

The Use of Modern Interactive Technologies in Learning: Correlation Analysis of the Results

Olena Bila, Viktoriia Miziuk, Tamara Gumennykova, Antonina Kichuk, Olena Sagan, Lyudmyla Perminova

Abstract: The need for qualified specialists is increasing every year, so scientists around the world are looking for new ways to improve learning. Among such tool is the use of interactive technologies. The study described in the article consisted of two parts: theoretical and empirical. Empirical, in turn, consisted of several parts: identifying the prevalence of the use of interactive technologies in education, testing their effectiveness in practice and evaluating their impact from the point of view of experts. The study confirmed that interactive teaching methods should be used in educational practice.

Index Terms: interactive technologies, effectiveness, expert assessments, Pareto diagram.

I. INTRODUCTION

The main task of higher education is to train fully qualified competent specialists with a high level of culture and the ability to flexible thinking, which allows them to independently renew their acquired knowledge, expand professional outlook and pedagogical skills. The public need for initiative, authoritative, well-educated specialists updates the social order for the training of specialists of a new generation who can apply the latest achievements of theory and practice in the process of creative self-realization, therefore, increasing the effectiveness and quality of education is more and more interesting for scientists around the world [1-5].

II. METHODOLOGY

Scientific research is considered in continuous development and is based on the connection between theory and practice. At the first stage of the scientific work, the study is conducted in the general direction. The authors solved the tasks of this stage with the help of observation, measurement and description. Theoretical cognitive tasks were formed in such a way that they could be tested empirically, which is carried out at the second stage of the study [6]. At this stage, statistical methods (questioning, poll), method of expert evaluations [7], mathematical modelling and for speeding up

Revised Manuscript Received on June 05, 2019

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the process of automated data processing prevailed. In particular, to test the hypothesis, we conducted a survey online and internally. Table 1 presents the gender, age, and educational attainment for the sample.

Table 1 The results of the conducted survey online and internally

Sample size	Ppl. (%)	Students	Lectures
Online	235 (69.3 %)	185 (84.9 %)	50 (41.3 %)
In a personal meeting	104 (30.7 %)	33 (15.1 %)	71 (58.7 %)
Total	339 (100 %)	218 (64.3 %)	121 (35.7 %)
Year of study			
Bachelor student		59%	
Master student		33%	
PhD student		8%	

At the first stage, the questionnaire contained only one question – Are you a student or a lecturer? Depending on the answer to this question, a list of questions for each category was further proposed about using or participating in classes using interactive technologies. This part of the study is necessary to identify the prevalence of the use of interactive technologies in universities. The next stage of the experiment implied approbation of the developed lessons in the educational process, including tasks with interactive teaching methods. At the lessons, techniques such as brainstorming, discussion, case study, game method and quest were used. At the first lesson, students were given questionnaires for self-assessment. The final stage was to conduct a definitive diagnosis using the same polls that were used at the initial step. This part of the study is needed to identify whether interactive technologies really increase the effectiveness of student learning.

III. BASIC ASPECTS OF INTERACTIVE LEARNING

Interactive learning is a particular form of organizing cognitive activity, a way of learning, carried out in the form of students' joint activities, in which all participants interact with each other, exchange information, solve problems together, model situations, evaluate the actions of others and their own behavior, immerse themselves in real atmosphere of business cooperation to resolve the issue.



The concept of learning involves several forms/models of learning: 1) passive; 2) active; 3) interactive (Fig. 1).

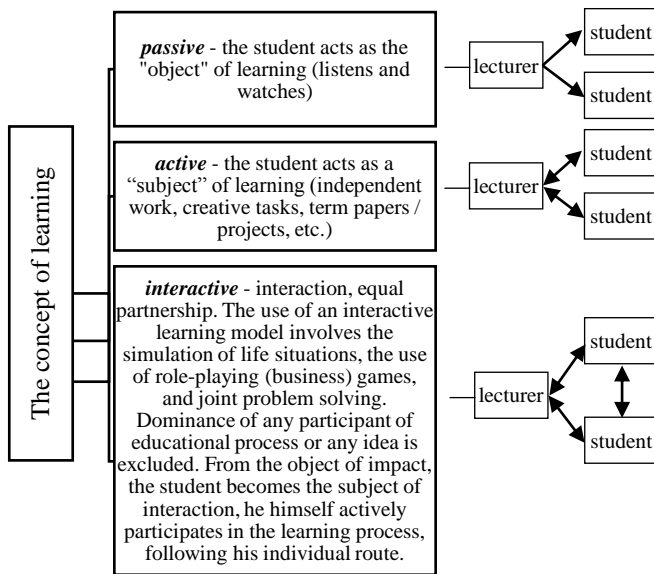


Fig. 1 Models of learning

The main methodological principles of interactive learning:

- careful selection of working terms, educational, professional vocabulary, conditional concepts (development of a glossary);
- comprehensive analysis of specific practical examples of professional activities in which the student performs various role functions;
- maintaining continuous visual contact with all students;
- the performance in each lesson by one of the students of the service of a moderator (moderator), who initiates and directs the discussion of a learning problem (the teacher, in this case, acts as an arbitrator);
- active use of technical means, including handouts and educational material in the form of tables, slides, educational films, videos, video clips, video equipment, with the help of which the material under study is illustrated;
- the teacher's constant maintenance of active intra-group interaction, the removal of tensions in relations between the participants, the neutralization of "sharp" steps and actions of certain groups of students;
- operative intervention of the teacher in the course of the discussion in case of unforeseen difficulties, as well as to clarify the new provisions of the curriculum;
- intensive use of individual tasks (home control tasks of self-diagnostic or creative nature, etc.);
- the organization of the spatial environment - the "playing field", which should contribute to the emancipation of students;
- playing of game roles taking into account individual creative and intellectual abilities;
- training in decision making under strict time rules and the presence of an element of uncertainty in the information.

- The organization of innovative learning includes:
- finding the problem formulation themes, goals and issues of the lesson;
- preparing the training space (specialized audiences, educational laboratories, etc.) for dialogue, for active work;
- the formation of the motivational readiness of the student and teacher to work together in the process of learning;
- the creation of special (official) situations that encourage the integration of efforts to solve the problem;
- development and adoption of rules of equal cooperation for students and teachers;
- the use of "supporting" methods of communication: benevolent intonation, the ability to ask constructive questions, etc.;
- optimization of the evaluation system of the cognition process and the results of joint activities;
- development of group-wide and interpersonal skills of analysis and introspection.
- Signs of interactive learning:
- interpersonal, dialogical interaction in the systems "teacher-student" and "student - student";
- collaborative small group work;
- active role-playing (game) and training organization of training.
- Based on the signs of interactive learning, the forms and methods of interactive learning can be divided into:
 1. discussion: interactive lecture, dialogue, group discussion, analysis of situations from practice, debates, etc.
 2. game: business, role-playing, organizational-activity, etc.
 3. training forms of conducting classes (communication, personal growth, professional).
- Quite often, the term "interactive learning" is mentioned in connection with information technology, distance education, using Internet resources, as well as electronic textbooks and reference books, online work.
- When using interactive methods, the role of the teacher changes abruptly, ceases to be central, it only regulates the process and deals with its overall organization, prepares the necessary tasks in advance and formulates questions or topics for discussion in groups, gives advice, controls the time and order of the planned plan.
- The use of interactive forms and methods of teaching in the process of teaching in a higher educational institution will allow acquiring:
 - – to a specific student:
 - the experience of actively learning the content of future professional activities in conjunction with practice;
 - development of personal reflection as a future professional in their profession;
 - development of the new experience of professional interaction with practitioners in this field;
 - – study group:
 - development of communication skills and cooperation in a small group;

- the formation of the value-orientation unity of the group;
- encouragement of flexible change of social roles depending on the situation;
- adoption of moral norms and rules of joint activities;
- development of skills of analysis and self-analysis in the process of group reflection;
- construction of the ability to resolve conflicts, the ability to compromise;
– system “teacher – group”
- non-standard attitude to the organization of the educational process;
- the formation of motivational readiness for interpersonal interaction not only in training but also in professional situations.

IV. THE EFFECTIVENESS OF INTERACTIVE LEARNING. RESEARCH RESULTS

As explained at the beginning, the first part of the study included a study of the prevalence of the use of interactive technologies in teaching students in universities. The survey results are shown in Fig. 2.

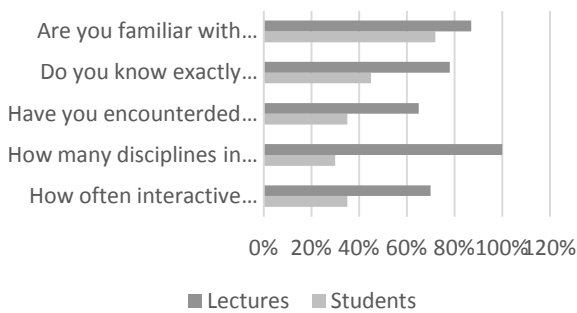


Fig.2 Survey results regarding the distribution of Interactive Learning

The analysis showed that almost all respondents have heard about the concept of "Interactive Technologies", but many do not understand which methods include this concept. Moreover, many teachers believe that they are used everywhere, but it is not (duplication of text on presentation slides does not apply to interactive technologies). Thus, more should be based on a survey of students than teachers. Also of interest is the study of exactly which Interactive technologies were used (Fig. 3).

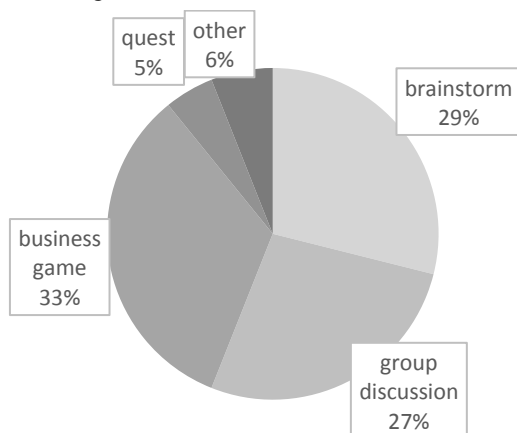


Fig. 3 Survey results regarding participation in certain types of Interactive Learning

The results show that the types of Interactive technologies (brainstorming and group discussion) that are not the most effective for learning the material are mainly used. Moreover, training methods are practically not used, which, as further research shows, are the most effective based on "learning the material and the acquisition of competences".

To identify whether interactive technologies really increase the effectiveness of student learning, a study was conducted, the results of which are shown below (Figures 4-5).

Before the start of classes, students, through self-examination, determined their competencies according to 7 different characteristics: ability to work in a group, time management, ability to take into account the opinion of the interlocutor, ability to argue your position, ability to find a compromise, learning lecture material and application of taught discipline in real life (Figure 4).

At the end of the semester, students also conducted self-analysis using the same questionnaires that were used at the initial stage. The results (Figure 5) exceeded our expectations: the growth was in all respects; however, for some, defined further as the most important, the increase was significant.

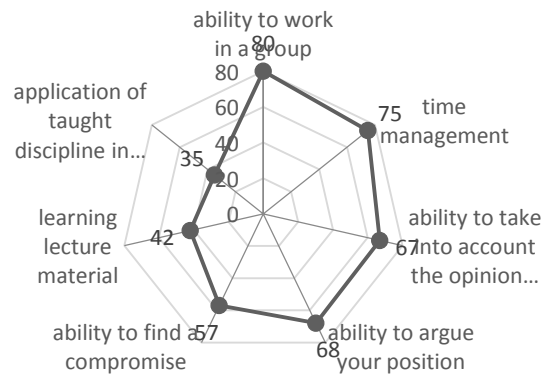
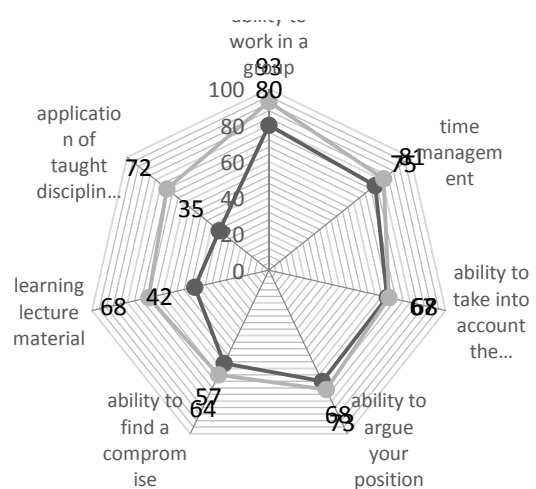


Fig. 4 Summary result of self-interviewing before participating in classes using interactive technologies



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Fig. 5 Summary result of self-interviewing after participating in classes using interactive technologies

Thus, on average, the competence of the teaching increased by 25.8% due to the use of elements of interactive technologies by the teacher:

$$I_e = \sqrt[7]{1.16 * 1.08 * 1.01 * 1.07 * 1.12 * 1.62 * 2.06} = \sqrt[7]{5,06} = 1,258$$

Further, through expert assessments [7] (teachers, students, employers, administrative staff), the most significant parameters were determined (Table 2).

Table 2 Determination of the most significant parameters by the method of expert assessments

Parameter (x _i)	Expert (x _j)					Σaj	Parameter weight
	1	2	3	...	57		
ability to work in a group	1	5	4	...	5	223,44	0,14
time management	2	1	5	...	1	159,6	0,10
ability to take into account the opinion of the interlocutor	3	2	3	...	4	143,64	0,09
ability to argue your position	5	4	5	...	3	175,56	0,11
ability to find a compromise	4	3	1	...	2	111,72	0,07
learning lecture material	6	6	7	...	6	351,12	0,22
application of taught discipline in real life	7	7	6	...	7	430,92	0,27
Σai						1596	1.00

Based on the table data, a Pareto diagram (Fig. 6) was constructed, in which the columns and accumulative curve show a specific weight of the parameters.

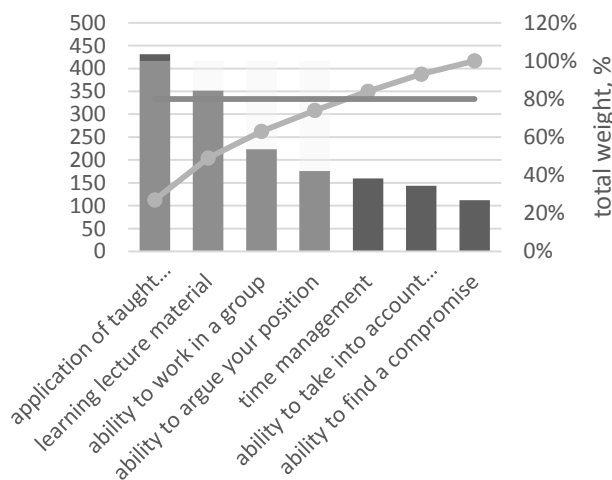


Fig.6 Pareto diagram

Thus, application of taught discipline in real life, learning lecture material, ability to work in a group and ability to argue your position were determined as the most important learning parameters. If we evaluate the effectiveness of training on the most important parameters, the effectiveness of interactive technologies rises to 42.7%:

$$I_e = \sqrt[4]{2,06 * 1.62 * 1.16 * 1.07} = \sqrt[4]{4,14} = 1,427$$

V. CONCLUSION

Research has shown that the use of interactive technologies in education affects both the skills of students in general and the development of theoretical material and the acquisition of competencies. Moreover, it should be noted that the attendance of students increased (from 45% to 68%). The study also showed that with the obtained positive results, interactive methods in no way replace explanatory, illustrative and practical means of conducting classes on technology. This is because the use of specific techniques and algorithms in practice is possible only after mastering their essence. This once again confirms that interactive teaching methods can be used in educational practice only on the condition that the suitability and effectiveness of their use in individual lessons or subjects of an academic discipline are determined. Further research will be aimed at identifying how interactive technologies affect the long-term memorization of material.

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