise the level of qualification every time in the practical direction. With the help of the IoT system in the educational platform, it will help students to form and improve practical skills in specific areas.

In this aspect, the study showed that existing educational platforms need to add an IoT system. All this will be useful for all users of other fields to master a new direction of science.

In the end, we analyzed the existing platforms to determine their advantages and disadvantages, and finally developed a solution suitable for teachers and students, with the ability to share and contribute to educational materials for the Internet of Things.

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