

The Experience of the Master Classes as a Means of Formation of Readiness of Teachers to Implement Innovation

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Abstract. The article describes the experience of the master classes for school teachers and university lecturers to use ICT in the educational process. Improving teacher's/lecturer's qualification involves their willingness to follow the advanced technology. However, there are several factors that should be considered in the preparation of training courses for teachers. The authors consider the technology of the master classes as an alternative to long-term courses. This approach has several advantages: short term, productivity at work. During the master-class the main goal is not to teach how to use the technology perfectly but to show its advantages, persuade to use a particular technology, demonstrate the ease of use, and motivate teachers for the further use of the offered technologies in their professional activity. The experience of master classes for teachers of Kherson and Kherson region over the past 5 years was analyzed.

Keywords. Teaching strategies, ICT Tool, Teaching Methodology, Capability.

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1 Introduction

This article describes the purpose and methodology of the master classes for the successful teachers' training programs on the use of appropriate ICTs and their knowledge of the trends and new approaches in the education system.

The introduction of new educational technologies in the educational process depends primarily on the willingness of a teacher. Without proper motivation of the teacher the best teaching ideas will not be implemented simply by the order. The famous Pareto principle 20/80 can be interpreted as following: only 20 % of teachers supports introducing innovations, 12 % of them are passive ones, and 8 % are active ones who encourage, develop and improve the technology. The majority of teachers

(80 %) oppose any innovation. This position does not depend on the innovation itself. However, trends in society require the restructuring of the education system and active introduction of innovation, which are able to prepare students for a successful life in the information society.

2 Related Work

Programs of involving teachers in learning using ICT are implemented by many researchers. At the same time general researches are conducted, for example, associated with the formation of teachers' ICT competence and aimed at effective implementation in the educational process and the further development of individual approaches (mobile studying, use of social networks in learning process and so on). Thus, in the research [10] a mobile learning project and experience in the use of mobile technologies in the training of teachers is described. The creation of flexible learning solutions that will allow teachers to have access to information using a variety of devices and training support in different situations is shown in the paper.

Another perspective direction of development of education is using social networks in learning [1]. Practical activities in the field of education, i.e. using of social networks in work to support learning, interaction of teachers and students, creating business relationships and knowledge sharing.

Analysis of the studies shows that the use of cloud technology is already normal practice for one third of population. In the future, this number will only increase and leading position will be owned by those companies and organizations that will offer their services using cloud resources, like services that can be customized to individual liking. This also applies to educational technology. Firstly cloud technologies allow universal access to data at any time. Secondly, they contribute to the construction of their own learning trajectory at the right pace.

According to research [4] 50 % of the adult population of Ukraine (over 15) use online resources, and two-thirds of them use social networking services. Modern gadgets (smartphones, tablets, laptops) are owned by 57 % of the population.

Conducted by UNESCO [14] research has shown that without appropriate training educators use technology only to solve their former tasks. In this case there is no transformation and qualitative growth of the level of teaching and learning.

As the recommendations UNESCO offers [14] the following stages of the introduction of ICT in educational practice:

- Demonstrate and model how mobile technologies can improve the quality of teaching, learning and management of the educational process.
- Share research data and analysis of mobile learning programs.
- Encourage dialogue between the main participants, including principals, teachers, students, parents, local authorities and the community on mobile technologies training.
- Provide a consistent concept of how technology, including mobile one, can contribute to the achievement of learning objectives.

However, there are some limitations such as the lack of theoretical and pedagogical foundations, sustainable integration in formal educational contexts and, in particular, the lack of support for teachers and training [2].

3 Problem Setting

Learning each trend is time-consuming process for a teacher. However, it is important to form teachers' sustained interest to the changes in society and the educational system under the influence of digital technologies. The main factors that need to convince teachers are:

- Change the role of ICT in Education (shift from a focus on "ICT for education" to the use of "ICT for education" [15])
- Use of digital devices which are natural part of the life of modern students' generation that meet their educational expectations.
- Emergence of new approaches in education such as SMART, IoT, STEM education (Science Technology Engineering Math), BigData, MOOC, BYOD (Bring Your Own Device), Blended Learning, Flipped Classroom, mobile learning, cloud, gamification of education, etc.
- Change in the spectrum of required specialties on a labor market (now and in the future) and the need for learning throughout life.

Thus, there is a need not only to teach the teachers to use certain software products and services in the work, but to form an understanding of the society development trends and their own willingness to learn new technology. Since 2012 we research the subject of teachers' training in ICT, use new approaches in teaching that meet the educational requirements of the today's youth, including training teachers through master classes [8]. In our view, conducting master classes are the most effective form for solving these tasks.

The purpose of the article is to describe the experience of the master classes as a means of formation of readiness of teachers to implement innovation.

Tasks:

- to analyze the main trends in modern education;
- to reveal teachers' attitude to the use of ICT in educational process;
- to determine the understanding of general trends in the development of education under the influence of ICT;
- to conduct master classes with the use of ICT tools and services for teachers.

In our view, for effective implementation of innovation each teacher should take certain steps:

1. To get knowledge about the nature, advantages and disadvantages of a particular innovation.
2. To accept innovation as the integral part.
3. To develop necessary competences, in particular informational.

4. To start using innovation.
5. To develop and spread innovation

There are both objective and subjective factors that explain the reluctance of most teachers to implement innovation:

- Mastering of innovation requires teacher to spend more time, which is not paid.
- It is necessary to rebuild style of work and usual teaching methods that causes a situation of discomfort.

Analyzing the results of the anonymous surveys (129 respondents), interviews with teachers, we find an explanation which is: "innovation – is just a passing fad", "the Headmaster wants to gain an authority", "I do not have opportunities to master innovation due to lack of free time" and others.

The article [9] considered three levels of information competence (I level – beginner; II level – active user; III level – expert). Based on these levels the authors propose to divide teachers' information competence according to their ability and willingness to use ICT in the learning process. The article also identifies the major reasons of teachers' unpreparedness for using ICT in learning. They include lack of motivation for using ICT; lack of complexity; learning computer skills only without the support of innovative educational technologies; ignoring the characteristics of adult education; neglect of interactive teaching methods; insufficient integration of knowledge and skills of students from different academic disciplines; insufficient formation of Computer Science teachers the skill concept of the 21st century.

However, today in our country there is a situation when teachers are supported by large companies and famous brands for the production of computer hardware and software. Since 2005 in Ukraine education programs were adopted: "Intel® Learning for the Future" and the educational program "Partnership in Learning", "Teachers online" and "Expert Teacher" (Microsoft). Also recently the Ministry of Education of Ukraine announced the cooperation with the company LEGO in the implementation of the robotics into learning process.

Under the impact of these initiatives teachers create their own educational spaces using ICT tools. Many teachers and lecturers are the professional bloggers, websites owners. An example is a community founded by Ivan Ivanov "ICT training of teachers in Ukraine" and its resource "To be able to live. The development of the XXI century skills using digital technology". This project was responded by hundreds of teachers and professors.

Teachers begin to link their professional growth not with deepen and broaden the knowledge of the school subject, but with the improvement of general pedagogical skills and knowledge. A special role in the professional growth of teachers belongs to the pedagogical aspects of ICT use.

Increasing the role of ICT in the educational process contributes to changing pedagogical techniques.

4 History of development of master class system in KSU

Conducting master classes in Kherson State University was founded in 2006 under the Intel program "Teaching for the Future." As a result of questioning teachers of pedagogical universities, who were trained under the program, expressed a desire to use IT in their work and realized that IT will develop an educational approach that focuses on the students' needs.

The cooperation of the Ministry of Education and Science of Ukraine with the Microsoft implementation of the joint program "Partnership in Learning" (Memorandum of Understanding of 28 October 2003. Protocol № 1 of 3 August 2004), to the order of MES # 693 of December 6, 2005. a program to train teachers and students of pedagogical universities 'Basis of Information Technologies' is implemented. Within the cooperation with pedagogical institutions of I-IV levels "Partnership in Learning' program supports 36 hours of seminars "Basics of Information Technology" for teachers of high schools. In 2009, 2 seminars for teachers of KSU were held. 17 university teachers took part in it.

The next step was the introduction of the course "Use of information technologies in educational process" for students of specialties of Physics, Mathematics, and a Primary School Teacher. However, this course is taught only to those teachers of with Computer Science specialization. At the same time, we saw that the students are sometimes hard to see the potential of a particular technology to be used in the educational process. They lacked the practice of working with school students. We developed the idea of organizing joint work of school teachers and students. We have chosen the master class as the best form. It is a modern form of educational training seminar for practical skills on different techniques and technologies to improve the professional level and share best experiences of participants, expanding horizons and introduction to the newest branches of knowledge.

Since 2012, we started cooperating with a number of Kherson schools and conducted master classes for teachers of educational institutions based on them. A feature of these master classes was that the teachers worked with students – future teachers. Students, as representatives of Net generation, easily mastered the technology, and teachers have seen better educational opportunities of new service [13]. Also, during the master classes we use gaming technology, brainstorming, group work, pair work. More detail on this experience in the article in 2014 [7], where the focusing was on the benefits of this technology for students. Each workshop was dedicated to one particular resource, such as didactic possibility of using word clouds; it was lasting for two hours.

Joint work of teachers and students in the format that often hard to implement. This is due to the time issue for every participant: students, teachers, professors. However, today the need for school teacher training is sharply increasing, and that's where the system of master classes can be an effective tool.

5 Setting up the Pedagogical Experiment

According to the importance of the formation of teachers understanding of education development trends under the influence of digital technologies, their willingness to self-development and use of new techniques and services we found the possibility of holding master classes for teachers of Kherson region who are passing courses on the basis of Kherson Academy of Continuous Education. According to Ukrainian law, each teacher must go through training 1 time in 5 years. To do this, they arrive at an appropriate center and have trainings for two weeks.

So, master class "Modern ICT tools and services for teachers of Mathematical and Technology disciplines" was first performed by the teachers of the department of Computer Science, Software Engineering and Economic Cybernetics of Kherson State University as part of the All-Ukrainian scientific-practical web conference with international participation "Innovative Dimension of Development of Mathematics and Technology Education ", held in October 29–30, 2015. This master class was held for 4 groups of Physics, Mathematics and Computer Science teachers in Kherson region. Total in the 2015, 129 teachers participated in the workshops.

Interest in the master classes was shown by the teachers of the Department of Physics and Methods of teaching of the Faculty of Physics, Mathematics and Computer Science in Kherson State University. The effectiveness of the master class significantly was improved through joint participation of school teachers and university professors. This event has become the platform to exchange experience and to find effective ways to use the web services offered in teaching physics in school. In the master class teachers and lecturers of physics took part, they teach future teachers of physics.

It made possible to pay attention to the peculiarities of the implementation of innovative approaches using ICT services in accordance with the methods of teaching school Physics course.

During the master classes our objective was to present teachers common tools that they can use in future professional activity in school regardless of the subject, to develop participants' interest to learning ICT and pedagogical and technological capabilities of the services, the ability and willingness to use them in their professional activities, to create an electronic bank of ideas on the use of ICT services for the solution of pedagogical problems.

Each workshop is designed for 7 hours in the computer lab with a video projector. The master class program includes the following issues:

1. Consideration of conflicts arising due to psychological characteristics of students with using modern and traditional approaches, methods and means of training.
2. Introduction to the concept of teachers 'flipped classroom'.
3. Use of Content management systems (CMS) and Learning Management Systems (LMS) (as examples there are systems used in Kherson State University: KSUOnline [6] and Virtual Kherson University [5]).
4. Highlighting educational opportunities and services (YouTube and International Educational Network of Khan Academy).

5. Create video tutorials for using services EdPuzzle and Blendspace, allowing to search desired videos from popular video sharing like YouTube, Vimeo, Khan Academy, LearnZillion etc. Create exercises, quizzes, additional questions and comments. Services include creating classes and have powerful features statistics.
6. Development of educational games using the service Learningapps.
7. Introduction to Internet services for the research and design activity for the Concept of STEM-education (Interactive works of virtual educational laboratory www.virtulab.net allow to conduct virtual experiments in Physics, Chemistry, Biology, Ecology and other subjects, in two-dimensional and in three-dimensional as well. Globallab – a platform that serves as the international environment of research interaction between students).
8. Introduction to interactive services and chronicles creation Dipity and Tiki-Toki.
9. Using of network services for the organization of modern educational process.
10. At modeling stage teachers were suggested to work in groups and to develop a lesson using Internet services: interactive video tutorial with test tasks; training game with the chosen theme; representing chronicle of historical facts related to the chosen training topic; publishing links to educational materials created in chosen CMS, LMS or blog.
11. Demonstration and discussion of copyright material for the lesson with the master class participants, use of these tools for enhancing learning activities.
12. At the stage of reflection there is a discussion on the results of joint activities; a survey of teachers to identify their satisfaction with the results of master class and intentions on how to use learnt technology in teaching is conducted.

Various online services use in their basis the principles of teamwork, cooperation, openness and accessibility. When choosing a service for the master class, we were guided by the following criteria:

- The feasibility
- Easiness to learn and to use the service
- Interactivity

The successful mastering of the master class theme was based on the productive activities of all participants.

During master classes these materials were used: "Introduction to Information Technology" and "Master Class" published on the website <http://ksuonline.kspu.edu/>.

6 Survey Analysis

For the final phase of the master class a survey was prepared. The survey contained 19 questions of closed type in three blocks:

- general information;
- experience in using ICT in the classroom;
- tendencies of changes in the education system.

The first set of questions concerned the general information about work experience, school location, and classes the teacher works with.

Among the interrogated there were many teachers with great work experience: 88 % have experience of more than 10 years. Majority of teachers work in secondary and high school (1-4 grades – 12 %, 5-11 grades – 88 %).

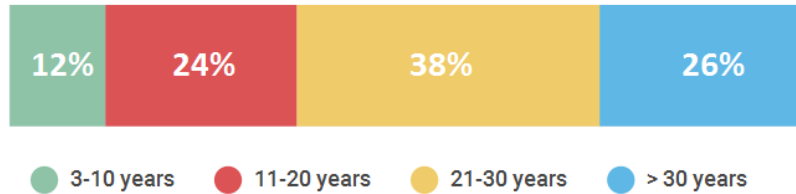


Fig. 1. Representation of teachers regarding work experience

As a master-class was conducted for teachers of training courses, most of the participants came from nearby towns and villages (88%).

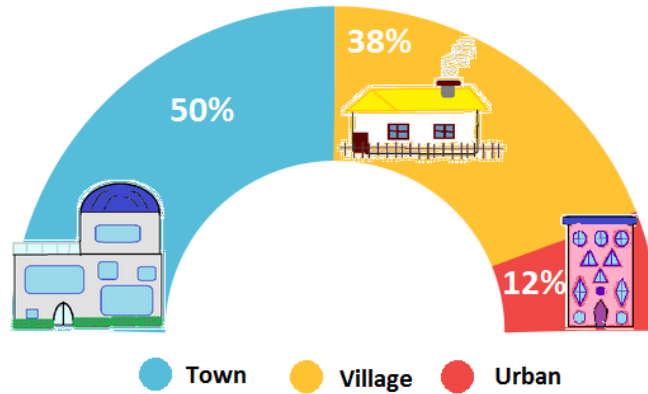


Fig. 2. Representation of teachers regarding school's location

The second set of questions concerned the identification of experiences and purposes of using ICT in professional work. Questions contained answers to the multi-selection (checkbox) and the line to write additional information.

The purpose you use Information technologies on a lesson is: *

- Never use
- To represent new topic
- To increase the motivation
- To examine students' achievement
- For assimilation of new material
- To interact with students
- To organise or entertain student
- Other

Fig. 3. Detail of the survey to identify the use of ICT experience

Three-quarters of respondents said that they use different devices in their practice, and a quarter said that they were going to use them, but do not have this opportunity yet. It should be noted that some respondents (3%) noted that their schools require lessons using ICT: teachers have to conduct lessons with an interactive whiteboard in the computer lab or using other ICT.

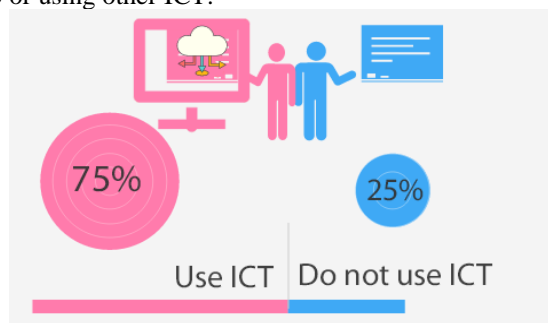


Fig. 4. Use ICT in teachers practice

Analyzing responses of 75% of teachers who use ICT, we found out the purpose of using ICT and distinguished the most popular activities. Traditionally, the most common purpose is to explain new material – 28 % and conducting current and final examination – 25 % (Table 1). 18 % of teachers use ICT in order to increase motivation and interest of students. Another 17 % of respondents use ICT to assimilate the material. None of the teachers gave their own version. The most difficult activity appeared the organization of communication and collaboration among students using digital technologies. From our point of view, this is due to the difficulty for the teacher to assess the contribution of each student in the joint work, the lack of formation of the teachers skills of cooperation organization of students work in groups.

Table 1. Activities with using of ICT

Activity	Answers, %
Explaining new material	28%
Increasing motivation	18%
Conducting current of final examination	25%
Assimilation of new material	17%
Improving communication with students	4%
Organization or entertaining of students	8%
Other	0%

On the question about their experience in using ICT in the classroom the following answers were received: laptop / computer (100 %), video (87 %), television (37 %), tablet (25 %), an interactive whiteboard (12 %) (Fig.5). Some respondents chose more than one answer. These data have improved significantly compared with surveys of previous years. They confirm the understanding of the need to use digital technologies in the classroom. However, the technical equipment is not always used effectively. It should also be noted that we do not show the statistics of equipped classrooms in the city and region where the average numbers may be very different. We present results of a survey conducted in November 2015 and January 2016 among teachers who held a master class. The findings of our survey data are correlated with the survey conducted among teachers of Computer Science in February 2015 [11].

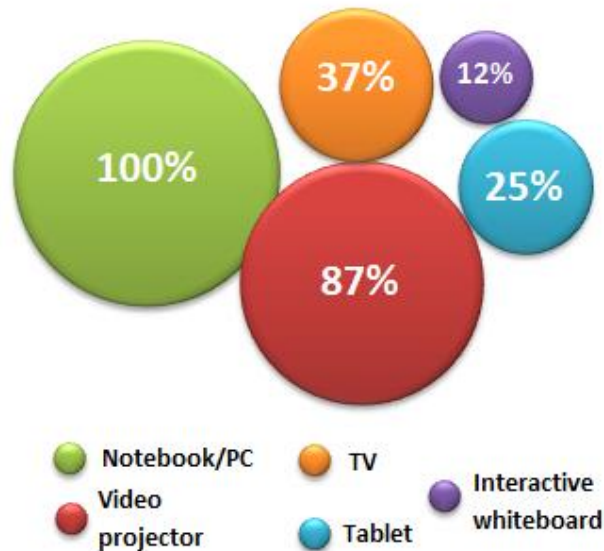


Fig. 5. Teacher's ability to use technical devices in the classroom

However, the teacher said that the possibility of using digital devices by students is less. Thus, almost all students are able to use computers in the classroom, 12 % of teachers give students an opportunity to use interactive whiteboards and mobile phones. Half of teachers (50 %) indicated that students have the opportunity to use tablet on the lesson.

When asked about their own activity in the network the largest number of respondents said they use e-mail (33 %). Among these, only 28 % use social networking, 17 % have blogs, and 11 % – a website. The intersection of these activities as blogging and maintaining the site, was not observed in the responses. Among the responses were others, including the absence of any activity (11 %).

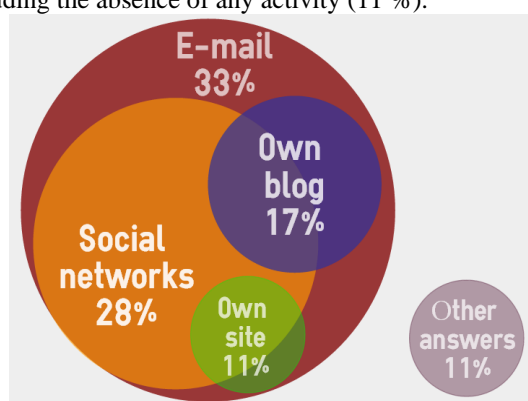


Fig. 6. Services used by teachers

One of the tasks we have set is to show teachers the opportunity to create their own information space. They can use a website or blog. Comparing the results of the answer to this question, we asked teachers in 2012, it should be noted that the percentage of teachers using websites and blogs in their work has increased. So, we can note the increase of use of blogs from 5 % to 17 %, sites – from 2 % to 11 %. E-mail is started using by 7% more. The number of social network users didn't change. After the master class, we monitored the sites and blogs of teachers. The audit of results made it possible to ensure that teachers use the proposed services and implement them in the learning process. The most popular are the video tutorials and training services LearningApps games. For example, the blog of teacher of mathematics Natalia Vas-kovskaya of Nikolskaya school (<http://natali-mir.blogspot.com/p/learningappsorg.html>), teacher Lebedenko Natalia of Gorkivska school (<http://lebedenkonat.blogspot.com/>), teacher Olhovska Natalia of Genichesk school №3 (<http://olkh68.wix.com/portfolio#!blank/gdznn>), teacher of Computer Science of Kherson school №27 Ignatenko Alla (<http://school12777.blogspot.com/>).

The last set of questions was developed with desirable psychometric properties to measure (detect) the level of awareness of current trends of changes in the education system. This block contains 6 questions and it was developed using a four-point Likert-type scale, ranging from "strongly disagree" to "strongly agree". The trends high-

lighted as a key factor in the development of education for the period from 2010 to 2015 were taken as a basis [12].

Teachers tend to connect their professional growth not with the increasing knowledge on a subject but with improvement of general pedagogical skills. Special role in teacher's development belongs to the pedagogical aspects of using ICT *

1 2 3 4

Strongly disagree Strongly agree

Learning Tools are changing. In training student uses tools that are used by a professional in different fields. So "chalk pedagogy" is replaced by different pedagogical techniques which concern the variety of learning styles of students. *

1 2 3 4

Strongly disagree Strongly agree

Fig. 7. A fragment of the third block survey

It was not a set of questions but most likely thesis with which most teachers agree. In fact, all the questions received a response "strongly agree." The unanimous approval was the fourth point. Here is a list of thesis.

1. Teachers tend to connect their professional growth not with the increasing knowledge on a subject but with improvement of general pedagogical skills. Special role in teacher's development belongs to the pedagogical aspects of using ICT the variety of learning styles of students.
2. Learning Tools are changing. In training student uses tools that are used by a professional in different fields. So "chalk pedagogy" is replaced by different pedagogical techniques which concern
3. Teacher's mark is increasingly replaced by students' self-esteem, their mutual and automatic estimation as well. The function of a mark is not to evaluate students perform on the tasks but target students on what is needed to be done to extend academic work and achievement.
4. The teacher does not know and should not know all the answers. Students do not expect that the teacher gives them the answers to the questions, but they hope they get help in finding the answers by themselves. Answers to the questions can be found using many different sources, including the Internet.
5. The educational space expands beyond the classroom. The teacher encourages students to study in various environments, including outside schools both in real and virtual environments. Much of the work takes place in a real world, with the participation of fellow student and other adults other than teachers.

6. Individual work becomes a common activity. Most of the students do academic work together with classmates or within the creative (research) groups, using a computer and the Internet as the main tool of their activities. The teacher is preparing educational materials in digital format, exchanging designs with colleagues inside and outside the school.
7. Expanding the range of knowledge and educational information. The student determines and is an essential source of information and resources. The teacher encourages the materials and tools that can be used by student. More and more teacher start to use examples from real life, and not limited to the scope of textbooks only.
8. Increasing of students' independence and responsibility for the results of educational activities. The teacher teaches only the core disciplines form the students' ability to develop the subject beyond this core independently. Student determines what to do, based on existing knowledge and an idea of what is needed to know. The role of teachers is reduced to a more general management in different types of work that initiate and carry out the students themselves.

The lowest asset was given to the 3d point which is connected with the change of the role of evaluation at school. Teachers' acquaintance with molding evaluation was one of the goals of the "Intel@Teach to the Future" program. Self-esteem – is one of the priorities skills for successful professional development and lifelong learning. Minor teachers' support of this idea is the basis for us to develop this direction in the future (i.e. to add in courses thematic blocks and tasks aimed at development of formative assessment skills, to acquaint teachers with the appropriate on-line services on master classes). Low estimate was given to point 1 and 5 which is also directly related to the work of teachers. However, unanimous approval was given to point 4, which increases student's responsibility for learning achievements.

Important is the desire expressed by teachers in more detailed use of new trends in education in their work.

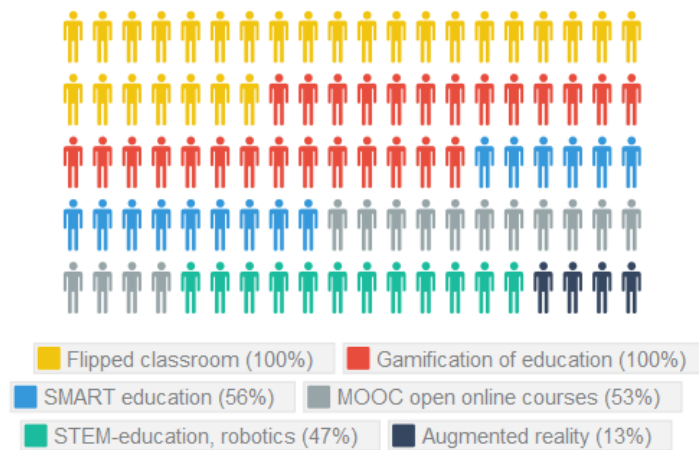


Fig. 8. The level of interest in the development and use of new educational trends

In the last survey, respondents noted what brands and services they would like to explore in more detail and use in their work. All of the teachers indicated that they wanted to use those services in the future which they learnt on a master class. The lowest support was given to STEM-education and Augmented Reality. In our opinion, it is connected with the material investment that needs to be done to implement these trends in education

7 Conclusions and Outlook

Technology of master classes can be a good alternative to long-term courses. This approach is well accepted by teachers and has several advantages like: short term, work productivity, creation of teaching materials using web services. During the master class the main goal becomes not to teach how to own the technology but to show its advantages and persuade to use a particular technology, to demonstrate the ease of its use, motivate teachers to further development of new services and their use in the professional activity.

An important result is shifting teachers' point of view to changes in the education system under the influence of digital technology, learning and adopting new trends.

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