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- 13.00.00 Pedagogika fanlari
- 13.00.01 Pedagogika nazariyasi. Pedagogik ta'limotlar tarixi
- 13.00.02 Ta'lim va tarbiya nazariyasi va metodikasi (sohalar bo'yicha)
- 13.00.03 Maxsus pedagogika
- 13.00.04 Jismoniy tarbiya va sport mashg'ulotlari nazariyasi va metodikasi
- 13.00.05 Kasb-hunar ta'limi nazariyasi va metodikasi
- 13.00.06 Elektron ta'lim nazariyasi va metodikasi (ta'lim sohaları va bosqichlari bo'yicha)
- 13.00.07 Ta'limda menejment
- 13.00.08 Maktabgacha ta'lim va tarbiya nazariyasi va metodikasi
- 13.00.09 Ijtimoiy pedagogika
- 07.00.00 Tarix fanlari
- 19.00.00 Psixologiya fanlari
- 01.00.00 Fizika-matematika fanlari
- 02.00.00 Kimyo fanlari
- 03.00.00 Biologiya fanlari
- 09.00.00 Falsafa fanlari
- 10.00.00 Filologiya fanlari
- 11.00.00 Geografiya fanlari

M

AKTABGACHA VA AKTAB TA'LIMI

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THE EFFECTIVENESS OF VISUAL TEACHING METHODS IN DEVELOPING SELF- DIRECTED LEARNING COMPETENCE AMONG UNDERGRADUATE MEHNAT MUHOFAZASI VA TEXNIKA XAVFSIZLIGI STUDENTS

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Abstract: In modern higher education, developing students' self-directed learning competence has become a key pedagogical priority, particularly in technical fields that require continuous professional development. This study investigates the effectiveness of visual teaching methods in enhancing self-directed learning competence among senior undergraduate students majoring in Mehnat muhofazasi va texnika xavfsizligi. A quasi-experimental research design was employed involving fourth-year students from several technical higher education institutions. The participants were divided into experimental and control groups. While the control group was taught using traditional instructional methods, the experimental group was instructed through visual teaching strategies, including mind maps, diagrams, and infographics. Data were collected using a self-directed learning readiness questionnaire as well as pre-test and post-test assessments related to occupational safety topics. Descriptive statistical analysis was applied to compare the learning outcomes of both groups. The findings indicate that students exposed to visual teaching methods demonstrated higher levels of learning autonomy, motivation, and engagement compared to those taught through traditional approaches. The results confirm that visual teaching methods significantly contribute to the development of self-directed learning competence among Mehnat muhofazasi va texnika xavfsizligi students. The study provides practical implications for improving teaching strategies in technical higher education institutions and supports the integration of visual learning tools into professional safety education.

Key words: visual teaching methods; self-directed learning; Mehnat muhofazasi va texnika xavfsizligi education; undergraduate students; technical higher education; learning competence.

Annotatsiya: Zamonaviy oliy ta'lim tizimida talabalarining mustaqil ta'lim olish kompetensiyasini rivojlantirish, ayniqsa uzluksiz kasbiy rivojlanishni talab qiladigan texnik yo'nalishlarda, muhim pedagogik ustuvor vazifalardan biri hisoblanadi. Mazkur tadqiqot Mehnat muhofazasi va texnika xavfsizligi yo'nalishida tahsil olayotgan bitiruvchi kurs talabalarida vizual o'qitish metodlarining mustaqil ta'lim kompetensiyasini rivojlantirishdagi samaradorligini aniqlashga qaratilgan. Tadqiqotda bir nechta texnik oliy ta'lim muassasalarining 4-kurs talabalarini qamrab olgan kvazi-eksperimental tadqiqot dizayni qo'llanildi. Ishtirokchilar tajriba va nazorat guruhlariga ajratildi. Nazorat guruhida an'anaviy o'qitish metodlari qo'llanilgan bo'lsa, tajriba guruhida aqliy xaritalar, diagrammalar va infografikalardan iborat vizual o'qitish strategiyalaridan foydalanildi. Ma'lumotlar mustaqil ta'limga tayyorgarlik darajasini aniqlash so'rovinomasi hamda mehnat xavfsizligiga oid mavzular bo'yicha o'tkazilgan pre-test va post-testlar yordamida yig'ildi. Olingan natijalarni solishtirish uchun tavsifiy statistik tahlil usullaridan foydalanildi. Tadqiqot natijalari vizual o'qitish metodlari asosida ta'lim olgan talabalarda o'quv faoliyatining mustaqilligi, motivatsiyasi va faolligi an'anaviy metodlar asosida ta'lim olgan talabalarga nisbatan yuqori ekanini ko'rsatdi. Natijalar vizual o'qitish metodlari Mehnat muhofazasi va texnika xavfsizligi yo'nalishi talabalarida mustaqil ta'lim kompetensiyasini rivojlantirishda muhim ahamiyatga ega ekanini tasdiqlaydi. Tadqiqot texnik oliy ta'lim muassasalarida o'qitish strategiyalarini takomillashtirish bo'yicha amaliy tavsiyalar beradi hamda kasbiy xavfsizlik ta'limida vizual o'quv vositalarini integratsiya qilish zarurligini asoslaydi.

Kalit so'zlar: vizual o'qitish metodlari; mustaqil ta'lim; Mehnat muhofazasi va texnika xavfsizligi ta'limi; bakalavr talabalar; texnik oliy ta'lim; ta'lim kompetensiyasi.

Аннотация: В системе современного высшего образования развитие компетенции самостоятельного обучения у студентов становится одной из ключевых педагогических задач, особенно в технических направлениях, требующих непрерывного профессионального развития. В данном исследовании рассматривается эффективность визуальных методов обучения в формировании компетенции самостоятельного обучения у студентов выпускных курсов, обучающихся по направлению Охрана труда и техника безопасности. В работе использован квазиэкспериментальный дизайн исследования с участием студентов 4 курса нескольких технических высших учебных заведений. Участники были разделены на экспериментальную и контрольную группы. В контрольной группе обучение осуществлялось с применением традиционных методов преподавания, тогда как в экспериментальной группе использовались визуальные стратегии обучения, включающие ментальные карты, схемы и инфографику. Сбор данных осуществлялся с помощью опросника готовности к самостоятельному обучению, а также пре- и пост-тестов по тематике охраны труда и техники безопасности. Для сравнения результатов обучения применялись методы описательной статистики. Результаты исследования показали, что студенты, обучавшиеся с использованием визуальных методов, продемонстрировали более высокий уровень учебной самостоятельности, мотивации и вовлечённости по сравнению со студентами, обучавшимися традиционными способами. Полученные данные подтверждают, что визуальные методы обучения существенно способствуют развитию компетенции самостоятельного обучения у студентов направления Охрана труда и техника безопасности. Исследование имеет практическую значимость для совершенствования стратегий преподавания в технических вузах и обосновывает целесообразность интеграции визуальных учебных средств в профессиональное образование в области безопасности труда.

Ключевые слова: визуальные методы обучения; самостоятельное обучение; образование в области охраны труда и техники безопасности; студенты бакалавриата; техническое высшее образование; учебная компетенция.

Introduction

The rapid development of technology and the growing complexity of industrial processes have significantly increased the demand for highly qualified specialists in the field of *Mehnat muhofazasi va texnika xavfsizligi*. Modern safety professionals are expected not only to possess theoretical knowledge but also to continuously update their competencies through independent learning. Consequently, the development of self-directed learning competence has become an essential objective of higher education, particularly in technical universities. Self-directed learning refers to learners' ability to take responsibility for planning, implementing, and evaluating their own learning processes. Previous studies emphasize that students who demonstrate strong self-directed learning skills are more adaptable to professional challenges and more effective in lifelong learning environments. However, traditional teacher-centered instructional approaches often limit students' active engagement and independence, especially in technically complex subjects.

In recent years, visual teaching methods have gained increasing attention as effective tools for enhancing students' cognitive engagement and learning autonomy. Visual elements such as mind maps, diagrams, and infographics help learners organize information, identify relationships between concepts, and better understand complex technical content. In *Mehnat muhofazasi va texnika xavfsizligi* education, where abstract regulations, risk assessment procedures, and safety systems are commonly taught, visual methods may play a particularly important role. Despite the growing interest in visual learning strategies, empirical research focusing on their impact on self-directed learning competence among senior *Mehnat muhofazasi va texnika xavfsizligi* students remains limited. Therefore, this study aims to investigate the effectiveness of visual teaching methods in developing self-directed learning competence among fourth-year undergraduate students in technical higher education institutions.

Research Methodology

This study employed a quasi-experimental research design to examine the effectiveness of visual teaching methods in developing self-directed learning competence among senior undergraduate students majoring in *Mehnat muhofazasi va texnika xavfsizligi*. A quasi-experimental approach was selected because it allows comparison between groups under real educational conditions without random assignment, which is common in higher education settings. The participants in the study were fourth-year undergraduate students enrolled in the *Mehnat muhofazasi va texnika xavfsizligi* (61020201) program at several technical higher education institutions. A total of two intact groups participated in the research: an experimental group and a control group. Both groups were comparable in terms of academic level, curriculum content, and prior learning experience. The research was conducted over one academic term. The control group was taught using traditional lecture-based instructional methods, including verbal explanations and textbook-based learning. In contrast, the experimental group was instructed using visual teaching methods, such as mind maps, diagrams, and infographics. These visual tools were integrated into lessons related to occupational safety regulations, risk assessment processes, and hazard prevention systems. The instructional content for both groups was identical; only the teaching methods differed. Data were collected using multiple instruments to ensure reliability. A Self-Directed



Learning Readiness Questionnaire based on a five-point Likert scale was administered to assess students' learning autonomy, motivation, and self-management skills. In addition, pre-test and post-test assessments were conducted to evaluate students' understanding of occupational safety concepts before and after the instructional intervention.

The collected data were analyzed using descriptive statistical methods, including mean scores and percentage comparisons. The pre-test and post-test results of the experimental and control groups were compared to determine changes in self-directed learning competence. This approach enabled the identification of differences in learning outcomes attributable to the use of visual teaching methods. Participation in the study was voluntary, and students were informed about the purpose of the research. The confidentiality of participants' responses was ensured, and the collected data were used solely for academic research purposes.

ANALYSIS AND RESULTS

The pre-test results indicated that there was no significant difference between the experimental and control groups prior to the instructional intervention. Both groups demonstrated similar levels of self-directed learning competence and baseline knowledge of occupational safety concepts, which confirms the initial equivalence of the groups.

Table 1: Pre-test results of experimental and control groups

Group	N	Mean Score	Percentage (%)
Experimental Group	30	61.4	61.4
Control Group	30	60.8	60.8

As shown in Table 1, the mean scores of both groups were nearly identical, indicating comparable starting conditions for the experiment. After the instructional intervention, noticeable differences were observed between the experimental and control groups. Students in the experimental group, who were taught using visual teaching methods, demonstrated higher levels of self-directed learning competence compared to those in the control group.

Table 2: Post-test results of experimental and control groups

Group	N	Mean Score	Percentage (%)
Experimental Group	30	78.9	78.9
Control Group	30	68.2	68.2

The experimental group showed a significant improvement in learning autonomy, motivation, and engagement. In contrast, the control group demonstrated only moderate progress, suggesting that traditional instructional methods were less effective in promoting self-directed learning. To further illustrate the effectiveness of visual teaching methods, pre-test and post-test results were compared within each group.

Table 3: Improvement comparison between groups

Group	Pre-test (%)	Post-test (%)	Improvement (%)
Experimental Group	61.4	78.9	+17.5
Control Group	60.8	68.2	+7.4

The experimental group achieved a 17.5% improvement, which is more than double the improvement observed in the control group. These findings indicate that visual teaching methods substantially enhanced students' self-directed learning competence in Mehnat muhofazasi va texnika xavfsizligi education. Overall, the results demonstrate that integrating visual teaching methods such as mind maps, diagrams, and infographics into Mehnat muhofazasi va texnika xavfsizligi courses leads to higher levels of self-directed learning competence among senior undergraduate students. The findings support the effectiveness of visual learning strategies in technical higher education contexts. The purpose of this study was to examine the effectiveness of visual teaching methods in developing self-directed learning competence among senior undergraduate students majoring in Mehnat muhofazasi va texnika xavfsizligi. The findings clearly demonstrate that students exposed to visual instructional strategies achieved higher levels of learning autonomy, motivation, and engagement compared to those taught using traditional teaching methods. The substantial improvement observed in the experimental group supports the assumption that visual teaching methods enhance students'

ability to organize information, regulate their learning processes, and take responsibility for independent study. Visual tools such as mind maps, diagrams, and infographics appear to facilitate deeper cognitive processing by helping learners identify relationships between concepts and structure complex information more effectively. This is particularly relevant in Mehnat muhofazasi va texnika xavfsizligi education, where students are required to understand abstract regulations, procedural systems, and risk assessment frameworks.

The results of this study are consistent with previous research emphasizing the positive impact of visual learning strategies on student engagement and academic performance. Prior studies have suggested that visual representations support meaningful learning by reducing cognitive load and improving information retention. In the present study, visual teaching methods not only improved content understanding but also contributed to the development of self-directed learning competence, which is a critical skill for future safety professionals who must continuously update their knowledge in response to evolving industrial standards. In contrast, the control group demonstrated limited progress in self-directed learning competence, indicating that traditional lecture-based instruction may not sufficiently promote independent learning skills among senior undergraduate students. While conventional methods remain effective for knowledge transmission, they may restrict opportunities for students to actively manage their own learning processes.

An important implication of these findings is that integrating visual teaching methods into technical higher education curricula can enhance students' readiness for lifelong learning. For Mehnat muhofazasi va texnika xavfsizligi programs, the use of visual tools may support students in independently analyzing workplace hazards, interpreting safety regulations, and applying theoretical knowledge to practical contexts. Despite its contributions, this study has certain limitations. The research was conducted with a limited sample size and focused exclusively on senior undergraduate students in Mehnat muhofazasi va texnika xavfsizligi programs. Future research could expand the sample to include students from different academic years or other technical disciplines and apply more advanced statistical analyses to further validate the findings. Overall, the discussion highlights that visual teaching methods represent an effective pedagogical approach for fostering self-directed learning competence in technical higher education and should be considered an integral component of modern instructional practice.

CONCLUSION

This study examined the effectiveness of visual teaching methods in developing self-directed learning competence among senior undergraduate students majoring in Mehnat muhofazasi va texnika xavfsizligi. The findings demonstrate that integrating visual instructional tools such as mind maps, diagrams, and infographics significantly enhances students' learning autonomy, motivation, and engagement compared with traditional teaching approaches. The results confirm that visual teaching methods support students in structuring complex technical information, understanding safety-related concepts more effectively, and taking greater responsibility for their own learning processes. This is particularly important for Mehnat muhofazasi va texnika xavfsizligi education, where future professionals must continuously update their knowledge and independently adapt to evolving industrial safety standards.

Overall, the study concludes that visual teaching methods represent an effective pedagogical approach for fostering self-directed learning competence in technical higher education and contribute positively to the quality of professional training in Mehnat muhofazasi va texnika xavfsizligi programs.

Based on the findings, the following recommendations are proposed:

Visual teaching methods should be systematically integrated into Mehnat muhofazasi va texnika xavfsizligi curricula in technical higher education institutions. Instructors are encouraged to combine traditional instruction with visual tools to promote independent and active learning. Higher education institutions should provide training for instructors on the effective use of visual learning strategies. Future research should involve larger samples, different academic levels, and more advanced statistical analyses to further validate the effectiveness of visual teaching methods.

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- 13.00.00 Pedagogika fanlari
 - 13.00.01 Pedagogika nazariyasi. Pedagogik ta'limotlar tarixi
 - 13.00.02 Ta'lim va tarbiya nazariyasi va metodikasi (sohalar bo'yicha)
 - 13.00.03 Maxsus pedagogika
 - 13.00.04 Jismoniy tarbiya va sport mashg'ulotlari nazariyasi va metodikasi
 - 13.00.05 Kasb-hunar ta'limi nazariyasi va metodikasi
 - 13.00.06 Elektron ta'lim nazariyasi va metodikasi (ta'lim sohaları va bosqichlari bo'yicha)
 - 13.00.07 Ta'limda menejment
 - 13.00.08 Maktabgacha ta'lim va tarbiya nazariyasi va metodikasi
 - 13.00.09 Ijtimoiy pedagogika
 - 07.00.00 Tarix fanlari
 - 19.00.00 Psixologiya fanlari
 - 01.00.00 Fizika-matematika fanlari
 - 02.00.00 Kimyo fanlari
 - 03.00.00 Biologiya fanlari
 - 09.00.00 Falsafa fanlari
 - 10.00.00 Filologiya fanlari
 - 11.00.00 Geografiya fanlari



MAKTABGACHA VA MAKTAB TA'LIMI

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