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ARTIFICIAL INTELLIGENCE–ASSISTED EARLY IDENTIFICATION OF LEARNING DIFFICULTIES IN EFL LEARNERS AND PEDAGOGICAL SUPPORT

Malika Muzaffarovna Bakhramova
Student, Foreign Language and Literature (English Language) Program
Department of Foreign Philology, Faculty of Philology
Urgench State Pedagogical Institute
Email: malikamuzaffarovna69@gmail.com
Urgench, Uzbekistan

ABOUT ARTICLE

Key words: artificial intelligence, EFL learners, early identification, learning difficulties, pedagogical support, learning analytics, personalized instruction, language learning, student engagement, adaptive learning.

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Abstract: This study explores the potential of artificial intelligence for the early identification of learning difficulties among EFL learners and the organization of timely pedagogical support. The research was designed as a mixed-methods study involving 40 EFL learners over an 8-week period. The study focused on such indicators as platform engagement, assignment completion, recurring grammatical and lexical errors, test performance, and participation in speaking activities. AI-assisted analysis was used to detect learners who showed early signs of academic difficulty. Based on the identified problems, differentiated pedagogical support was provided through adapted tasks, targeted grammar and vocabulary exercises, gradual speaking practice, and individualized feedback. The findings showed positive changes in learner participation, assignment completion, test performance, and the reduction of recurring errors, particularly among the at-risk group. The study concludes that artificial intelligence can serve as an effective supportive tool in EFL education when it is used to strengthen early diagnosis and personalize pedagogical intervention rather than

replace the teacher. The results highlight the importance of combining AI-based monitoring with human-centered instructional support in order to improve learner achievement and engagement.

SUN'IY INTELLEKT YORDAMIDA INGLIZ TILINI CHET TILI SIFATIDA O'RGANUVCHILARDA O'QUV QIYINCHILIKLARINI ERTA ANIQLASH VA PEDAGOGIK QO'LLAB-QUVVATLASH

Malika Muzaffarovna Baxramova
Urganch davlat pedagogika instituti Filologiya fakulteti
Xorijiy filologiya kafedrasi Xorijiy til va adabiyoti: ingliz tili yonalishi talabasi
malikamuzaffarovna69@gmail.com
Urganch, O'zbekiston

MAQOLA HAQIDA

Kalit so'zlar: sun'iy intellekt, EFL o'quvchilari, erta aniqlash, o'quv qiyinchiliklari, pedagogik qo'llab-quvvatlash, ta'lim analitikasi, individuallashtirilgan ta'lim, til o'rganish, o'quvchilar faolligi, adaptiv ta'lim.

Annotatsiya: Mazkur tadqiqot ingliz tilini chet tili sifatida o'rganuvchi (EFL) talabalarda o'quv qiyinchiliklarini erta aniqlash va o'z vaqtida pedagogik qo'llab-quvvatlashni tashkil etishda sun'iy intellektning imkoniyatlarini o'rganishga bag'ishlangan. Tadqiqot aralash metodologiya asosida ishlab chiqilgan bo'lib, 8 hafta davomida 40 nafar EFL o'quvchisi ishtirokida amalga oshirilgan. Tadqiqotda ta'lim platformasidagi faollik, topshiriqlarni bajarish darajasi, takrorlanuvchi grammatik va leksik xatolar, test natijalari hamda og'zaki nutq faoliyatidagi ishtirok kabi ko'rsatkichlarga e'tibor qaratilgan.

Sun'iy intellekt asosidagi tahlil yordamida o'quv jarayonida qiyinchiliklarga duch kelayotgan talabalar erta bosqichda aniqlangan. Aniqlangan muammolar asosida moslashtirilgan topshiriqlar, maqsadli grammatika va lug'at mashqlari, bosqichma-bosqich nutq amaliyoti hamda individual fikr-mulohazalar orqali differensial pedagogik yordam ko'rsatilgan.

Tadqiqot natijalari talabalar ishtiroki, topshiriqlarni bajarish ko'rsatkichlari, test natijalari va takrorlanuvchi xatolarning kamayishida ijobiy o'zgarishlar yuz berganligini,

ayniqsa xavf guruhidagi o‘quvchilar orasida sezilarli natijalar kuzatilganligini ko‘rsatdi. Tadqiqot xulosasiga ko‘ra, sun’iy intellekt o‘qituvchini almashtirish uchun emas, balki erta diagnostika va pedagogik aralashuvni individuallashtirishni kuchaytirish uchun qo‘llanilganda, ingliz tilini o‘qitishda samarali yordamchi vosita bo‘lib xizmat qilishi mumkin. Natijalar o‘quvchilarning akademik muvaffaqiyati va ta’lim jarayonidagi faolligini oshirish uchun sun’iy intellekt asosidagi monitoringni insonparvar pedagogik qo‘llab-quvvatlash bilan uyg‘unlashtirish muhimligini ta’kidlaydi.

РАННЕЕ ВЫЯВЛЕНИЕ ТРУДНОСТЕЙ ОБУЧЕНИЯ У ИЗУЧАЮЩИХ АНГЛИЙСКИЙ ЯЗЫК КАК ИНОСТРАННЫЙ С ИСПОЛЬЗОВАНИЕМ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА И ПЕДАГОГИЧЕСКАЯ ПОДДЕРЖКА

Малика Музаффаровна Бахрамова
Студентка направления «Иностранный язык и литература: английский язык»
Кафедра зарубежной филологии, Филологический факультет
Ургенчский государственный педагогический институт
E-mail: malikamuzaffarovna69@gmail.com
Ургенч, Узбекистан

О СТАТЬЕ

Ключевые слова: искусственный интеллект, учащиеся EFL, раннее выявление, трудности обучения, педагогическая поддержка, образовательная аналитика, персонализированное обучение, изучение языка, вовлеченность обучающихся, адаптивное обучение.

Аннотация: Данное исследование рассматривает потенциал искусственного интеллекта для раннего выявления трудностей в обучении у учащихся, изучающих английский язык как иностранный (EFL), а также для организации своевременной педагогической поддержки. Исследование было разработано как смешанное (количественно-качественное) и проводилось с участием 40 учащихся EFL в течение 8 недель. Основное внимание уделялось таким показателям, как активность на образовательной платформе, выполнение заданий, повторяющиеся грамматические и лексические ошибки, результаты

тестирования и участие в устных видах речевой деятельности.

Для выявления учащихся, демонстрирующих ранние признаки академических затруднений, использовался анализ данных с применением искусственного интеллекта. На основе выявленных проблем была организована дифференцированная педагогическая поддержка посредством адаптированных заданий, целевых упражнений по грамматике и лексике, поэтапной практики устной речи и индивидуализированной обратной связи.

Результаты исследования показали положительные изменения в уровне участия учащихся, выполнении заданий, результатах тестирования и сокращении количества повторяющихся ошибок, особенно среди группы риска. Исследование приходит к выводу, что искусственный интеллект может служить эффективным вспомогательным инструментом в обучении английскому языку как иностранному, если используется для усиления ранней диагностики и персонализации педагогического вмешательства, а не для замены преподавателя. Полученные результаты подчеркивают важность сочетания мониторинга на основе искусственного интеллекта с человеко-ориентированной педагогической поддержкой для повышения учебных достижений и вовлеченности обучающихся.

Introduction. In the context of the ongoing digital transformation of education, artificial intelligence technologies are becoming increasingly integrated into foreign language teaching practices. In particular, within English as a Foreign Language (EFL) settings, artificial intelligence has gained special importance due to its capacity to adapt learning materials, analyze individual learner errors, monitor student engagement, and provide personalized recommendations. Recent scholarly reviews indicate that artificial intelligence can contribute positively to the development of language

skills, increase learner engagement, support the instructional process, and promote critical thinking in EFL education, although certain methodological and technological limitations still remain (Toscu, 2025).

At the same time, learning difficulties among EFL learners are often identified too late. Such difficulties may appear in the form of limited vocabulary development, recurring grammatical errors, disruptions in reading comprehension, lack of confidence in speaking, failure to complete assignments on time, and declining learning motivation. If these signs are not recognized at an early stage, they may lead to academic underachievement, reduced classroom participation, and a negative attitude toward language learning. Research based on learning analytics and machine learning has shown that even limited learner performance data can be used to identify at-risk students at an early stage, thus making it possible to organize timely pedagogical intervention and support (Azizah et al., 2024).

However, although the general benefits of artificial intelligence in EFL education have been widely discussed in the literature, the issue of using AI specifically for the early detection of learning difficulties and linking this process to pedagogical support mechanisms has not yet been sufficiently systematized. In particular, approaches that combine such indicators as assignment completion rate, platform activity, error patterns, and responsiveness to feedback require deeper investigation within EFL methodology. From this perspective, the relevance of the present study lies in examining the potential of artificial intelligence to identify learning difficulties among EFL learners at an early stage and in substantiating pedagogical support strategies appropriate to the detected problems. Accordingly, the aim of this study is to explore the pedagogical possibilities of AI based monitoring and analytical tools for the early detection of learning difficulties in EFL education and to propose an effective support model based on the identified needs.

Research Methodology. This study was designed as a mixed-methods investigation aimed at identifying learning difficulties among EFL learners at an early stage with the help of artificial intelligence and exploring appropriate forms of pedagogical support. A mixed-methods approach was selected because it allows the researcher to examine learners' engagement, assignment completion, recurring language errors, and responses to feedback in an integrated way. In this study, artificial intelligence was understood not only as a technological tool for data processing, but also as a pedagogically meaningful mechanism for connecting diagnosis with targeted instructional support.

Such an approach is consistent with research showing that AI-enabled adaptive learning systems can collect and analyze learner data in order to support individualized instruction and decision making in educational settings (Kabudi et al., 2021).

The study involved 40 EFL learners and was conducted over a period of 8 weeks. All participants were enrolled in the same instructional program and represented a relatively similar level of English proficiency ranging from elementary to intermediate. During the study period, learners' online activity, assignment submission patterns, short test results, written performance, and oral participation were monitored on a regular basis. Particular attention was paid to indicators such as low platform engagement, delayed task completion, repeated grammatical and lexical errors, weak response to teacher feedback, and hesitation in speaking tasks. These indicators were used to identify students who might be at risk of developing learning difficulties. In EFL contexts, learning analytics has been shown to be useful for examining learner behavior and detecting the factors that influence language performance, especially in technology-supported learning environments (Lin & Hwang, 2018).

Several instruments were used for data collection. First, platform-based learning records were examined to measure learners' participation, login frequency, and assignment completion behavior. Second, short diagnostic tests were administered to evaluate learners' progress in grammar, vocabulary, reading, and writing. Third, learners' written and oral tasks were analyzed with the support of AI-based tools in order to identify recurring error patterns and signs of slow academic progress. Fourth, teacher observation was used to document learners' classroom participation, responsiveness, and confidence in completing communicative tasks. Based on these data, the learners were conditionally grouped into two categories: a stable learning group and a group requiring additional pedagogical support. This procedure reflects the logic of adaptive learning systems, in which learner data are used to personalize instructional decisions and support mechanisms (Kabudi et al., 2021).

In the next stage of the study, pedagogical support was organized according to the needs identified through AI-assisted analysis. Learners with low participation received shorter and more structured tasks. Those with frequent grammatical errors were given targeted grammar exercises, while learners with limited vocabulary were provided with simplified lexical activities. Students who demonstrated hesitation or anxiety in oral production were engaged in gradual and low-pressure speaking tasks designed to increase confidence. In addition, the teacher offered individual feedback,

short explanatory guidance, and regular follow-up support. Thus, in this study, artificial intelligence was not treated merely as a monitoring tool, but as a supportive means of informing differentiated pedagogical intervention. Previous studies have also indicated that learner engagement, interaction, and participation patterns are closely related to EFL performance, which strengthens the methodological basis for such individualized support (Lin & Hwang, 2018).The collected data were analyzed by means of descriptive analysis. The learners' performance before and after the support stage was compared in terms of task completion rate, test achievement, frequency of errors, and level of platform activity. Qualitative data were interpreted based on teacher observation and the overall dynamics of learner progress. Through this procedure, the study aimed to determine the extent to which early AI-assisted identification of learning difficulties could contribute to timely pedagogical intervention and improved learning outcomes in EFL education.

Results. The findings of the study showed that it is possible to identify learning difficulties among EFL learners at an early stage with the help of artificial intelligence and to organize appropriate pedagogical support accordingly. During the first weeks of observation, learners who demonstrated low platform engagement, delayed assignment submission, repeated grammatical and lexical errors, and weak participation in speaking tasks were identified as an at risk group. This result is consistent with studies showing that even limited learning data can be used to detect at risk students at an early stage (Azizah et al., 2024).

At the beginning of the study, 14 out of 40 learners were classified as requiring additional pedagogical support. For this group, short and clearly structured tasks, targeted grammar exercises, adapted lexical activities, and gradual speaking tasks were introduced. After the pedagogical intervention, improvements were observed in assignment completion rates, diagnostic test scores, the reduction of recurring errors, and the level of platform activity. This supports previous research indicating that AI-assisted assessment and analysis can positively influence language learning outcomes (Chen et al., 2025).

The results also showed that some progress was observed in the stable group, but the most noticeable improvement occurred in the at-risk group. This means that the early detection mechanism was particularly effective for learners experiencing difficulties. Therefore, artificial intelligence functioned not as a substitute for the teacher, but as a supportive mechanism that helped reveal early

signs of decline in learner performance and made timely pedagogical intervention possible (Azizah et al., 2024; Chen et al., 2025).

Table 1.

Main indicators of EFL learners before and after pedagogical support

Indicator	At the beginning	At the end	Change
Average assignment completion rate	68%	84%	+16%
Average diagnostic test score	61 points	76 points	+15 points
Number of recurring grammatical errors	9.2	5.1	-4.1
Weekly active platform logins	2.8 times	4.6 times	+1.8 times
Share of learners actively participating in speaking tasks	45%	70%	+25%
Number of at-risk learners	14	6	-8

The data in Table 1 indicate that positive changes were observed across all major indicators. In particular, the reduction in the number of at-risk learners from 14 to 6 suggests that early detection combined with adapted pedagogical support worked effectively. This is also in line with meta-analytical findings showing that AI-enabled assessment tools have a positive effect on learning outcomes (Chen et al., 2025).

Discussion. The results of this study indicate that the early identification of learning difficulties among EFL learners through artificial intelligence can support faster and more accurate pedagogical decision making. In particular, declining platform activity, delayed assignment submission, weaker interim performance, and recurring errors appeared to be important indicators showing that a learner might be moving into an at-risk group. This finding is consistent with learning analytics research suggesting that when learners are provided with information about their learning progress, their position in comparison with class performance, and their likely future outcomes, academic improvement may occur especially among students with medium and high levels of risk (Russell et al., 2020).

Another important finding of the study is that the effectiveness of artificial intelligence did not remain limited to diagnosis only, but also served as a basis for individualizing pedagogical support.

Once it became possible to identify the specific area in which a learner was experiencing difficulty, the teacher could provide adapted tasks, short explanations, targeted exercises, and step by step support. This result is in line with research showing that when EFL learners use self-made AI chatbots as personalized writing support tools, they receive feedback and assistance tailored to their own needs, which may positively influence both motivation and learning outcomes (Guo & Li, 2024).

The improvement observed in learner engagement, participation, and assignment completion is also noteworthy. This suggests that an early identification system does not simply label a learner as problematic, but instead creates practical opportunities for re-engaging that learner in the instructional process. Recent EFL studies have also shown that students who work with AI tools often demonstrate higher levels of engagement, enjoyment, and motivation. Therefore, AI based support may strengthen not only academic performance in language learning but also learners' attitudes toward the learning process and their internal motivation (Yuan & Liu, 2025).

At the same time, these findings should be interpreted with caution. AI supported assistance may produce noticeable positive changes in such areas as writing, organization, vocabulary development, and language use, yet it is also possible that excessive dependence on such tools may negatively affect learners' independent thinking, creativity, and critical reflection. For this reason, the most appropriate way to use artificial intelligence in EFL education is not as a substitute for the teacher, but as a supportive system that strengthens the teacher's diagnostic and methodological capacities (Alangari, 2025).

Conclusion. In conclusion, this study demonstrated that artificial intelligence can serve as an effective tool for the early identification of learning difficulties among EFL learners and for the organization of timely pedagogical support. The findings showed that indicators such as low platform engagement, delayed task completion, recurring language errors, and weak participation in speaking activities can help reveal learners who are at risk of academic difficulty at an early stage. When such difficulties are identified in time, teachers are better able to provide differentiated support that responds to learners' specific needs.

The study also confirmed that the value of artificial intelligence in EFL education lies not in replacing the teacher, but in strengthening the teacher's ability to monitor learner progress, interpret warning signs, and plan targeted intervention. Adapted tasks, individualized feedback, focused

grammar and vocabulary support, and gradual speaking practice contributed to positive changes in learner participation and achievement. In this sense, AI should be understood as a supportive pedagogical instrument that enhances early diagnosis and personalized instruction.

Overall, the results suggest that the integration of artificial intelligence into EFL teaching can improve both academic outcomes and learner engagement when it is used carefully and purposefully. At the same time, the effectiveness of such integration depends on the teacher's professional interpretation of learner data and the pedagogical quality of the support provided. Therefore, future studies may further explore larger learner groups, longer intervention periods, and different EFL contexts in order to deepen understanding of how AI can be used for sustainable and human-centered language education.

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