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Promoting 21st Century Core Competencies, Academic Performance and Attitude among Gen Z Prospective EFL Teachers Through Blended Project-Based Learning

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Abstract

This research investigated the effect of blended project-based learning on promoting 21st-century core competencies, academic performance, and attitude towards PBL among Gen Z English major prospective teachers at the Faculty of Education, Mansoura University. The intended participants comprised a random sample of third-year English major students (N= 230). They were categorized alphabetically into two groups and randomly allocated to either experimental or control groups. To fulfil its objectives, the research employed a quasi-experimental design utilizing pre-post administration for two separate groups. The instruments employed included a 21st-century core competencies Assessment Inventory, an achievement test, and a scale measuring attitudes towards Project-Based Learning (PBL). The t-test for both dependent and independent samples was employed for data analysis. The results demonstrated that the experimental group exhibited considerably higher post levels in 21st-century competencies and attitudes towards project-based learning than the control group. The experimental group surpassed the control group in academic performance although the differences were not profound. The findings validated that blended PBL significantly enhances 21st-century competencies, academic performance, and attitudes towards PBL among Gen Z prospective teachers majoring in EFL.

Keywords: *blended PBL, EFL, 21st Century core competencies, attitude, academic performance, Gen Z, prospective teachers*

ملخص البحث

تناول البحث الحالي دراسة أثر التعلم المدمج القائم على المشروعات على تعزيز الكفاءات الجوهرية في القرن الحادي والعشرين، الأداء الأكاديمي، والاتجاه نحو التعلم القائم على المشروعات لدى معلمي المستقبل من الجيل Z بشعبة اللغة الإنجليزية بكلية التربية جامعة المنصورة. شارك في البحث عينة عشوائية من طلاب الفرقة الثالثة بشعبة اللغة الإنجليزية عددهم (ن= ٢٣٠) طالبا وطالبة تم تقسيمهم أبجديا إلى مجموعتين واختيار إحداهما عشوائيا لتكون المجموعة التجريبية والأخرى كانت الضابطة. تم تبني المدخل شبه التجريبي باستخدام تصميم التطبيق القبلي- البعدي على مجموعتين مستقلتين لتحقيق أهداف البحث. اشتملت الأدوات على مقياس تقييم ذاتي لمهارات القرن الحادي والعشرين، اختبار تحصيلي، ومقياس اتجاه نحو التعلم

القائم على المشروعات. وبالنسبة للتحليل الاحصائي للبيانات فقد تم استخدام اختبار (ت) للمجموعات المستقلة والمرتبطة. أثبتت النتائج أن المستوى البعدي لطلاب المجموعة التجريبية في مهارات القرن الحادي والعشرين وكذلك اتجاهاتهم نحو التعلم القائم على المشروعات فاق بشكل دال احصائيا مستوى طلاب المجموعة الضابطة. كذلك فاقت المجموعة التجريبية نظيرتها الضابطة في التحصيل الأكاديمي بالرغم من أن الفروق لم تكن كبيرة جدا. أكدت هذه النتائج أن استخدام مدخل التعلم المدمج القائم على المشروعات كان له إمكانية كبيرة في تحسين كفاءات القرن الحادي والعشرين الجوهرية، الأداء الأكاديمي والاتجاه نحو التعلم القائم على المشروعات لدى الطلاب معلمي المستقبل من الجيل Z بشعبة اللغة الإنجليزية .

الكلمات الدالة: *التعلم المدمج القائم على المشروعات، اللغة الإنجليزية كلغة اجنبية، كفاءات القرن الحادي والعشرين الجوهرية، الاتجاه، الأداء الأكاديمي، الجيل Z، معلمي المستقبل*

Introduction

The learning paradigm of the 21st century has fundamentally altered contemporary classrooms. As the number of digital natives in the classroom increases, both instructors and students encounter an evolving educational environment that must cater to diverse learning speeds, styles, and requirements. Contemporary students differ from those born before the 1990s. Members of Generation Z were born into a technologically advanced environment. Consequently, understanding the learning qualities that influence effective learning is crucial for addressing students' educational requirements (Santosa, 2017).

It is indisputable that higher education must adapt to the practices and technological advancements prevalent in the 21st century in the increasingly digital world. Additionally, it is vital for university teachers to change and recognize that Gen Z students need different teaching approaches and methods. Contemporary students differ from those born before the 1990s. Members of Generation Z were born into an age of technological advancement. They possess a distinctive amalgamation of attitudes, beliefs, social norms, and behaviors that will influence education and practice for an extended period. In the modern technological era, it is imperative for Gen Z students to participate in inquiry-based learning to facilitate the examination of issues from several perspectives, analyze them, and generate new information for a thorough understanding of the challenges (Santosa, 2017; Chicca & Shellenbarger, 2018).

Gen Z students demonstrate insufficient social and interpersonal skills due to their frequent technology use and extensive screen time. Individuals face a heightened risk of solitude, insecurity, and mental health challenges, including anxiety and depression. Their technological habits result in a constrained attention span, leading to a propensity for boredom in

the presence of monotony and repetition. Generation Z seeks convenience and immediacy. That's why faculty members must consider the development of essential interpersonal communication and collaboration skills, which are critical 21st-century competencies that students need to acquire (Chicca & Shellenbarger, 2018).

This generation's members frequently utilize digital technologies and social networks for social interactions, resulting in a significant reliance on the virtual world. Members of this generation often lack the habit of critically evaluating online information and its sources. The extensive amount of information received and processed daily has led to reduced attention spans among students and increased time required to complete individual tasks. The members of Generation Z frequently engage in solitary activities, such as reading about current events and communicating through digital devices, resulting in an intrapersonal learning process. Initially, students of this generation seek to acquire knowledge through diverse digital technologies independently. As learners become more acquainted with the subject matter, they tend to relax and engage in group work (Stjepić, Vukšić & Suša Vugec, 2019).

The characteristics of Generation Z suggest that conventional teacher education programs and delivery methods are insufficient for addressing the needs of this emerging generation. If educators maintain traditional delivery methods, they may face difficulties in satisfying the needs of the new generation (Chicca & Shellenbarger, 2018). Furthermore, to address the requirements of the new educational paradigm, learning must be conducted in accordance with 21st-century learning skills and principles. The traditional model of teacher-centered education must transition to a student-centered learning approach (Kember, 2009; Attard, et al., 2010). Some educational institutions fail to implement the teaching and learning process as intended. This can be attributed to teachers' insufficient knowledge regarding effective teaching methods that facilitate an optimal teaching and learning process (Astawa, Artini & Nitiasih, 2017).

The role of teachers in the new paradigm has shifted from lecturing to that of facilitators, focusing on monitoring, supervising, and facilitating the learning process. This approach grants learners greater autonomy and fosters a sense of responsibility. Language learners today exhibit a preference for increased flexibility, autonomy, and engagement to improve the enjoyment and effectiveness of their learning experience. For them, the best way to learn is to get involved in class discussions and activities. They prioritize the acquisition of knowledge and skills with consideration for

their practical application. Consequently, it equips them to address the challenges of the 21st century (Islam, Halim & Halim, 2022).

Nonetheless, the significant knowledge expansion and challenges of the 21st century have compelled educators to reconfigure and advance the entire teaching and learning process based on new foundations. This aligns with the recent initiative to create an interactive educational environment, leading to contemporary teaching strategies that utilize effective methods implemented across all educational infrastructures (Noor-ul-Amin, 2013; Barahmeh et al., 2017).

In order to accomplish the required transition in education, 21st-century skills are crucial, according to Trilling and Fadel (2009) and the Partnership for 21st Century Learning Skills (2009). The Pacific Policy Research Centre (2010) identifies project-based learning as a best practice for the implementation of 21st-century skills aimed at preparing students for future employment and careers. This approach may serve as a strategy to enhance students' engagement in learning, aligning with constructivist principles. Bell (2010) highlighted that project-based learning serves as a fundamental approach for fostering independent thinkers and learners.

Project-based learning (PBL) is an instructional model that focuses on student engagement, facilitating the acquisition of knowledge and skills through problem-solving and investigative processes aimed at addressing specific challenges. It motivates students to acquire content and skills for a genuine purpose where the process begins with a central question that prompts inquiry and investigation. Students develop a product or presentation responding to the driving question (Essien, 2018). Authentic projects necessitate resourcefulness and preparation by the student (Dimmitt, 2017). In Project-Based Learning, projects are described as multifaceted tasks focused on stimulating questions or challenges that involve students in activities such as designing, problem-solving, making decisions, or conducting investigations. These projects offer students the chance to work independently and autonomously over extended durations, culminating in tangible products or realistic presentations (Thomas, 2000; English & Kitsantas, 2013; Boss & Krauss, 2014).

The blended learning approach is likely advantageous for Generation Z, as this cohort exhibits a preference for face-to-face interaction, pragmatic problem-solving, self-reliance, and proficiency to work both autonomously and as part of a team. Additionally, they demonstrate proficiency in quickly accessing various resources to achieve their goals (Howe, 2014; Seemiller &

Grace, 2016). Hybrid learning environments offer significant potential for effective learning within this cohort (Carter, 2018).

In light of Gen Z students' unique attributes and their favored learning styles and methods, it becomes clear that they have problems with conventional learning methods and have negative attitudes towards most of them. In addition, the requirements of the 21st century, with its core competencies and matching methodologies, reveal that the traditional language learning outcomes are no longer enough for Gen Z students in higher education. New competencies are being highlighted and required. Consequently, the project-based learning approach can be considered a promising methodology to be implemented in higher education. In addition, it can have added value when accompanied by blended learning. So, the current research was an attempt to integrate project-based learning with blended learning for developing 21st-century core competencies; namely the 4Cs, academic performance and positive attitude towards the PBL approach.

Context of the problem:

This research was carried out at the Faculty of Education, Mansoura University, Egypt. It involved two hundred and thirty junior student teachers (N= 230) enrolled in the English section studying a course entitled "EFL Teaching Methods for Special Needs Students". The course is normally taught during the second semester of the third year of the four-year TEFL teacher preparation program. It handles the difference between special needs and mainstream students, various types of learning difficulties and disabilities such as dyslexia, dysgraphia, autism, ADHD, and other disabilities. The course facilitates the development of professional skills essential for designing, developing, and evaluating effective techniques for early identification and instruction in English as a Foreign Language (EFL) for students. It offers a range of practical techniques for addressing special educational needs within an inclusive classroom context.

The course instructor (the researcher) noted that students struggled to comprehend the different learning difficulties and disabilities. Additionally, numerous students failed to recognize the importance of engaging in this course. Numerous students highlighted this issue in their feedback regarding the course over two consecutive years via the questionnaires distributed by the faculty's quality assurance unit. The researcher decided to implement the PBL approach to enhance learning and ensure its relevance for students.

Furthermore, the previous related studies that were reviewed and examined supported the need of higher education learners to focus on the

4Cs skills in order to meet the changing needs of the twenty-first century. As noted by Caine (2011), Huang et al. (2010), and Van Roekel and the Association (2014), the 4Cs should be a central focus to prepare individuals to navigate the demands of the 21st century as effective citizens and workers.

Statement of the problem

The current research problem was identified as the need of English Major Gen Z student teachers to promote their 4Cs skills, level of academic performance, and attitude towards PBL, which greatly affect their success in their studies and teaching careers.

Questions of the research

The present study sought to address the following primary question: "How does blended project-based learning promote the 21st-century core competencies, academic performance and attitude towards PBL among Gen Z prospective EFL teachers?"

The following sub-questions were derived from the main question:

1- What are the features of blended project-based learning to develop 21st-century core competencies among Gen Z English major student teachers?
2- To what extent is blended project-based learning effective in promoting 21st-century core competencies among Gen Z English major student teachers?
3- To what extent is blended project-based learning effective in promoting academic performance among Gen Z English major student teachers?
4- To what extent is blended project-based learning effective in promoting positive attitudes towards PBL among Gen Z English major student teachers?

Hypotheses

The following hypotheses were attempted to be verified based on the literature review and related previous studies:

1- There is a statistically significant difference between the mean scores of the experimental group and the control group students on the post-administration of the 21st Century core competencies Inventory, favoring the experimental group.
2- There is a statistically significant difference between the mean scores of the experimental group students on the 21st Century Core Competencies Inventory pre- and post-administration, with results favoring the post-administration.

3- There is a statistically significant difference between the mean scores of the experimental and control group students on the post-administration of the achievement test for the project-based course, favoring the experimental group.
4- There is a statistically significant difference between the mean scores of the experimental and control group students on the post-administration of the Attitude towards PBL Scale, favoring the experimental group.
5- There is a statistically significant difference between the mean scores of the experimental group students on the pre-and post-administrations of the Attitude towards PBL Scale, favoring the post-administration.

Instruments

The researcher developed and utilized the following instruments to collect research data:

1- The Twenty-First Century Core Competencies Assessment Inventory to assess the four dimensions of the 4Cs, namely collaboration, communication, critical thinking, and creativity.
2- An achievement test to assess English major student teachers' level in the course "EFL Teaching Methods for Special Needs Students" after studying it using the blended PBL method and the traditional method.
3- An Attitude towards PBL Scale to assess junior student teachers' attitudes before and after implementing the blended PBL course.

Purpose

This research sought to achieve the following objectives:

1- Identifying the impact of the blended project-based learning approach on promoting 21st-century core competencies among Gen Z English major student teachers.
2- Identifying the impact of the blended project-based learning approach on promoting the academic performance of Gen Z English major student teachers.
3- Identifying the impact of the blended project-based learning approach on promoting positive attitudes towards PBL among Gen Z English major student teachers.

Significance

The significance of the current research stems from its ability to:

1. Direct the attention of EFL curriculum planners to the significance of integrating project-based learning as a practical, systematic approach in EFL programs at Faculties of Education.
2. Help EFL instructors adapt their teaching practices to suit the requirements of developing 21st-century skills in their students by implementing a project-based approach.

3. facilitate the enhancement of Higher-Order Thinking Skills through the promotion of the four Cs of the 21st century among EFL majors.
4. Help Gen Z student teachers develop positive attitudes towards collaborative PBL; as they usually tend to perform independent tasks.
5. Attract the attention of researchers in the field of EFL to a blended project-based approach as a powerful means of developing 21st-century core competencies that suit the nature of technology natives.

Delimitations

The scope of the current research was limited to the following delimitations:

1. The 21st-century core competencies (4Cs), namely, collaboration, communication, critical thinking, and creativity.
2. A sample of 3rd year English major student teachers at the Faculty of Education, Mansoura University (N= 230). They were alphabetically divided into two groups and randomly assigned to an experimental group (n= ١١٥) who studied the course using the blended PBL, and a control group (n= ١١٥) who studied the same course using the conventional method of lecturing and individual assignments.

Definition of Terms:

Blended project-based learning:

Garrison and Kanuka (2004, p. 96) defined blended learning as "the thoughtful integration of classroom face-to-face learning experiences with online learning experiences."

Holden and Westfall (2006, p.32), in contrast, provided a more elaborate explanation: "blended learning is instruction using multiple media. This includes integrating instructional media into a traditional classroom or into a distance learning environment and can include any combination of media that supports instruction, regardless of the mix of synchronous or asynchronous media."

Project-based learning (PBL) is a student-centered pedagogical method that revolves around project-based activities. It employs a dynamic classroom environment, enabling students to take control of their learning and gain a profound understanding through the active investigation of real-world challenges and issues (Thomas, 2000; Larmer, Markham & Ravitz, 2003; Bell, 2010; Essien, 2018).

According to Wurdinger et al. (2007:151), PBL can be defined as "a teacher-guided method that aims to engage students in the process of

creating their projects through the following the steps of identifying a problem, developing a plan, testing the plan against reality, and reflecting on the plan".

Within the context of the current research, blended Project-based learning is *operationally* defined as an approach implemented within the framework of a course that is delivered directly through face-to-face lectures and online meetings using Zoom application for online meetings where English major junior student teachers collaborate within the framework of a teacher-guided method that aims to engage them in the process of creating their projects that reflect their understanding of the course content and the way of implementing it.

21st-century Core Competencies-4Cs

They are defined as "a set of future skills that represent higher-order thinking and social skills which are organized in cognitive skills as well as being considered as student-centered skills such as creative thinking, critical thinking, innovation, collaboration, responsibility, and communication" (partnership for 21st-century learning, 2009; National Research Council, 2013). The skills referred to as 4Cs include collaboration, communication, critical thinking and creativity:

Collaboration

Successful collaboration is characterized by the ability to work effectively with others (P21, 2019), demonstrating teamwork skills in a respectful manner within diverse groups, exhibiting flexibility and a willingness to compromise to achieve shared goals, sharing responsibility, and acknowledging the contributions of each team member. Students possessing collaboration skills can cultivate diverse perspectives, enabling them to articulate and justify their own ideas (Kulikovskikh et al., 2017).

Communication

The Partnership for 21st Century Skills (2009), Trilling and Fadel (2009), and the National Education Association (NEA) assert that contemporary students must proficiently communicate thoughts and ideas through spoken, written, and nonverbal means, as well as listen attentively to comprehend meaning. In addition, they should be able to communicate for various reasons; utilize many media and technology while assessing their effectiveness as a priority, and engage effectively with a wide range of individuals and environments and contexts (P21, 2019).

Critical Thinking

Critical thinking skills comprise "the ability of individuals to reason effectively, analyze, interpret, summarize and evaluate alternative

perspectives, and think critically about choices and procedures" (Partnership for 21st Century Skills, 2009; Trilling & Fadel, 2009; Pacific Policy Research Centre, 2010). P21 (2019) identified several indicators of critical thinkers, including the ability to reason effectively, employ systems thinking, make informed judgements and decisions (such as analyzing and evaluating arguments, synthesizing and interpreting information, and reflecting on learning), and solve problems (which involves addressing unfamiliar issues, clarifying diverse perspectives, and leading to improved solutions).

Creativity and Innovation

Partnership for 21st Century Skills (2009) defines creativity as "learners think creatively by using and creating a wide range of ideas; expand, refine, investigate, and assess unique ideas to improve and expand creative endeavors". P21 (2019) identified creativity and innovation through three key components: thinking creatively, which involves employing diverse idea generation techniques, producing novel and valuable ideas, and elaborating on those ideas; collaborating creatively with others, characterized by effective communication of new ideas, receptiveness to various perspectives, demonstration of originality, and self-directed work; and implementing innovations, which entails making contributions to the field.

Attitude towards PBL:

Attitude is a psychological inclination manifested through the assessment of a certain entity with varying levels of approval or disapproval (Eagly & Chaiken 1993).

Attitude is defined by Eagly and Chaiken (2007, p. 585) as "the way in which a person views and evaluates something or someone, a predisposition or a tendency to respond positively or negatively toward a certain idea, object, person, or situation. It is traditionally structured along three dimensions: cognitive (perceptions and beliefs), affective (likes and dislikes, feelings, or evoked emotions), and behavioral (actions or expressed intentions toward the object based upon the "cognitive" and "affective" responses)".

Attitude towards PBL can be operationally defined as the way in which Gen Z junior student teachers view and evaluate the project- based learning approach as indicated through the significance of the difference between their mean scores on the pre- and post- administrations of the Attitude Towards PBL Scale.

Gen Z

Generation Z, born post-1995, has been immersed in social networks from a young age and exhibits a greater digital orientation than Generation Y, necessitating a distinct analytical approach. This generation is also referred to by several names, including "Gen Tech, Children of Internet, Post-Millennials, Generation I, Digital Natives, Gen Wii, Media Generation, .com Generation, and iGen" (Stjepić, Vukšić & Suša Vugec, 2019).

Members of this category are enthusiastic users of technological systems and applications and seekers of the digital realm. Generation Z, as true digital natives, is uniquely acclimated to engaging predominantly within the digital realm, having been nurtured entirely under the influence of technology (Chicca & Shellenbarger, 2018).

Review of Literature and previous studies:

21st-century education has fundamentally altered contemporary classrooms. As the number of digital natives in the classroom increases, both instructors and students encounter an evolving educational environment that must cater to diverse learning speeds, styles, and requirements. To facilitate student advancement in the contemporary technology-driven competitive landscape and to promote knowledge acquisition in specific domains, educational systems must integrate 21st-century core competencies into their curricula to bridge the gap between students' domain knowledge and the competencies necessary for its application (Arabloo et al., 2021).

21st century core competencies:

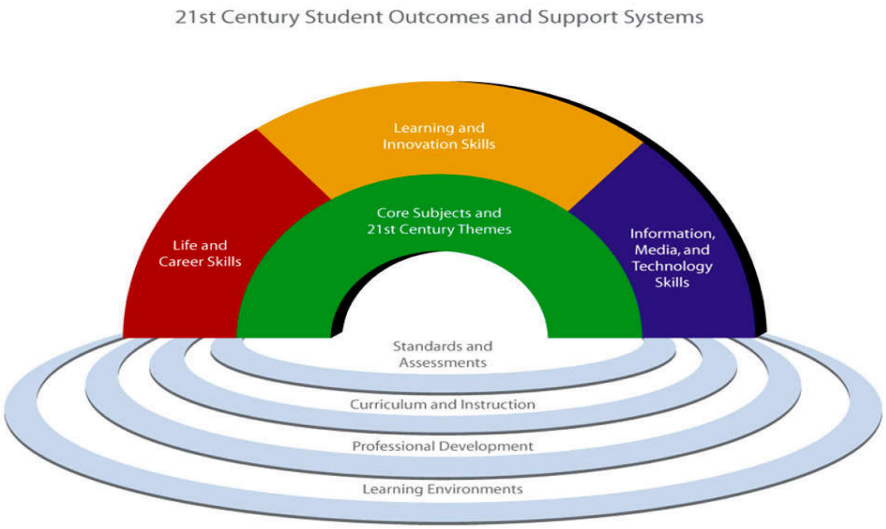
The phrase "21st-century competencies" denotes the skills recognized by the Partnership for 21st Century Skills, the principal national organization dedicated to integrating these abilities into education. The term "twenty-first-century competencies" encompasses the basic knowledge, skills, and behaviors deemed crucial for contemporary learners to achieve success in both professional and personal spheres (American Association of Colleges of Teacher Education, 2010). Students must get the help of well-trained teachers to learn 21st-century skills (Pacific Policy Research Centre, 2010).

The Partnership for 21st Century Skills has established a framework for 21st-century learning, delineating the competencies essential for student success in the contemporary global economy. It promotes the incorporation of skills such as critical thinking, problem-solving, and communication into the instruction of fundamental academic disciplines, including English, reading or language arts, world languages, arts, mathematics, economics,

science, geography, history, government, and civics. P21, the foremost framework for 21st-century skills in educational information technology, categorizes eleven capabilities into three essential components:

• Critical Thinking and Problem Solving
• Communication and Collaboration
• Creativity and Innovation

Figure 1: The Framework for 21st Century Learning model



Source: Partnership for 21st Century Skills (2009, p.9)

The Framework comprises four primary components of learning. First, core subjects and 21st-century themes cover all vital disciplines, such as global awareness, financial literacy, economic knowledge, entrepreneurial skills, civic understanding, and health literacy. Second, creativity and innovation, critical thinking and problem-solving, as well as communication and collaboration, form the foundation of learning and innovation skills. The third component, information, media, and technology skills, covers information literacy, media literacy, and ICT (information, communications, and technology) literacy. Life and career skills, as the fourth pillar, involve flexibility and adaptability, initiative and self-direction, social and cross-cultural abilities, productivity and accountability, and leadership and responsibility (Partnership for 21st Century Skills, 2009).

This research examines the 21st-Century competencies identified by the Partnership for 21st-Century Learning (P21), with a particular emphasis on learning and innovation skills, commonly referred to as the 4Cs. P21 is regarded as the most significant among the initiatives advocating for 21st-century skills (Bourn, 2018). Saxena (2014) emphasized that the 4Cs, regarded as essential 21st-century super skills, enable students to acquire the critical attributes required for success in college, the workplace, and civic life. Thus, they should be integrated into curriculum frameworks, explicitly taught, and systematically assessed in educational and other contexts (Geisinger, 2016).

Contemporary educators prioritize cultivating 21st-century skills in students. Acquiring the 4Cs is fundamental for students to build the essential attributes required for success in higher education, employment, and civic engagement in the twenty-first century. They are also substantial, requiring innovative, forward-thinking approaches. These competencies should be integrated into curriculum design, instructed, and assessed in educational settings or other contexts (Geisinger, 2016).

Generation Z:

Generation X includes individuals born from 1965 to 1979, currently aged 45 to 59; Generation Y, also known as Millennials, refers to individuals born between 1980 and 1994, currently aged 30 to 44; and Generation Z consists of individuals born from 1995 to 2015, currently aged 9 to 29 years (Pew Research Centre, 2018). Each generation possesses unique characteristics; however, they can be defined by distinct collective features shaped by the contexts in which they have lived (Betz, 2019).

Generation Z represents the first cohort raised in an Internet-centric environment, resulting in a distinct comprehension of information access and worldview compared to earlier generations (Adamson, Chen, Kackley, & Micheal, 2018; Prensky, 2001). This newest generation has been referred to by various labels, including Post-Millennials (ages 9 to 29), iGen, iGeneration, digital natives, and homelanders. This generation is familiar with the swift dissemination of information delivered in a visually and technologically advanced manner. The statement, “Growing up in a virtual cloud of technology with infinite sources of information and digital interactions has changed the way they think, communicate and learn,” accurately characterizes the current generation (Adamson et al., 2018, p.29). Each generation of students exhibits distinct characteristics shaped by the economic, social, and cultural conditions of their upbringing, which in turn

influence their perceptions of formal learning (Shorey, Chan, Rajendran & Ang, 2021).

Millennials exhibit technological proficiency, favor collaborative learning approaches that incorporate blended learning and possess strong communication skills in both face-to-face and virtual settings (Issacs et al., 2020). They look for valuable and immediate feedback, maintain strong connections on social media, and exhibit an idealistic approach to risk-taking (Issacs et al., 2020; Chicca and Shellenbarger, 2018). Conversely, Generation Z students are digital natives who prefer an independent learning style that emphasizes visual and kinesthetic engagement over passive approaches. Individuals prioritize convenience and demonstrate openness to constructive feedback (Issacs et al., 2020). Gen Z students demonstrate underdeveloped in-person social skills, a phenomenon linked to their significant dependence on technology, adversely affecting their conversational abilities (Seemiller and Grace, 2016; Chicca and Shellenbarger, 2018). Despite their extensive social media connections, they prioritize privacy and demonstrate pragmatic and entrepreneurial traits (Issacs et al., 2020; Chicca and Shellenbarger, 2018). The shared and distinct characteristics between millennials and Gen Z necessitate modifications in educational practices, pedagogies, and teaching approaches to establish a successful and comprehensive learning environment that meets their learning needs (Shorey et al., 2021).

Based on a review that included seventeen studies published between 2016 and 2021, Shorey et al. (2021) identified characteristics of Gen Z students as digital natives who predominantly depend on technology in their daily lives, averaging approximately nine hours of electronic device usage per day. This reliance has led to underdeveloped social skills, increasing their vulnerability to mental health issues such as depression, anxiety, and insecurity. Furthermore, individuals experience continuous technological stimulation, exhibit a brief attention span, and pursue immediate gratification. This generation demonstrates openness and acceptance of diversity. This generation, shaped by uncertain times, exhibits pragmatism and caution regarding future security- physical, emotional, and financial. Consequently, they demonstrate a reduced propensity for risk-taking while favoring the development of options and alternative plans. Their social awareness is evident in the swift dissemination of news and prevailing opinions, as they advocate against societal injustices, such as institutionalized discrimination. Close mentoring relationships are also highly valued.

Innovative methods that integrate social interactions, technology, and academic requirements are necessary for a dynamic learning environment that suits the characteristics of Gen Z learners. Collaborative projects, group-based assignments, and blended learning approaches are highly recommended (Shorey et al., 2021). The table below outlines the key characteristics of Gen Z and the suitable teaching-learning strategies and approaches to support them.

Table 1: Key traits of Generation Z and educational strategies to effectively support their learning (Adapted: Chicca& Shellenbarger, 2018).

Characteristic	***Strategies and approaches to teaching and learning that cater to Generation Z***
Individuals with significant technology usage and a strong desire for digital engagement	- Provide guidance on evaluating digital sources' credibility, relevance, and accuracy, conducting research, and practicing proper citations. - Utilize online tutorials or videos to illustrate information literacy concepts.
	- Describe the ethical obligations associated with the use of social media and confidentiality.
	- Identify several technology platforms suitable for instructional purposes: Virtual learning environments, Hybrid or blended courses, Readings accessible on tablets and smartphones - Utilize accessible online learning platforms, including Khan Academy and CrashCourse.
Pragmatic	Use interactive online textbooks whenever they can.
	Motivated to participate in class activities using their own devices.
	Embrace hands-on learning
	Make explicit connections between theoretical material and real-world examples, and incorporate real-world examples into course content. • Describe a case study • Synchronize what they learn in the classroom with what they do in the field.
	Feedback, feedback, feedback

Characteristic	***Strategies and approaches to teaching and learning that cater to Generation Z***
Underdeveloped social and relationship skills	Provide students with flexible office hours or virtual availability.
	Participate in class discussions by getting there early or staying late.
	Skills in group processing and interpersonal communication, including listening attentively, offering helpful criticism, and considering alternative points of view, should be explained and demonstrated.
	Revise the projects due in cooperative and group settings Establish ground rules for group projects; delegate responsibilities; direct group efforts towards editing and refining the final product
Mindful and worried about the security of one's mental, physical, and financial situation	Assist students in participating in dialogical conversations- those that are respectful and open- particularly with individuals they may disagree with, especially on controversial or sensitive subjects.
	Encourage learners to take on responsibility • Think about implementing learning contracts, particularly for practicum experiences. • Offer options in assignment topics whenever feasible. • Distribute assignment sections to reduce the tendency for overindulgence and procrastination.
Individualistic	When suitable, permit students to engage in independent work and progress at their own speed • Online modules for self-study
	It is advisable to incorporate flexibility in the curriculum and/or coursework whenever possible. • Electives and options for course sequencing • Choose from the menu of course assignments
Increased risk for isolation, anxiety, insecurity, and depression	Identify shifts in student behavior and initial indicators, like unexpectedly skipping class.
	Support students and foster their involvement in the classroom
	Recommend appropriate resources to students.

Characteristic	*Strategies and approaches to teaching and learning that cater to Generation Z*
	Students recognize their classmates and note down a peer's contact information.
Lack of attention span, desire for convenience, and immediacy	Establish achievable expectations for students regarding faculty availability.
	Assist in directing attention through brief intervals of instruction.
	Consistently alternate between different teaching and learning methods throughout a class session. To capture students' interest with shorter attention spans, incorporate a mix of modalities, including lectures, discussions, videos, and demonstrations.
	Focus on depth rather than breadth of information.
	Accurately select readings, including only the most relevant information.
	Employ active teaching and learning methods. • Concept mapping • Flipped classroom • Case studies • Problem-based learning
Open-minded, diverse, and comfortable with diversity	Promote discussions in class about inclusiveness and tolerance.
	Focus group activities involving diverse perspectives from heterogeneous student groupings
	Foster a creative mentality in students, promoting ingenuity, originality, and development.
	Employ diverse methodologies for instruction and evaluation of learning.

Gen Z, viewing themselves as independent problem-solvers, may favor jigsaw formats where individual students research online to provide distinct components for a collective project. However, their constant access to global information may contribute to a diminished interest in current events. The objective is to design collaborative projects that allow individual students to contribute segments while addressing issues they encounter personally (Mohr & Mohr, 2017).

To align teaching with 21st-century competencies, educators must select methods that encourage active student participation in the learning process while facilitating mastery of the 4Cs. Furthermore, to facilitate an effective teaching and learning process, educators must employ creativity

and innovation in applying technology as a medium in their instructional methods. Project-Based Learning (PBL) functions as a method to strengthen students' teamwork and communication skills by engaging them in group work and social interactions designed for problem-solving. PBL promotes student engagement in class projects aligned with their interests and needs while fostering critical thinking and the application of content knowledge. In project-based learning, direct interaction occurs between the teacher and students as they collaboratively develop the project within the classroom (Haniah et al., 2021).

Project-based language learning (PBL) structures learning around projects and is considered a significant advancement in 21st-century education. It promotes student-centered classrooms through active participation (Astawa et al., 2017; Bell, 2010). Project-based learning (PBL) is recognized as an effective method for helping learners analyze problems, explore potential solutions, make decisions, design projects, and resolve issues. It is believed to effectively integrate 21st-century skills and language proficiency within an English as a Foreign Language (EFL) classroom (Gardner, 2000; Fandiño, 2013). Engaging in a series of intentional processes such as planning, distributing responsibilities, implementing the plan, performing self or peer assessments of the results, and reporting outcomes enables students to build relationships that foster the development of various social and communication skills (Bell, 2010).

Project-Based Learning (PBL) focuses on a student-centered pedagogy that fosters a dynamic classroom atmosphere, enabling students to deepen their understanding by engaging in real-world challenges and problems (Essien, 2018). Numerous studies indicate that Project-based instruction effectively enables English language learners to generate comprehensible output and experience integrated language learning. For instance, PBL demonstrated effectiveness in enhancing EFL writing skills (Thitivesa& Essien, 2013; Giawa, 2022; Ilham, 2022), EFL productive skills (Astawa, Artini & Nitiasih, 2017), and language proficiency improvement in general (Arabloo et al., 2021; Yaprak, 2022). Moreover, PBL has a notable impact on the enhancement of 21st-century competencies (4Cs) among secondary school students (Bani-Hamad& Abdullah, 2019; Badr, 2021; Haniah et al., 2021; Sari& Prasetyo, 2021).

Previous studies indicate that PBL resulted in improvements for students, as well as benefits. Imtiaz and Asif (2012) demonstrated that PBL significantly enhanced students' language skills and fostered autonomous learning in Pakistan. Vicheanpant and Ruenglertpanyakul (2012) and Al-Bahadli et al. (2023) demonstrated the effectiveness of problem-based learning (PBL) in enhancing students' communication skills, accompanied by increased positive attitudes, motivation, and engagement in the learning

process. Nassir (2014) identified a significant difference in the English achievement of Iraqi students before and after the application of Project-Based Learning (PBL). Rochmahwati (2016) identified a beneficial impact on the EFL speaking skills of Indonesian students before and after instruction using PBL. The finding coincided with a positive enhancement in students' attitudes towards language learning. Finally, in relation to improving the learning outcomes of student teachers, both studies by Al-Busaidi et al. (2021) and Busayairi et al. (2023) confirmed the effectiveness of PBL as a tool for student teachers' professional development and as a crucial instrument for integrating theoretical and practical dimensions of preservice teacher education.

Due to the complexity of projects, students are organised into groups, fostering communication skills and encouraging individuals with differing or conflicting perspectives to establish common ground or, at minimum, to collaborate without ongoing tension. This teamwork building facilitates students' understanding of specialization and delegation, which are highly significant in real-world contexts (Essien, 2018). It was found that PBL improves students' enthusiasm, confidence, creativity, self-directed learning, and teamwork skills. It also enhances teaching motivation and satisfaction among educators (Astawa, Artini & Nitiasih, 2017).

Technology significantly influences Gen Z students' learning, with blended learning demonstrating superior outcomes for theoretical knowledge compared to face-to-face or e-learning alone (Bock et al., 2021). The integration of various learning environments, including in-person and online modalities, enhances student interaction, collaboration, and ongoing feedback, thereby facilitating reflective learning (Santosa, 2017). Blended learning is an instructional approach that combines the benefits and social interaction opportunities of traditional classrooms with the active learning capabilities of online environments, rather than merely reflecting an arbitrary ratio of delivery modalities. It must be considered not just as a temporary adjustment but as a core transformation of the instructional approach (Dziuban, Hartman & Moskal, 2004).

Blended learning utilizes various resources to connect traditional classrooms with the essential skills required in the twenty-first century. The expansion of online learning represents a significant educational trend in the twenty-first century (Gil & Garcia, 2011). A blended course aims to integrate the most effective aspects of traditional classroom instruction with those of online learning, thereby fostering active, self-directed learning opportunities for students while providing increased flexibility (Jacobsen, 2011). This approach assists university educators in facilitating student-centered and active learning, thereby strengthening the acquisition of vital 21st-century skills, including communication, information literacy,

creativity, collaboration, and the proficiency to leverage digital technologies for diverse purposes (Garrison & Kanuka, 2004; Zurita, Hasbun, Baloian & Jerez, 2015). By using this approach, learning communities can be established that collaboratively develop knowledge through inquiry, reflection, and dialogue (Oakley, 2016).

The advantages of blended learning have been thoroughly examined in research studies on language learning. Most studies aimed to examine alterations in student behavior and performance. They highlighted that blended learning plays a role in enhancing the development of language skills (Albiladi & Alshareef, 2019; Jia et al., 2012; Miyazoe and Anderson, 2010), boosts the English language learning contexts (Shih, 2010), and encourages learners to learn the language authentically (Albiladi & Alshareef, 2019). These studies also demonstrated improved student performance and academic achievement (Zhang & Zhu, 2018; Oweis, 2018), motivation (Oweis, 2018) and a favorable attitude toward hybrid English courses (Shih, 2010).

To conclude, it is clear that implementing PBL approach in instructional practices could be a fruitful means for achieving intended learning outcomes. It is hopefully expected to be more effective if restructured in a blended way, where there is a mixture of face-to-face instruction and online meetings. It is a promising approach that would allow GenZ student teachers to collaborate in order to achieve the target of solving a real problem and developing crucial skills needed in the 21st Century. Finally, its effects on academic achievement would be also promising, as students work hard to make use of theoretical knowledge they acquired in a practical way that would contribute to having an original product.

Attitudes towards PBL:

Attitude serves as a practical and effective framework for elucidating consistent behavioral patterns. It frequently summarizes, explains, and predicts behavior (Baker, 1992). One's attitude towards an object can be inferred from their verbal expressions and behaviors associated with that object. Attitude signifies an evaluation commonly expressed on a bipolar continuum, stretching from favorable to unfavorable or positive to negative, including dimensions such as good-bad, harmful-beneficial, pleasant-unpleasant, and likeable-dislikeable (Azjen, 2001).

Baker (1992) posited that changes in language attitudes may be influenced by personal experiences, notable events (such as violent incidents and mass protests), communities, familial relationships, peer groups, institutions, and mass media. Research by Mantle-Bromley (1995) indicated that purposefully designed language learning programs could foster more positive language attitudes. Gardner et al. (2004) further identified the classroom environment and academic results as key factors

affecting shifts in language attitudes. They concluded that "the possibility of change is not great, but it is larger for variables directly associated with the classroom environment than for more general variables" (p. 28). It can be inferred that improved learning environments may result in favorable changes in attitudes.

Components of attitude

Attitude is conceived of as the mental and neural predisposition, either positive or negative, towards a person, place, object, or event. The ABC model, a widely referenced framework for understanding attitudes (Eagly & Chaiken, 1998; Van den Berg et al., 2006), comprises three components: Affect, Behavior, and Cognition. Attitude comprises three components: the affective component (neural) representing feelings or emotions, the behavioral component (readiness) indicating responses or actions; and the cognitive component (mental) encompassing beliefs or evaluations (Jain, 2014).

The emotional response (like/dislike) to an attitude object is affective. Because emotion and cognition about an attitude object interact simultaneously, an individual's attitude cannot be derived from their ideas about it. Positive or negative attitudes towards PBL can affect students' learning strategies (Railsback, 2002). Second, an appraisal of a person's viewpoint (belief or disbelief) regarding an issue indicates the cognitive component. According to Fishbein & Ajzen (1975), a belief involves information that associates an object with a particular attribute. Regarding PBL, people have stronger positive sentiments towards objects they identify with positive traits. Finally, the behavioral aspect is an individual's verbal or nonverbal predisposition to behave or respond to an attitude object (Wicker 1969). A person's positive or negative reaction to an action pertains to an attitude object. Usually, attitudes are predictable. In other words, a series of reactions to an attitudinal stimulus may be organized or predictable.

While distinct processes, the affective, cognitive and behavioral components operate in an integrated and interrelated manner to convey the attitude. As they share a common attitude, they operate consistently. Each component influences the other two; thus, changes in one component's attitude result in changes in the other components. This process renders the attitude dynamic.

According to Komol and Suwanphathama (2020), attitudes are categorized into two types: positive and negative. Students with positive attitudes are more likely to experience improvements in their learning performance. Their performances and outcomes in language acquisition may decline when they exhibit negative attitudes. Moreover, students form their attitudes based on their judgment of certain objects' usefulness or value to them. In addition to positive and negative attitudes, there was a neutral

attitude, when people tended to have a non-dominant attitude, not positive or negative (Tella, Indoshi& Othuon, 2010; Tran& Tran, 2020).

Attitudes and 21st-century competencies are essential factors that enable project-based learners to enhance their learning capacity, achieve a deeper understanding of conceptual knowledge, and foster learner autonomy (Tella, Indoshi& Othuon, 2010; Tran & Tran, 2020). Recent studies on students' attitudes towards PBL are limited in number. Han (2017) conducted a survey across six high schools in Korea to examine students' attitudes towards science, technology, engineering, and mathematics (STEM) project-based learning (PBL). Results indicated that students with positive attitudes towards PBL preferred pursuing STEM majors in the future. Haryatti (2017) conducted a study to assess students' attitudes regarding the implementation of PBL within Computer Assisted Language Learning (CALL). Results indicated that students held positive attitudes towards PBL. Studies conducted recently show that students usually have positive attitudes towards project-based learning (PBL).

Methodology:

The following section includes participants, design, instruments, and the treatment procedures followed in the current research.

Participants:

Participants in the research were two hundred and thirty Gen Z junior student teachers (N= 230) enrolled in the third year of the English Major Program at the Faculty of Education, Mansoura University, during the second semester of the academic year ٢٠٢٣-٢٠٢٤. The alphabetical division of the participants resulted in two groups: the control group, made up of the first half, and the experimental group, made up of the second half. Both groups studied the "Methods of Teaching EFL for Special Needs" course. However, the experimental group (n=115) were taught by the researcher by implementing the blended project-based approach, while the control group (n=115) was taught by another instructor through the traditional method of lectures and having some individual assignments of preparing application activities. Both groups studied the same course for the first time. Students' ages ranged between 19 and 20 years old. Their experiences in learning English as a foreign language were almost the same starting from the first year at the primary stage. They constituted a homogenous group of Gen Z students who graduated from the literary section at the general secondary stage.

Design:

This research employed a quasi-experimental design with pre-post administration across two independent groups to assess the effectiveness of blended project-based learning in promoting 21st-century core competencies, academic performance, and attitudes towards project-based

learning among Generation Z junior English major prospective teachers at the Faculty of Education.

Instruments:

The instruments listed below were developed by the researcher and administered to achieve the purposes of the current research:

(1) The 21st Century Core Competencies Assessment Inventory

The 21st Century Core Competencies Assessment Inventory is a self-assessment tool designed to measure Gen Z English major student teachers' levels in the four specified competencies before and after the experimental treatment. Self-assessment is considered a formative strategy aimed at helping students recognize their strengths and weaknesses, allowing them to make improvements based on specific criteria. It is employed to encourage self-regulation, assist students in reflecting on their progress, and guide revisions and improvements in a project.

The inventory consisted of forty-five statements distributed to four competencies: collaboration, communication, critical thinking and creativity. There were some negative statements to guarantee the validity and consistency of students' responses to the inventory. The specifications of the inventory are illustrated in table (2) below:

Table (2): Specifications of the 21st Century core competencies Assessment Inventory

Competencies	No. of statements	Negative statements no.
1- Collaboration	1- 12	3
2- Communication	13- 24	22
3- Critical thinking	25- 33	28
4- Creativity	34- 45	37, 42

Students assessed their proficiency in each competency by rating the statements on a five-point Likert scale, ranging from (5) strongly agree to (1) strongly disagree. To assess the **validity** of the inventory, the statements were presented to several TEFL specialists for evaluation regarding their appropriateness and clarity. The jurors expressed their perspectives, noting that the inventory was clear and suitable for assessing students' 21st-century 4Cs competencies.

The internal consistency and reliability of the 21st Century Core Competencies Assessment Inventory were estimated through the inventory pilot administration to (٣٠) students other than the study sample. The results of this pilot study were as follows:

The first step in assessing the inventory's internal consistency was to calculate the Pearson correlation coefficient between each statement's score

and the overall score for the core competency in the 4Cs framework. The results are demonstrated in table (3).

Table 3: ***The correlation between the score of each statement and the 21st century 4 Cs Core Competencies***

Core competencies	N	Correlation Coefficient	Core competencies	N	Correlation Coefficient
(1) Collaboration	1	0.753**	(3) Critical thinking	25	0.93**
	2	0.771**		26	0.84**
	3	0.762**		27	0.73**
	4	0.633**		28	0.69**
	5	0.784**		29	0.78**
	6	0.693**		30	0.79**
	7	0.69**		31	0.82**
	8	0.58**		32	0.86**
	9	0.753**		33	0.77**
	10	0.836**	(4) Creativity	34	0.69**
	11	0.818**		35	0.8**
	12	0.755**		36	0.803**
(2) Communication	13	0.684**		37	0.76**
	14	0.8**		38	0.72**
	15	0.803**		39	0.78**
	16	0.736**		40	0.75**
	17	0.617**		41	0.84**
	18	0.784**		42	0.66**
	19	0.753**		43	0.81**
	20	0.837**		44	0.69**
	21	0.653**		45	0.86**
	22	0.84**			
	23	0.79**			
	24	0.86**			

****Correlation is significant at the 0.01 level.**

Table (3) displays that the correlation coefficients were significant at the 0.01 level, suggesting a strong relationship between the scores of the inventory statements and the core 4Cs competencies.

Second, for the hypothesized consistency of the inventory, the relationship between the score of each core competency and the overall score of the inventory was measured. The findings are displayed in Table (4).

Table 4: ***The correlation between the score of each core competency and the total score of the inventory***

Core competencies	Correlation Coefficient	Sig
Collaboration	0.91	0.01
Communication	0.892	0.01
Critical thinking	0.767	0.01
Creativity	0.89	0.01

As indicated in Table (4), the correlation coefficients were both positive and statistically significant at the 0.01 level. This means that the inventory had a valid internal consistency.

Reliability of the inventory:

Cronbach's Alpha method was used to estimate the reliability of the inventory, with the variance of the inventory items being calculated. This method illustrates the correlation between the statements and between each statement and the total score of the inventory. The results were as follows:

Table 5: Cronbach's Alpha reliability coefficient for the 21st century Core Competencies Assessment Inventory

Core competencies	N of Items	Cronbach's Alpha
Collaboration	12	0.86
Communication	12	0.89
Critical thinking	9	0.74
Creativity	12	0.81
Total	45	0.904

It is evident that the reliability coefficient for the whole inventory equals (0.904) which means that the inventory was suitable for the purposes of the research.

Duration of responding to the Inventory:

The time needed to respond to the inventory statements was estimated by recording each student's time spent piloting instruments and then estimating the mean time needed to respond to the inventory. The estimated time was about ٣٥ minutes. Thus, the 21st Century Skills Assessment Inventory was ready in its final version to be applied in the research (see Appendix A)*.

(2) The Academic Performance Test

The purpose of the test was to measure the actual level of junior student teachers' knowledge of the course content after applying the

* Appendices are available from the researcher upon request.

blended PBL, thus determining the effectiveness of the treatment in developing students' academic performance.

The test included two types of questions; multiple choice and true/ false questions distributed to the cognitive levels of Bloom's taxonomy. The first part consisted of 15 multiple choice questions and the second part consisted of 20 true/ false questions. The researcher relied upon the course specification to formulate the questions of the test. The total score of the test was 70 marks; 2 marks were assigned to each question.

Test validity

The initial version of the test was submitted to three TEFL professors for assessment regarding the appropriateness of the questions and the level of difficulty, in order to gauge its content validity. The test demonstrated its validity through the jurors' confirmation.

Piloting the test:

To estimate test structural validity (internal consistency) and reliability, a pilot sample, separate from the main study sample, was used to administer the test (n=30).

First: Structural Validity (Internal consistency) of the test:

To determine the degree to which the achievement test is internally consistent, correlation coefficients between the scores of each question and the total score of the main level to which it belongs and between the scores of each question and the total score of the test were calculated.

Initially, the following is a list of the values of the correlation coefficients that were found between the overall score of the cognitive level to which each question belonged and the score of each individual question:

Table 6: Values of correlation coefficients between questions and cognitive levels of the achievement test

Cognitive level	No.	Correlation Coefficient	Cognitive level	No.	Correlation Coefficient	Cognitive level	No.	Correlation Coefficient
Remembering	1	0.723**	Higher-order levels	14	0.665**	Higher-order levels	12b	0.723**
	2	0.888**		1b	0.75**		13b	0.41*
	13	0.759**		2b	0.816**		14b	0.71**
Understanding	9	0.622**		3b	0.849**		15b	0.4*
	10	0.8**		4b	0.467**		16b	0.823**
	15	0.726**		5b	0.433*		17b	0.492**
Applying	7	0.715**		6b	0.725**		18b	0.515**
	12	0.692**		7b	0.563**		19b	0.483**
Higher- order levels	3	0.723**		8b	0.695**		20b	0.62**
	4	0.592**		9b	0.65**			
	8	0.565**		10b	0.685**			
	11	0.783**		11b	0.65**			

****Correlation is significant at the 0.01 level.**

***Correlation is significant at the 0.05 level.**

Based on the statistics in Table (6), almost all correlation coefficients were statistically significant at 0.01(except for items no. 13b and 15b, which were significant at the 0.05 level). This indicates a strong correlation between each item's score and the total score of the level to which it belongs.

Secondly, to evaluate the anticipated consistency of the test, the correlation coefficients between the scores of each cognitive level and the overall test score were analyzed. The results are displayed in Table (7).

Table 7: Correlation between cognitive level scores and test score

Cognitive levels	Correlation Coefficient	Sig
Remembering	0.706	0.01
Understanding	0.87	0.01
Applying	0.91	0.01
Higher-order levels	0.817	0.01

The results in Table (7) clearly show that correlation coefficients were positive and statistically significant at the 0.01 significance level. This indicates that the test had valid internal consistency.

Reliability of the knowledge test:

The test's reliability was assessed using Cronbach's Alpha technique, which involved calculating the variance of the test items.

Through this method, the correlation between the questions in each cognitive level and between each level and the total test score is illustrated. The results were as follows:

Table 8: Cronbach's Alpha reliability coefficient for the achievement test

The whole test	N of Items	Cronbach's Alpha
Total	35	0.799

It is evident that the reliability coefficient for the whole test equals (0.799) which means that the test was suitable for the purposes of the research.

Calculating the ease, difficulty and the discrimination coefficients for the test items:

To calculate the ease and difficulty factors for each test item, the following equation was used:

Ease factor = number of correct answers / (number of correct + incorrect answers) (for questions one or zero), and ease factor = students' Mean score/ question maximum score (for questions that are scored out of 2)

It was found that the ease coefficients ranged between (0.2-0.8).

The **discrimination coefficient** was calculated for each test item through the following equation:

√(Difficulty factor x Ease factor) = Discrimination factor and it was in the acceptable range of (0.4- 0.5).

Duration of the test:

The test was structured to be answered within two hours according to the faculty's regulations. Consequently, the knowledge test was ready in its final version for administration in the research (see Appendix B).

(3) The Attitude Towards PBL Scale:

The attitude towards PBL scale aimed at assessing students' evaluation of PBL before and after experiencing it. It consisted of three dimensions reflecting the components of attitude according to the ABC Model, including twenty statements, each rated on a 5-point Likert-type scale from 'strongly disagree' to 'strongly agree'. To ensure more valid student responses, two negative statements were included in the second dimension of the scale.

The responses were scored according to the supplied alternatives for students: strongly disagree = 1, disagree = 2, not sure = 3, agree = 4, strongly agree = 5. The negative statements were evaluated inversely: strongly disagree = 5, disagree = 4, neutral = 3, agree = 2, strongly agree = 1.

Content validity of the scale:

To verify the scale's validity, it was presented to a panel of jurors for validation and recommendations for modifications. Minimal terms were suggested for alteration and substitution with more lucid alternatives. The recommendations were implemented, and the challenging terms were substituted with more comprehensible synonyms appropriate for the students' level. Subsequently, it was ready for administration in its definitive form.

Structural Validity (Internal consistency) of the scale:

To assess the structural validity of the scale, it was administered to a sample of thirty students (n=30) distinct from the participants in the main study. Using correlation coefficients between the score (frequencies) of each statement and its corresponding dimension, as well as between the score (frequencies) of each dimension and the total score of the Attitude towards PBL scale, the internal consistency was assessed. Initially, the correlation coefficients between the score of each statement on the scale and the total score of the relevant dimension were as follows:

Table 9: Values of correlation coefficients between statements and dimensions of the scale

Dimensions	No.	Correlation Coefficient	Dimensions	No.	Correlation Coefficient
(1) Feelings	1	0.747**	Thoughts and Beliefs	11	0.865**
	2	0.812**		12	0.73**
	3	0.717**	(3) Taken Actions	13	0.873**
	4	0.715**		14	0.873**
	5	0.765**		15	0.887**
	6	0.751**		16	0.893**
(2) Thoughts and Beliefs	7	0.712**		17	0.873**
	8	0.723**		18	0.908**
	9	0.761**		19	0.885**
	10	0.676**		20	0.806**

****Correlation is significant at the 0.01 level.**

Results in table 9 illustrate that correlation coefficients were significant at (0.01) level of significance which indicates that there is a significant relationship between the score of each statement and the total score of the dimension to which it belongs. In other words, each statement was strongly related to the dimension to which it belongs.

Second, for verifying structural validity of the scale, correlation coefficients between the scores of each dimension and the total score of the scale were estimated. The results were as follows:

Table 10: Correlation coefficient values between the dimensions and the scale's overall score

Dimensions	Correlation Coefficient	Sig
1st Feelings	0.775	0.01
2nd Thoughts and beliefs	0.775	0.01
3rd Taken actions	0.827	0.01

The results in Table 10 indicate that correlation coefficients were positive and statistically significant at the (0.01) level. The results also indicate that the Attitude towards the PBL scale demonstrated a high level of internal consistency.

Reliability of the Attitude towards PBL Scale:

The reliability of the scale was assessed using Cronbach's Alpha method, which determines the variance among the scale items. This method illustrates the degree of correlation among the items and the relationship of each item with the overall score of the scale. The results are presented in the table below:

Table 11: Cronbach's Alpha Reliability Coefficient for the Attitude towards PBL Scale

Scale	N of Items	Cronbach's Alpha
Total	20	0.865

The reliability coefficient value of the whole scale was (0.865) which is a good value for reliability (0.9 ≥ α ≥ 0.8). This implied that the scale was reliable and suited the purposes of the research. Hence, the scale was ready in its final version for administration in the current research (see Appendix C)

Data Collection:

Prior to implementing the treatment, the researcher assessed both the experimental and control groups using the 21st Century Core Competencies Assessment Inventory and the Attitude towards PBL Scale to ensure equivalence between the two groups. The achievement test was not administered to either group as neither had studied the course before. A "t" test for independent groups was used to compare the means of the students' scores on the study tools. Table 12 shows the results of the pre-administration of the 21st Century Core Competencies Assessment Inventory.

Table 12: Comparing experimental and control groups on the pre-administration of the 21st Century Core Competencies Assessment Inventory.

Competencies	Groups	N	Mean	Std. Deviation	T Value	df	Sig
a. Collaboration	Experimental	115	14.19	2.53	0.739	228	Not Sig at 0.05
	Control	115	13.95	2.467			
b. Communication	Experimental	115	14.12	2.169	0.448	228	Not Sig at 0.05
	Control	115	13.99	2.25			
c. Critical thinking	Experimental	115	12.55	0.901	1.266	228	Not Sig at 0.05
	Control	115	12.70	0.973			
d. Creativity	Experimental	115	16.43	3.676	0.63	228	Not Sig at 0.05
	Control	115	16.74	3.855			
Total	Experimental	115	57.29	6.729	0.106	228	Not Sig at 0.05
	Control	115	57.38	6.926			

The results presented in Table 12 demonstrate that the mean scores of the two groups did not show a statistically significant difference on the 21st Century Core Competencies Assessment Inventory, indicating that both groups are equivalent in their proficiency in these competencies.

The results of the pre-administration of the Attitude towards PBL scale are illustrated in Table 13.

Table 13: comparing experimental and control groups on the pre-administration of the Attitude towards PBL Scale

Dimensions	Groups	N	Mean	Std. Deviation	T Value	df	Sig
1	Experimental	115	10.88	2.340	1.76	228	Not Sig at 0.05
	Control	115	10.32	2.455			
2	Experimental	115	10.96	2.036	0.188	228	Not Sig at 0.05
	Control	115	10.90	2.16			
3	Experimental	115	12.35	0.761	0.173	228	Not Sig at 0.05
	Control	115	12.37	0.765			
Total	Experimental	115	34.18	2.928	1.571	228	Not Sig at 0.05
	Control	115	33.59	2.778			

The results presented in Table 13 demonstrate no statistically significant difference in the mean scores of the two groups on the Attitude towards PBL scale, indicating that both groups had equivalent attitudes towards PBL prior to the treatment.

The Intervention

The aim of the intervention:

The current intervention aimed at developing the 21st-century core competencies (the 4 Cs), academic performance, and attitude towards PBL of Gen Z English major student teachers. To achieve that aim, a blended PBL approach was utilized within the course.

Objectives of the intervention:

By the end of the proposed intervention, students should be able to:

1- Apply the steps of project-based learning to manipulate topics in the special needs course.
2- Attain high levels of learning and academic performance in relation to the course studied.
3- Master the 4Cs: collaboration, communication, critical thinking, and creativity, which are 21st-century core competencies.
4- Develop positive attitudes towards PBL.

Designing the blended project-based course

Third-year English major student teachers in the sixth semester of their four-year teacher education program study a course entitled “Methods of Teaching EFL to Special Needs Students”. The course handles various learning difficulties and impairments and how to diagnose and deal with them in the EFL classroom. It also relates all the difficulties and impairments to the inclusive classroom. The course handles these difficulties theoretically, giving examples now and then for students to remember.

The course was restructured to incorporate blended project-based learning, engaging students in diverse tasks and activities that enhanced their comprehension of issues pertaining to teaching English to students with special educational needs. They worked in teams of their own choice consisting of 10 to 15 student teachers. Each team was asked to select a learning difficulty or impairment to develop a project that consisted of a PowerPoint Presentation, a poster, and two or more practical activities to be used in teaching EFL to special needs students.

On one hand, face-to-face lectures involved introducing the course; its learning outcomes, learning difficulties included as a content, introduction to the hybrid PBL approach and its steps. The researcher gave the experimental group a thorough idea about the approach and how the course would proceed. On the other hand, online lectures or meetings were held through Zoom application where teams presented their PowerPoint presentations, received feedback to their presentations, asked for clarification or help, shared peer feedback and suggestions of improvement for the presentations.

The phases of the project-based learning methodology were implemented during the course in accordance with the ten-step framework: Step 1: Students and the instructor choose a theme for the project; Step 2: The students and the teacher delineate the project's objectives; Step 3: The students and the teacher arrange the project's framework. Step 4: The educator prepares students to fulfil the criteria for information acquisition. Step 5: Students gather data. Step 6: The instructor directs students in the compilation and analysis of data. Step 7: Students aggregate and evaluate the material. Step 8: The instructor provides students with the language prerequisites for the final activity. Step 9 entails students presenting the finished output, whereas Step 10 necessitates students evaluating the project (Lam, 2011).

The students completed all primary phases of project design. The project allowed students to apply the knowledge and skills acquired during the course. Their projects were displayed in a project exhibition attended by the Faculty Vice Dean for Student Affairs, some interested faculty members and student teachers (For exhibition photos, see Appendix D).

Students were assessed through the 21st Century Core Competencies Assessment Inventory, a final knowledge test and an Attitude Towards PBL Scale.

Results:

Testing the first hypothesis:

The first hypothesis stated that "There is a statistically significant difference between the mean scores of the experimental and control group students on the post-administration of the 21st Century Core Competencies Assessment Inventory in favor of the experimental group". To verify the first hypothesis, the researcher employed a "t" test for independent groups to assess the significance of differences between the mean scores of the experimental and control group students following the administration of the 21st Century core competencies Inventory. The table below presents (t) values alongside their statistical significance.

Table 14: comparing the experimental and control groups on the post-administration of the 21st Century Core Competencies Assessment Inventory

Core competencies	Groups	N	Mean	Std. Deviation	T Value	df	Sig
Collaboration	Experimental	115	56.01	1.442	61.32	228	0.01
	Control	115	31.50	4.036			
Communication	Experimental	115	52.77	2.330	51.9	228	0.01
	Control	115	33.44	3.242			
Critical thinking	Experimental	115	41.76	0.854	38.88	228	0.01
	Control	115	22.78	1.19			
Creativity	Experimental	115	52.66	2.797	43.38	228	0.01
	Control	115	33.50	3.824			
Total	Experimental	115	203.19	4.527	101.6	228	0.01
	Control	115	121.23	7.372			

A statistically significant difference exists between the mean scores of the experimental and control groups on the post-administration of the 21st Century Core Competencies Assessment Inventory, favoring the experimental group. The mean scores ranged between (41.76) and (56.01) for the experimental group and between (22.78) and (33.50) for the control group. The values of "t" were statistically significant at (0.01) level of significance in favor of the experimental group, both for the total score of the inventory (t= 101.6) and the scores of the component four dimensions (t value ranged between 38.88 and 61.32). Thus, the first hypothesis was verified and accepted.

Hypothesis two posited that there exists a statistically significant difference between the mean scores of the experimental group students on the pre- and post-administrations of the 21st Century Core Competencies Assessment Inventory, with the post-administration scores being higher.

To verify the second hypothesis, the researcher used the "t" test for dependent groups to identify the significance of differences between the

mean scores of the experimental group students on the pre-and post-administrations of the 21st Century Skills Assessment Inventory. The table below presents (t) values along with their statistical significance.

Table 15: Comparing the pre-and post-administrations of the 21st Century Core Competencies Assessment Inventory to the experimental group

Core competencies	Measurement	N	Mean	Std. Deviation	T Value	df	Sig	(η2)
Collaboration	Pre	115	14.19	2.53	145.1	114	0.01	0.995
	Post		56.01	1.442				
Communication	Pre	115	14.12	2.169	126.97	114	0.01	0.993
	Post		52.77	2.330				
Critical thinking	Pre	115	12.55	0.901	235.9	114	0.01	0.998
	Post		41.76	0.854				
Creativity	Pre	115	16.43	3.676	92.94	114	0.01	0.987
	Post		52.66	2.797				
Total	Pre	115	57.29	6.729	193.5	114	0.01	0.997
	Post		203.19	4.527				

The results presented in Table 15 show a statistically significant difference between the mean scores of the experimental group students on the pre-and post-administrations of the 21st Century Core Competencies Assessment Inventory, with higher post-administration scores. Mean scores of the post-administration ranged between ($41.76 \leq M \leq 56.01$) for the component dimensions and were (203.19) for the total score on the post-administration of the test. The values of "t" ranged between ($92.94 \leq t \leq 235.9$) and was (193.5) for the total score. All these values are statistically significant at (0.01) level, indicating that the blended PBL course effectively promoted the targeted 4Cs competencies. Consequently, the second hypothesis was verified and accepted.

To examine the impact of the proposed intervention, i.e. the blended PBL on the 21st Century core competencies of Gen Z English major student teachers, the effect size of the proposed intervention was assessed by comparing the mean scores of students in the experimental group on the pre-and post-administrations of the 21st Century core competencies Inventory using η2. The data presented in Table 15 indicate that the effect size of the proposed intervention on the 4 Cs competencies collectively was (0.997), a notably high ratio, as the effect ratio is expected to meet or exceed the value of (0.14). The data suggests that a remarkable percentage (99.7%) of the variance in student performance regarding their 4Cs competencies can be ascribed to the influence of the proposed intervention. Regarding each 4Cs sub-competencies, the effect ratio varied between 0.987 and 0.998, indicating a notably high effect. An analysis of these statistics suggests that a variant percentage between 98.7% and 99.8% in students' performance concerning their 21st-century core competencies, specifically the 4Cs, can be ascribed to the effect of the blended PBL-based course implementation.

Hypothesis three stated, “There would be a statistically significant difference between the mean scores of the experimental and control group students on the post-administration of the academic knowledge test on the project-based course in favor of the experimental group”. The knowledge test was only post-administered to the experimental and the control groups because they had not studied the PBL-based course before. To verify the third hypothesis, the researcher employed the "t" test for independent groups to assess the differences between the mean scores of the experimental and control group students following the administration of the knowledge test. The table below presents (t) values along with their statistical significance.

Table 16: Comparing the experimental and control groups on the post-administration of the knowledge test

Levels	Groups	N	Mean	Std. Deviation	T Value	df	Sig
Remembering	Experimental	115	5.23	0.501	2.198	228	0.05
	Control	115	5.07	0.631			
Understanding	Experimental	115	5.25	0.493	4.704	228	0.01
	Control	115	4.87	0.72			
Applying	Experimental	115	3.80	0.402	37.08	228	0.01
	Control	115	1.61	0.49			
Higher-order levels	Experimental	115	50.17	0.868	85.28	228	0.01
	Control	115	39.82	0.97			
Total	Experimental	115	64.45	1.306	63.26	228	0.01
	Control	115	51.37	1.793			

The post-administration results of the knowledge test reveal a statistically significant difference in favor of the experimental group compared to the control group. The mean score of the test was 64.45 for the experimental group and 51.37 for the control group. The difference in means was limited; however, the "t" values were statistically significant at the 0.01 level for the experimental group, both for the total test score (t= 63.26) and for three of the four component levels: understanding, applying, and higher-order levels. The remembering level attained significance at the 0.05 level. Consequently, the third hypothesis was verified and accepted.

The fourth hypothesis stated that “There would be a statistically significant difference between the mean scores of the experimental and control group students on the post-administration of the Attitude towards PBL Scale in favor of the experimental group”. To verify this hypothesis, the researcher employed the "t" test for independent samples to ascertain the significance of mean score changes between the experimental and control groups following the administration of the attitude scale. The table below presents (t) values along with their statistical significance.

Table 17: Comparing the experimental and control groups on the post-administration of the Attitude towards PBL scale

Dimensions	Groups	N	Mean	Std. Deviation	T Value	df	Sig
Feelings	Experimental	115	27.37	0.995	29.91	228	0.01
	Control	115	17.78	3.292			
Thoughts and Beliefs	Experimental	115	28.27	1.391	28.524	228	0.01
	Control	115	18.22	3.514			
Taken Actions within PBL	Experimental	115	36.22	1.248	30.77	228	0.01
	Control	115	25.23	3.618			
Total	Experimental	115	91.86	2.328	41.55	228	0.01
	Control	115	61.23	7.555			

The post-administration results of the Attitude towards PBL scale revealed a statistically significant difference in mean scores between the experimental and control groups, with the experimental group scoring higher. The mean score for the experimental group was 91.86, while the control group had a mean score of 61.23. The "t" values were statistically significant at the 0.01 level in favor of the experimental group for the scale's total score and the scores of the three component dimensions. Consequently, the fourth hypothesis was verified and accepted.

The fifth hypothesis stated that "There would be a statistically significant difference between the mean scores of the experimental group students on the pre-and post-administrations of the Attitude towards PBL Scale in favor of the post one". To verify this hypothesis, the researcher employed the "t" test for dependent groups to assess the significance of differences between the mean scores of the experimental group students on the pre-and post-administrations of the Attitude towards PBL scale. Table (18) presents the results.

Table 18: Comparing the pre- and post-administration of Attitudes towards the PBL scale to the experimental group

Dimensions	Measurement	N	Mean	Std. Deviation	T Value	df	Sig	(η2)
Feelings	Pre	115	10.88	2.34	69.77	114	0.01	0.977
	Post		27.37	0.995				
Thoughts and Beliefs	Pre	115	10.96	2.036	77.71	114	0.01	0.982
	Post		28.27	1.391				
Taken Actions within PBL	Pre	115	12.35	0.761	183.8	114	0.01	0.996
	Post		36.22	1.248				
Total	Pre	115	34.18	2.928	181.29	114	0.01	0.996
	Post		91.86	2.328				

The data in Table 18 demonstrate a statistically significant improvement in the experimental group's mean scores on the Attitude

towards PBL scale from pre- to post-administration, favoring the latter. The mean score for the post-administration was 91.86, considerably higher than the mean score of 34.18 for the pre-administration. The values of "t" were statistically significant at the (0.01) level, indicating that the course effectively promoted a positive attitude towards PBL for the targeted sample. Consequently, the fifth hypothesis was verified and accepted.

Discussion:

The current research investigated the effect of blended Project- Based Learning on 21st-century core competencies, academic performance and attitudes towards PBL among Gen Z English major prospective teachers at the Faculty of Education. The results showed that the experimental group had significantly higher mean scores on the 21st Century Core Competencies Assessment Inventory, the knowledge test, and the Attitude towards PBL scale compared to the control group, with a significance level of 0.01. This means that English major student teachers' 4Cs competencies, academic performance, and attitude towards PBL improved as a result of applying the blended project-based learning. In addition, the experimental group's mean scores on the Attitude towards PBL scale and the 21st Century Core Competencies Assessment Inventory significantly differed before and after the post-administration, with the post-administration showing a clear advantage. Consequently, this indicates that the proposed treatment effectively promoted 21st-century skills, namely, collaboration, communication, critical thinking, creativity, and a positive attitude towards PBL.

The present study provides evidence for the effectiveness of using a blended Project-based learning approach in promoting English major student teachers' 21st Century Skills, academic achievement and positive attitudes towards PBL. The findings of the current study corroborate the previous relevant studies that investigated the effect of using PBL approach in general on developing language skills such as writing as proved by Thitivesa and Essien (2013), Giawa (2022), Ilham (2022); EFL productive skills such as Rochmahwati (2016), and Astawa, Artini and Nitiasih (2017); and language proficiency improvement in general such as Imtiaz and Asif (2012), Arabloo et al. (2021), and Yaprak (2022). Moreover, it substantiates the results reached by other similar studies that PBL had a significant effect on the improvement of 21st-century skills (4Cs) such as Vicheanpant and Ruenglertpanyakul (2012), Bani-Hamad and Abdullah (2019), Badr (2021), Haniah et al. (2021), Sari and Prasetyo (2021), and Al- Bahadli et al. (2023). Finally, in relation to improving the learning outcomes of student teachers, both studies by Al-Busaidi et al. (2021) and Busayairi et al. (2023)

confirmed the effectiveness of PBL as a tool for student teachers' professional development and as an essential instrument for integrating theoretical and practical dimensions of preservice teacher education.

The achieved results could be attributed to the benefits of incorporating the hybrid collaborative PBL approach in teaching the targeted course, which in fact has a plethora of features that allow for more interaction, collaboration, critical thinking, and creativity on the part of English major student teachers. These features unite the advantages of hybrid and collaborative learning where students can meet anywhere and at any time that suits them and allow for more opportunities for creative thinking. PBL aids teachers and students to achieve high levels of performance in the targeted knowledge and skills because it increases students' activeness and motivation during the learning process and enables them to apply the knowledge they acquired to achieve the maximum benefit of that theoretical knowledge.

Generally speaking, Gen Z English major participants in the research reported satisfaction with the blended PBL course and its characteristics; they described it as distinct, motivating, engaging, and aligned with their preferred learning styles and ways of constructing knowledge. They were especially interested in the idea of collaborating with their teams to provide evidence for their full comprehension of the content provided. They formed the teams according to their choice, selected a difficulty of their interest, and selected how they could illustrate their understanding. Further, they were satisfied with the effort they exerted within the framework of the collaborative projects.

Project-based learning is a practical pedagogical approach that fosters active and profound learning by engaging students in exploring real-world problems within a collaborative framework. This method cultivates essential 21st-century skills, including collaboration, communication, critical thinking, and creativity. The feedback exchanged between the instructor and students within and among the teams facilitated the acquisition of new insights regarding their projects. Feedback is considered essential for the effective implementation of PBL. The role of the instructor as a facilitator, guide, and consultant contributed to the success of the course, where students found fruitful guidance throughout the process of working on their projects. Especially for the face-to-face component of the blended course, GenZ student teachers changed their attitudes towards it from the beginning till the end of the duration of the treatment. At the beginning of the treatment, students were reluctant to share and participate in the discussions and lectures held directly to clarify any misconceptions about the course content. However, by the end of the treatment, they were more interested in participation and collaboration to

have the best project. The findings indicate that sharing activities and feedback fosters a positive classroom environment, improves teacher-student relationships, and enhances proactive learning attitudes.

Conclusion:

In conclusion, 21st-century skills are no longer a luxury requirement for current and future generations. They should be nurtured alongside academic competence. Students majoring in English from Generation Z exhibit high technological proficiency. They demonstrate considerable adaptability to innovative trends and promptly integrate emerging and current technologies and information and communication devices into their academic and professional pursuits. This implies that faculty members ought to adapt their conventional teaching methods to incorporate contemporary technologies and strategies that address the requirements of Gen Z students.

Effective use of PBL promotes deep and sustaining student learning. PBL has the potential to significantly impact students' lives, particularly for those with limited access to peers. It demonstrates a direct effect on the communication of EFL college students. The interaction during project presentations and feedback sessions encouraged students to engage in inquiry and discussion, subsequently influencing their overall performance, achievement, and attitudes.

Recommendations:

The current study yielded the following recommendations:

1. Much attention should be directed to orienting university students in project-based learning, as it is a convenient teaching-learning approach in the current digital era.
2. Teacher training programs should incorporate project-based learning (PBL) to cultivate creative educators capable of critical thinking, effective communication, and collaborative work.
3. Digital competence is essential for university professors aiming to integrate modern techniques into their lessons and address the needs of Gen Z students.
4. Teachers should facilitate student exploration of skills through project-based learning and promote a deeper understanding of the methodology. Teachers' beliefs and commitment are critical for successfully implementing project-based learning for students.
5. Teachers are required to develop comprehensive PBL lesson plans and select suitable techniques and tools to improve PBL effectiveness. Rubrics and portfolios should be established for assessment purposes.

Suggestions for further research:

In light of the outcomes and recommendations of this research, the following topics are proposed for future investigation:

• The effectiveness of using hybrid PBL in developing EFL academic writing skills of English major students at faculties of Education.

• The effect of implementing the PBL on EFL student teachers' critical reading and creative writing skills.

• A proposed training program based on digital tools to develop 21st-century skills and self-regulation of secondary stage students.

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