IMPLEMENTING INFORMATIONAL LEARNING METHODOLOGY IN PREPARATION OF IT TEACHERS

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ABSTRACT

This article outlines possible algorithm and methodology for implementing informational learning theory and practice in IT teacher preparation and training. Moreover, the article seeks to show how informational learning can be effective in teacher preparation environment.

Keywords: Computer science, informational learning environment, algorithm, Internet.

INTRODUCTION

In today's IT world which is developing and improving in a rapid pace, to structure national education on the basis of informational learning and its full integration into the minds of learners has become one of the most important issues in educational field [1]. In modern informational learning environment, problem-based learning is widely used in combination with information-receptive and reproductive techniques. So in this context online learning is widely applied as a means to present the content and control the learner's cognitive performance.

From users' points of view, informational learning is primarily information data highway that enables network clients to exchange data and provide them with virtual communication. As a result, the implementation of informational learning leads to the creation of interactive communication. This implies the optimal use of human and technical capabilities, and the use of communication, by teaching and learning, interrelated activities, the principles of differentiation, and their individuality.

Opportunities of informational learning are far greater than traditional paper-based environment because they are considered as structured theoretical and practical resource in web-sites or web-portals comprising of curriculum, science or course programs providing with profound learning, manuals, e-books, video extracts, presentations, assignments for self-study, homework, online training programs, e-simulators, self-assessment questions, tests, as well as methodological recommendations on learning a subject or doing tests. Therefore, one of the main tasks of educational institutions is the introduction of new modern informational and educational environment for today's education system. However, a number of questions regarding their implementation in the learning process still remain open.

So what state of education do we have in today's educational institutions which are implementing informational learning, what successes or drawbacks do we have in this area, and what are the challenges that need to be addressed in this field?

LITERATURE REVIEW

The use of modern informational learning and creation the information-based environment in the education system requires a revision of the essence and content of this type of learning. Therefore, a new approach to information-based teaching and learning has begun to be a main focus in this sphere. The educational process is a holistic process which consists of interaction between the teacher and the learner. Currently this process is combined with the interactive learning packages, video and audio lectures, computer programs, television and radio courses etc. Instruction in this process is directly related to the learners' greater capabilities, intellectual potential, and acquisition of necessary information. The scientists of both the Commonwealth of Independent States (CIS) and the Republic of Uzbekistan have conducted much research on the problems of using the informational learning in education system, the theory of informational learning, its methodology and practice of digital education. In particular, a number of researchers such as A.A. Andreev, O.E. Belova, A.V. Baraulina, N.A. Goncharova, E. N. Dronova, V.A. Krasilnikova, A.L. Nazarenko, L.F. Solovyev, A.A. Abdukadirov, U.Sh. Begimkulov, M.Kh. Lutfillaev, F.R. Murodova, N.I. Taylakov, B.Z. Turaev, O.A. Tarabrin, T.T. Shoymardonov did a large scope of study in this field. However, there has not been enough research about informational learning methodology to prepare and train future IT instructors.

According to N.I. Taylakov there are a number of problems in the implementation of e-learning [8] such as lack of teachers' mastery and imagination about e-learning; lack of capacity to apply it in the classrooms; insufficient number of specialists in the implementation of e-learning etc.

U.Sh. Begimkulov [3] suggested that the creation of informational learning environment in the education system would accelerate all stages of the educational process, improving the quality and efficiency of the learning process through a wide use of information technology, enhancing learners' cognition, and expanding their interdisciplinary links. A.V. Baraulina [2] proposed the following opportunities which can be achieved via informational learning: it provides positive motivation, conducts the classes at high aesthetic and emotional levels; provides high levels of differentiation (individual training); increases the amount of work done in the class by 1.5-2 times; improves knowledge control; develops learners' spatial imagination; rationalizes the learning process and increases the effectiveness of the lessons, develops learners' research skills, advances the ability to use information resources such as various information systems, e-libraries etc.

E.N. Dronova [4] argued that the online presentation of informational learning will increase the learners' interests towards this subject.

In order to achieve these positive results, the organizers of the informational learning environment should include video lectures, training programs, self-evaluative and controlling diagnostic software, self-study and laboratory works in their lessons [4].

According to these scholars' analyses, informational learning facilitates the provision of didactic tasks to create holistic conditions for developing learners skills such as effective integration of both traditional learning and distance learning teaching methodologies, development of students' abilities to search for materials independently, conduct independent research by studying and solving specific problems, work with various sources of materials to prepare their course papers, qualification papers, masters' dissertations etc. and work on material selection and its analysis.

RESEARCH METHODOLOGY

Today, education through the informational learning is prevalent in America, Germany, Great Britain, Japan, China, South Korea and Russia, and by the end of the 21st century, it is expected to capture the whole world. A number of educational establishments such as Distance Learning Center of Pennsylvania State University (worldcampus.psu.edu), California Virtual University (cvc.edu), Washington Open University (gwu. edu), Western Governors University (umuc.edu), Minnesota Virtual University (careerwise.mnscu.edu), University of Florida (distance learning) (fcd.ufl.edu) [5] put much of their effort in implementing informational learning.

Today, there are more than 2 million students studying at the Open University in the UK (open.ac.uk), which has 305 local and 42 regional centers in different parts of the world. 250 centers of the university provides more than 120,000 students with electronic resources, audio and video materials related to natural sciences. Similar open educational centers are available in Canada, Austria, Spain, Pakistan, the Netherlands, Turkey, India and other countries [5].

Germany has one of the unique education systems which is based on informational learning. This education system began with the centralized planning of distance learning of higher education professionals. Hagen (fernuni-hagen.de) and Dresden University of Technology (tu-drezden.de) are the great examples for highly specialized professional education and training. The university provides educational services to more than 50,000 students on natural sciences [5].

Many Chinese students use e-resources on the Netease Open Course platform. Netease courses have remained as alternative university with free tuition and flexi time. The network has more than 20,000 lectures (video conferences, seminars of the world's most popular universities etc.). Many video lessons include Chinese subtitles; users also have access to mobile applications, which they can utilize while traveling, at work or doing sports. [9]

Netease's headquarters is located in Hangzhou, and for five years the office has been cooperating with Oxford, Yelsk and Cambridge universities as well as American web resources. The majority of the users of this network are 18-35 years old who are mainly university students or recent graduates [10].

The national curriculum up to 2003 of the Ministry of Education of Japan focused primarily on retraining elementary, middle school and university teachers to improve their IT skills and capabilities. By 2005, all educational institutions in Japan were connected to a 24-hour high-speed ADSL and optical fiber Internet. In order to assess the level of students' learning on different subjects, teacher registers were digitized and posted on the Internet. A special online database was created for parents to monitor their children's online learning skills and communicate with their teachers via e-mails and video conferences. Kyoto University (kyoto-u.ac.jp/en), Tokyo Institute of Technology (titech.ac.jp), University of Tokyo (u-tokyo.ac.jp), Kyushu University (kyushu-u.ac.jp), Nagoya University (civil.nagoya-u.ac.jp), Osaka University (osaka-u.ac.jp) have been best samples for educational institutions which meet world standards in teaching.

South Korea is the most popular country which widely implements IT in its education system. Students have an easy access to educational resources via their mobile phones or smart phones used in class, out-of-class or at home. There is also an active e-learning system with more than 700 e-learning provider companies.

In the Russian Federation, a lot of research has been carried out to improve the informatization process in education and provide its wide use in this field. As a first step, the Russian national, educational and scientific network - runnet.ru was created within the Russian framework of state programs uniting a number of universities for using worlds' leading universities' scientific and educational resources. In the period of 2001-2005, several educational portals were created to set up a unified informational system, with more than 10,000 educational resources, and 42 regional distance learning centers were supplied with IT facilities for online training [6]. Today Russia is widely using such informational learning tools as access-video.ru, academu.yandex.ru, coursera.ru, loftblog.ru, cictemnik.ru, in training future IT experts.

Huge work was done in Uzbekistan in terms of wide implementation of informational learning in educational institutions. In this regard, several informational-educational tools such as ZiyoNET -informational network portal (ziyonet.uz), the open educational video portal (uTube.uz), the website of the University of Information Technology (acm.tuit.uz) started their functioning.

However, the preparation of future IT teachers to such informational environments demands the radical improvements in the educational algorithms and appropriate methodology. For that reason, we recommend the following algorithm (see Figure 1).

Figure 1. Structure of algorithm for using informational learning
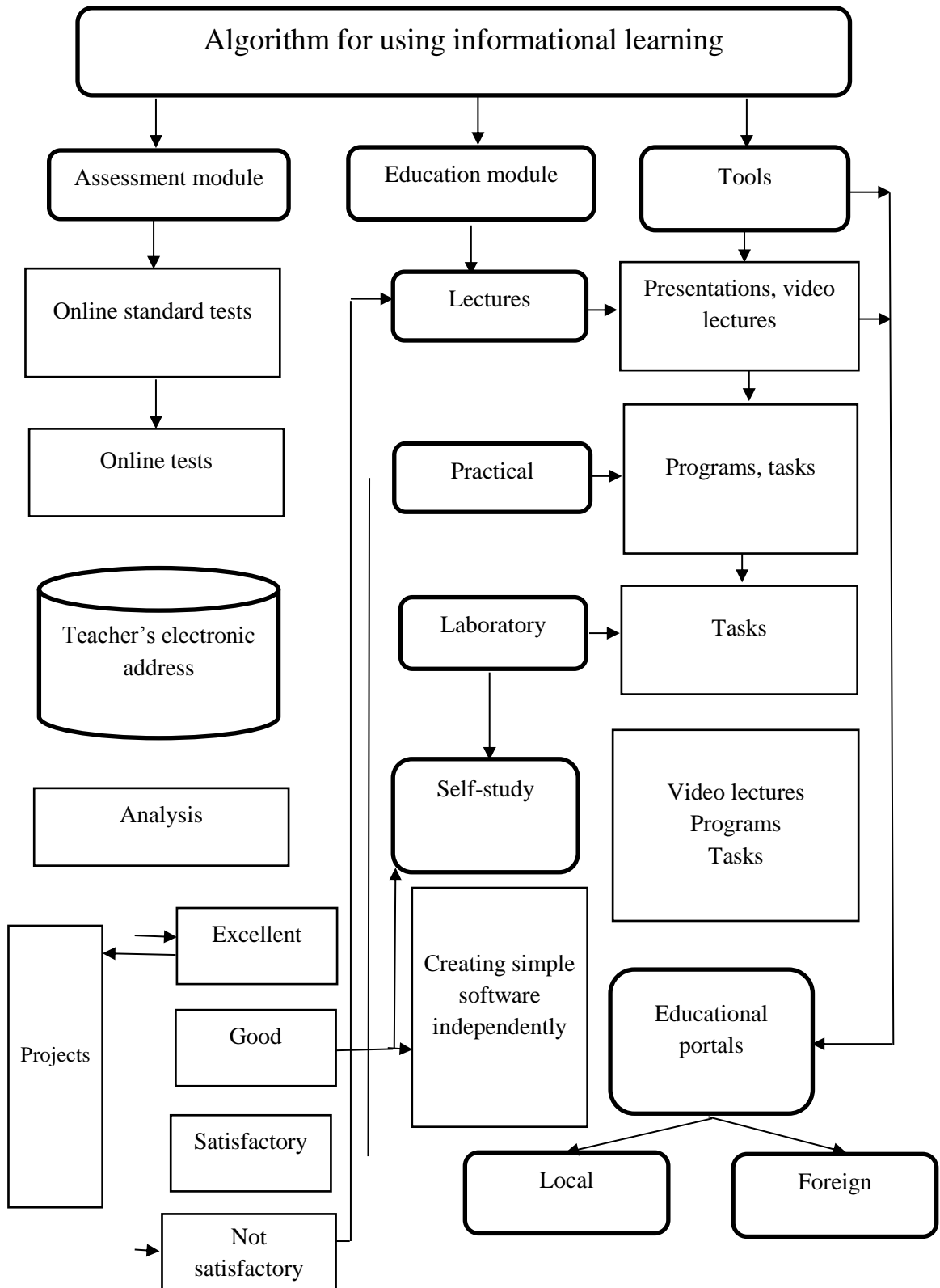
Teachers will use informational learning online, at the same time monitor and analyze the computer related disciplines. Excellent and good students will have a range of tasks such as to work with practical applications, e-books, training programs and complete various projects. Students with satisfactory and unsatisfactory marks will have online assignments including lectures, workshops, and laboratory works.

The above-mentioned algorithm and the informational learning tools shown in Table 1 were implemented at Navoi State Pedagogical Institute to teach students' of "Methodology of Teaching Informatics" department.

Table 1

№	Subjects	Informational learning tools
1.	Algorithms and programming language	ziyonet.uz, acm.tuit.uz, uTube.com
2.	Informatics	ziyonet.uz,uTube.com
3.	Information systems	ziyonet.uz,uTube.com
4.	Computer graphics	ziyonet.uz,uTube.com
5.	Web design	ziyonet.uz,uTube.com, academu.yandex.ru, coursera.ru, loftblog.ru
6.	Database	ziyonet.uz, access-video.ru
7.	Network technology	ziyonet.uz,uTube.com
8.	Computer supply	ziyonet.uz,uTube.uz, uTube.com, cictemnik.ru
9.	Computer modeling	ziyonet.uz,uTube.com
10.	Voluntary subjects	ziyonet.uz,uTube.com, academu.yandex.ru, coursera.ru

The use of informational learning tools, shown in Figure 1 and Table 1, will improve students' abilities to create new ideas, develop the abilities for independent decision-making, to solve problems in a non-standard way, using innovative approaches, in contrast to traditional practices and experiences and promote the development of their active learning.

Analysis and results

The success of the pedagogical experiment performed during the pedagogical investigation testifies the need to take into account its organizational and pedagogical aspects in this process. That is why during the research special attention was paid to these particular aspects. The organization of the experimental work started with the prior knowledge and feedback of teachers from Navoi State Pedagogical Institute. The pilot study was conducted in 2017-2019 among students of full-time and correspondence courses of Navoi State Pedagogical Institute in the direction of "Methodology of teaching Informatics ". 246 students were selected for the experimental and controlling groups.

During the experiment, a number of discussions and observations were held with the teachers and students of computer science on key features of the informational learning. 18 teachers and 246 students participated in the interview and observation results.

Due to the survey results the following statistical data was collected: the large percentage of teachers (56.4%) claimed that there is a need to use informational learning in the classroom, 28.6% of instructors suggested that it can be used autonomously, 14.8% of IT teachers advised

to use informational learning only with difficult subjects, and last, but not least, 0.2% of people believed that this type of learning is not so helpful.

According to the survey results conducted among students, 45% of students believed that they need to use informational learning in their learning process, 40.3% suggested that informational learning is appropriate to apply independently, 14.4% of people believed that it can be easily applied with difficult contexts and 0.3% consider that informational learning do not support the learning process.

All survey results obtained in 2019 were thoroughly analyzed and summarized, and in order to verify their reliability a mathematical-statistical analysis was performed on the basis of Student-Fisher criterion. In the process of application of this criterion, the approximate sums

$$\overline{X} = \frac{1}{n}\sum_{i=1}^{4} n_i X_i$$ and the formula

$A\% = \frac{\bar{X}}{3} \cdot 100\% - \frac{\bar{Y}}{3} \cdot 100\%$ for the determination of the dispersion coefficients

$$D_n = \sum_{i=1}^{4} \frac{n_i (x_i - \overline{X})^2}{n-1}$$ were widely used. On the basis of the obtained numerical results it

was indicated that the assessment specifications of teaching effectiveness is more than one, and that the evaluation of knowledge is greater than zero. It is obvious that the experimental group scores were higher than those in the control group.

According to the calculation, the average learning indicator of the experiment group was higher than that of the control group by 11.4%.

CONCLUSION

In conclusion, to train professional IT teachers, it is recommended to learn Office software, graphics programs, database management systems, programming languages, and computer software and hardware. For this reason, future IT teachers will need to acquire the software, hardware and the necessary skills to apply them professionally in teaching contexts. One of the easiest ways to master these software tools is to work with them independently using informational learning which requires the use of training programs. With the help of informational learning IT instructors will learn computer software individually, understand intuitively the basics of informational learning and search for necessary information. Therefore, we recommend using the algorithm and informational learning to educate future computer science teachers as this learning algorithm is more effective for self-study and self-assessment.

The organization of the educational process based on the educational and pedagogical software, included in the content of informational learning, facilitates to increase the interest of the learners, develops their cognitive, creative, motivational, heuristic thinking skills, and enhances the effectiveness of learning materials. Moreover, it also allows modeling and tracking the programs that are difficult to learn, and it ensures not only the effective implementation of the programs on the basis of their degrees, but also logic and perceptions of IT teachers. Furthermore, it teaches instructors to use scientific and creative approach towards their teaching, it has a lot of contribution to easy learning and the formation of scientific outlook, as well as the acquisition of necessary knowledge and an increase their interest towards their disciplines. Accordingly, we can say that it is advisable to use informational learning, online

training programs and self-monitoring tools to ensure teachers' creative abilities to conduct effective lessons. This is an excellent opportunity for future IT teachers to learn autonomously.

From the above statistical analysis we can conclude that informational learning should be widely disseminated on the basis of the suggested algorithm for preparing and training IT instructors in pedagogy.

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