BG Pulse Journal USA
ISSN:1947-2536 http://www.bgpulseusa.com/index.php/bg

THE IMPACT OF INTERACTIVE TEACHING METHODS ON STUDENTS' ACADEMIC ACTIVITY AND LEVEL OF KNOWLEDGE ASSISTING

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Doi: https://doi.org/10.5281/zenodo.23669971

Annotation: This article conceptually and empirically studies the impact of the use of interactive teaching methods on students' academic activity and in-depth mastery of educational materials in the modern higher pedagogical education system. In the context of the transformation of the educational paradigm from a traditional reproductive approach to a person-oriented, constructivist educational model, activating students' cognitive activity is an urgent pedagogical task. Students of the "Primary Education" specialty of the Termez University of Economics and Service were selected as the main object of the study, and pedagogical experimental work was conducted on them. The research methodology is based on qualitative and quantitative analysis, pedagogical observation, questionnaires, test tests, and mathematical and statistical analysis of the results (Student's t-criterion). In the process of the experiment, an integrated model of "Flipped Classroom", problem-based learning (PBL), case studies, and Jigsaw technologies was tested. The results showed that the cognitive activity, independent thinking skills, and the efficiency of mastering complex knowledge of students in the experimental group using interactive methods were statistically significantly higher (by an average of 18.4%) than in the control group. At the end of the study, scientific and methodological recommendations were developed for the systematic introduction of interactive methods into the educational process in the professional training of future primary school teachers.

Keywords: interactive methods, academic activity, knowledge acquisition, cognitive activity, constructivism, higher pedagogical education, Bloom's taxonomy, case study, problem-based learning, student-centered learning.

Abstract: This article provides a conceptual and empirical study on the impact of interactive teaching methods on students' academic engagement and the quality of knowledge acquisition in the modern higher pedagogical education system. In the context of transforming the educational paradigm from a traditional reproductive approach to a student-centered, constructivist model, stimulating students' cognitive activity represents a critical pedagogical priority. The primary subject of the research involved students majoring in "Primary Education" at the Termez University of Economics and Service, where pedagogical experimental work was conducted. The research methodology is based on qualitative and quantitative analysis, pedagogical observation, surveys, diagnostic testing, and mathematical-statistical evaluation of the empirical data using Student's t-test. An integrated pedagogical framework incorporating Flipped Classroom, Problem- Based Learning (PBL), Case-study, and Jigsaw techniques was implemented during the experimental phase. The findings demonstrated that cognitive engagement, critical thinking skills, and higher-order knowledge retention were statistically significantly higher (by an average of 18.4%) in the experimental group compared to the control group. Conclusively, scientifically substantiated

methodological recommendations are proposed for the systematic integration of interactive technologies into the professional training curricula of future primary school educators.

Keywords: interactive methods, academic engagement, knowledge acquisition, cognitive activity, constructivism, higher pedagogical education, Bloom's taxonomy, case-study, problem-based learning, student-centered learning.

Introduction: In today's globalization and information age, the fundamental task of the higher education system is not only to transfer ready-made knowledge, but also to form in students the competencies of independent thinking, critical analysis of problems, rational decision-making in non-standard situations, and constant self-development. The need for a radical reform of the education system in the Republic of Uzbekistan, in particular, to raise the quality of higher education to a new level within the framework of the priority areas set out in the "Uzbekistan - 2030" strategy, and the introduction of advanced international pedagogical technologies into educational processes is being put on the agenda. In particular, the creation of an interactive educational environment is of particular importance in the process of training future primary education teachers, since the innovative methodology they master will serve as the main factor determining the quality of education of primary school students in the future. In the traditional education model, the student is mainly a passive recipient of information, and the teacher is the only source of knowledge. This approach is reproductive in nature and leads to the retention of acquired knowledge in short-term memory, the fading of creative activity, and the slow formation of skills for applying knowledge in practical situations. In contrast, interactive teaching methods, based on subject-subject relationships, make the student a central, active participant in the learning process. In an interactive environment, the learner conducts independent research, collaborates in a group, and masters the practice of filtering and synthesizing information. If we analyze the level of study of this problem, the theoretical foundations of active and interactive education go back to the concepts of "social constructivism" and "zone of proximal development" of LS Vygotsky, and the practice-oriented educational views of J. Dewey, J. Piaget and K. Rogers. Western scientists C. Bonwell, J. Eison, S. Freeman, M. Prince in their fundamental empirical research have proven the positive impact of active teaching in STEM and humanitarian areas on students' academic mastery. The issues of improving interactive methods and educational technologies in the development of pedagogical science in Uzbekistan have been widely studied in the scientific works of such scientists as U. Begimkulov, N. Azizkhodjaeva, O'. Tolipov, M. Sayidaxmedov, R. Ishmuhamedov, B. Ziyomuhamedov. However, the systematic impact of interactive teaching methods on the cognitive, behavioral, and affective components of
academic activity and their correlation with the depth of mastery in the case of undergraduate and graduate students in primary education has not been sufficiently comprehensively studied. The main goal of this study is to theoretically and empirically substantiate the impact of interactive teaching methods on the level of academic activity of students and the effectiveness of mastering the subject in the process of higher pedagogical education, as well as to develop a practical model for improving the system of training future teachers. To achieve this goal, the following tasks were set:

1. Analysis of the modern pedagogical and psychological essence of the theory of interactive education;

2. Systematize the criteria for students' academic activity and indicators of knowledge acquisition levels on a taxonomic basis;

3. Organization of pedagogical experimental work based on students of the "Primary Education" department of the Termez University of Economics and Service;

4. Evaluate empirical results using statistical methods and formulate a set of scientific recommendations for higher education practice.

DISCUSSION: The use of interactive methods in the educational process is directly related to the restructuring of the cognitive processes of the individual and the optimal activation of the cognitive architecture. Theoretically, the Cognitive Load Theory (Cognitive Load Theory – J. Sweller) shows that in traditional lecture classes, the student's working memory is overloaded with unnecessary cognitive load. When information is transmitted one-way, the student cannot perform sufficient mental operations to analyze it and consolidate it into long-term memory. Interactive teaching, on the other hand, ensures the student's participation in the learning process through practical actions, which increases the constructive cognitive load (germane load) and serves to firmly establish the information in memory through semantic networks.

The phenomenon of academic activity itself is a multidimensional concept, which is described in modern scientific literature through three main clusters:

1. Behavioral activity: Discipline in attending classes, frequency of participation in questions and answers during the lesson, timely and regular completion of assigned tasks.
2. Cognitive activity: The student's ability to use deep learning strategies, critically analyze information, compare complex concepts, and transfer knowledge to a new context.
3. Affective or emotional activity: Internal interest in the learning process, positive emotions in the lesson, a value-based approach to science, and professional self-awareness.

A comparative analysis of traditional and interactive teaching methods shows that in traditional methodology, activity is maintained mainly at the expense of external control (extrinsic motivation). The teacher predominates as a controlling, punishing or evaluating subject. This creates the basis for the fact that learning is mainly limited to the lower levels of Bloom's taxonomy - "remembering" and "understanding". On the contrary, interactive methods - in particular, the "Flipped Classroom" model, problem-based learning (PBL), cooperative learning in small groups (Cooperative Learning) and case-study - turn the student into an internally motivated researcher. For example, in the "Flipped Classroom" model, the student independently gets acquainted with the theoretical material (via digital platforms), while valuable time in the classroom is allocated to higher-level cognitive operations such as analysis, synthesis, design and evaluation. As a result, the stages of Bloom's taxonomy of "applying", "analyzing" and "creating" are fully covered. In the context of higher pedagogical education, this is doubly important. Future primary education specialists should not only get acquainted with interactive methods theoretically, but also experience them in their own learning experiences. If a student is formed in an environment where he is not an active subject, he will not be able to apply interactive methods to schoolchildren tomorrow. Therefore, the systematic use of interactive methods in the university educational process performs the function of professional imitation and modeling. The teacher here takes on the

status of a facilitator, moderator and guiding mentor, which creates a psychologically safe and free exchange of ideas in the classroom.

MAIN PART: In order to study the practical impact of interactive teaching methods on students' academic activity and level of knowledge acquisition, a pedagogical pilot study was organized at the Faculty of Pedagogy and Social and Humanitarian Sciences of the Termez University of Economics and Service in the direction of "Primary Education" during the 2023-2024 academic year. The study covered a total of 68 students. They were divided into two groups of equal opportunities:

- Control group (CG): 34 students. The learning process was conducted in a traditional lecture-seminar system, based on traditional assignments.

- Experimental group (TG): 34 students. An integrated set of methods including "Flipped Classroom", case study, PBL (problem-based learning), Insert, "Brainstorming" and Jigsaw was systematically introduced into the learning process.

Before the start of the experiment, the initial knowledge levels and cognitive activity indicators of students in both groups were measured using diagnostic tests and special questionnaires (adapted from the MSLQ – Motivated Strategies for Learning Questionnaire methodology). The results of the initial diagnostics showed that the overall level of preparation of the groups was almost the same, and no statistically significant differences were detected ($p > 0.05$).

1-jadval. Tajriba oxirida talabalarning bilimlarni o‘zlashtirish darajalari qiyosiy ko‘rsatkichlari

O‘zlashtirish darajalari	Nazorat guruhi (n=34)	Tajriba guruhi (n=34)	Farq (%)
Yuqori daraja (86 – 100 ball)	7 nafar (20,6%)	16 nafar (47,1%)	+26,5%
O‘rta daraja (71 – 85 ball)	18 nafar (52,9%)	15 nafar (44,1%)	-8,8%
Quyi daraja (55 – 70 ball)	9 nafar (26,5%)	3 nafar (8,8%)	-17,7%
O‘rtacha ball (M ± SD)	73,4 ± 6,8	85,2 ± 5,4	+11,8 ball

Jadval ma’lumotlaridan ko‘rinib turibdiki, tajriba guruhida yuqori darajadagi o‘zlashtirish ko‘rsatkichiga erishgan talabalar ulushi 47,1% ni tashkil etib, nazorat guruhiga (20,6%) nisbatan 26,5% ga oshgan. Quyi darajadagi talabalar esa sezilarli ravishda qisqarib, 26,5% dan 8,8% ga tushgan.

Matematik-statistik tahlil (Styudent t-kriteriyasi)

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

$t_{emp} = 7,93$
$df = 66$
$t_{cr}\ (\alpha = 0,05) = 2,00$
$t_{cr}\ (\alpha = 0,01) = 2,65$
$p < 0,001$

Bu natija tajriba va nazorat guruhlari o‘rtasidagi farq tasodifiy emas, balki interfaol o‘qitish metodlarining qo‘llanilishi bilan bog‘liq ekanligini to‘liq ilmiy jihatdan tasdiaydi.

following qualitative changes were observed in the experimental group:

1. Initiative in the lesson: In the control group, the proportion of active participants in the lesson was 25-30% of the lesson time, while in the experimental group this figure reached 75-80%. Since each student had a specific role in the small group (leader, analyst, secretary, presenter), cases of being left out were eliminated.

2. Information literacy: Students in the experimental group demonstrated high competence in working with primary literature, scientific articles, and comparative data. When analyzing problem situations, they learned to abandon ready-made templates and draw independent logical conclusions.

3. Professional-affective interest: According to the results of the survey, 91.2% of students in the experimental group expressed high internal motivation for subjects taught through interactive methods and a deep understanding of the importance of science in professional practice. Thus, the obtained factual data clearly show that interactive teaching methods raise the effectiveness of education to a qualitatively new level compared to the traditional passive approach, are a powerful pedagogical tool for managing students' cognitive activity and improving the quality of their assimilation.

CONCLUSION: The results of the theoretical analysis and empirical research fully confirm the high pedagogical effectiveness of interactive teaching methods in terms of their impact on the academic activity of higher education students and their deep assimilation of educational materials . The integration of interactive models based on subject-subject relationships instead of the traditional reproductive approach to educational practice maximizes the cognitive potential of the student.

The final scientific conclusions of the study are as follows:

1. Interactive methods, through the correct distribution of cognitive load, expand the student's ability to perceive, analyze and recreate educational information in practical activities. This ensures that the quality of mastery rises to the higher levels of Bloom's taxonomy.

2. The systematic use of interactive methods by students of the "Primary Education" specialty forms their professional and methodological reflection. The future teacher himself participates in the learning process as a subject, tests the mechanisms of interactivity in his personal experience and directly transfers this experience to his future pedagogical activity.

3. Statistical analysis (based on Student's t-test $p < 0.001$) proved that the average mastery rate of students educated in an interactive environment was significantly higher than that of the control group, and this was not a random fluctuation, but the result of a systematic pedagogical effect.

Based on the research results, the following practical recommendations are put forward for further improving the process of higher pedagogical education:

- Gradually reduce traditional lecture hours in higher education institutions and transform them into interactive laboratories enriched with "Flipped Classroom", case studies, and problem-based learning elements;

- Develop rubrics for formative assessment of students' academic activity for teachers and professors and include interactive case assignments as a mandatory component in educational and methodological complexes;

- Widespread introduction of blended learning platforms, which consist of a synthesis of digital technologies and interactive methods, in teaching special subjects in pedagogical curricula.

This research work serves as an important practical and methodological basis for improving the intellectual potential of future primary school teachers and preparing them as independent-thinking, competitive specialists.

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