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STRATEGIES TO OVERCOME FLA: TEACHERS' VIEWS

Abstract. This study aims to identify efficient strategies to overcome and reduce foreign language anxiety (FLA) among English as a Foreign Language (EFL) students. 9 EFL teachers from the university shared their views toward FLA and reported their strategies to reduce FLA. Using a qualitative method, semi-structured interviews were conducted. The findings showed that several effective strategies may help to overcome FLA among students. The strategies have included creating a supportive atmosphere and classroom environment, using engaging teaching methods, and helping students build confidence. This study contributes to the existing findings of FLA while comparing the teachers' effective strategies.

Keywords: foreign language anxiety, English as a foreign language, teachers' strategies, teaching methods.

Introduction

Nowadays, the English language is a lingua franca, meaning that it is extensively used as a means of communication all over the world. It has served from the past till nowadays, being classified as inner, outer, and expanding circles (Kachru, 1988). Kazakhstan is in an expanding circle, meaning that students are learning English as a foreign language(EFL), where they rely on the provided norms for the English language. In the process of acquiring a foreign language, students' attitudes and emotions play a crucial role. Occasionally or repeatedly, students may experience negative emotions, such as distress, uncertainty, and anxiety, thus leading to a negative impact on teaching and learning(MacIntyre, 2017; Morgan, 2020; Muller & Goldenberg, 2021). Language anxiety is an affective factor that impacts a student's ability to learn a language. MacIntyre and Gardner (1994) defined foreign language anxiety (FLA) as "the worry and negative emotional reaction when learning or using the foreign language". It has been identified as the most powerful predictor of one's performance and achievement (Liu & Huang, 2011). In this case, the classroom environment and the teacher play one of the most crucial roles in the process of acquiring a foreign language. In particular, teacher-student interaction is important in the increase or decrease of the students' anxiety levels (Horwitz, 1988; Koch & Terrell, 1991 & Young, 1990). A language teacher is a person who guides, encourages, and supports the students and is a person who can mitigate the anxiety level of a student. If the teacher notices any signs of anxiety in the learning process, some adjustments can be made, and strategies can be implemented.

This study is essential to the teaching sphere, particularly providing some strategies to overcome FLA among students, because it is one of the vital and ongoing topics nowadays. It can be beneficial for teachers.

The goal of this study is to explore the strategies that teachers use to help students overcome FLA in the classroom. It aims to analyze teachers' perspectives on effective teaching methods that can reduce students' anxiety in foreign language learning.

Language anxiety has been investigated since 1970 and defined as "a distinct complex of self-perceptions, beliefs, feelings and behaviors related to classroom learning arising from the uniqueness of the language learning process" (Horwitz et al., 1986). In order to measure the level of anxiety of students, Horwitz et al. introduced an instrument, the Foreign Language Classroom Anxiety Scale (FLCAS), which consists of 33 items rated on a five-point Likert scale ranging from 1 (strongly agree)

to 5 (strongly disagree) (1986). However, besides anxiety, there are other affective variables such as motivation, self-esteem, and attitudes and cognitive variables such as the ability to process and produce information that also have an effect on students' language learning process. Here, the cognitive psychologist MacIntyre highlighted the role of affective and cognitive variables to understand how individuals learn a foreign or second language (1995). Affective variables might have an effect on students positively (motivation is high and anxiety is low, learning process occurs) or negatively (high anxiety and low self-esteem, blocking the learning process) (MacIntyre, 1995). If students are experiencing anxiety, their cognitive skills are blocked as well, consequently leading to poor academic performance, forgetting words, and being under pressure. The interaction between affective and cognitive factors is significant, as the former influences the latter. For instance, anxious students may struggle to focus, limiting their ability to recall words or structure sentences. This idea is similar to Krashen's (1982) affective filter theory, which claims that the learning process occurs and students are open to learn and process new information only when they feel relaxed and have a low level of anxiety.

Anxiety is the most investigated affective emotion as it can have a detrimental effect on a student's academic performance. It has been described as a feeling of tension and nervousness that emerges as a response to a danger to a value that an individual finds important for the existence (May, 1977; Spielberg, 1983). Similarly, Young defined it as a complicated phenomenon peculiar to language learning (1992), and Zhang defined anxiety as the tension that the learner experiences in performing a learning task (1994). The more anxious students are, the less motivation they have to learn a foreign language. Moreover, FLA may have different causes such as lack of self-confidence, constant worry, and shyness, which are mostly recognized in increased heart rate, shaking hands, and dry mouth. Horwitz et al. identified three components of FLA that may happen in the classroom: communication apprehension, test anxiety, and fear of negative evaluation (1986). Communication apprehension is an inability to communicate effectively with others and a type of shyness with marked fear or nervousness. As the language learning process requires students to speak, many students feel nervous during speaking activities, and this condition is caused by uncontrollable anxiety characterized by body movements and the inability to speak clearly (Fauzi, 2022). Students avoid speaking and participating in discussions and group activities. Test anxiety is the fear of failing a test, accompanied by tension and stress. Horwitz et al. (1986) explained that test anxiety is linked to a student's fear of poor performance, leading to avoidance behaviors and decreased motivation to learn. Lastly, fear of negative evaluation is the fear of being judged and evaluated by others negatively. Students are prone to avoid doing any tasks, speaking, and participating in the lessons due to fear of making mistakes (Mitrevski et al., 2024). They prefer to remain silent and constantly worry about how others perceive their knowledge of English (Horwitz et al., 1986). Furthermore, the English language can be either a comfort place or seem as an obstacle for anxious students (Nicolson & Adams, 2010). Teachers and peers might also be direct causes of students' anxiety. The teacher's role is crucial in the learning process, as teacher-student interaction can increase or decrease the students' anxiety levels (Horwitz, 1988; Koch & Terrell, 1991 & Young, 1990). Moreover, Aida (1994) explored the impact of teachers' teaching styles on students' anxiety levels. It was concluded that the teaching style, for instance, a harsh manner can impact detrimentally and cause the students to feel anxious in the classroom. Instead, teachers' "facilitator" manner should emerge since teachers are responsible for creating and maximizing learning opportunities (Kumaravadivelu, 2003). To mitigate the students' anxiety level, strategies can be implemented by teachers.

Methods and materials

A semi-structured interview with EFL university teachers was a data collection to find out the most appropriate strategies and comprehensively describe them. The interview questions were designed to explore how EFL teachers perceive FLA in their students and what strategies they use to help learners overcome it. The aim was to determine whether teachers had effective methods to reduce FLA and understand their perspectives on the impact of anxiety on students' learning. The interview was conducted in English, Kazakh and Russian based on the participants' language preference to

ensure clarity and allow for more detailed responses. Nine EFL teachers from university-level institutions voluntarily participated in the interview. Their responses provided valuable insights into the various strategies and approaches used to manage FLA in the classroom. To protect participants' rights and confidentiality, all names remained anonymous in the study. The teachers were fully informed about the purpose of the research, data collection methods, and how the information would be handled. They were assured that their responses would remain confidential and be used solely for academic research purposes.

Accordingly, the research questions are as follows:

1. What are the main factors that contribute to students experiencing FLA in foreign language classrooms, and how are they recognized?

2. What are the most effective strategies that teachers use to reduce FLA in foreign language classrooms?

Demographic information about the EFL teachers is presented below (see Table 1). The participants vary in age and teaching experience, representing diverse backgrounds in language education. All participants are non-native English speakers, providing valuable perspectives on FLA and strategies to mitigate it in the classroom.

Table 1. Information about participants

	T 1	T 2	T 3	T 4	T 5	T 6	T 7	T 8	T 9
Ages	22	23	23	22	21	27	28	27	30
Gender	F	M	M	M	F	F	F	M	F
Teaching experience (years)	2	2	2	3	1	7	5	5	10
Workload (hours per week)	18	20	20	20	15	22	25	25	27

Findings

The data gathered from semi-structured interviews were categorized into three groups: main factors contributing to FLA, behavioural/physical and emotional signs of FLA, and teachers' strategies to overcome the FLA.

Main factors contributing to the FLA

In the interviews, school and university teachers responded to the question related to the main factors contributing to the FLA of students that they have noticed in students in English classrooms. As a result, most responses from EFL teachers were similar, and the most striking factors that the most of the students encountered are displayed in Table 2 below.

Table 2. Main factors:

Factors	**Descriptions**
Low-level of English	• Low proficiency in a foreign language can be an obstacle in learning language, leading to anxiety. • The wrong level class can detrimentally affect the achievement of a student.

Previous experience of learning English	● Negative experience in the journey of language learning is linked to anxiety.
Fear of judgment	● Being evaluated and judged by others makes students more anxious in the classroom.
Lack of communication	● Lack of communication with peers and teacher's support and encouragement increase anxiety.

Low-level of English

Students with a low level of English language might struggle with comprehension, which leads to the feeling of anxiety. One of the teachers pointed out that "Students' proficiency level can tell things about its anxiety level and if it is low, the student's anxiety is higher among others"(T2). Other teachers also mentioned that "Very low level of English accompanied with wrong class division can be detrimental to students' achievement leading to anxiety of students"(T1 and T8). It is suggested to place students in the groups of their actual level of English, since placing above the actual level can company students with high frustration and anxiety.

Previous experience of learning English

Previous negative experiences may increase students' anxiety. These negative experiences can be connected with failure, embarrassment, and teaching methods. Most of the participants highlighted this factor as one of the main saying "If a student often associates English with previous negative experience and stressful situations, he\she will develop avoidance behaviour in the classroom. This really increases anxiety" (T 1, 4, and 8). Teaching methods play a vital role in the learning process. "Strict, high-pressure, and implementing only traditional methods can lead to anxiety among students. Teachers should be approachable and patient" mentioned one participant highlighting the importance of up-to-date methods of teaching (T3).

Fear of judgement

This was the most mentioned factor by teachers where they noticed that students are afraid of being judged and laughed at by others. The fear of making mistakes, especially in front of others, significantly increases a student's anxiety. It was mentioned by teachers: "Sometimes I notice that some students are reluctant to speak just because they are afraid of being judged by their group mates. I realize that at that moment my students are very anxious" (T1). Another mentioned factor was "In my opinion, students sometimes feel anxious because of peer pressure and lack of confidence"(T9). Factors such as lack of confidence, which is an affective variable, can make a student not to be active in a classroom, preventing the student from participating in activities and discussions.

Lack of communication

This factor features from the previous factor when there is a lack of communication between students in a classroom. "In a classroom, there should be a good atmosphere and relationship between peers based on friendship and openness" noted by participants (P 2 and 5). Insufficient interaction between peers can increase anxiety, as students feel isolated in their learning process. Here, a teacher should encourage students to build and maintain positive relationships. It was suggested that teachers should encourage and foster communication in a classroom and provide support to help students build friendly bonds.

Behavioural/physical and emotional signs of FLA

In the interview questions, teachers were asked how they recognize when a student is experiencing FLA in a classroom. The responses were listed as signs that have been noticed by teachers and divided into behavioural and emotional ones. Participants believe that anxiety can influence students' behaviour and emotions negatively, leading to avoidance, stress, and lower academic achievement.

Table 3. Signs

Signs	Examples
Behavioural/physical	● Avoidance of speaking ● Avoidance of eye contact ● Sweating
Emotional	● Shyness ● Nervousness ● Lack of confidence

Behavioural signs such as avoidance of speaking and eye contact are constantly appearing in the classrooms of teachers. Most of the respondents shared that the most behavioural sign was avoidance of speaking. "Only 20-30% of the classroom can be active while others do not speak at all avoiding speaking activities and discussions" mentioned one participant (T 4). This "silence" display can reflect poorly on a student causing anxiety. Furthermore, it negatively affects the success of the interaction and in general students' willingness to communicate. Another participant noted "Most students avoid speaking because of their anxiety and fear that they will make a mistake and give a wrong answer" (T 6). Beside these signs, one teacher mentioned that in the classroom there were students who started sweating if the student's name was called and asked to answer a question (P 1). Speaking in front of peers can be stressful for anxious students making them feel tension and sweat, triggering shaky hands, long pauses, tone of voice with rapid breathing. Regarding emotional signs, shyness, nervousness, and lack of confidence were mentioned in almost all responses among teachers. These negative emotions can hinder students learning a foreign language, impeding their focus and memory retention.

Teachers' strategies to overcome the FLA

The objective of this study was to identify efficient strategies used by university teachers on reducing foreign language anxiety. Number of strategies are implemented by the teachers and they have shared with their efficient ones. All teachers emphasized the importance of their role in a classroom in working with students. There are the most highlighted and important strategies according to the teachers:

1.Establishing a supportive atmosphere.

All teachers highlighted the significance of a class atmosphere. The class atmosphere is the main indicator of the learning process. For anxious students especially, the supportive classroom environment can be beneficial to reduce anxiety. According to interviewees, a friendly and supportive atmosphere encouraged by a teacher mitigates the anxiety among students and the risk of feeling anxiety. One participant noted "Students should be free to make mistakes in a foreign language and feel safe. Teachers should try to create this safe environment and make students feel that they will not be judged by others" (T 7). Teachers as a facilitator and mentor by constantly supporting and encouraging students can minimize the anxiety of students. Comfortable and relaxed classroom atmosphere established by the teacher might possibly decrease students' anxiety towards the learning process. Supportive atmosphere can be built by providing support whenever a student faces challenges in the process of acquiring a foreign language. Moreover, stressful and unhealthy competition based learning can cause anxiety. Instead of creating a supportive classroom environment, excessive competition based learning has a potential to discourage students from learning a language. Consequently, instructors should establish a safe and supportive environment for students, where they feel comfortable and safe making mistakes, a non-judgmental atmosphere, where students can engage in the activities and discussions and collaborate with each other. This is a common strategy for teachers who work with anxious students, listening to them, constantly providing students with encouragement, and being free of competition by letting students make mistakes and not be judged.

2.Positive psychology

This strategy is based on students' confidence building. Teachers seek for the best of the students and are concerned with their strengths, at the same time, fostering students' well-being. It is a strategy that focuses on students' development, confidence, and fulfillment, including education. In contrast to negative emotions such as anxiety and stress, it emphasizes positive emotions such as joy and interest among students. For instance, some teachers noted one strategy that helped them to reduce students' anxiety which is positive teacher-student talk, where teachers help and encourage students. One teacher mentioned "Before starting a lesson I have a small positive talk with students, it can be about anything, about their life, life at school, pets and so on" (T 3 and 9). These kinds of small talks can soften the tension in a classroom and harmonize students' attitude. In addition, giving appraisal for correct answers is another way of this strategy. In this respect, teacher variables such as friendliness, emotional support, tone of voice, and positive mood influence students positively reducing their anxiety. These positive emotions may undo negative ones, as when students have positive emotions and attitudes, they better absorb information and become more aware of language input.

3.Adaptive teaching methods

The final strategy that all teachers mentioned in their responses was implementation of adaptive teaching methods. As a classroom includes a variety of students, it might be impossible to implement an individual approach to each student. However, some teaching methods can be beneficial for most of the students. "When I see a shy and anxious student, I try to divide students into groups and make them work together in groups. Then they start sharing their ideas and in general speaking" mentioned T 4, 6, 7 and 8. So group work and pair work can mitigate students' anxiety and foster better communication between peers. Another teacher (T 9) mentioned that she has a student who has anxiety when it comes to public performance, so she allowed her student to record a video of her speaking. She adopted this teaching method to student's needs and "By letting the student perform her task as he\she wants, we depict our care and support which actually can reduce their anxiety". Furthermore, role-play methods can be beneficial for anxious students. Some teachers implemented this method and said "As they do not use English for the sake of answering, rather try to use it and do something with it, related to real-life situations" (T 2 and 5). Role-plays might be an effective strategy to mitigate students' anxiety, simultaneously, engaging students in the learning process.

Conclusion

The aim of this research was to identify the factors that contribute to FLA, their signs and strategies to overcome FLA that are implemented by EFL university teachers. The findings obtained by the semi-structured interviews include main factors for anxiety and their behavioural/physical/emotional signs that help teachers recognize that their students have foreign language anxiety. Students' low level of proficiency, fear of judgement, negative experience in learning English, and a lack of communication with peers and teachers were the main factors for their anxiety. Their anxiety was shown in behaviours by avoiding speaking, avoiding eye contact as well as sweating. According to their emotional signs, being shy, nervous and lack of confidence interfered with students' participation and being active during a lesson. The teachers' observation regarding their students' anxiety was analyzed as these given factors and signs. The strategies that were implemented by the teachers found to be effective and efficient. It involved creating a supportive atmosphere in a classroom, providing positive psychology, and adapting teaching methods to students' needs.

This study can be beneficial for EFL teachers. By understanding and addressing the FLA, teachers can establish a more positive and supportive environment and relationships with students. These strategies can reduce students' anxiety and make them feel safe in the journey of a foreign language learning and can be helpful tools for teachers to amplify students' language learning experiences.

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ШЕТЕЛ ТІЛІН МЕҢГЕРУДЕГІ ҮРЕЙДІ ЖЕҢУ СТРАТЕГИЯЛАРЫ: МҰҒАЛІМДЕРДІҢ КӨЗҚАРАСЫ

Аңдатпа. Бұл зерттеу шетел тілі ретінде ағылшын тілін оқитын (EFL) студенттер арасындағы шетел тілін меңгерудегі үрейді (FLA) төмендетудің тиімді стратегияларын анықтауды мақсат етеді. Зерттеуге университеттен 9 EFL мұғалімі қатысып, FLA-ға қатысты пікірлерімен бөлісті және оны азайтуға бағытталған стратегияларын баяндады. Сапалық зерттеу әдісі қолданылып, жартылай құрылымдалған сұхбаттар жүргізілді. Зерттеу нәтижелері студенттер арасында FLA-ны төмендетуге көмектесетін бірқатар тиімді стратегияларды анықтады. Бұл стратегияларға қолдау көрсететін атмосфера қалыптастыру, жағымды сынып ортасын құру, қызықты оқыту әдістерін қолдану және студенттердің эмоционалды интеллектісін дамыту кіреді. Бұл зерттеу FLA-ға қатысты бұрынғы ғылыми нәтижелерді толықтырып, мұғалімдердің тиімді стратегияларын салыстыруға мүмкіндік береді.

Түйінді сөздер: шетел тілін меңгерудегі үрей, ағылшын тілі шет тілі ретінде, мұғалімдердің стратегиялары, оқыту әдістері.

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СТРАТЕГИИ ПРЕОДОЛЕНИЯ ИНОЗЫКОВОЙ ТРЕВОЖНОСТИ ПРИ ИЗУЧЕНИИ ИНОСТРАННОГО ЯЗЫКА: ВЗГЛЯД УЧИТЕЛЕЙ

Аннотация. Данное исследование направлено на выявление эффективных стратегий по преодолению иноязыковой тревожности (FLA) при изучении иностранного языка среди студентов, изучающих английский как иностранный (EFL). В исследовании приняли участие

9 преподавателей EFL из университета, которые поделились своими взглядами на FLA и представили стратегии по его снижению. В рамках качественного исследования были проведены полуструктурированные интервью. Результаты показали, что существует ряд эффективных стратегий, способствующих снижению тревожности среди студентов. Среди них: создание поддерживающей атмосферы, формирование благоприятной учебной среды, использование увлекательных методов обучения и развитие эмоционального интеллекта у студентов. Данное исследование вносит вклад в существующие научные данные о FLA и сравнивает эффективные стратегии преподавателей.

Ключевые слова: тревожность при изучении иностранного языка, английский как иностранный язык, стратегии преподавателей, методы обучения.

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SHAPING FUTURE SCIENTISTS: THE ROLE OF IZHO IN INFLUENCING STEM INTERESTS AND SKILL DEVELOPMENT AMONG HIGH SCHOOL STUDENTS

Abstract. This study examines the impact of participation in the International Zhautykov Olympiad (IZhO) on high school students' perceptions of 21st-century skill development and STEM career aspirations. Using a mixed-methods approach, the research investigates gender differences, variations across STEM specializations, age-related trends, school-type influences, and the effect of repeated participation. The findings revealed significant gender differences, with female students reporting greater improvements in Presentation, Scientific Thinking, and Collaboration skills compared to males. No significant differences were observed across STEM specializations, suggesting that IZhO contributes similarly to skill development across Mathematics, Physics, and Informatics students. Age analysis indicated that younger students (13–14 years old) perceived greater skill enhancement than older groups, particularly in General Skills, Presentation, and Problem Solving. Vocational school students reported the highest perceived benefits in Technology skills compared to public and private school counterparts. Additionally, a moderate frequency of Olympiad participation (10–20 times) was associated with the greatest improvement in Critical Thinking skills. These findings highlight the potential of Olympiad participation to foster essential skills and inspire STEM career aspirations. They also suggest the need for tailored interventions to address age- and gender-specific needs, maximize benefits for all school types, and explore strategies to sustain students' engagement over repeated participation. The study underscores the value of STEM competitions in preparing students for future academic and career success.

Keywords: STEM education, 21st-century skills, Olympiad participation, skill development, gender differences, STEM careers.

Introduction

The International Zhautykov Olympiad (IZhO) serves as a prestigious platform for high school students to engage in advanced problem-solving and showcase their abilities in STEM (Science, Technology, Engineering, and Mathematics) subjects such as Physics, Mathematics and Computer Science. Despite the increasing recognition of Olympiad competitions as catalysts for skill enhancement and career inspiration, limited research explores their specific impacts on students' perceptions of skill development and aspirations for STEM careers.

This study seeks to address this gap through investigating how IZhO participation influences students as they view skill improvement and aspire to careers. It explores if these ideas are formed through items like sex, years, topic focus, school form, and involvement rate. Educators as well as policymakers must have a comprehension of these dynamics. If they design programs that are inclusive and also effective, they can maximize all the benefits of such competitions for diverse student populations.

Several of the key questions that guide this research are these: Do gender differences actually exist within perceived skill development which results directly from IZhO participation? Do students of all of the different STEM disciplines perceive some benefits? Specialization may change these benefits. How do people perceive skill improvements? How do career aspirations depend on age? What school type reports about participation's greatest benefits? How does the participation frequency impact STEM career interests and students’ skill development perceptions?

Sahin et al. (2015) survey is used in the study to explore these questions because it assesses factors influencing students' career choices and skill development through Olympiad participation. This research, through analyzing IZhO participant responses, gives perceptions regarding how competitions do help inspire future STEM experts as well as foster vital skills. For skill-building opportunities, they should be equitably accessible for those within competitive academic environments since the findings offer valuable STEM education strategy optimizations.

Literature Review

Science Olympiad Benefits

Students can participate in the Science Olympiad to showcase their skills, in STEM fields at competition levels – events and even on the global stage like the IZhO. Some of the competitions within this realm are the International Physics Olympiad and International Chemistry Olympiad. Taking part in these contests offers benefits, like chances of getting into top universities (Lim et al., 2014) shaping career aspirations positively for long term success in STEM fields (Smith et al., 2021). Additionally, engaging in these competitions helps develop skills for the age such as communication, teamwork and adaptability.

The IZhO is designed for high school students. Includes tests in physics, mathematics and informatics to spark curiosity and enhance problem solving abilities well as critical thinking skills among participants. Students are evaluated through both theory and experiments. Studies related to the similar Olympiads such as International Junior Science Olympiads (IJSO), often focus on examining the interest profiles of participants (Dierks et al., 2014; Höffler et al., 2019). Research conducted as subsequent studies (Höffler et al., 2017), have explored topics such as social self-perception and social emotional wellness with findings also reported (Nadhirah et al., 2019). Dierks et al. (2014) for example used the RIASEC framework to analyze the interests of students, in science competitions. They found traits that set apart those involved in science contests. In a study Höffler et al. (2017) it was discovered that participants in science competitions displayed self-perceptions compared to those who did not participate and sports competitors. However, girl participants exhibited self-perceptions despite having academic achievements.

In their study Nadhirah et al. (2019) explored the social skills of students participating in science olympiad during quarantine. They found that these students faced difficulties in managing their emotions, resolving conflicts and interacting socially despite their abilities. This highlights the influence of the science olympiad on students' academic growth.

Factors Influencing Students' STEM Career Interests

Scientific Olympiads effectively spark interest in STEM careers so that science develops sustainability in such a major role (Baskaran, 2016). If students participate within these competitions, they gain hands-on experience and analyze skills. Role models in STEM as well as supportive educational settings can shape long-term career interests greatly. Individual and also social and environmental factors do all influence STEM career paths. These factors affect students in particularity. From an age, personal characteristics such as inquisitiveness and self-assurance play a role in interest in STEM subjects (Campbell et al., 2017). Finnish athletes are keen on sports since mathematics and literature were introduced and German participants are driven to mention it as key and Chinese Olympians find family support important, stressing that. These results were confirmed by Smith et al. (2021), who highlighted how self-assurance and curiosity affect Olympians' career decisions in a study. Sahin et al. (2015) reported gender disparities in STEM field preferences. Top et al. (2015) supports this finding as well. Men prefer engineering while women are more attracted to environmental studies. Engagement in Science Olympiad competitions, another study conducted by Top et al. (2015) uncovered, offers recognition also acts as a strong incentive toward securing scholarships. When students perform well, higher grades may influence in a positive way their interest within STEM for the reason that they are attracted toward science and technology subjects (Balta et. al., 2023a; Japashov et. al., 2022).

Interest within STEM fields may also be impacted through family relationships such as parents' jobs and siblings' number. Japashov et. al. (2022) showed interest levels differ based on family size

and Balta et. al. (2023a) study even found a link of siblings as well as career interests. That interest was specifically for math related careers. Support for family is also another important factor. Role models do matter in this context too! For career goal navigation, it can be influenced through family size and also its impact on achievements (Black et al., 2005; Japashov et. al. 2022).

Improving these aspects related to society and the environment. Such as differences, between genders in STEM fields and how teamwork and family connections play a role. Can boost students' pathways towards careers, in science and technology fields while also fostering progress and creativity.

Factors in the environment that influence interest in STEM fields include support from authorities and job prospects as educational regulations in place for students wanting to pursue STEM education and careers. Lim et al. (2014) conducted attention to Singapore's efforts in promoting interest in STEM subjects through initiatives like supporting competitions and offering development opportunities for educators. Research by Langdon et al. (2011) highlighted the earning potential of the earning potential of STEM professionals compared to those outside the field which contributes to the attractiveness of STEM occupations. Johnson (2012) revealed that despite a start and eagerness among stakeholders to implement STEM policies; challenges arise due to communication barriers hindering progress.

21st century skills development

The increasing focus on 21st century skills shows education adapting to fulfill needs (Agaoglu & Demir, 2020; Care et al., 2018; Chalkiadaki, 2018; Geisinger, 2016). Even though these skills are in fact not entirely just concepts, Sahin et al. (2015) highlight that they are now seen as important for thriving in today's technology dominated working environment. Research studies from varied perspectives have explored the cultivation of these skills. Research findings discuss project-based learning (PBL) (Baran et al., 2018). The emphasis here is on just how. Olympiad contests engaged Sahin et al. (2015) plus the study (Stehle & Peters-Burton, 2019) showed benefits.

In their work about 21st century skills, Beers (2011) describes these as abilities for professional growth that include critical thinking, creative problem solving, effective communication, cultural sensitivity, media literacy, revolutionary thinking, as well as skill in information and communication technology (ICT). Project Based Learning (PBL) is effective at fostering these competencies via encouraging students' independence, collaboration among peers, awareness of the environment and expertise in information technology as revealed by Baran et al. (2018). They made recommendations in order to further develop these skills. The training programs of educators should incorporate PBL. Stehle and Peters-Burton (2019) do also support the idea that these abilities should be integrated into teacher training programs by way of the STEM curriculum.

Moreover, STEM improves the quality of education by fostering critical thinking and problem-solving skills among students (Author et al., 2023). Furthermore, Sahin et al. (2015) highlighted the impacts of engaging in Science Olympiad competitions, focusing on abilities, like communication, with others. Working together in teams while also emphasizing the importance of analytical thinking.

In terms and based on what has been written by experts, in the field of education and learning researches stress the importance of integrating skills training within educational systems. They highlight the benefits of using inquiry based teaching methods and encouraging students to participate in activities as crucial steps towards equipping them for achievement, in a world that heavily relies on technology and is constantly evolving.

Methodology

Research design

Researchers used a combination of methods to study how students benefit from taking part in IZhO and to understand what influences their interest in STEM careers and how their attitudes and 21st century skills develop over time. The use of this approach allows researchers to delve into topics by combining qualitative methods to improve the credibility and richness of their discoveries. As highlighted by Creswell and Clark (2017) the mixed method approach combines qualitative methods for gathering and analyzing information. As Creswell (1994) qualitative research delves into social

issues offering a comprehensive view, in real contexts while quantitative research focuses on numerical analysis and statistical procedures (Creswell, 2017).

In this research project's framework included an explanatory design, within which a mixed method approach was applied for investigation purposes. Quantitative data collection was used initially to uncover trends and connections among variables. Afterward qualitative data collection through interviews, as a research tool was utilized to offer insights and broaden the perspectives (Almeida, 2018; Creswell & Clark, 2017) showcase an approach to investigating research queries and amplifying the depth of the study's results.

Research questions

Are there differences in the perception of skill development among male and female students who participate in the IZhO?

Do high school students specializing in different STEM subjects (Mathematics, Physics, Informatics) perceive varying levels of improvement in 21st-century skills due to their participation in the IZhO?

What is the relationship between students' ages and their perceptions of how IZhO participation influences their development of 21st-century skills and aspirations for STEM careers?

Which type of school reports the highest perceived benefit from participating in the IZhO Olympiad regarding skill development and STEM career aspirations?

What is the relationship between the number of Olympiad participations and students' development of skills, and their aspirations for STEM careers?

Instrument

We used Sahin et al.'s (2015) survey in our research to explore how high school students view the factors affecting their career choices and their opinions on how participating in the International Science Olympiad influences their interests and skills, for the future. The questionnaire comprises a mix of choice and open-ended queries aimed at gathering data, on the profiles of Olympiad contestants as well as their past engagements with Science Olympiad events and the factors shaping their future intentions and views on how participating in Science Olympiad competitions impacts their career choices and academic progress, in contemporary skills.

Data analysis and results

Analysis of the quantitative data

The data collected through an online survey was analyzed using descriptive statistics, t-tests, one-way ANOVA, and two-way ANOVA via the Jamovi platform.

Descriptive Statistics

The skewness and kurtosis values for all the analyzed skills were calculated to assess the normality of the data distribution. Table 1 presents the descriptive statistics for the variables under study, including measures of central tendency, dispersion, and distribution characteristics.

Table 1. Descriptives

	Skewness	Std. error skewness	Kurtosis	Std. error kurtosis
General skills	-0.247	0.238	-0.280	0.472
Presentation	-0.210	0.238	-0.789	0.472
Scientific Thinking	-0.210	0.238	-0.789	0.472
Collaboration	-0.0052	0.238	-1.01	0.472
Problem Solving	-0.560	0.238	-0.604	0.472
Innovation	0.305	0.238	-0.822	0.472
Creativity	-0.0467	0.238	-1.09	0.472
Technology	0.327	0.238	-1.14	0.472
Critical Thinking	-0.450	0.238	-0.844	0.472
Life and Career	-0.122	0.238	-1.14	0.472

Gender difference

To examine gender differences in perceptions of skill development resulting from participation in the International Zhautykov Olympiad (IZhO), an independent sample t-test was conducted. The results indicated significant differences between male and female students for three specific skills: Presentation (p=0.005), Scientific Thinking (p=0.005), and Collaboration (p=0.021). These findings suggest that gender plays a role in shaping perceptions of IZhO's impact on these skills.

Table 2. Independent Samples T-Test

		Statistic	df	p
General skills	Student's t	-1.88	101	0.062
Presentation	Student's t	-2.88[1]	101	0.005
Scientific Thinking	Student's t	-2.88[1]	101	0.005
Collaboration	Student's t	-2.35[1]	101	0.021
Problem Solving	Student's t	-1.70[1]	101	0.092
Innovation	Student's t	-1.69	101	0.095
Creativity	Student's t	-1.22[1]	101	0.226
Technology	Student's t	-1.27[1]	101	0.208
Critical Thinking	Student's t	-1.49[1]	101	0.139
Life and Career	Student's t	-1.31	101	0.195

Further analysis of the mean values revealed that female students rated the contribution of IZhO to their skill development significantly higher than male students for Presentation, Scientific Thinking, and Collaboration skills. The differences in mean scores are presented in Table 3, illustrating that female students consistently reported greater perceived improvement in these skills.

Table 3. Group Descriptives

	Group	N	Mean	Median	SD	SE
Presentation	M	87	2.93	3.00	1.199	0.129
	F	16	3.81	4.00	0.544	0.136
Scientific Thinking	M	87	2.93	3.00	1.199	0.129
	F	16	3.81	4.00	0.544	0.136
Collaboration	M	87	2.75	3.00	1.340	0.144
	F	16	3.56	3.50	0.814	0.203

Subject Differences in Perceived Skill Improvement

To address the research question, "Do high school students specializing in different STEM subjects (Mathematics, Physics, Informatics) perceive varying levels of improvement in 21st-century skills due to their participation in the IZhO Olympiad?", a one-way ANOVA (Welch's) (see Table 4) was conducted to examine differences in skill improvement perceptions across the three subjects.

The analysis revealed that there were no statistically significant differences in perceived skill improvement among students specializing in Mathematics, Physics, or Informatics for any of the 21st-century skills assessed. The p-values for all skills exceeded the threshold of significance ($p > 0.05$). This suggests that students from different STEM subject specializations perceive their participation in the IZhO Olympiad as contributing similarly to their development of 21st-century skills.

Table 4. One-Way ANOVA (Welch's)

	F	df1	df2	p
General skills	0.2411	2	63.1	0.787
Presentation	1.8370	2	62.9	0.168

[1] Levene's test is significant ($p < .05$), suggesting a violation of the assumption of equal variances

	F	df1	df2	p
Scientific Thinking	1.8370	2	62.9	0.168
Collaboration	1.4480	2	62.6	0.243
Problem Solving	1.5175	2	62.4	0.227
Innovation	0.1054	2	61.7	0.900
Creativity	0.7932	2	60.6	0.457
Technology	0.5027	2	59.9	0.607
Critical Thinking	0.3246	2	61.3	0.724
Life and Career	0.0447	2	61.8	0.956

Age Differences in Perceived Skill Improvement

Research Question: What is the relationship between students' ages and their perceptions of how IZhO participation influences their development of 21st-century skills and aspirations for STEM careers?

The analysis categorized students into three groups based on their ages: Group 1 (13–14 years old), Group 2 (15–16 years old), and Group 3 (17–18 years old). A one-way ANOVA was conducted to evaluate whether age influenced students' perceptions of how participation in the International Zhautykov Olympiad (IZhO) contributed to their development of 21st-century skills.

As shown in Table 5, there were significant differences across the age groups for General Skills ($F(2, 15.8) = 6.326$, $p = .010$), Presentation Skills ($F(2, 24.6) = 8.543$, $p = .002$), Scientific Thinking ($F(2, 24.6) = 8.543$, $p = .002$), and Problem Solving Skills ($F(2, 19.2) = 6.696$, $p = .006$). These findings indicate that age plays a role in students' perceptions of skill improvement in these areas.

Table 5. One-Way ANOVA (Welch's)

	F	df1	df2	p
General skills	6.326	2	15.8	0.010
Presentation	8.543	2	24.6	0.002
Scientific Thinking/	8.543	2	24.6	0.002
Collaboration	1.183	2	13.8	0.336
Problem Solving	6.696	2	19.2	0.006
Innovation	1.085	2	14.1	0.364
Creativity	0.658	2	14.3	0.533
Technology	1.672	2	13.8	0.224
Critical Thinking	3.052	2	18.5	0.071
Life and Career	1.402	2	16.0	0.275

The post hoc analysis of mean values (Table 6) revealed that students in Group 1 (13–14 years old) rated the contribution of IZhO to their skill development significantly higher than those in Group 2 (15–16 years old) and Group 3 (17–18 years old) for General Skills, Presentation, Scientific Thinking, and Problem Solving. Notably, Group 3 (17–18 years old) had the second-highest mean scores for these skills, indicating a trend where younger students tend to perceive greater benefits from IZhO participation.

Table 6. Group Descriptives

	Age	N	Mean	SD	SE
	1	6	4.00	0.632	0.258
General skills	2	38	2.95	0.957	0.155
	3	59	3.41	0.949	0.124
	1	6	3.83	0.408	0.167
Presentation	2	38	2.82	1.182	0.192
	3	59	3.15	1.172	0.153

	Age	N	Mean	SD	SE
Scientific Thinking	1	6	3.83	0.408	0.167
	2	38	2.82	1.182	0.192
	3	59	3.15	1.172	0.153
Problem Solving	1	6	4.50	0.548	0.224
	2	38	3.58	1.177	0.191
	3	59	3.54	1.179	0.154

These results suggest that younger students, particularly those in Group 1, perceive the greatest impact of the Olympiad on their skill development, which could reflect differences in their learning needs, experiences, or aspirations compared to older students.

School Type Differences in Perceived Skill Improvement

The research question, "Which type of school reports the highest perceived benefit from participating in the IZhO Olympiad regarding skill development and STEM career aspirations?" was addressed by categorizing schools into three groups: Pr (Private schools), P (Public schools), and V (Vocational schools). A one-way ANOVA was conducted to evaluate whether school type significantly influenced students' perceptions of how IZhO participation contributed to their development of 21st-century skills.

The analysis revealed that among the evaluated skills, only the perception of improvement in technology showed a statistically significant difference across school types, as indicated by the p-value (p=0.037; see Table 7).

Table 7. One-Way ANOVA (Welch's)

	F	df1	df2	p
General Skills	0.146	2	43.6	0.864
Presentation	1.836	2	40.3	0.172
Scientific Thinking	1.836	2	40.3	0.172
Collaboration	0.122	2	44.6	0.886
Problem Solving	0.635	2	41.6	0.535
Innovation	1.939	2	43.2	0.156
Creativity	0.603	2	41.2	0.552
Technology	3.577	2	41.5	0.037
Critical Thinking	1.004	2	43.2	0.375
Life and Career	1.100	2	42.3	0.342

The descriptive statistics (Table 8) further demonstrated that students from vocational schools reported the highest mean scores for perceived improvement in technology (M=3.00, SD=1.487), followed by public schools (M=2.59, SD=1.359), and private schools (M=2.00, SD=1.069). These results highlight that students from vocational schools felt the greatest benefit from IZhO participation in developing technology-related skills.

Table 8. Group Descriptives

	School type	N	Mean	SD	SE
Technology	Pr	22	2.00	1.069	0.228
	P	61	2.59	1.359	0.174
	V	20	3.00	1.487	0.332

The Number of Olympiad Participations and Perceived Skill Improvement

Research Question: What is the relationship between the number of Olympiad participations and students' development of skills, and their aspirations for STEM careers?

To analyze this, we categorized the students into four groups based on their number of Olympiad participations: 1) those who participated 1-10 times, 2) those who participated 10-20 times, 3) those

who participated 20-30 times, and 4) those who participated more than 30 times (see Table 9). A one-way ANOVA was conducted to evaluate whether the number of Olympiad participants significantly influenced students' perceptions of how participation in the International Zhautykov Olympiad (IZhO) contributed to their development of 21st-century skills. The p-value for the analysis indicates that only Critical Thinking demonstrated a significant difference (p=0.033).

Table 9. **One-Way ANOVA (Welch's)**

	F	df1	df2	p
General Skills	0.942	3	26.4	0.435
Presentation	0.275	3	25.5	0.843
Scientific Thinking	0.275	3	25.5	0.843
Collaboration	0.767	3	25.2	0.523
Problem Solving	0.679	3	25.3	0.573
Innovation	2.054	3	24.5	0.133
Creativity	2.638	3	24.7	0.072
Technology	0.926	3	25.7	0.442
Critical Thinking	3.410	3	24.4	0.033
Life and Career	0.542	3	24.7	0.658

Table 9 presents the detailed results of the ANOVA. To further examine the group differences, the mean values for Critical Thinking were analyzed. The first and third groups had nearly identical mean scores (M=3.74 for group 1 and M=3.71 for group 3), indicating similar perceptions regarding their Critical Thinking development (see Table 10).

Table 10. Group Descriptives

	Number of Participation to Olympiad	N	Mean	SD	SE
Critical Thinking	4	32	3.03	1.177	0.208
	3	7	3.71	1.496	0.565
	2	25	2.88	1.424	0.285
	1	38	3.74	1.032	0.167

Factors Influencing Students' STEM Career Interests

To define the main factors affecting IZhO participants' interest in a STEM career, we asked about their future major choice. Here, analyzing students' responses, we defined three categories of students' future majors: STEM, Non-STEM, and Not-decided. In the STEM category, we included any science, technology, engineering, and math majors. For the Non-STEM category, we included humanities majors, such as art, history, politics, and business. Also, 4 students from our sample intended to choose to Not-decided yet (Table 11).

Table 11. Majors that students possibly want to study in college (university)

Majors	Counts	% of Total	Cumulative %
STEM	95	92.2 %	92.2 %
Non-STEM	4	3.9 %	96.1%
Not-decided	4	3.9 %	100.0 %

Furthermore, Table 12 represents the frequency of students' responses to the question: "Write 5 factors, in order, that most affected your interest in a STEM career." Here, we once again carefully read students' responses and classified them based on the most frequent answers.

Table 12. Factors affected students STEM career interest.

Themes	Count (n)	% of Total
Family (parents and siblings)	15	15.8
Relatives, friends, and other people	7	7.4
School Staff (teachers and administration)	39	41
Personal ability (I am good at STEM)	17	17.9
Role model, literature, and Media (Internet TV)	17	17.9

Table 12 shows that school staff (teachers and administration) (41%) and family members (23.2%) are the most influential factors in students' future STEM careers. The majority of students claim that their science teachers motivated them to be involved in science and inspired them to pursue a STEM career. As another important factor in students' STEM career choice, students indicated relatives, friends, and other people (7.4% of responses). Additionally, Personal ability and STEM role models, scientific literature, and media were shown as the main factors in students' future career decisions (17.9% of responses).

The tenth question of the survey asked students about their beliefs regarding how participation in IZhO influenced their career interests. More than half of the sample (55 students) believe that IZhO reinforced their decision to pursue a STEM major. 41 students believe that participation in IZhO did not influence their decision about a future STEM career, while 4 students believe that IZhO changed their decision, and 3 students claim that IZhO made them confused about a future STEM career.

Discussion

This study investigated high schoolers' views about skill growth plus STEM job goals shaped via involvement within the International Zhautykov Olympiad (IZhO). The findings show how gender differs, age varies, subjects specialize, school types exist, also repeated participation influences the shaping of these perceptions.

For female students, there were reports of more improvements to Presentation, Scientific Thinking, and Collaboration skills than for their male counterparts as well, which is revealing of meaningful gender-based differences within perceptions of skill development. These results do suggest that female students may appreciate the Olympiad's opportunities much more. The Olympiad allows them to present and refine these skills now. This discovery agrees with older research for it says helpful settings matter to female STEM students since those build skill and trust. Exploring underlying factors could research these disparities further. Differences based on gender in the prior experiences or in the cultural expectations can be examples of those factors.

Contrary to expectations, students focusing on STEM fields like Mathematics, Physics, Informatics said they had nearly the same skill gains after IZhO participation. Because of how it lacks any important variation, the Olympiad offers up a broadly helpful platform. The platform develops for the 21st-century the skills across the STEM fields. IZhO's versatility is stressed via these results at fostering necessary skills like Critical Thinking and Problem Solving regardless of subject specialization.

Age was found to have an influence on student perceptions particularly when considering Problem Solving, Scientific Thinking, Presentation Skills, and General Skills. Younger students of ages thirteen to fourteen reported higher perceived benefits. Older classmates did not state likewise great gains. This trend may reflect the greater sensitivity of younger students to differences in baseline skill levels or new learning experiences. Also, it is possible for older students to view their progress with more criticality because they may have matured in academics or have experienced some other STEM opportunities. The results show a need for customized Olympiad events for age groups. Tailoring maximizes the impact of the experiences.

When we analyzed by school type, we found students in vocational schools improved Technology skills more than those in public and private schools. This finding shows that vocational education fosters learning that is both practical and is technology-oriented. The curricula for these school types could also reflect some emphasis differences with technological skills. For future initiatives, they could consider leveraging vocational schools so that they strengthen technology education in order to improve skill development opportunities for each of the participants.

The study also examined the relationship of the number of Olympiad participations along with skill development. The researchers found only Critical Thinking showed meaningful differences between groups. Students whose participation was moderate (10–20 times) interestingly reported higher perceived improvements than students with other rates. This finding suggests a plateau effect where frequent participation could lead to diminishing returns in perceived skill enhancement.

Further research is needed to understand how repeated participation shapes students' experiences and skill development trajectories.

The findings highlight the potential of Olympiads such as IZhO to inspire STEM career aspirations as well as contribute to the development of 21st-century skills. The results suggest that in the event programs target and intervene, such as by additionally supporting older students or stressing technology skills across all of school types, they could be more effective at it. For ensuring equitable benefits for male as well as female participants, gender-specific strategies may be warranted. These are strategies that can help provide for fair outcomes.

Our analysis shows IZhO participation affects students' future careers through career interest greatly. A majority of all students reported a desire for pursuing STEM fields at college or at university since that participation within science competitions had an influence that was long-term. Earlier research has shown how Science Olympiads transform students' long-term career interests together with ambitions in STEM (Smith et al., 2021). Such research supports this conclusion. In general, such findings remain consistent through all research regarding Science Olympiads, plus they validate that idea which states these events encourage academic success, personal growth, and professional development.

Though this study provides valuable perceptions, several limitations must be acknowledged. The generalizability of findings to more broad populations may be limited by the representative sample size that was used. Also, self-reported data use may cause bias since subjects think or remember. Future research could address these limitations via longitudinal designs so objective skill development measures may be incorporated. The impact from Olympiad participation on cultural or regional differences could be explored too.

Conclusion

Overall, this study underscores how Olympiad participation greatly helps to foster critical skills so as to shape STEM career aspirations among high school students. Educators and policymakers can maximize all of the benefits of such programs by addressing all of the unique needs of different demographic groups. Various educational contexts also allow them to use strengths as they hope to prepare for a STEM workforce with more skills and motivation.

Educational settings can benefit greatly in practical and theoretical ways from results of this study. For educators, policymakers, or other stakeholders, a program integrating Olympiad-style problems into a regular school curriculum can be designed. Since it has practical application in education and real implications, the program can foster critical thinking and problem-solving skills in students. For building of their confidence and for motivation in pursuing a STEM career, Olympiads participation of students should actively be promoted. Also, focused assistance for marginalized groups may help guarantee wider access to these key experiences, as they ready pupils with the vital modern skills useful for later achievement. In theory, this study is an improvement to the literature that exists on extracurricular activities because the study shows just how structured environments that are also competitive like science Olympiads can improve intrinsic motivation as well as self-efficacy plus important skills, so competition-based learning is suggested to be a component of great value within STEM education models.

For obtaining quantitative data from Kazakhstan along with a few other countries, the research was limited to a specific cohort of participants. Future research could expand on these findings by examining a more diverse population and exploring the long-term impact of participation in science Olympiads on career trajectories and skill development. Moreover, it is also interesting to investigate how students' attitudes toward participating in the IZhO are influenced by whether they receive valuable prizes and medals or no recognition at all. Understanding this dynamic could shed light on the role of external rewards in shaping students' motivation and engagement in science competitions. In conclusion, this study demonstrates the enormous influence that participation in scientific Olympiads may have on students, ranging from increasing their self-esteem and critical thinking abilities to sparking a lifelong interest in STEM careers. This study emphasizes the relevance of incorporating such Olympiads into school curriculum by presenting empirical data on how these contests help to the development of critical 21st-century skills. The findings not only add to our understanding of effective educational approaches, but also provide vital insights for developing future educational policies and practices that will better support and inspire the next generation of scientists and innovators.

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БОЛАШАҚ ҒАЛЫМДАРДЫ ҚАЛЫПТАСТЫРУ: IZHO ХАЛЫҚАРАЛЫҚ ОЛИМПИАДАСЫНЫҢ ЖОҒАРЫ СЫНЫП ОҚУШЫЛАРЫНЫҢ STEM БАҒЫТТАРЫНА ҚЫЗЫҒУШЫЛЫҒЫ МЕН ДАҒДЫЛАРЫН ДАМЫТУҒА ЫҚПАЛЫ

Аңдатпа. Бұл зерттеу Халықаралық Жәутіков олимпиадасына (IZhO) қатысудың мектеп оқушыларының XXI ғасыр дағдылары мен STEM мамандықтарына қызығушылығына әсерін зерттейді. Аралас әдістеме (mixed-methods) негізінде жүргізілген зерттеу жыныстық айырмашылықтарды, STEM салалары арасындағы ерекшеліктерді, жас ерекшеліктерін, мектеп түрінің ықпалын және қатысу жиілігінің әсерін талдайды. Зерттеу нәтижелері бойынша қыз балалар Ер балаларға қарағанда Презентация, Ғылыми ойлау және Ынтымақтастық дағдыларының анағұрлым жоғары дамығанын көрсетті. STEM бағыттары арасында айтарлықтай айырмашылық байқалмады, бұл IZhO-ның Математика, Физика және Информатика оқушылары үшін бірдей тиімділігін көрсетеді. Жас ерекшелігіне қарай талдау нәтижесінде 13–14 жастағы оқушылар Жалпы дағдылар, Презентация және Мәселені шешу салаларында жоғары өсімді байқаған. Кәсіптік мектеп оқушылары Технология дағдылары бойынша ең жоғары нәтижелер көрсетті. Сонымен қатар, Олимпиадаға орташа деңгейде (10–20 рет) қатысқан оқушыларда Сыни ойлау дағдысы айтарлықтай жақсарған. Бұл нәтижелер Олимпиадаға қатысудың маңызды дағдыларды дамытудағы және STEM саласына қызығушылықты арттырудағы әлеуетін көрсетеді. Сондай-ақ, жас және жыныс ерекшеліктерін ескеретін арнайы тәсілдер, мектеп түріне бейімделген әдістер қажет екенін және бірнеше рет қатысудың мотивациясын сақтауға бағытталған стратегияларды әзірлеудің маңыздылығын айқындайды. Зерттеу STEM байқауларының болашақтағы академиялық және кәсіби табысқа дайындаудағы рөлін атап көрсетеді.

Түйінді сөздер: STEM білім беру, XXI ғасыр дағдылары, Олимпиадаға қатысу, дағдыны дамыту, гендерлік айырмашылықтар, STEM мансаптары.

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ФОРМИРОВАНИЕ БУДУЩИХ УЧЁНЫХ: РОЛЬ МЕЖДУНАРОДНОЙ ЖАУТЫКОВСКОЙ ОЛИМПИАДЫ (IZHO) В ФОРМИРОВАНИИ ИНТЕРЕСА К STEM И РАЗВИТИЮ НАВЫКОВ У СТАРШЕКЛАССНИКОВ

Аннотация. Данное исследование посвящено анализу влияния участия в Международной Жәутыковской олимпиаде (IZhO) на восприятие школьниками развития навыков XXI века и стремления к карьере в STEM-сфере. С использованием смешанных методов (mixed-methods) исследуются гендерные различия, специфика по направлениям STEM, возрастные тренды, влияние типа школы и эффект многократного участия. Результаты показали значительные гендерные различия: девочки сообщили о большом прогрессе в навыках презентации, научного мышления и сотрудничества по сравнению с мальчиками. Между направлениями STEM существенных различий не выявлено, что указывает на равную эффективность IZhO для учащихся по математике, физике и информатике. Анализ по возрасту показал, что учащиеся 13–14 лет отмечают больший рост навыков, особенно в общих умениях, презентации и решении проблем. Ученики профессиональных колледжей продемонстрировали наивысшие показатели в технологических навыках по сравнению с учащимися государственных и частных школ. Кроме того, умеренная частота участия (10–20 раз) была связана с наибольшим прогрессом в критическом мышлении. Эти результаты подчеркивают потенциал участия в олимпиадах для развития ключевых навыков и стимулирования интереса к STEM-карьере. Также подчеркивается важность индивидуализированных подходов с учетом возраста и пола,

а также разработка стратегий по поддержанию мотивации при повторном участии. Исследование подчеркивает значимость STEM-соревнований для подготовки учащихся к академическому и профессиональному успеху.

Ключевые слова: STEM-образование, навыки XXI века, участие в олимпиадах, развитие навыков, гендерные различия, STEM-карьера.

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EVALUATING THE EFFECTIVENESS OF A PEER TUTORING PROGRAM FOR ENGLISH LANGUAGE SUPPORT

Abstract. This study investigates the impact of a peer tutoring initiative at a university in Uzbekistan designed to help students struggling with English proficiency in an English-Medium Instruction (EMI) environment. Although the institution requires a minimum IELTS score of 5.5 for admission, faculty observed that many students still encountered difficulties, especially in speaking and writing. To address these challenges, a pilot peer tutoring program was introduced, offering structured language support through volunteer student tutors. The research employed a mixed-methods design, utilising pre- and post-program surveys, tutor session reports, and faculty feedback. Results demonstrated marked improvements in students' confidence and English skills, with speaking emerging as the central area of concern for 75% of participants. After the program, 83.3% of students reported greater confidence in using English, and tutors observed high participation rates, with 76.9% of tutees actively engaged in sessions. Despite this, tutor recruitment and retention, inconsistent attendance, and gaps in institutional support posed challenges to program sustainability. The findings attest to the effectiveness of peer tutoring as a means of supporting languages in EMI environments but emphasise the importance of formal tutor training, designated tutorial spaces, and incentives in an attempt to enhance long-term outcomes. More research is recommended to measure the effect of the program on grades as well as long-term language acquisition.

Keywords: peer tutoring, English proficiency, EMI, student support, higher education, language learning, academic success

Introduction

English-Medium Instruction (EMI) in Uzbekistan: Policy, Capacity Building, and Challenges

During the past three years, there has been an intensified focus on English language learning in Uzbekistan, led by the government's initiative for internationalisation of higher education and improving the employability of graduates. The change is noticeable in higher enrollment of students in English language courses and growing interest in English-Medium Instruction (EMI) programs in HEIs. Uzbekistan holds the 98th position out of 116 countries in the EF English Proficiency Index (2024), indicating the country's comparatively low proficiency in the English language. In response, the government has set out broad reforms, including the Concept for the Development of Higher Education until 2030, to strengthen English education throughout the national school system, from primary grades to university level (British Council, 2024). These reforms reflect the government's recognition of English as a fundamental skill for academic success, international competitiveness, and professional advancement.

Nowadays, Uzbekistan has a total of 210 HEIs, including 115 state universities, 65 private universities, and 30 foreign universities (FLEDU, 2023). In the broader education reform context, many HEIs have incorporated EMI into mainstream pedagogical practice. As Dearden (2015) noted, "the use of EMI is a rapidly growing global phenomenon in grade school and higher education (HE) outside the Anglophone world" (Rahman M. et al., 2018). EMI programs are a strategic means of aligning Uzbekistan's higher education system with international norms, promoting academic collaboration and enhancing the competitiveness of graduates in the global labour market (British Council, 2024). Despite all the efforts, however, the majority of students are not able to meet the English language requirements of universities, especially in speaking and writing.

There is evidence that 5.5 on IELTS may be a challenging score for students to cope with English-medium academic content. Yen and Kuzma (2009) found that students who enter higher education with an IELTS score of 5.5 struggle with course content, assignments, and assessment demands. Research conducted on students at the University of Worcester determined that students with an IELTS score of 6.0 or higher typically struggled to comprehend lectures, sometimes requiring personal interpreters to attend course discussions. The authors think that although the score a student obtains on an IELTS test is intended to show whether or not the student possesses an adequate level of English language ability to be able to meet the language demands of tertiary study, it does not mean that they will academically succeed or that they will not experience any language difficulties" (Yen & Kuzma, 2009, p. 2).

Furthermore, their study indicates that poorer IELTS scores, especially in the Listening and Writing domains, are related to unsatisfactory academic performance, thereby corroborating the view that an admission-ineligible score could be insufficient for academic success. This study's findings align with those of Rahmanova and Ekşi (2023), who indicate that, despite EMI implementation intended to enhance English competence, students still face considerable challenges in accessing academic content due to insufficient language capacity (p. 460). Refer to Table 1 below for details on *Language Proficiency in the Class of 2028*.

It is against this background that peer tutoring has appeared as a viable means of mitigating language skill issues in the university. This peer learning method involves more experienced students assisting peers in acquiring academic skills and has gained considerable acknowledgement for its role in fostering language skills, confidence, and overall academic performance (Falchikov, 2001; Topping, 1996). Chan et al. (2016) define peer-assisted learning as "the acquisition of knowledge and skill through active help and support among status equals or matched companions" (p. 1818). Whereas Arco-Tirado et al. (2020) point out that structured peer tutoring schemes are capable of significantly improving students' academic performance, particularly in those subjects with intense language use (p. 103). Likewise, Chang (2010) discovered that peer tutoring promotes both linguistic and cognitive growth, as tutees benefit from diverse approaches to learning and tutors consolidate their own knowledge (p. 59). In the Uzbekistan context, where cultural issues such as the reluctance to seek assistance due to fear of being perceived as lacking can impede language acquisition, peer tutoring offers a non-hierarchical, student-centred setting that fosters mutual support and active participation. Rahmanova and Yangın Ekşı (2023) note that one of the most significant challenges of EMI in Uzbekistan is that "students' English deficiencies make it difficult to fully engage with subject content," suggesting that additional language support is necessary for success (p. 462).

A closer examination of student language proficiency highlights the distribution of English competency among students in an EMI setting at the university in Uzbekistan (see Table 1). The data indicate that only 4.79% of students achieved an IELTS score of 5.5, while the majority demonstrated higher proficiency levels, such as IELTS 6.5 (21.25%), 7.0 (25.63%), and 7.5 (22.08%). Nevertheless, a substantial proportion still fell within the lower bands, including IELTS 6.0 (11.25%) and TOEFL iBT 51–60 (7.29%), which may pose challenges in effectively comprehending academic content. These figures further support the argument that language proficiency plays a critical role in students' ability to succeed in EMI programs. Although EMI initiatives aim to promote English competency, students with lower IELTS scores are likely to require additional academic support, such as peer tutoring, to strengthen their comprehension and engagement with course materials.

Table 1. *Language Proficiency in the Class of 2028*

Category	Number of Students	Percentage (%)
IELTS 5.5	23	4.79
IELTS 6.0	54	11.25
TOEFL iBT 51-60	35	7.29
IELTS 6.5	102	21.25
IELTS 7.0	123	25.63

IELTS 7.5	106	22.08
IELTS 8.0	21	4.38
TOEFL iBT 63-67	5	1.04
TOEFL iBT 105-116	2	0.42
IB Certificate Holders	14	2.92

Note. Percentages are based on a total of 480 students.

To combat the issue of poor English skills among EMI university students, a peer tutoring program has been introduced as a support mechanism. The programs enable more capable students to tutor their peers in developing academic English skills, enhancing comprehension, and building confidence in using English for educational purposes. Arco-Tirado et al. (2020) demonstrated that peer tutoring greatly promotes both tutees' and tutors' academic achievement, emphasising that organised peer interaction supports active learning and language acquisition (p. 107). Similarly, Huang (2015) contends that "peer tutoring in EMI contexts provides students with opportunities for authentic interaction in English, reinforcing academic vocabulary and fluency" (p. 73).

While most universities require a minimum score of 5.5 in the IELTS or 46 in the TOEFL IBT, some students still struggle, particularly with speaking and writing. Recognising this deficiency, we observed that some of the students were working, and accordingly, a Peer Tutoring Program was introduced in Week 9 of the fall semester as a pilot study. The program, despite tutor recruitment challenges, aimed to offer one-on-one assistance in a peer-led setting to help students overcome challenges in EMI courses.

The mission of the Peer Tutoring Program is to help underperforming students through personalised language support to enhance their confidence and academic success. By fostering a nurturing, student-driven learning environment, the program bridges the gap between institutional language demands and actual levels of proficiency. This study explores the effectiveness of peer tutoring in improving students' English ability and academic performance. It seeks to identify how a peer tutoring program improves the English language capacity and academic performance of students in an EMI university. Specifically, it examines whether peer tutoring assists students in having better comprehension, developing confidence, and succeeding in EMI classes. Accordingly, the central research question guiding this study is: To what extent does a peer tutoring program improve English language proficiency and academic performance in an EMI university?

Literature Review

Peer Tutoring in Higher Education

Peer tutoring refers to a collaborative learning approach in which individuals of equal social status teach each other, typically involving a more experienced peer tutoring a less experienced peer (Ching & Chen, 2019). The practice is an effective intervention from both economic and educational perspectives, promoting learning motivation while simultaneously offering social and academic gains to the involved individuals (Tulqinov, 2023). Seo and Kim (2019) conceptualise peer tutoring as a learning method in which "academically successful tutors, who are more advanced in their knowledge of subject matter or academic skills, provide learning assistance to less-advanced tutees" (p. 99). Peer tutoring's two-way nature allows for skill acquisition for both tutees and tutors, as tutors acquire leadership and communication skills, and tutees are provided with one-on-one instruction (Seo & Kim, 2019). However, Tulqinov (2023) stresses that the tutor-tutee relationship is "ongoing, developmental, and reciprocal," and thus needs continuous involvement (p. 10). In contrast, Seo and Kim (2019) point out that tutees tend to make more academic progress than tutors, the latter's main gain being skill and confidence development.

Peer tutoring has found widespread application as an efficient pedagogical tool in higher education. Topping (1996) has described it as "a system of instruction in which learners help each other and learn by teaching" (p. 322), emphasising the fact that both tutors and tutees gain from the experience. Falchikov (2001) points out that peer tutoring helps tutors to learn the material better and also fosters a collaborative learning environment that benefits everyone involved. Likewise, Boud, Cohen, and Sampson (2001) highlight the importance of peer learning in acquiring critical thinking

and communication skills that are essential for academic success. Stigmar (2016) posits that peer-to-peer teaching offers pedagogical gains, especially in enhancing students' critical thinking, learning autonomy, and motivation. Current research further suggests that peer tutoring can effectively narrow knowledge and skill gaps, particularly among diverse student groups (Arco-Tirado et al., 2020; Colvin & Ashman, 2010). The effectiveness of such schemes is especially pronounced in environments where students begin their tertiary studies with differing degrees of readiness, a situation that is characteristic of Uzbekistan. However, the success of such programs is contingent upon the motivation and readiness of peer tutors, as well as the institutional support provided to them (Topping, 2005).

Problems Associated with Language Competency in Higher Education

Language competency is one of the strongest predictors of academic achievement, especially for non-native speakers of English. Hyland (2006) asserts that "language is the medium through which academic knowledge is constructed and assessed" (p. 24), so competence is crucial for students who seek higher education. Most students, however, struggle with the requirements of academic English, specifically in speaking and writing. This is particularly true in Uzbekistan, where students who achieve an IELTS score of 5.5 tend to struggle even though they have met the requirement for admission. Cummins (2008) distinguishes between cognitive academic language proficiency (CALP) and basic interpersonal communication skills (BICS), with students possibly acquiring conversational fluency but not the academic language required at the university level. Kirkpatrick (2011) and Dearden (2015) identify the absence of immersive linguistic environments in countries where English is not the first language as a significant contributing factor. Rahmanova and Yangın Ekşi (2023) point out that English-Medium Instruction (EMI) exposes Uzbekistan to different challenges, to which additional linguistic support for both lecturers and students is required. It is thus imperative that universities adopt some interventions, such as peer tutoring, to mitigate these challenges and assist students in attaining the required proficiency levels.

The Effects of Peer Tutoring on Language Acquisition

Research indicates that peer tutoring has a significant impact on language learning, especially in speaking and writing skill development. According to Roscoe and Chi (2007), peer tutoring can be effective in promoting active participation, which is an essential aspect of the language learning process. They point out that "tutees benefit from personalised feedback and the opportunity to practice in a low-stakes environment" (p. 298). These results are corroborated by the results presented by Arco-Tirado et al. (2020), in which students demonstrated greater confidence and better academic performance following their involvement in a peer tutoring program. Furthermore, research by Topping (2005) and Falchikov (2001) highlights the role of peer tutoring in enhancing metacognitive attributes, including self-regulation and reflection, which are crucial for language learning competencies. Chan, Phan, Salihan, and Dipolog-Ubanan (2016) say that peer-assisted learning enhances social and academic development, particularly in high-risk classes. However, the effectiveness of peer tutoring is dependent on the quality of interaction between tutors and tutees, and how well the program aligns with students' needs (Colvin & Ashman, 2010).

Challenges in Using Peer Tutoring Programs

There are challenges in using peer tutoring programs despite their benefits. A second major issue regards recruiting and retaining qualified tutors. Topping (2005) claims that "the effectiveness of peer tutoring schemes is reliant to a great extent on the motivation and ability of the tutors" (p. 645). In the context of Uzbekistan, this barrier was evident in the difficulties encountered in finding voluntary tutors with expertise in English who were willing to dedicate their time to the program. Another issue is maintaining consistency and high quality in tutoring sessions. Boud et al. (2001) emphasise the need to offer tutors training to give constructive feedback and establish a positive learning environment. If tutors are not qualified, they could unintentionally reinforce mistakes or overlook their tutees' individual needs (Li et al., 2022). Also, institutional support is essential for the long-term viability of such programs since they typically need training materials, resources, and assessment (Colvin & Ashman, 2010; Arco-Tirado et al., 2020).

Assessing the Effectiveness of Peer Tutoring

Assessment of the effectiveness of peer tutoring programs needs to be rigorous in its approach. Topping (2005) suggests combining quantitative and qualitative measures, i.e., pre- and post-tests, questionnaires, and session reports, for assessing both learning outcomes and participants' attitudes. Post-program questionnaires and session reports were used in the Uzbekistan study to evaluate the development of language ability and confidence levels (Rahmanova & Yangın Ekşi, 2023). Roscoe and Chi (2007) suggest that self-assessment and reflection are valuable aspects of assessment because they offer informative insights regarding the metacognitive advantages of peer tutoring.

Directions for Future Research and Best Practices in Peer Tutoring

To maximise the efficacy of peer tutoring interventions, future efforts must attend to best practices delineated in the existing literature. Topping (2005) suggests offering extensive tutor training, such as methods for delivering positive feedback and group process management. Moreover, programs must be tailored to meet the unique needs of the population of students, as highlighted by Colvin and Ashman (2010). The aspect of institutional support is also vital to the long-term viability of such programs. Boud et al. (2001) advocate for incorporating peer tutoring into the overall curriculum and recommend offering incentives for participation, such as credit or recognition. In addition, the use of technology, such as online platforms, can help increase access to peer tutoring and lead to better interactions among tutors and tutees (Roscoe & Chi, 2007). By using these best practices, schools can maximise the benefits of peer tutoring and more effectively address language proficiency challenges.

Methodology

This study evaluates the effectiveness of a peer tutoring program within an English-Medium Instruction (EMI) university context. It uses a mixed-methods approach, combining both quantitative and qualitative methods for gathering data. The purpose of the study was to evaluate the effects of peer tutoring on students' confidence, English language skills, and general academic achievement.

Participants and Recruitment

To join the program as tutees, 20 students expressed interest, which was sufficient, as only three students volunteered to serve as tutors. Because there was an insufficient number of tutors, the program coordinators targeted multiple students and invited those who scored 8.0 or above on the IELTS to participate. We contacted them privately and asked them to become a tutor in this program. Finally, nine tutors voluntarily agreed to help their peers. However, during the six- to seven-week program, only five tutors remained active, as four others withdrew for various reasons.

Those five tutors consisted of one female and four males. The male tutors represented a range of disciplines and academic levels, including two Software Engineering majors (Year 2 and Year 3), one Chemical & Materials Engineering major (Year 2), and one Mechanical Engineering major (Year 1)—all four self-reported English proficiency at the C1 level. The female tutor was a Teaching Assistant from the English Department, whose advanced English skills were evident through her teaching role, although her exact proficiency level was not formally documented. Although 20 students initially signed up as tutees, three withdrew before the program began, leaving 17 who formally agreed to participate. However, not all provided data for analysis. Of these, only 12 completed the pre-survey and subsequent feedback instruments. Therefore, findings reported in this study are based on the 12 respondents, while the larger number reflects overall sign-ups.

Program Development and Implementation

To plan the entire tutoring process, the program organisers created application documents that contained specific expectations for both tutees and tutors. Each group was issued separate guidelines to ensure that each participant understood the project’s goals, activities, and scope. These issues were incorporated into the program’s design using faculty surveillance and informal dialogues with students. Initially, it was envisioned that the classroom peer tutoring would take place in a classroom with more than 90 students. However, the program coordinators came to realise that there may be more supporters than were noticed. Therefore, a wider system of tutors was implemented, and we asked students to sign up via Google Forms, and within no time, 20 tutees had signed up.

Coordinators prepared a presentation for the meeting with the tutors and explained the core objectives of the peer tutoring program. Before the start of the tutoring sessions, it is expected that students will be provided with a supportive environment that encourages them to express themselves freely and use English without fear of ridicule. Research suggests that students in Uzbekistan may be hesitant to seek help due to cultural factors, including a fear of appearing incompetent or lacking knowledge (Bozorov, 2024). To address this, the workshop advocated for a non-authoritarian, collegial approach, which emphasised cooperation above and beyond simple teacher-pupil relationships. Tutees, unlike tutors, did not have to participate in an orientation. So, program coordinators convened with them midway through the program to monitor their advancement and remind them of their duties. Although several tutees remained engaged, only three attended the meeting, likely because cultural factors made open scholarly conversation somewhat uncomfortable.

Data Collection

To comprehensively evaluate the effectiveness of the peer tutoring program, this study employed three primary data collection methods: pre- and post-program surveys, tutor session reports, and faculty observations, supplemented by recruitment forms and final evaluation activities that provided additional contextual information.

1. Pre- and Post-Program Surveys: Tutees completed online questionnaires before and after the program. The pre-program survey (Google Form) captured baseline data on motivations, expectations, confidence in English, and specific areas of need. It combined closed-ended items (e.g., confidence ratings, priority skills such as speaking, writing, vocabulary) with open-ended questions (e.g., “What do you hope to achieve by the end of the program?”). Of the 20 students who initially signed up, three withdrew voluntarily; only 12 completed the pre-survey. At the end of the semester, the post-program survey was distributed among tutees to reflect on their learning experiences, perceived improvements, and challenges.

2. Session Reports: After each session, tutors submitted concise reports documenting the topics covered, tutee engagement, session length, and notable observations. These reports provided insights into learning activities and participation patterns while minimising unnecessary administrative burden.

3. Faculty Observations: Faculty members teaching Academic and Communication Skills informally observed student performance during regular coursework. These observations highlighted students’ difficulties in speaking, writing, and listening, which motivated the design of the program. Although not formally recorded, notes from discussions with lecturers about their classroom observations were used to triangulate the survey and tutor report findings.

Supplementary Sources: Recruitment forms collected during the sign-up stage provided demographic and background information (e.g., program of study, self-rated proficiency, preferred tutoring format and frequency, specific goals). Additionally, at the program’s conclusion, an evaluation meeting and certification ceremony recognised tutors’ contributions, though we did not use these events as formal data sources.

The findings from these three primary sources, supported by supplementary recruitment information, were analysed to determine the extent to which the peer tutoring program improved students’ English proficiency and confidence in an EMI university context.

Data Analysis

We used a mixed-methods analysis approach. Quantitative data from pre- and post-program surveys were analysed using descriptive statistics (e.g., frequency counts, percentages, and rating scale averages) to identify changes in students’ confidence levels, self-reported proficiency, and areas of need. Figures were generated to visually represent key findings such as primary language challenges, confidence levels, and self-reported progress. Qualitative data from open-ended survey responses, tutor session reports, and faculty observations were analysed thematically. After rereading open-ended responses multiple times, we coded inductively to identify recurring patterns and grouped them into themes such as “confidence building,” “speaking as primary challenge,” and “active

participation." Triangulation across surveys, tutor session reports, and observations strengthened the interpretation of findings by allowing comparisons of perspectives from tutees, tutors, and faculty.

Validity and Reliability

To enhance validity, multiple data sources have been presented above (surveys, session reports, and faculty observations), which were used for triangulation, which reduced reliance on any single perspective. Consistency in tutor session reporting was maintained through a standardised reporting template. Reliability was strengthened by using the same pre- and post-program survey structure, enabling comparison across time points. In addition, findings were reviewed by program coordinators and faculty to ensure that interpretations aligned with observed patterns. While this study primarily relied on self-perception data from tutees, the inclusion of tutor reports and faculty observations provided additional qualitative evidence to corroborate student accounts. Future research should incorporate standardised language assessments or other objective measures of proficiency to provide stronger quantitative evidence of language gains.

Findings and Analysis of Peer Tutoring Program Effectiveness

Quantitative Data

The pre-survey results indicate that 50% of students (6 out of 12) joined the peer tutoring program primarily to gain confidence in using English, while the remaining students aimed to enhance their English skills for a higher IELTS score. The most critical area where students needed support was speaking (83.3%, 10 out of 12) (see Fig. 1), followed by vocabulary (16.6%, 2 out of 12).

The most frequently cited skill was vocabulary improvement as a notable area of progress in the post-program survey. The primary motivations for joining the program were improving English speaking skills (100%, 12 out of 12), followed by gaining confidence in communication (91.6%, 11 out of 12), and improving grammar (66.6%, 8 out of 12). The post-survey analysis confirms that speaking proficiency was the primary concern among participants.

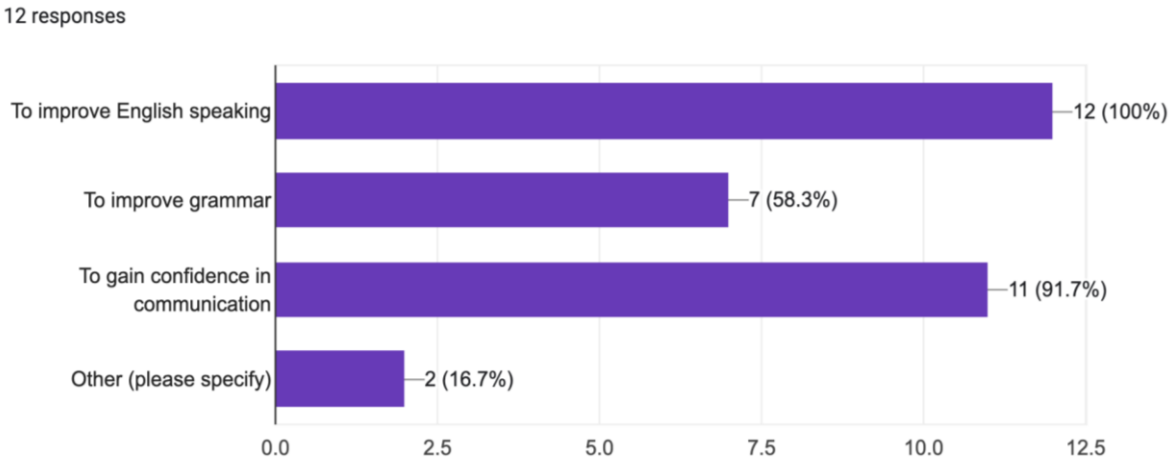

Figure 1. Main Reasons for Joining the Peer Tutoring Program

In Figure 2 below (see Fig. 2), it is apparent that the single area where students feel they need the most support in their English was again speaking skills. Among the 12 respondents, 75% (9 out of 12) indicated that speaking is their biggest challenge, highlighting the importance of oral communication in their academic and social interactions. The lack of immersive English environments may explain this, as research shows that students studying English outside Anglophone contexts often develop reading and writing skills before achieving oral fluency (Cummins, 2008; Dearden, 2015; Kirkpatrick, 2011; Rahmanova & Yangın Ekşi, 2023).

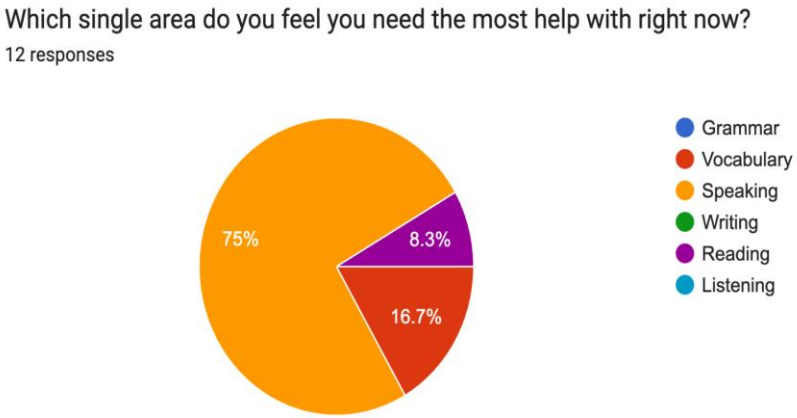

Figure 2. Areas where students need the most help in English

This aligns with everyday concerns in English as a Medium of Instruction (EMI) settings, where students often struggle to express themselves fluently and confidently. Additionally, 16.7% (2 out of 12) identified vocabulary as their primary area of difficulty, suggesting that while students may have a basic understanding of English, they lack a strong lexicon to support effective communication. Only 8.3% (1 out of 12) reported reading as their primary concern, indicating that comprehension skills are relatively stronger compared to productive skills like speaking and vocabulary use. These results suggest that interventions, such as peer tutoring programs, prioritise speaking-focused activities while also incorporating vocabulary-building exercises to support students' overall language proficiency.

A majority (58.3%, 7 out of 12) rated their confidence at level 3 on a 5-point scale, indicating moderate self-assurance but also room for improvement (see Fig. 3). Meanwhile, 16.7% (2 out of 12) selected level 4, suggesting a higher degree of confidence. In comparison, another 16.7% (2 out of 12) placed themselves at level 1, showing a lack of confidence in their abilities. Only 8.3% (1 out of 12) rated their confidence at level 2, reinforcing the idea that some students struggle with their self-perception in English communication. Notably, no students reported the highest confidence level (5), suggesting that even those with stronger language skills still feel they need improvement. These findings emphasise the need for structured speaking opportunities, confidence-building exercises, and continued peer support to help students enhance their self-efficacy in English.

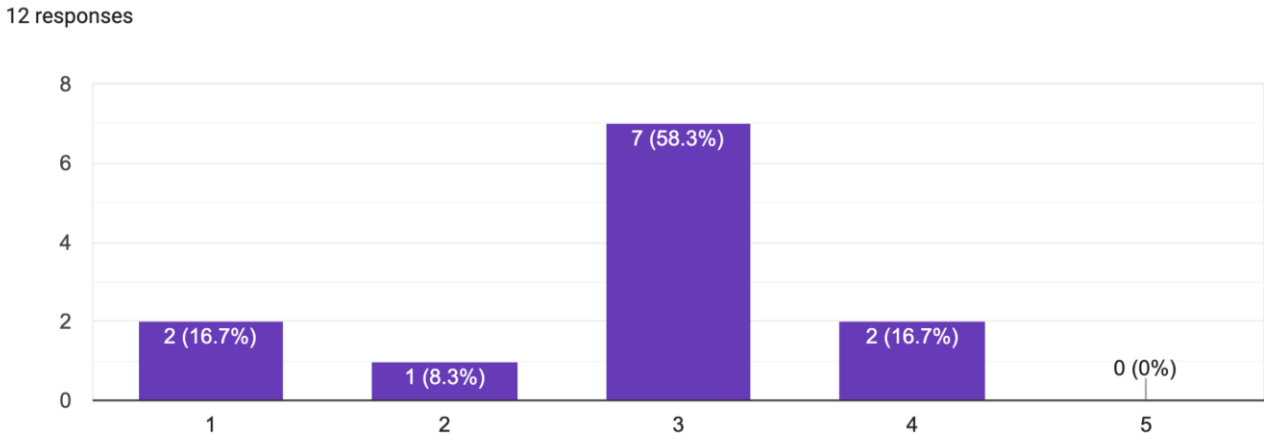

Figure 3. Confidence Levels in English Proficiency

Post-program responses indicate a notable increase in students' confidence in their English usage. 83.3% (10 out of 12) of students reported improved confidence, while 16.6% (2 out of 12) described their confidence as “greatly improved” (see Figure 4). The informal and peer-led nature of the program was a key factor in its success, as one tutee noted, “It was a great experience for me to be part of this program. The classes were conducted in an informal style, which made the program very interesting and enjoyable.” This highlights the effectiveness of peer tutoring in fostering a relaxed and engaging learning environment.

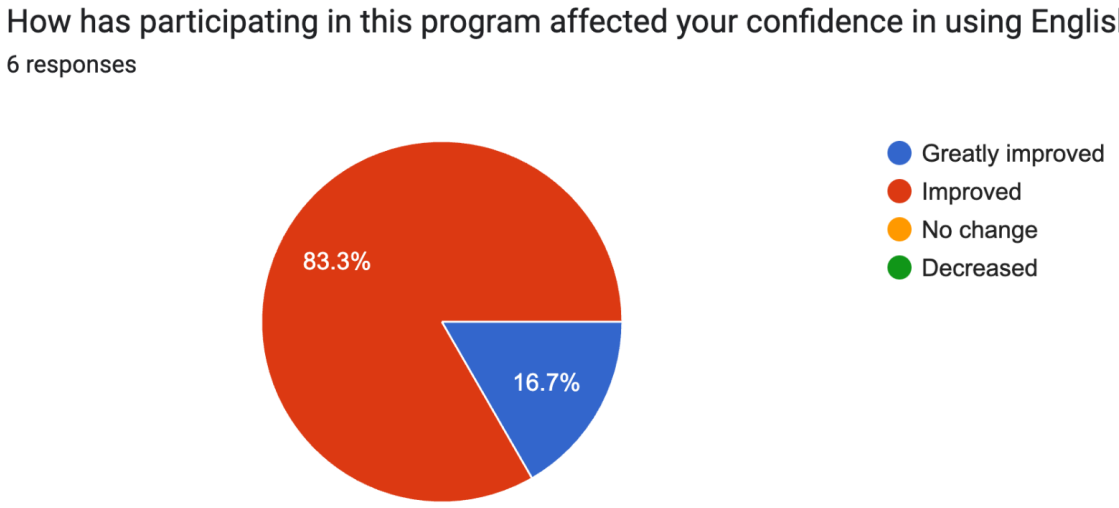

Figure 4. Impact of Peer Tutoring on Students’ Confidence

The session reports from tutors reinforce the program’s focus on speaking as the primary area of improvement, with over 26% of sessions exclusively dedicated to speaking and an additional 50% integrating speaking with other skills such as grammar, vocabulary, and discussion-based activities. Common topics covered included sentence structure, pronunciation practice, past and present tenses, AI debates, and vocabulary related to travel, technology, and university life. The majority of tutees were reported as “very active” (73%), while 23% were “somewhat active.” Tutors highlighted challenges such as students being shy and hesitant to speak, which aligns with the pre-survey findings that confidence was a significant concern.

The research question aimed to determine the extent to which a peer tutoring program improves English language proficiency and academic performance in an EMI university. The data presented in Figure 5 (see below) suggests that the majority of tutees experienced a notable improvement in their understanding of the material. With 60% of respondents rating their comprehension at the highest level and an additional 28% providing a strong rating, the program has had a positive impact. This aligns with prior research on peer tutoring, which suggests that such programs can enhance academic learning by providing individualised support and fostering an interactive learning environment. The small percentage of students rating their understanding at a moderate level (12%) may indicate that some tutees required additional time or more targeted assistance to achieve greater progress.

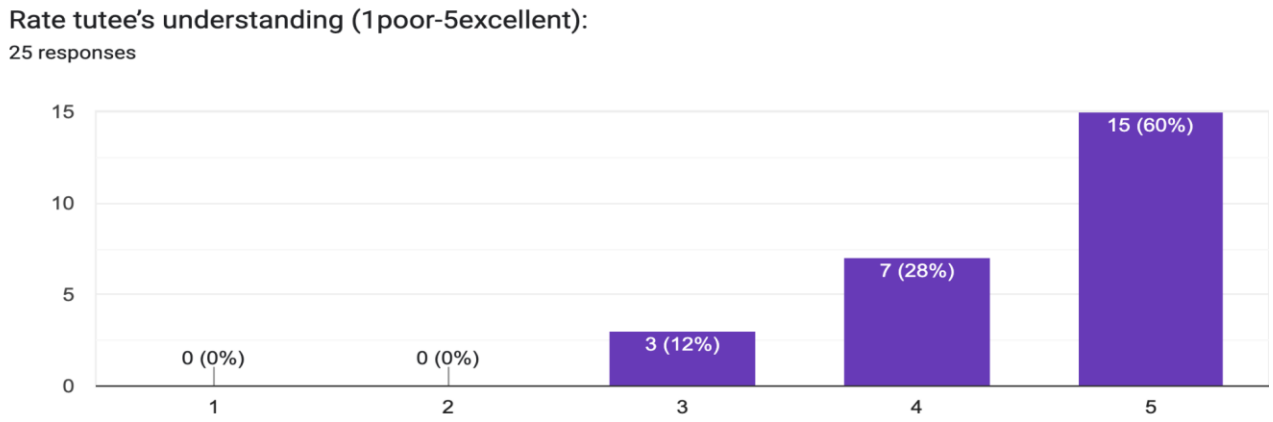

Figure 5. Tutees' Progress in Understanding During the Peer Tutoring Program

Additionally, the high level of engagement among tutees, with over three-quarters (76.9%) reporting that they were "very active" during tutoring sessions. The other 26.9% indicated that they were "somewhat active," meaning that all of the students were involved to some degree. This rate of participation is notable, as active participation is associated with more language acquisition and more confidence in English usage. The fact that no students reported low levels of participation also suggests the success of the program at providing an interactive and engaging learning environment.

Cumulatively, these results confirm the effectiveness of the peer tutoring program in enhancing students' English capacity and motivation, thereby responding to the first research question. However, despite these positive results, further research is warranted to establish long-term retention and the actual effect on academic performance beyond perceived understanding as measured through self-reporting. Regardless of these successes, there were problems with the program as recruitment of tutors and consistency in some of the sessions were fraught with challenges. Tutors recommended assigning a permanent classroom to tutoring and distributing printed materials as ways to streamline the program. They also recommended the addition of more speaking practice to a regular schedule, review of vocabulary exercises, and focused practice on tricky grammar topics (e.g., conditionals, past tenses) in future sessions.

Qualitative Data: pre-survey analysis

To complement the quantitative results, this section presents a thematic analysis of open-ended feedback collected from the tutee pre-program survey. The purpose is to provide students with a voice, making visible their motivations, expectations, and concerns in their own words. These responses contextualise the peer tutoring program by linking learners' lived experiences to the broader concerns of English-Medium Instruction (EMI) difficulties identified in the literature. One of the dominant themes across the pre-survey responses was the necessity to build speaking and confidence in English, which validates Hyland's (2006) contention that language capacity is at the core of academic achievement and Cummins' (2008) distinction between conversational fluency and academic proficiency. One student answered that their main ambition was "speaking confidently in classes," while another stated the aim of achieving "IELTS score 8.0." Both succinct short-term academic needs and long-term plans for global mobility are reflected in these answers, resonating with Dearden's (2015) contention that EMI students tend to struggle with productive skills in non-immersion conditions. Speaking was the most oft-cited area of support, with one student stating, "Improving my speaking in English," and another citing "fluent speaking" as his hoped-for outcome.

Along with speaking, grammar, vocabulary, and writing were also pinpointed by students as areas of need, suggesting that although oral skills were prioritised, overall linguistic competencies were also seen as barriers to success. For instance, one respondent explained that they joined the

program "to improve grammar and vocabulary," while another emphasised the necessity of writing by selecting "considerable help needed" in this skill. These findings align with Topping's (1996) description of peer tutoring as a system that enables learners to address multiple skill deficiencies simultaneously. Surprisingly, no students expressed strong reservations about being part of the program, responding with "Not at this time" or simply "No." This suggests that students were mainly open to the idea of peer support despite cultural limitations in Uzbekistan, where, as Bozorov (2024) discussed, students may be hesitant to seek help for fear of appearing incompetent.

Post-Survey Analysis

Following the program, tutees completed a post-survey to assess their experiences, growth, and overall satisfaction with the program. Qualitative feedback is valuable in that it provides comparison with their expectations prior to the program and illustrates perceived value of peer tutoring in addressing language concerns. Following are the most salient themes presented through direct quotes of students. A significant theme was the perceived improvement in confidence and English usage, which corresponds with Roscoe and Chi's (2007) emphasis on the value of practice in low-stakes environments. Several students explicitly stated that their confidence had *"improved"* or *"greatly improved,"* with one respondent adding, *"I feel better prepared for my academic courses after the program."* Another described the experience as *"a great experience for me to be part of this program. The classes were conducted in an informal style, which made the program very interesting and enjoyable."* These reflections align with Arco-Tirado et al. (2020), who found that structured peer tutoring significantly enhances student performance by fostering motivation and active participation. At the same time, the data reveal that personalised interaction and discussion-based learning were especially valued. One student highlighted that the best aspect of the program was *"discussion and one-on-one working,"* while another noted *"the teacher's ability to adapt to my interests."* These insights echo Huang's (2015) argument that EMI learners benefit most when programs provide authentic, engaging interaction tailored to student needs. Significantly, when asked whether they would recommend the program, every respondent replied "Yes," underscoring the overall acceptance of peer tutoring as a supportive mechanism. Still, some limitations remained, as one participant mentioned the program was *"not finished,"* hinting at challenges of continuity that mirror Topping's (2005) caution about sustaining peer tutoring schemes over time.

Session Report Analysis

To further capture the dynamics of the program, 26 session reports from five tutors were analysed. These reports, completed after each class, provide insight into the nature of tutoring activities, participation, and the challenges encountered. They serve as a complement to the pre- and post-survey data by showing how the program operated in practice. A recurring theme was the active participation and growing engagement of students. Tutors frequently described their tutees as "very active" or "ready for the classes and actively participating in discussions." One report noted that "students are learning vocabulary that will be useful for their academic studies." At the same time, another reflected, "in comparison to what we had at the start of the semester, there is visible progress in speaking." These observations align with Arco-Tirado et al. (2020), who emphasise that structured peer tutoring environments boost confidence and encourage more consistent practice. The focus on topics such as debates, retelling, and one-on-one speaking also resonates with Huang's (2015) argument that authentic, discussion-based peer learning strengthens oral proficiency in EMI settings. At the same time, the reports highlight challenges in sustaining participation and ensuring resources. One tutor shared, stating "there are students who are really shy, and it is difficult to get them to speak," while another noted that "some students do not regard the lessons as a high priority" which demotivates tutors to teach tutees. Practical concerns were also raised, such as the need for "the ability to print resources for lessons" or the difficulty of keeping students motivated without variation by saying that "not every time, but sometimes, it is kind of difficult to maintain energy [in the class]." These comments echo Colvin and Ashman's (2010) finding that peer tutoring requires both institutional support and strategies to address learner hesitancy. While overall feedback suggests significant learning gains, these challenges reflect Topping's (2005) caution that peer tutoring programs must carefully balance enthusiasm with sustained support mechanisms.

Discussion

These findings are consistent with prior research that highlights peer tutoring as an effective mechanism for enhancing speaking skills and building learner confidence in EMI contexts. For example, Arco-Tirado et al. (2020) found that structured peer tutoring significantly improved academic performance, while Huang (2015) emphasised its role in reinforcing fluency and academic vocabulary. Similarly, Roscoe and Chi (2007) demonstrated that tutees benefit from low-stakes environments where they can practice without fear of failure, a pattern mirrored in the present study. At the same time, some divergence exists. While previous studies (Falchikov, 2001; Seo & Kim, 2019) noted substantial reciprocal benefits for tutors, the present study did not formally measure tutors' academic gains, focusing instead on tutee outcomes. This creates a gap that future research should address by systematically capturing the perspectives of tutors. Another point of contrast is that although prior research (Colvin & Ashman, 2010) emphasises the importance of institutional support for sustainability, our study highlighted challenges with tutor recruitment and retention that indicate weaker structural backing, suggesting that program impact may be constrained in resource-limited settings.

Taken together, the present findings reinforce much of the existing literature on the effectiveness of peer tutoring in language development, while also underscoring contextual challenges such as cultural reluctance to seek help and limited institutional support, which are less emphasised in international studies. This combination of consistency and divergence highlights the need for EMI universities in Uzbekistan to adapt peer tutoring practices to their specific sociocultural and institutional contexts.

Conclusion

The results indicate that peer tutoring is a possible way of closing language proficiency gaps in an EMI university context, even over a short duration. The flexibility in scheduling and one-on-one setting of peer tutoring enabled positive student experiences, with the majority of students claiming growth in confidence and speaking ability. The informal, student-centred approach of the program fostered a relaxed and interactive atmosphere, allowing tutees to build their English skills in a low-pressure setting. The findings indicate that peer tutoring can serve as a valuable complement to classroom learning, particularly for students seeking to improve their speaking and grammar. However, despite these positive outcomes, the program faced significant challenges in recruiting and retaining tutors, which threatened its long-term sustainability. The difficulty in attracting committed tutors highlights the need for formal incentives, such as course credit or official recognition, to ensure student participation.

The research findings indicate that peer tutoring is an effective support mechanism for EMI students, particularly in enhancing their spoken English and confidence. Although vocabulary and grammatical ability also developed, talking was the main issue and area of improvement. The high levels of tutor engagement further attest to the program's success in active participation. However, future programs must address the primary challenges by having formal tutor training, providing dedicated tutoring areas, and providing incentives for tutors and tutees. Long-term studies should also be conducted to ascertain the retention of language improvement after program duration. Through enhancing and expanding the peer tutoring programme, universities can offer additional support to EMI students to overcome language challenges and achieve academic success.

Limitations and Future Directions

Several limitations to this study must be taken into consideration when interpreting the results. One of the primary limitations was the brief time period since the program only ran for 6-7 weeks, and it was challenging to measure long-term language proficiency gains. Another limitation is the small sample of tutors and tutees, which restricts the generalizability of the findings to a larger population of students. The research was conducted using tutor session reports and self-reported questionnaires instead of standardised tests, so the perceived development in language ability may not accurately indicate actual progress. Tutors were chosen based on high English proficiency (IELTS

8.0), but they were not formally trained in tutoring skills, which could have compromised the quality and consistency of support offered. Voluntary sign-up led to selection bias, with students who were already interested in learning English more likely to sign up, so it was not known if the program would work as well with less motivated students. Cultural constraints in Uzbekistan, where students are reluctant to seek academic assistance for fear of being seen as incompetent, possibly restrict sign-up and attendance at sessions. In addition, issues of irregular attendance and commitment problems arose, with some tutors pulling out of the program due to time constraints and some tutees failing to attend the sessions regularly, which undermined continuity of learning. Institutional support was also weak, with no dedicated tutoring facilities for the program, no formal curricular recognition, and no financial incentives for tutors, all of which would have facilitated program sustainability. The syllabus placed its greatest emphasis on oral skills, while other equally significant aspects, such as academic writing, listening, and reading skills, were treated as secondary. This imbalance may have limited its overall impact on students' English proficiency. Next, the study did not determine whether the language gains made by students were long-lasting because no follow-up testing occurred once program completion had occurred. Hence, it cannot be said to what degree peer tutoring is effective within an EMI university setting in the long term. These limitations can be addressed in future versions of the program to enhance its effectiveness and yield more robust evidence on the role of peer tutoring in contributing to students' English proficiency and academic performance.

The peer tutoring initiative may also be expanded and reach even more areas of study wherein students can equally falter. The project has already been utilized in calculus, introduction to computer science, and physics courses at the same university, which speaks to its adaptability and potential to permeate more studies. As effective as peer tutoring has been in language development, universities providing EMI need to institutionalize such courses so that students are provided with systematic and structured scholarly support from peers. Formal acknowledgment of tutors, provision of special tutoring rooms, and incorporation of peer tutoring into university policy can also maintain the program's longevity. Language retention in the long term, the impact of peer tutoring on academic performance, and how to increase students' participation levels should also be explored in future research. Expansion of this program to other disciplines will enhance its achievement as a holistic support system, fostering academic as well as linguistic success for students in EMI environments.

Another significant limitation is that numerous of the measures relied on students' own subjective accounts of confidence and language development and not evidence-led measures of proficiency. While tutor session reports and staff observations were used for purposes of triangulation, the absence of standardised language tests or other quantitative performance indicators limits the generalisability of the findings. Future research should therefore incorporate objective testing to complement self-reported outcomes and provide more robust evidence of program impact.

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АҒЫЛШЫН ТІЛІН ҚОЛДАУҒА АРНАЛҒАН ӨЗАРА ОҚЫТУ БАҒДАРЛАМАСЫНЫҢ ТИІМДІЛІГІН БАҒАЛАУ

Аңдатпа.Бұл зерттеу Өзбекстандағы бір университетте ағылшын тілінде оқытылатын (EMI) ортада ағылшын тілін меңгеруде қиындықтарға тап болған студенттерге көмек көрсету үшін енгізілген тең құрбылар (Peer) тьюторлығы бастамасының ықпалын зерттейді. Университетке қабылдау үшін ең төменгі IELTS 5.5 деңгейі талап етілгенімен, оқытушылар көптеген студенттердің, әсіресе сөйлеу мен жазуда, қиындықтарға тап болғанын байқады. Осы мәселелерді шешу мақсатында ерікті студент-тьюторлардың құрылымдалған тілдік қолдауын ұсынатын пилоттық бағдарлама іске қосылды.
Зерттеу аралас әдістер дизайнына сүйеніп, бағдарламаға дейінгі және кейінгі сауалнамаларды, тьюторлық сессия есептерін және оқытушылардың пікірлерін қамтыды. Нәтижелер студенттердің сенімділігі мен ағылшын тілін меңгеру дағдыларының айтарлықтай жақсарғанын көрсетті, ал сөйлеу 75% қатысушылар үшін негізгі мәселе ретінде анықталды. Бағдарламадан кейін 83,3% студент ағылшын тілін қолдануда сенімділіктерінің артқанын хабарлады, ал тьюторлар 76,9% тьютилардың сабақтарға белсенді қатысқанын атап өтті.
Соған қарамастан, тьюторларды тарту мен ұстап тұру, сабақтарға тұрақсыз қатысу, сондай-ақ институционалдық қолдаудың жеткіліксіздігі бағдарламаның тұрақтылығына кедергі келтірді. Тұжырымдар Peer тьюторлығының EMI ортасында тілдік қолдауды қамтамасыз етудің тиімді әдісі екенін дәлелдегенімен, ұзақ мерзімді нәтижелерді жақсарту үшін ресми тьюторларды даярлау, арнайы сабақ өткізу орындары және ынталандыру жүйесі қажет екендігін көрсетеді. Бағдарламаның бағаларға және тілдің ұзақ мерзімді игерілуіне әсерін бағалау үшін қосымша зерттеулер жүргізу ұсынылады.

Түйінді сөздер: Peer (теңқұрбылар) тьюторлығы, ағылшын тілін меңгеру, EMI (ағылшын тілінде оқыту), студенттерді қолдау, жоғары білім, тіл үйрену, академиялық жетістік.

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ОЦЕНКА ЭФФЕКТИВНОСТИ ПРОГРАММЫ ВЗАИМНОГО ОБУЧЕНИЯ ДЛЯ ПОДДЕРЖКИ АНГЛИЙСКОГО ЯЗЫКА

Аннотация.Данное исследование рассматривает влияние инициативы равноправного (Peer) тьюторства в одном из университетов Узбекистана, направленной на поддержку студентов, испытывающих трудности с английским языком в условиях обучения на английском языке (EMI). Несмотря на то, что минимальное требование для поступления в университет составляет IELTS 5.5, преподаватели отмечали, что многие студенты продолжают сталкиваться с проблемами, особенно в устной и письменной речи. Для решения этих трудностей была запущена пилотная программа равноправного тьюторства, в рамках которой добровольцы-студенты оказывали структурированную языковую поддержку.
Исследование опиралось на смешанный дизайн, включавший анкетирование до и после программы, отчёты о тьюторских сессиях и отзывы преподавателей. Результаты показали значительное повышение уверенности студентов и улучшение их навыков английского языка; при этом устная речь оказалась основной проблемной областью для 75% участников. После завершения программы 83,3% студентов сообщили о большей уверенности в использовании английского языка, а тьюторы отметили высокий уровень вовлеченности, при котором 76,9% подопечных активно участвовали в занятиях.

Тем не менее набор и удержание тьюторов, нерегулярное посещение и недостаточная институциональная поддержка стали вызовами для устойчивости программы. Полученные данные подтверждают эффективность Peer тьюторства как средства поддержки студентов в условиях EMI, однако подчёркивают необходимость формальной подготовки тьюторов, выделенных учебных пространств и системы поощрений для достижения долгосрочных результатов. Рекомендуются дальнейшие исследования, чтобы измерить влияние программы на академические оценки и долгосрочное освоение языка.

Ключевые слова: равноправное тьюторство, владение английским языком, EMI, поддержка студентов, высшее образование, изучение языков, академический успех

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