Mobile Learning Approach as a Supplementary Approach in the Organization of the Studying Process in Educational Institutions

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Abstract. The traditional face-to-face educational attitude is now losing its positions to innovative ICT-style web-based approach. The problem of quality distance learning organizing is relevant for higher education institutions, especially nowadays with no borders not only for technology and information but also for physical viruses that make substantial corrections to the way people live, communicate and study.

Rapidly growing communication technologies put forward new requirements for future professionals in any sphere, this demand can be met by qualitative approach to learning techniques as well as significant educational process restructuring.

The article features different scientists' views on the notions of mobile (open, distance) learning, as well as blended (hybrid) learning. Foreign outlook on distance learning experience is given, domestic experts' research on the topic is analysed. The necessity of mobile learning approach implementation in higher education institutions is substantiated within the scope. It is supported by the results of a survey, completed by first and second year NTUU KPI students on specialties 122 (Computer Sciences) and 124 (System analysis).

It is emphasized that with the progress of a large number of web-oriented services, sophisticated technologies development, augmented and virtual realities implementation, new conditions are created for the development of learning skills to work with innovative systems. The article shows the need for the above-mentioned skills to be supported by a holistic system for distance learning organization in education institutions in Ukraine.

Keywords: distance learning, blended learning, mobile learning

1 Introduction

The ubiquitous use of technologies has significantly transformed the way people work, study, entertain and even the way they think and perceive information. With communication technologies development human brain begins to develop in a some-how different way, involving different parts of the brain, from what it takes to read a book and develop imagination to colorfully picture what is being discussed - to no need to imagine while watching a movie or using some 3D environment program where it's all done for us by actors or creators.

This inevitably changed the methods and ways teachers use for the organization of the educational process.

Everyday consumer electronic devices such as smartphones, laptops or tablets started to be used as pedagogical devices as well. With each piece of technology having slightly different presentation characteristics the teaching party aims at delivering best results.

The use of electronic devices (which were initially used only for communication or entertainment) into education brought such phenomenon as counter-interference between learning and different other processes, meaning that students organize their education at convenient time and place, quite often switching between other issues which they could be doing at the same time [1, p.16]. This, on the other hand, in some cases gives the effect of distraction from studying itself and possibly worsens the outcomes of the learning process.

Abdullah Saykili, from Anadolu University, Turkey, in his research for "8th Teaching & Education Conference" in Vienna in 2019 suggests that nowadays learn-ers study with "a plethora of tools and applications that potentially interrupt the learn-ing processes and distract learners from academic purposes" [2, p.325].

The question of bigger risks of distraction and easier dropout from the process of non face to face learning was also studied in the research "Understanding the Student Dropout in Distance Learning" done by Regina Barwald with a group of experts where they imply that early identification of students at risk of dropping out is possi-ble due to predictive modeling analysis [3, p.2].

Notwithstanding the distractions or possible non-educational atmosphere and envi-ronment while doing studies with ICT, the new way of learning gains popularity. The following step is taking education out of the classroom into any students' convenient location. On this stage distance learning and blended learning were introduced as direct sequence of ICT development, and because of their convenience the above-mentioned learning types became rather popular among students.

2 Research methods

Pedagogical and methodical literature analysis, observation and survey as well as study on other researchers' works and conference contributions were used in the scope of our research. It is completed with the analysis of domestic and foreign expe-rience of distance and blended learning implementation, an outlook on pros and cons of non-auditorium study, as well as the necessity of ICT use in the studying process organized by educational institutions.

An experiment was conducted to try out a project of blended learning implementation in English language classes. Observations over online studying organization were made during the distance learning implementation in the period of the quarantine in March 2020.

3   Research Results

The Learner Collection of "The International Journal of Technologies in Learning" in May 2014 puts education into a great value as a "space to re-imagine and try out a new and better world which delivers improved material, environmental and cultural outcomes for all", which must "surely be a place of open possibilities, for personal growth, for social transformation", where the educators are described as "forces of change" [4, p.10].

The authors imply that teachers as well as the whole process of educating both reflect the society with its interests, needs and changes, and nurture the kind of students who understand that they live in the community where individuals have a responsibility to interact in the world of overlapping social networks, which they determine and which they are determined by.

The authors use a name for this system of modern constructive studying - New Learning – obviously opposing it to the old ways of education. "While many nations persevere with educational structures founded in the 19th century or earlier, the knowledge economy demands different and creative approaches to learning" [4, p.10]. The above-described phrase corresponds to the general understanding of the idea of mobile (open, distance) or blended learning as well.

Distance learning, as a way of studying in which you do not attend any brick-and-mortar facility but are taught over the Internet, apparently took origin from correspondence courses, where the necessity to contact the teacher face to face gradually became less and less obvious with internet and cloud technologies progress.

In the book "Mobile and blended learning Innovations for improved learning outcomes" the beginning of online education is seen with BBC's free online courses in 2000 which were "supplemented by web-based resources". It is presumed that rather than "the simplistic concept of anytime anywhere learning" the definition of such terms as "distance learning" and "mobile learning" was at its early start even more easily distinguished than it is now when the range of ICT devices and web-based technologies advance to more and more sophisticated levels, and distance learning involves gathering data, processing data, communicating, "interacting with interface", "interacting with an outdoor environment" as well as the fact of possibility of "starting learning immediately" or "when it is required by the program" [1, p.17, 18].

Blended or "hybrid" learning is seen as the act of "mechanical blending" by Scientists at Clayton Christensen Institute (the USA) and is described as "a combination of the new, disruptive technology with the old technology" which "represents a sustaining innovation relative to the old technology", and is actually a combination of old (traditional) teaching methods with the new ways brought by advanced technologies [5].

While blended learning, according to Parsons' and his colleagues' idea, bases on the combination of Distance, On site, Face-to-face and Online parts, where the key

component of context is seen as actual presence or non-presence in the brick-and-mortar classroom [1, p.19].

Teaching staff in Ukraine are now at the start of the distance or blended learning technology implementation, and researchers have only recently started analyzing it. Basing on the experience and works of their foreign colleagues they are developing a system of practical recommendations which can be applied in educational institutions of Ukraine.

In particular, S.L. Proskura thinks that Blended learning has high potential and it does not just reflect technologies and ways of learning, its main idea is seen by the researcher as personalization of learning [6].

Other Ukrainian experts - Yu.V. Trius, I.V. Herasymenko, see blended learning as a purposeful process of acquiring knowledge, skills and abilities, mastering the methods of cognitive activity on the basis of systematic use of both traditional and innovative pedagogical technologies in order to improve the quality of education [7, p.300].

The 2015 research of S.G. Lytvynova implies that the most widely used and result-giving Blended learning technique used by teachers in Ukraine at that time was the Flipped Classroom technique [8].

Distance Learning as well as Blended learning, both as ways of implementing newest IT trends constantly seek to "enrich learning experiences and processes by trying out innovative technologies and bring forward the best practices" [2, p.324].

Australasian Journal of Educational Technology published a research by Zeynep Kocoglu, Yesim Ozek and Yesim Kesli from Yeditepe University, Istanbul, Turkey, where they quoted Rita Kupetz and Birgit Ziegenmeyer from Hannover University, Germany, who indicated that the approach of blended learning uses activities designed to "support different aspects of student learning and to be flexible enough to respond to the needs of different types of learners" as well as "the integration of declarative and procedural knowledge, thus supporting the learner when constructing professional knowledge and skills." [9, p.3].

Abdullah Saykili puts forward an idea that "educational practices undertaken in distance learning … evolved into intelligent adaptive systems" which in recent years have "witnessed experimentations with innovative technologies such as Mobile learning, Gamification, … Virtual reality and Augmented reality, … which place learner in the centre of learning process, and all of this "enables considerable improvements in learner modeling and thereby personalization of learning processes." [2, p.324].

The above-mentioned works of experts from different parts of the world support the idea that most of the innovations and refinements in both distance and blended learning have been developed to support a student-centered attitude which is now adopted in both state and private educational institutions in the whole world and in Ukraine in particular.

The authors are interested in studying and evaluating practical solutions of Distance and Blended learning implementation within the learning process in Ukrainian educational institutions as well as the amount of technologies that are presently used by teachers to organize the learning process in a sufficiently up-to-date way.

A survey on ICT use in the process of "in-auditorium" education was carried out by the authors aiming to evaluate the level of blended learning techniques which were used while organizing brick-and-mortar lessons at National University of Ukraine "Kyiv Polytechnic Institute" over the period of September-December 2019. Computer Sciences and Applied System Analysis specialties students were asked about the per-

centage of ICT use within the classroom activities they face in their lessons of programming and computer science at university. The graph below (Fig.1) features the following results: 24,3 % of all interviewed evaluate the quantity of technological presence in their technical subjects in-class lessons as only at 40% of capacity; at the same time 12,6% of the respondents see the full load of ICT use up to 100% which can not be considered as a step to the digitalization of the learning process provided by higher education institutions.
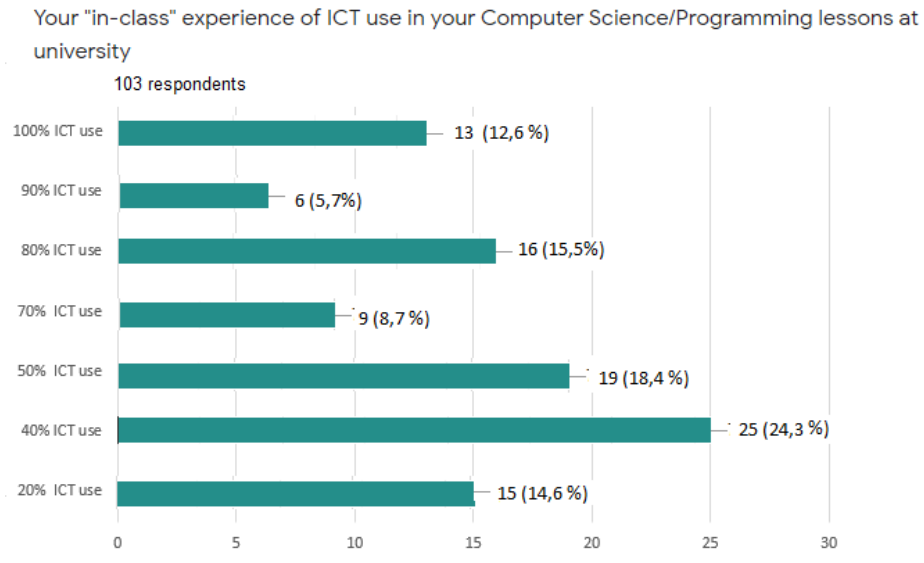
Your "in-class" experience of ICT use in your Computer Science/Programming lessons at university

103 respondents

Fig. 1. Percentage of ICT use in technical discipline classes, students' evaluation

At the same time clear prevalence of technology use in technical subjects like programming or computer sciences over other disciplines (non-technical) can be seen in the responses of the focus group students (See Fig.2). The diagram shows poor 6,8 % of the respondents who think that ICTs are fully used in the classroom lesson, compared to 25,2% who think the technology is used only by 20% of capacity.

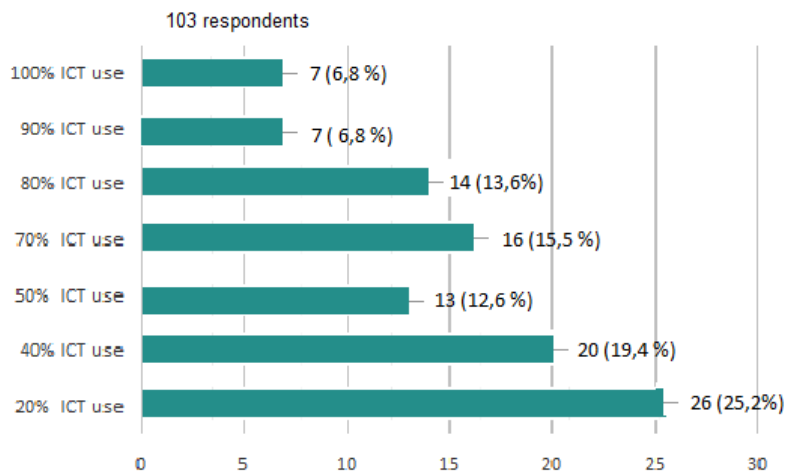**Your "in-class" experience of ICT use in other subjects lessons at university**

103 respondents

100% ICT use	7 (6,8 %)
90% ICT use	7 (6,8 %)
80% ICT use	14 (13,6%)
70% ICT use	16 (15,5 %)
50% ICT use	13 (12,6 %)
40% ICT use	20 (19,4 %)
20% ICT use	26 (25,2%)

Fig. 2. Percentage of ICT use in non-technical discipline classes.

Modern technologies serve as basis while aiming at providing the best teaching and methodological support for students as well as for interactivity, assessment and feedback. ICT use is closely connected with the use of specific online resources which also raises the question of most fully appropriate as well as convenient for both teachers and students' use online platforms. Thus, S.L. Proskura in her work features such object-oriented learning environments as Moodle or Campus, as basis of the modern information and computer technologies in use [10, p. 5].

S.G. Lytvynova in her turn gives the ground for the use of cloud based technologies, proving that "There is a widespread adoption of cloud services ... They are the main tools for the efficient organization of cooperation and cooperative work between students and teachers now. " [11, p. 3].

When asked about the platforms they use or are familiar with, the NTUU KPI students, participating in the survey, showed the tendencies, which can be applied to most technical specialties students at present period, although their experience is deeply affected by the teachers' or institutions' choices of platforms to deliver the knowledge on.

The graphs on Fig.3 show that 44,7% of the NTUU KPI students in Computer Sciences and Programming specialties have worked with Moodle, while 24,3 % find it not convenient to use, mainly because they consider it to be slow, as 1% of the respondents marked in comments.
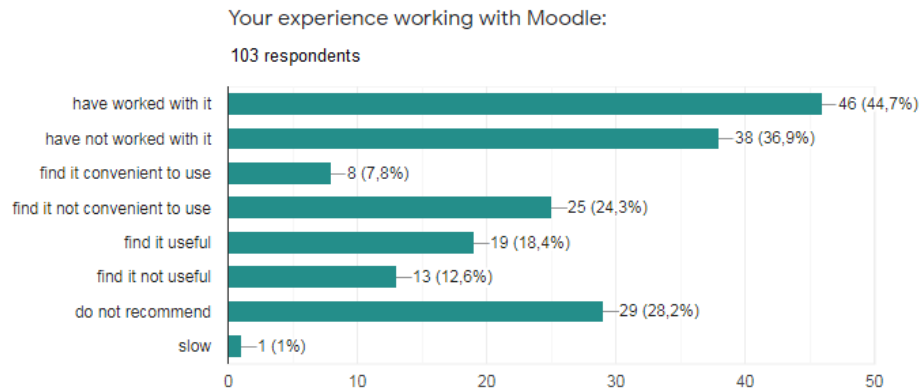
Your experience working with Moodle:

103 respondents

Category	Value
have worked with it	46 (44,7%)
have not worked with it	38 (36,9%)
find it convenient to use	8 (7,8%)
find it not convenient to use	25 (24,3%)
find it useful	19 (18,4%)
find it not useful	13 (12,6%)
do not recommend	29 (28,2%)
slow	1 (1%)

Fig. 3. Experience in working with Moodle

The second leading platform chosen by teachers to organize the learning process appears to be Google Classroom, as we can see in Fig.4, with 40% of the respondents having worked with it, and 28,2% finding it convenient to use, which is supported by the 43,7% of the students who see it as a really useful tool.
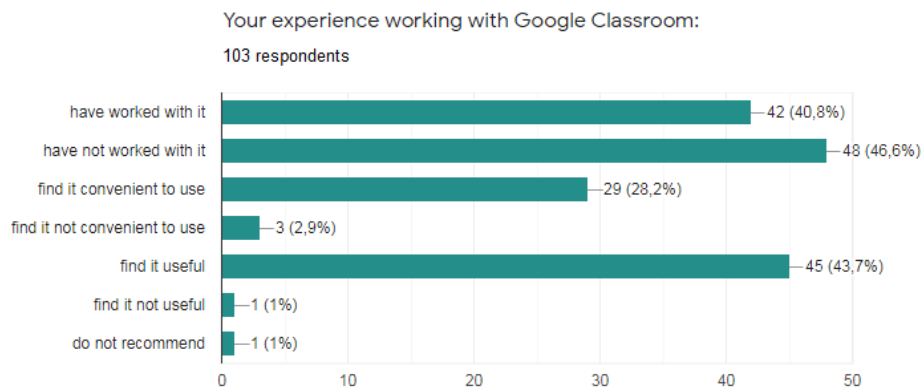

Your experience working with Google Classroom:

103 respondents

Category	Value
have worked with it	42 (40,8%)
have not worked with it	48 (46,6%)
find it convenient to use	29 (28,2%)
find it not convenient to use	3 (2,9%)
find it useful	45 (43,7%)
find it not useful	1 (1%)
do not recommend	1 (1%)

Fig. 4. Experience in working with Google Classroom

Another popular with students resource appears to be Quizlet.com, which organizes learning, revision and control in an amusing and even competitive way, providing online games and competitions. Fig.5 shows 38,8% of all respondents chose Quizlet.com as a supportive online platform, with 35% of students finding it useful, especially for language learning, and with 0% of non-recommending ones.
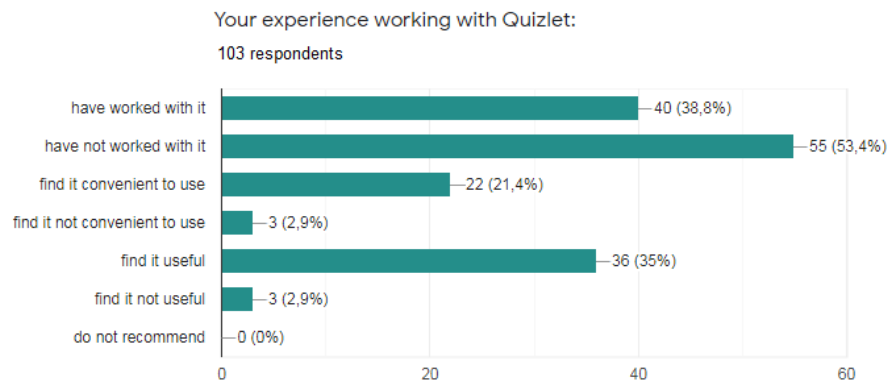
Fig. 5. Experience in working with Quizlet.com

Most evaluated stand-alone non-university platforms that are used in the role of supplementary tools are found as Coursera, Prometheus and Edx.org – see Fig.6, 7, 8 below.
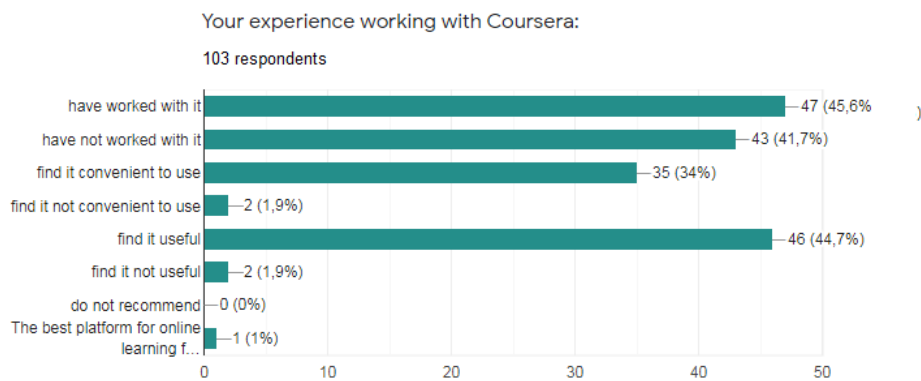

Fig. 6. Experience in working with Coursera

Coursera has been used by 45,6% of the respondents, and it has been considered useful by nearly the same amount of students (44,7%), with only 1,9% seeing it as not convenient or not useful.

Smaller amount of the NTUU KPI students who took part in the survey have experience in working with Prometheus. This is shown by the data introduced in Fig.7 which gives us the notion that 65% of the respondents have not worked with it compared to 27,2% of those who do have experience using it, as well as 25,2% of those who find it useful.
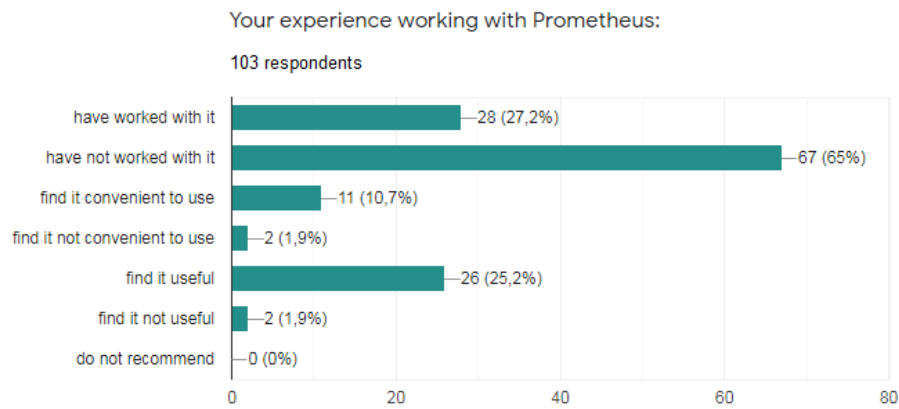
Your experience working with Prometheus:

103 respondents

have worked with it —28 (27,2%)
have not worked with it —67 (65%)
find it convenient to use —11 (10,7%)
find it not convenient to use —2 (1,9%)
find it useful —26 (25,2%)
find it not useful —2 (1,9%)
do not recommend —0 (0%)

Fig. 7. Experience in working with Prometheus

Other platforms do not prove to be the same popular with the focus group students as the above-mentioned ones. The survey results analysis shows that 83,5% of the respondents are not familiar with Edx.org (Fig.8).

Your experience working with Edx.org:

103 respondents

have worked with it —13 (12,6%)
have not worked with it —86 (83,5%)
find it convenient to use —8 (7,8%)
find it not convenient to use —1 (1%)
find it useful —11 (10,7%)
find it not useful —1 (1%)
do not recommend —0 (0%)
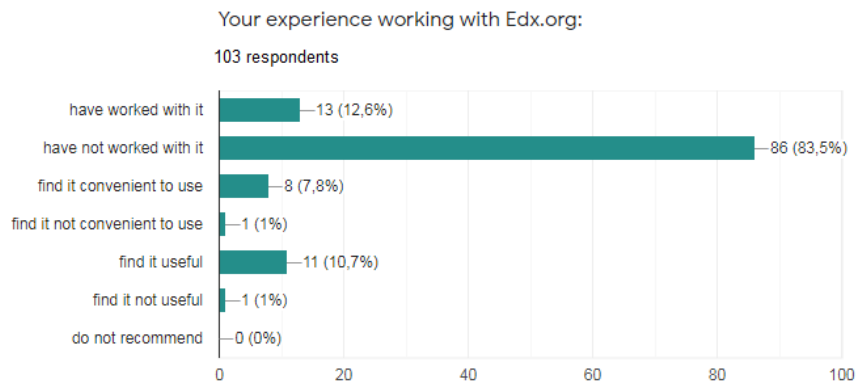
Fig. 8. Experience in working with Edx.org

In this respect platform CS50 from Harvard University takes 69,9% of all respondents who have no experience working with it, compared to only 22,3% who have used it for studying (See Fig.9).
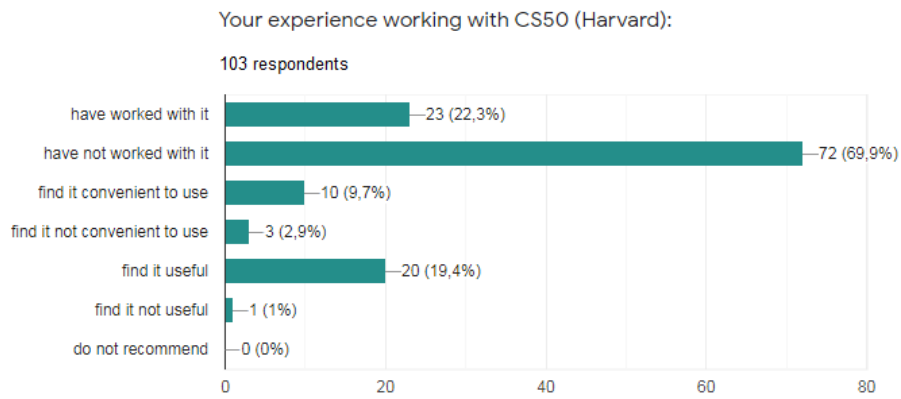
Fig. 9. Experience in working with CS50 (Harvard)

The above described survey of online platforms rating leaves such resources as Canvas, also known as Instructure, ITVDN and WizIQ out of the focus group's attention (See Fig.10, 11, 12).
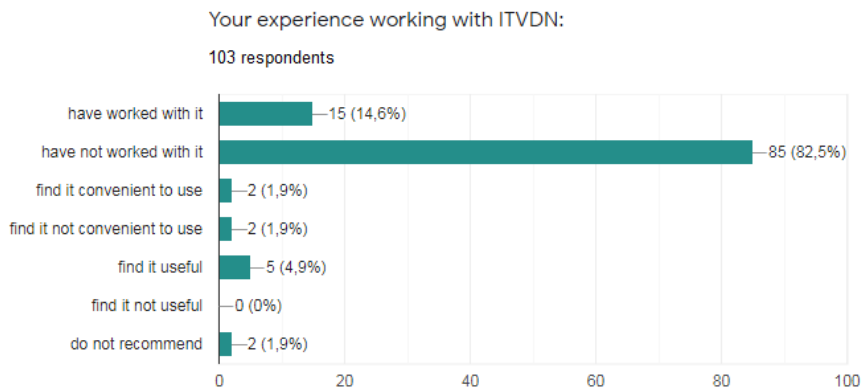

Fig. 10. Experience in working with ITVDN

Fig.11 shows only 14,6% of the respondents having worked with, where most of the focus group – 82,5% have no experience in working with it.
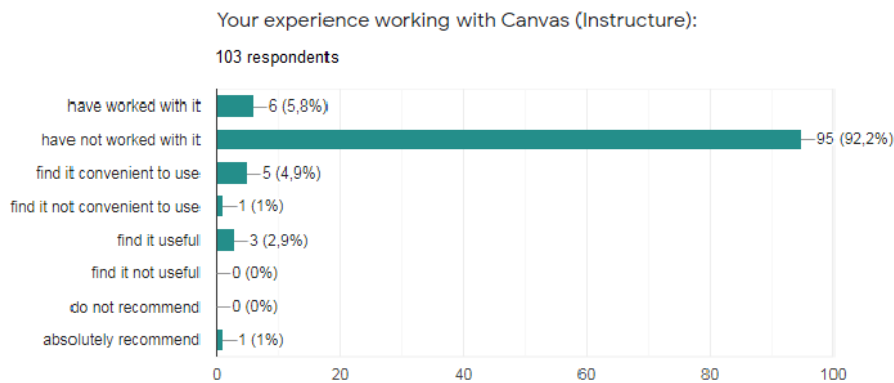
Fig. 11. Experience in working with Canvas

Canvas (or Instructure) can not be considered popular with NTUU KPI technical specialties students as well, leaving 92,2% of the respondents not familiar with it (Fig. 11). At the same time WizIQ seems to be the most undiscovered of all the above-mentioned online learning platforms, having a considerable amount of 96,1% of the survey participants unaware of its functions (Fig.12).
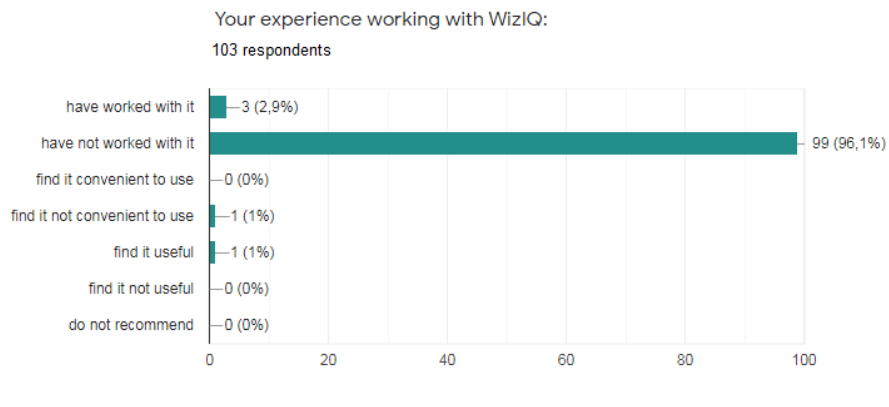

Fig. 12. Experience in working with WizIQ

One of main goals of the present study is to fully understand the juxtaposition between distance learning and 'in-auditorium' learning. Our research includes an observation on students' attitude to the fully organized distance learning provided by the teachers of the NTUU KPI during the quarantine 2020 due to the prevention steps to stop spreading COVID-19.

Fig.13 shows clear preference of distance learning over classroom learning by the majority of the respondents, 27,5% see no advantages of it, though.
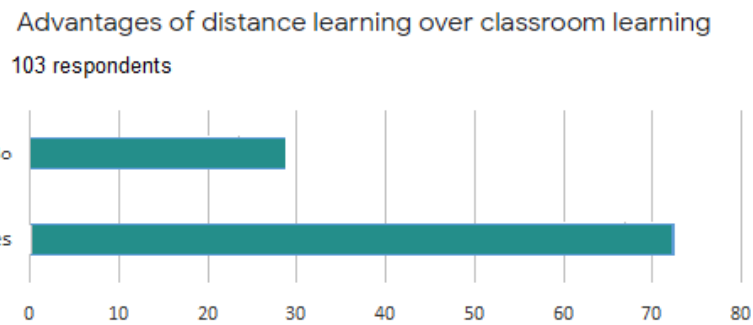
Fig. 13. Advantages of distance learning over "in-auditorium" learning

The authors do not have any intention to jump to the conclusion or to promptly follow modern trends, but a kind of tendency to subconsciously rate ICT-filled studying higher than the old ways traditional one can be traced. Understanding the substantial share of variations, attitudes and diversions each individual learner can bring to the process of student-centered education we studied the respondents' descriptions of what the present fully distance learning process lacks to their opinion.

Fig.14 and Fig.15 illustrate some of the students' answers, where they reveal some weak points which have to be improved.
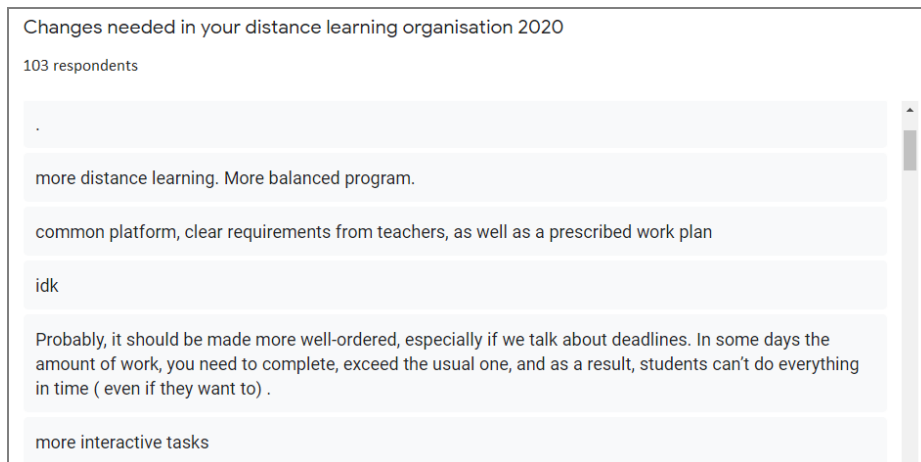

Fig. 14. Students' views on the minuses of the distance learning organization provided in March - May 2020
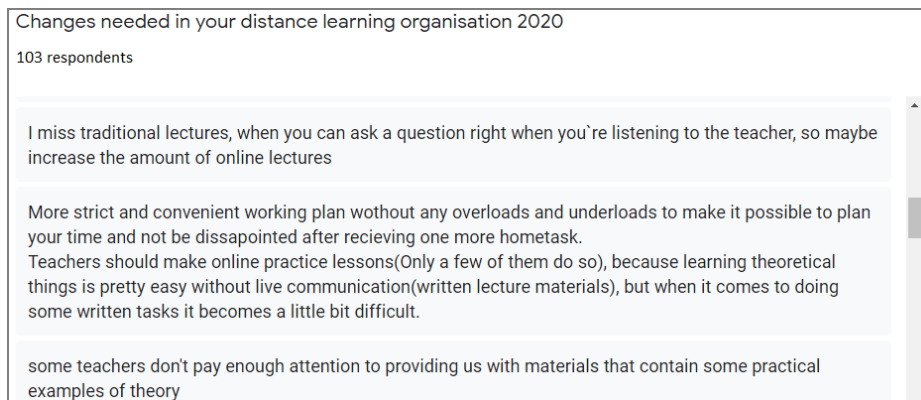
Fig. 15. Students' views on the minuses of the distance learning organization provided in March - May 2020 (part 2)

We can see from Fig.15 and Fig.16 that most inconveniences are caused by the absence of sequences of online video lectures on each subject, a more organized schedule with observed work load, as well as too few practical tasks completed with explanations or examples. Some of the other minuses include lack of common platform with clear requirements and too little interaction with the teacher, for example, video instructions or consultations.

4 Conclusions

It is obvious that times and technologies as well as minds and attitudes are changing drastically and the process of learning will no longer be the same as before. Every following generation will apparently be different, they will be people with different values, they will work, think, speak, process information, build communications in their own way. Even now standard training schemes tend to be ineffective for the new-coming generation. The world is changing so the approaches to learning have to be changed to keep up with the pace. It is the use of computer and web-based technologies supported by virtual and augmented reality (all of which can be called "mobile learning" as a general term) that can keep up with the developing demand on the market of educational services.

After studying and analyzing different types and models of learning with ICT implementation, considering the impact of rapidly changing internet communication technologies and observing the present global situation (when people are willing or have to and sometimes due to the circumstances are forced to stay in a particular place, keep to the rules of quarantine, dwell in the distance from their educational entity or even family and country) we can make a conclusion that the way of mobile learning direction can be adopted and developed as a supplementary line in educational institutions.

The results of the survey clearly showed that teachers in technical subjects like programming have been fully using technology for achieving best results. Non-technical subjects, on the other hand, are less supported by ICT within the curricula.

Students require additional supplementary learning to complete the harmonization of their education, so they seek for the help of online platforms which they lack provided by the university [12, p.6]. This fact is clearly visible form the responses of the focus group NTUU KPI students of technical specialties 122 (Computer Sciences) and 124 (System analysis) who took part in the survey done by the authors.

The survey results also show that online platforms such as Coursera and Prometheus are most widely chosen by the students to catch up with learning materials and programs, when other popular abroad resources, such as CS50 (Harvard) or Instructure have not gained popularity among Ukrainian students yet.

Educational systems in most general types of Ukrainian higher education institutions aim at in-auditorium studying process organization more than at mobile (distance) learning system development [13], [14], [15]. Present state and prospects of technology development, migration, remote working as well as global situation put forward the necessity of having methodologically supported program as well as technical and personnel capacity to fulfill sustainable distance education.

Evidence shows that students on their side see fully provided distance learning as a sufficient, interesting and more modern and way of knowledge obtaining. They find the experience useful. Some of their feedback ideas on the drawbacks of the present way of mobile learning organization which they have now can possibly be considered and adopted by institutions' guidance.

Thus we can suggest that further study of the question is needed as there appears a need to rethink and restructure the whole educational process, update the contents of educational programs and develop new holistic programs for distance studying to supplement mobile learning vector in education, to enrich students' involvement and concern as well as to avoid distraction and loss of interest. More research has to be done in the question of students' feedback and wishes about distance education improvements as they are the objects of educational activity who have to experience it in its only development phase.

This puts quite more responsibility on the teaching party, giving the teacher more work load. As learning technologies are changing rapidly and significantly teachers have to keep up with innovation, devote a lot of time for preparing appropriate involving materials to provide best possible learning outcomes. Which seems to also be really important is that the strategy of mobile learning vector has to be supported and developed on the institutional level.

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