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The Effect of Web 2.0-Supported Gamification on EFL Students' Self-Efficacy in Online Learning Environments

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Abstract

While online learning is not a new way of teaching and learning practices, various challenges, often stemming from motivational issues, lead to high dropout rates. For this reason, educators have increasingly integrated gamified tools and online teaching strategies, which offer new learning experiences through game elements. These tools proved especially effective during the COVID-19 pandemic and are expected to continue transforming education across all levels, including higher education. One critical factor influencing student success in both traditional and online settings is self-efficacy. This study investigated the impact of Web 2.0-supported gamification on the self-efficacy of EFL (English as a Foreign Language) students in an online learning environment. A quasi-experimental method and a mixed-method sequential explanatory design were used. Participants included 60 first-year undergraduate students taking English as a compulsory course at a state university in Türkiye. A scale and a semi-structured interview form were used as data collection tools. Quantitative data were analyzed statistically, while qualitative data were examined through content analysis. Findings showed a statistically significant increase in self-efficacy levels of the experimental group who used gamified tools. These results suggest that Web 2.0-supported gamification can be an effective strategy for enhancing learner self-efficacy in online language learning environments.

Keywords: gamification, learning self-efficacy, online learning, online learning environments, web 2.0 tools.

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Introduction

The growth of online learning with the proliferation of information and communication technologies (ICTs) in today's digital world enables both face-to-face and flexible and self-directed learning, where online courses and games are incorporated into the teaching and learning process (Palaniappan & Noor, 2022). The replacement of traditional face-to-face teaching practices with online learning environments, especially during the pandemic, has affected human life in many aspects, including health, economy, and tourism, as well as education (Hebebci et al., 2020; Özen & Karaca, 2021). Thus, educational institutions have been asked to offer more flexible teaching and learning practices through online platforms (Oliveira et al., 2021). Accordingly, countries have had to find alternative ways to transform educational practices digitally. Although online learning has a long history and the number of students participating in online learning platforms is constantly increasing, there are some challenges related to student motivation in these environments, leading to high course dropout rates (Park & Choi, 2009).

Self-efficacy, a key determinant of learners' success in online learning, is one of the most frequently researched topics in educational studies (Prior et al., 2016). The functional features of self-efficacy in online learning can be better revealed by investigating and evaluating the mediating role of self-efficacy to clarify which factors may influence participants' reactions and behaviors when using online learning technology (Bates & Khasawneh, 2007). Furthermore, it is believed that one's self-efficacy plays a crucial role in their motivation (Özen & Karaca, 2021). Lee and Mendlinger (2011) investigated whether students' perceived self-efficacy beliefs affected their perceptions regarding the ease and usefulness of learning in an online environment via samples attained from online classroom students in Korea and the United States. The findings revealed that there was a positive relationship between perceived self-efficacy and perceptions of the ease and usefulness of online learning environments. A research study aiming to investigate learner characteristics in distance learning platforms showed that learners have relatively positive distance learning self-efficacy beliefs that are related to both their self-regulation skills and intrinsic motivation. Moreover, learners' distance education self-efficacy, information processing skills, and self-regulated learning skills were found to be important indicators of learners' gains in distance education platforms (Zhang et al., 2001). Considering the importance of motivational issues, especially for online learning environments, it is seen that there are limited studies investigating the impact of gamification based on empirical evidence in terms of its educational benefits (Boudadi & Gutiérrez-Colón, 2020). Thus, this present study aims to investigate the effects of gamification via Web 2.0 tools, including Kahoot!, Quizizz, Socrative, and Mentimeter, on EFL learners' self-efficacy in online learning environments based on a quasi-experimental research study.

Gamification and the Hierarchy of Game Elements

Gamification, defined by Deterding et al. (2011) as a technology that uses game design elements in non-

game contexts, has attracted the attention of educational contexts over the years since its adaptation as a trend (Toda et al., 2019). This interest in gamification has increased in recent years in e-learning platforms, including higher education institutions (Alzahrani & Alhalafawy, 2022). Therefore, methods for integrating gamification practices into teaching and learning became increasingly prominent. To be able to design a game-based approach along with a positive impact, several required game elements called components, mechanics, and dynamics should be combined to develop a needs-oriented learning procedure (Bicen & Kocakoyun, 2018). The hierarchical structure of game elements, as illustrated by Werbach and Hunter (2012, p. 82), is as follows:

Figure 1. Game elements hierarchy

As the figure illustrates, game dynamics occupy the top of the hierarchy, addressing the broader picture that must be considered and managed. Game mechanics refer to the fundamental processes that move the action forward and enable player participation in the game, and finally, game components express specific instances of mechanics and dynamics.

Regarding the study, several game elements have been identified in the literature for the selected Web 2.0 tools. For Kahoot!, these include points, leaderboards, rewards (Zarzycka-Piskorz, 2016), winners, feedback (Kıyançiçek & Uzun, 2022), sound effects, and nicknames (Kapsalis et al., 2020). Socrative incorporates live results, immediate feedback (Flores, 2015), badges, scores, and competition (Hetesi, 2021). Quizizz features leaderboards, memes, quiz reports (Anak Yunus & Hua, 2021), points, time restrictions (Pitoyo et al., 2019), rewards, and avatars (Razali et al., 2020). Lastly, Mentimeter includes immediate feedback, entertainment (Gokbulut, 2020), and cooperation (Mohammadi et al., 2021).

Theoretical Framework Regarding Selected Web 2.0 Tools

Kahoot! is an online gamified platform resulting from the Course Quiz research project initiated at the Norwegian University of Science and Technology (NTNU) in 2006 (Lin et al., 2018). The platform, which consists of surveys and quizzes, is considered one of the best online applications for education. It is valued for its ability to create a meaningful and fun learning environment while fostering problem-solving skills and critical thinking (Dellos, 2015). Putri (2019) also suggests that using Kahoot! in the learning process can enhance the quality of student learning in the classroom, reporting the greatest improvements in classroom dynamics, student engagement, motivation, and overall learning experiences. On the Kahoot!

platform, the instructor can use tests in two ways: synchronously during live lessons or asynchronously as homework (Altawalbeh, 2023). Furthermore, Baszuk and Heath (2020) indicate that Kahoot! simplifies the use of technology in the curriculum and provides students with opportunities for active learning and collaboration.

Quizizz is an online student response system that provides learners with multiplayer activities, enabling participants to engage in the process at their own pace. Similar to Kahoot!, it enables instructors to initiate quizzes to facilitate interactive learning. However, unlike Kahoot!, both questions and answers are displayed on student devices, eliminating the need for a projected screen. Additionally, since answering sessions are asynchronous and player-paced, students do not have to wait for others to move on to the next question (Chaiyo & Nokham, 2017). Degirmenci (2021) also suggests that it is effective and plays a crucial role in the English teaching and learning process. Among its advantages, the platform is recommended as an effective assessment tool, as it facilitates the assessment process through gamification (Handoko et al., 2021).

Considering student-response programs, Socrative is used for both formative and summative assessments. It is considered a great tool for language learners, incorporating gamified strategies such as live results and immediate feedback, which help reduce anxiety while enabling students to answer questions through trial and error (Flores, 2015). Additionally, since Socrative is accessible from anywhere with an internet connection, it provides an adjustable learning experience that facilitates real-time student engagement, even in virtual environments (Christianson, 2020). Balta and Güvercın (2016) highlight one of its most valuable features: the ability for instructors to randomize both the order of questions and answer choices, ensuring that each student receives a different sequence of questions during a quiz. Moreover, Awedh et al. (2015) argue that Socrative enhances collaborative learning, ultimately improving students' overall performance.

Mentimeter is an online Web 2.0 application that provides a useful soundboard at the start of a lesson or seminar, allowing instructors to display a question on the board as students arrive. Their answers provide instant context for discussion and debate (Vallely & Gibson, 2018). Ahshan (2021) indicates that Mentimeter activities enable real-time learner-instructor interactions and active learning activities by reflecting participants' responses to instructor questions performed during online sessions. Since participants' answers are instantly and anonymously displayed on the teaching screen, it facilitates quick and anonymous feedback for both quantitative and qualitative questions, like Socrative (Vallely & Gibson, 2018). Moreover, thanks to the anonymous response feature, unlike the traditional discussion process, students do not need to worry about their identity when answering a particular question (Sari, 2021). In Mentimeter's word cloud feature, words repeated by users are placed larger in the center and others smaller at the edges. Responses move dynamically with each new input, and instructors can see the number of respondents instantly so they can decide when to continue (Mayhew et al., 2020).

Previous Studies on Gamification

As gamification is trending in various fields, it has been the focus of research in different disciplines. In this context, various studies have been carried out for educational purposes. Mahayanti et al. (2020) aimed

to investigate the effects of digital games on the self-regulated learning processes of 144 Indonesian young learners of English through a mixed-method explanatory sequential design. Their findings indicated that digital game-based learning motivates participants to perform tasks by taking strategic actions. Similarly, Park and Kim (2021) explored the impact of gamified online learning activities on student learning by utilizing a platform called Science Level Up. Their study revealed that gamified learning positively influences students' motivation, self-efficacy, and self-determination while also improving their comprehension of instructional content.

To date, numerous research studies have been conducted with selected Web 2.0 tools. Kahoot! has been the focus of research for years in a variety of contexts as it is used in many fields. Lin et al. (2018) conducted a study with undergraduate English language students at a Malaysian public university using Kahoot!, a game-based platform. The results showed that Kahoot! was useful in increasing students' motivation and participation, thus encouraging both theoretical and practical learning. Socrative has also been widely studied in the literature for its features, including instant feedback and real-time teaching and learning capabilities. Lawrance et al. (2021) examined the use of Kahoot! and Socrative for interactive assessment in teaching in India. They concluded that gamification tools strongly increased students' enthusiasm and desire to use these tools in their learning process.

Several studies have explored the use of the Quizizz platform for educational purposes. Anak Yunus and Hua (2021) conducted a quasi-experimental study to investigate the impact of the gamified Quizizz platform on young Malaysian ESL learners' acquisition of irregular English verbs. Based on the results, they concluded that the platform effectively enhances the teaching and learning of irregular past verbs while also increasing learners' interest and enthusiasm for English language acquisition. In another research study, Gokbulut (2020) explored the effects of Kahoot! and Mentimeter word cloud activities on pre-service teachers in the Department of Primary School Education at a state university in Türkiye, and the findings showed that both applications are useful for e-learning environments.

Self-Efficacy

Self-efficacy, as a key term, refers to a demonstration of confidence a person must have to successfully perform a specific task, activity, or challenge (Alqurashi, 2016). It is argued that a person's perceived self-efficacy influences their emotions, thoughts, actions, and motivation (Bandura, 1994). Self-efficacy is also closely linked to self-regulation. Learners in online learning environments should have the necessary self-efficacy to achieve their success goals and regulate their learning processes (Ergul, 2004). Therefore, online learning self-efficacy significantly contributes to academic success (Ahmadipour, 2022). Furthermore, it is claimed that at its core, a person who is less confident in using information technologies also feels less positive towards technology (Liaw, 2008). While much of the research on online self-efficacy focuses on computer-based learning, self-efficacy remains a fundamental component of a successful online learning experience (Shen et al., 2013).

Main Processes of Self-Efficacy

Bandura (1994) identifies four main self-efficacy processes related to the following cognitive, affective, motivational, and choice processes:

Cognitive Processes: The effects of individuals' self-efficacy beliefs on cognitive processes are seen in various ways. An individual's perceived self-efficacy is related to goal setting. In this context, those with a strong sense of self-efficacy tend to set higher-level goals and strive to achieve them.

Motivational Processes: Self-efficacy plays a crucial role in self-regulating one's motivation; most people believe that motivation is cognitively generated. To motivate themselves, they create paths forward based on their beliefs about what they will do in possible situations and organize their actions accordingly. In line with this, they first set their own goals and then take action to achieve them.

Affective Processes: An individual's beliefs about coping with challenging situations are closely related to the level of stress/depression or motivation experienced in these situations. Similarly, it is argued that personal factors influence a learner's self-efficacy. Accordingly, efficacy beliefs influence the decision to continue online learning and are essential for achieving successful learning outcomes (Bradley et al., 2017; Puzziferro, 2008). Besides, self-efficacy theorists argue that having low self-efficacy leads to motivational problems, and if learners assume that they cannot succeed in certain tasks, which refers to low self-efficacy, they try to perform these tasks superficially and consequently avoid doing them (Margolis & McCabe, 2006).

Background to the Study

Although gamification has been widely used across various environments and contexts, and its positive effects on learning have been recognized for years, it has not been addressed empirically, leading to the need for a theoretical basis (Sailer et al., 2014). Furthermore, Dichev and Dicheva (2017) argue that studies on gamified online learning are lacking, even though online learning requires stronger motivation and provides a more promising field for applying gamification. Puzziferro (2008) states that a person's self-efficacy belief creates a motivational effect and is effective on individual behavior; in other words, perceived self-efficacy performs as a mediating factor in determining action. Individuals who think they have the essential abilities to perform a task successfully tend to have high self-efficacy beliefs, whereas those who do not believe that they have the relevant characteristics have low self-efficacy levels to fulfill this task (Walker et al., 2006). Although it is a very crucial goal, few studies have considered some specific online learning behavior outcomes that self-efficacy stimulates (Prior et al., 2016). In this vein, Shen et al. (2013) indicate that further experimental research studies should be conducted to reveal how self-efficacy emerges in online learning environments.

Unlike previous studies, which are largely descriptive or focus on comparing traditional classrooms with online learning environments, this study adopts a quasi-experimental research design. Both the control and experimental group participants are online learners, providing insights into the effects of gamified Web 2.0 tools—such as Kahoot!, Quizizz, Socrative, and Mentimeter—on EFL learners' self-efficacy in online learning environments. The applications were selected on the basis that all of them are

easy-to-use tools that provide users with free access up to a certain level and can be accessed from any mobile or online platform (De Boer & Winnips, 2015). However, their selection also aligns with the study's objectives, as each tool offers distinct features. For example, Kahoot! has a more animated interface than others with a more formal appearance (De Boer & Winnips, 2015). Additionally, Kahoot! fosters a highly competitive atmosphere, making it particularly useful when the goal is to encourage competition among participants—a factor that has been identified as a motivator in itself (Nicholson, 2012). Compared to other applications, Socrative is one of the Web 2.0 tools that can be used for smaller groups because it does not guarantee success for more than 50 participants. When instructors want to create quizzes on the platforms, Socrative and Mentimeter allow them to create different question types and open-ended questions (De Boer & Winnips, 2015). Moreover, while the Kahoot! platform allows users to add images to questions; the Quizizz application allows adding images to both questions and answers (Göksün & Gürsoy, 2019).

Research Questions:

The research questions of the current study are as follows:

1. What is the effect of gamified Web 2.0 tools on EFL learners' self-efficacy in online learning environments?
   a. What are EFL learners' perceptions of the impact of gamified Web 2.0 tools on their learning self-efficacy in online learning environments?
2. Do EFL learners' perceptions of learning self-efficacy change based on their gender?
3. Do EFL learners' perceptions of learning self-efficacy change based on their previous experiences with Web 2.0 tools?

Method

Design of the Study

Since the study participants were intact groups, the present study was based on a quasi-experimental research design in which causal relationships are tested with a comparison group without a randomization process (White & Sabarwal, 2014). Moreover, there are differences between quasi-experimental designs and true experimental designs in terms of control over variables. Therefore, the quasi-experimental design researcher must be aware of some variables that the design cannot control (Campbell & Stanley, 2015).

It is widely recognized that the mixed-method approach has gained attention over the years. Since the study utilizes both quantitative and qualitative methods, it was performed through a mixed-method sequential explanatory research design. There appear two ways of viewing mixed methods in terms of time order, whether concurrent or sequential, and the level of dominance regarding qualitative or quantitative methods (Wu, 2012). This present study holds the QUAN → qual status in which the qualitative data are collected and analyzed after the quantitative data collection and analysis in consecutive order. A semi-structured interview was also conducted with participants to collect qualitative data and reveal the quantitative results in a broad sense (Ivankova et al., 2006). Furthermore, Bowen et al. (2017) argue that

the sequential collection and analysis of quantitative and qualitative data in a study provides a better understanding of the issues by providing two different types of information compared to separate data collection and analysis.

The figure of mixed-method sequential explanatory research design QUAN → qual status can be illustrated by Creswell et al. (2003, p.180) as follows:

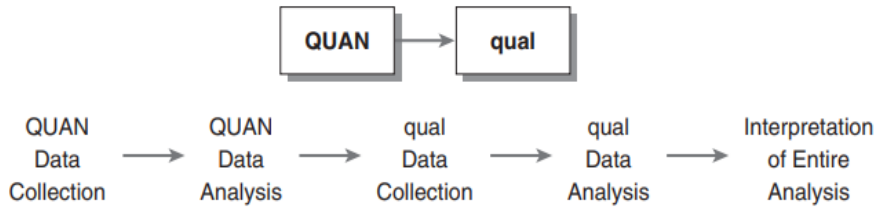

Figure 2. Mixed-method sequential explanatory research design

As seen in the figure, in a mixed-method sequential explanatory research design, the researcher first follows the order of collecting and analyzing quantitative and then qualitative data. Lastly, the entire analysis is interpreted.

Participants

The study participants comprised 60 first-year EFL students from various departments, including Turkish Language and Literature, Chemistry, Biology, Physics, History, Geography, and Mathematics, at a state university in Türkiye. The course that constitutes the focus of the study is the Compulsory Foreign Language course accepted by the Council of Higher Education (CoHE) in Türkiye. To ensure that the participants of the experimental (N=30) and control group (N=30) had similar characteristics or backgrounds, the researchers developed a Demographic Information Form to collect information on participants' gender, major, duration of English language learning, prior experience with online learning environments and Web 2.0 tools, frequency of technology use for learning English, mobile device preferences for online learning, and their perceived computer proficiency and motivation levels.

Data Collection Instrument: Online Learning Self-Efficacy Scale (OLSES)

The data collection tool used in this study is the Online Learning Self-Efficacy Scale (OLSES) developed by Zimmerman and Kulikowich (2016) through items obtained from 338 post-secondary students enrolled in an online course with and without prior online learning experience. The scale includes three factors: learning in the online environment, technology use, and time management. Cronbach's alpha values for each sub-dimension are stated as follows:

Table 1. Cronbach alpha values of each dimension of OLSES

Subscale	Cronbach's alpha
Learning in the online environment (10 items)	.89
Technology use (7 items)	.84
Time Management (5 items)	.85

Although various self-efficacy scales for online learning exist, it is essential to update these scales to reflect rapid technological advancements, as updated online learning self-efficacy scales will enable stakeholders to obtain more accurate results regarding the current situation. In this respect, the OLSES, which was used as a data collection tool in the current study, is the most appropriate scale considering the number of items (22) in terms of current online learning technologies and applicability (Yavuzalp & Bahçivan, 2020). In addition, no significant difference was found between students with and without prior online learning experience during the original scale development process. This finding suggests that the scale should be used for students with and without previous online learning experience for further studies (Yavuzalp & Bahçivan, 2020; Zimmerman & Kulikowich, 2016). Regarding the reliability of the scale, Cronbach's Alpha value was calculated as .93 based on the participants' OLSES pre-test and post-test scores in the main study. The Turkish versions of the scale items adapted from Yavuzalp and Bahçivan (2020) were also added to the original items to ensure the participants' better understanding of the scale.

For data triangulation, both qualitative and quantitative data were collected. A semi-structured interview was performed to collect qualitative data and analyzed through content analysis. The opinions of field experts were obtained, and a pilot test was conducted with two volunteer students to identify any problematic or unclear questions. After obtaining official permission from the original developers of the scale and the ethical approval report, the scale was applied as a pre-test and post-test. Additionally, a semi-structured interview process was conducted with the experimental group participants.

Data Collection and Piloting

Considering the pre-test scores of the experimental and control group participants, which showed that they had similar characteristics regarding their self-efficacy beliefs, the experimental group started to receive treatment that included gamification activities with Web 2.0 tools. However, the control group received instruction via traditional PowerPoint presentations on the course topics. Prior to the main study, various adjustments were made based on the pilot study procedure. Thus, for the Kahoot! activity, two different activity links were shared with the participants, one for virtual classrooms and one for self-paced learners who followed the online course on their mobile phones and needed another device as a clicker. Accordingly, two different leaderboards were shared with participants through the researchers' screen sharing.

As no problems were encountered during the piloting of the Quizizz activity, the experimental group participants were briefed on the general framework, including the rules, various boosters, and the redemption question, which allowed participants to get a second chance for three questions they previously answered incorrectly. The researchers then initiated a live test, and students responded at their own pace. Each participant who answered the questions correctly received several power-ups to be used in any question. The entire process and the leaderboard were presented as a real-time event through the researchers' screen sharing. Unlike the previous event, participants did not need any other device to participate in the Quizizz platform.

Similarly, since there were no problems in the pilot study process, the participants were informed about the gamified activity on the Socrative platform. Unlike other applications, the researchers created a room name instead of a game pin. The participants were included in the activity by logging in, and then a

live quiz was started. They could immediately see whether each was true or false as they answered the questions. The entire process, along with instant feedback, was also shared with the participants through the researchers' screen sharing.

The following week, participants were briefed about another online learning program, Mentimeter, and how to participate in a word cloud activity. Since the subject of the previous lesson was "verbs used in the classroom", they were asked which verbs they remembered. Later, a game code was shared with them, and they were asked to enter menti.com and write their answers. Each participant had the chance to write three entries and submit them multiple times. Repetitive responses were situated in the center, and the participants could see the whole process instantly through screen sharing.

Data Analysis

Various statistical measurements and analyses were performed in the study. Since it is recommended to ensure the assumption of normality before conducting an analysis and applying a parametric/non-parametric test (Ghasemi & Zahediasl, 2012), a normality test was performed first. The normality test is considered a prerequisite for making statistical measurements (Razali & Wah, 2011) as it helps ensure the validity of results, leading to robust and reliable findings (Keselman et al., 2013).

To determine whether a statistically significant difference existed between two independent data sets, the independent samples t-test was conducted (Nunan & Bailey, 2009). When the assumption of normality was violated, the Mann-Whitney U test was used as a nonparametric alternative (Nachar, 2008; Nahm, 2016). Since the study aimed to analyze the effects of Web 2.0-supported gamification activities in online learning environments, the interview process was performed on the Microsoft Teams platform, where the treatment was also conducted. Furthermore, participants' answers obtained through the semi-structured interview were transcribed and analyzed through content analysis.

Findings

Findings regarding Research Question 1

Comparison of OLSES Pre-Test and Post-Test Scores of Experimental and Control Groups

A normality test was first conducted based on the participants' pre-test OLSES scores to determine whether parametric or nonparametric tests should be performed. Since the data of each group exceeded 29, the Kolmogorov-Smirnov test was performed (Büyüköztürk, 2013), and it was seen that the pre-test scores of the control group were not normally distributed based on the mean scores of the experimental (p=.200) and control groups (p=.004). Therefore, the Mann-Whitney U test, which is a nonparametric test, was performed, and the findings were as follows:

Table 2. Mann-Whitney U test results of the OLSES pre-test scores of the groups

Group	N	Mean	Mean Rank	Sum of Ranks	M-Whitney U	p
Experimental	30	77.90	27.02	810.50	345.500	.122
Control	30	80.37	33.98	1019.50		

p>.05

As seen in Table 2, the test results showed that there was no statistically significant difference between the pre-test scores of the experimental and control group participants in terms of their online learning self-efficacy (U = 345.5, p > 0.05). When the pre-test mean scores of both the control (80.37) and the experimental group (77.90) were analyzed, it was observed that their mean scores were similar. Hence, the null hypothesis that there would be no statistically significant difference between the pre-test scores of the experimental and control groups in terms of online learning self-efficacy was accepted. However, the alternative hypothesis that there would be a statistically significant difference between the OLSES pre-test scores of both groups was rejected.

In order to analyze the OLSES post-test scores of the participants, a normality test was first conducted, and it was seen that the OLSES post-test mean scores of the experimental (p=.165) and control groups (p=.067) were normally distributed. Therefore, an independent samples t-test was performed, and the findings were as follows:

Table 3. Independent samples t-test results of the OLSES post-test scores of the groups

Group	N	Mean	SD	df	t	p
Experimental	30	79.00	9.49	58	-2.07	.044*
Control	30	86.73	18.12			

p*<.05

An independent samples t-test was performed to compare the overall post-test scores of the experimental and control groups, and the results showed that there was a statistically significant difference between the experimental group (M=79.00, SD=9.49) and the control group (M=86.73, SD=18.12), t(58)=-2.07, p=.044, d=0.53. The total post-test scores of the participants were in favor of the experimental group with a moderate effect size. Based on the findings regarding participants' pre and post-test scores, it is possible to conclude that gamification activities positively affect their self-efficacy beliefs in online learning environments and transform learning into an enjoyable process.

Qualitative Findings on Participants' OLSES Pre-Test and Post-Tests

The quantitative data findings are also compatible with the qualitative data obtained from the semi-structured interviews and can be suggested as follows:

> *"I observed that some of our friends, who were hesitant in the classroom, expressed themselves better in the online environment. I think they are more comfortable expressing their ideas or asking questions. In the beginning, there were problems such as how it would work. Learning becomes easier when it becomes more practical and commonplace over time, and gamification activities have made this process more fun." (Interviewee 7).*

> *"In terms of online learning, I was more nervous at the beginning of the semester. I felt more comfortable with gamification activities. I became more comfortable with my experiences as I got used to it." (Interviewee 4).*

When participants were asked whether and how gamification activities affected their learning self-efficacy in online learning environments, they answered positively. In the same vein, the positive contribution of the treatment to learning self-efficacy in online learning environments was reinforced by the responses of different participants:

> *"Of course, it did. These activities are extracurricular applications, and these applications are always nice and encouraging for students." (Interviewee 5).*

> *"At first, I was hesitant to participate. In the next lessons, I started to warm up more. It made us feel more comfortable. As I participate in gamification activities, my desire to attend the lesson increases proportionally." (Interviewee 6).*

Findings regarding Research Question 2

Comparison of OLSES Pre-Test and Post-Test Scores of Experimental Group Regarding Gender Difference

With the rise in the number of female learners in online learning environments—compared to the past, when education was largely male-dominated—gender differences in study groups have gradually become a significant topic in the literature (Yukselturk & Bulut, 2009). In this direction, the gender differences of the study group were analyzed, and based on the results of the Kolmogorov-Smirnov test, it was seen that the pre-test and post-test scores of male and female participants were normally distributed. Thus, an independent samples t-test was conducted for each analysis, and the findings are shown in Table 4 as follows:

Table 4. Independent samples t-test results of OLSES pre-test and post-test scores of the male and female participants in the experimental group

Experimental	**N**	**Mean**	**SD**	**df**	**t**	**p**
Female pre-test	20	78.65	12.94	28	.474	.639
Male pre-test	10	76.40	10.67			
Female post-test	20	86.00	10.87	28	-.592	.559
Male post-test	10	88.20	6.06			

p>.05

Independent samples t-tests were performed to examine the gender differences of the experimental group in OLSES, and it was concluded that there was no statistically significant difference between the pre-test scores of female (M=78.65, SD=12.94) and male students (M=76.40, SD=10.67), t(28)=.474, p>.005. In addition, the findings showed that there was no statistically significant difference between the post-test scores of female (M=86.00, SD=10.87) and male students (M=88.20, SD=6.06) on OLSES t(28)=-.592, p>.005.

Comparison of OLSES Pre-Test and Post-Test Scores of Control Group Regarding Gender Difference

Since the number of addresses for men and women in the control group was less than 30, the Shapiro-Wilk test was performed (Cevahir, 2020), and the findings showed that the pre-test and post-test scores of male and female students were not normally distributed. Thus, the Mann-Whitney U test was performed for each analysis, and the results are indicated as follows:

Table 5. Mann-Whitney U test results for OLSES pre-test and post-test scores of male and female participants in the control group

Control	N	Mean	Mean Rank	Sum of Ranks	M-Whitney U	p
Female pre-test	18	82.27	15.44	278.00	107.000	.966
Male pre-test	12	78.65	15.58	187.00		
Female post-test	18	79.72	15.22	274.00	103.000	.832
Male post-test	12	77.92	15.92	191.00		

p>.05

The results showed that there was no statistically significant difference between the OLSES pre-test scores of male and female students in the control group ($U = 107.0$, $p > 0.05$). The absence of a statistically significant difference in terms of gender differences based on the OLSES post-test scores of the control group also revealed similar results ($U = 103.0$, $p > 0.05$). Therefore, it is possible to indicate that the online learning self-efficacy perceptions of male and female students in the control group did not differ according to gender, as in the experimental group participants.

Findings regarding Research Question 3

Comparison of Pre-Test and Post-Test Scores on OLSES Regarding Previous Web 2.0 Tools Experiences of Experimental Group Participants

It is acknowledged that students approach learning situations with a variety of prior experiences. Therefore, in general terms, it is expected that prior success with online learning technology may lead to higher self-efficacy, while prior poor performance is likely to lead to lower self-efficacy (Bates & Khasawneh, 2007). In this vein, it was aimed to analyze whether participants' previous experiences with Web 2.0 tools had an impact on their self-efficacy beliefs. Thus, a normality test was first conducted on the pre-test and post-test scores of the experimental group to assess the homogeneity of participants' prior experience with Web 2.0 tools on OLSES. The results indicated that while the pre-test scores were normally distributed, the post-test scores were not. Therefore, an independent samples t-test was conducted for their pre-test scores, and the findings were as follows:

Table 6. Independent samples t-test results of the experimental group participants' OLSES pre-test scores regarding their previous experience with Web 2.0 tools

Experimental	N	Mean	SD	df	t	p
Yes	6	81.00	6.87	28	.696	.492
No	24	77.12	13.07			

p>.05

As a result of the findings, it was revealed that there was no statistically significant difference between experimental group participants' pre-test scores regarding their prior experiences with Web 2.0 tools on OLSES (M_{yes}=81.00, SD=6.87; M_{no}=77.12, SD=13.07), t(28)=.696, p>.005.

Table 7. Mann-Whitney U test results of the experimental group participants' OLSES post-test scores regarding their previous experiences with Web 2.0 tools

Experimental	N	Mean	Mean Rank	Sum of Ranks	M-Whitney U	p
Yes	6	93.00	21.42	128.50	36.50	.065
No	24	85.16	14.02	336.50		

p>.05

A Mann-Whitney U test was performed, and the findings showed that there was no statistically significant difference between the post-test scores of the experimental group with and without prior experiences with Web 2.0 tools (U=36.50, p>0.05).

Comparison of OLSES Pre-Test and Post-Test Scores of the Control Group Regarding Previous Web 2.0 Tools Experiences

Regarding the normality, the Shapiro-Wilk test results showed that the participants' pre-test scores were not normally distributed. Thus, a Mann-Whitney U test was conducted, and the results came out as follows:

Table 8. Mann-Whitney U test results of OLSES pre-test scores of control group participants

Control-Pre Test	N	Mean	Mean Rank	Sum of Ranks	M-Whitney U	p
Yes	10	82.70	16.30	163.00	92.00	.725
No	20	79.20	15.10	302.00		

p>.05

The findings showed that there was no statistically significant difference between the pre-test scores of the control group participants (U=92.00, p>.05). However, since the results showed a normal distribution for the post-test scores, an independent samples t-test was performed, and the findings were as follows:

Table 9. Independent samples t-test results of the OLSES post-test scores of the control group participants

Control-Post Test	N	Mean,	SD	df	t	p
Yes	10	80.90	20.42	28	.400	.692
No	20	78.05	17.34			

p>.05

As seen in the table above, there was no statistically significant difference between the OLSES post-test scores of the participants (M_{yes}=80.90, SD= 20.42; M_{no}=78.05, SD=17.34), t(28)=.400, p>.05.

Discussion

An analysis of the first research question, which examined the effects of gamification with Web 2.0 tools on EFL learners' self-efficacy in online learning environments, revealed a statistically significant difference in favor of the experimental group. This difference was evident in the pre-test and post-test scores,

indicating a positive impact of the treatment. Furthermore, the quantitative findings aligned with qualitative results, reinforcing the conclusion that gamification positively influenced participants' learning self-efficacy in online learning environments. In a study, Banfield and Wilkerson (2014) aimed to evaluate gamification as a method of experiential learning theory (ELT) on learners' motivation and self-efficacy to carry out several tasks. Their findings demonstrated that students' self-efficacy improved when they learned through gamification-based pedagogy. Furthermore, they emphasized that self-efficacy is a crucial component of skill development, and that gamification significantly enhances it. Similarly, Babakhani and Tabatabaee-Yazdi (2023) examined the effects of educational gamification on Iranian EFL learners' self-efficacy and the advantages of its implementation in online English language classrooms. The results based on the participants' post-test scores showed that gamification as a treatment was effective for the experimental group and that the implementation of gamified activities significantly enhanced students' self-efficacy. In another study, Ustun et al. (2022) aimed to analyze the effects of Augmented Reality (AR)-supported EFL course on high school students' attitudes toward the course and their self-efficacy in English based on a mixed-method pre-test/post-test experimental design. The results indicated a positive effect on students' attitudes toward the course and their self-efficacy in English language learning.

Similar findings have been reported in various research studies. In a study involving in-depth case analyses and comparisons of Internet self-efficacy levels and online learning strategies, Tsai and Tsai (2003) randomly selected eight participants from a group of 73 first-year university students. Their findings revealed that individuals with high Internet self-efficacy demonstrated better performance in web-based learning tasks and exhibited more effective information-seeking strategies than those with low Internet self-efficacy. In a similar vein, Wang and Wu (2008) aimed to reveal the role of self-efficacy and feedback in a web-based learning environment, and through the regression analysis, they indicated that learners with high self-efficacy tried to use more learning strategies, including elaboration, repetition, and critical thinking skills. In another study, Alemayehu and Chen (2023) conducted a study with 354 participants from various academic levels in Taiwanese higher education institutions to examine the effects of learner motivation, self-monitoring, and self-efficacy on participation in online learning environments. Their findings indicated a positive relationship between these variables. Furthermore, Turan et al. (2022) examined the behavioral intentions of 313 pre-service teachers from two large universities in Türkiye to use gamification tools and the critical factors affecting their use. The findings revealed that perceived self-efficacy and attitude constructs significantly affected pre-service teachers' behavioral intentions and personal enjoyment of using gamification tools.

Regarding the second research question, which examined whether gender differed between the groups, the findings showed no statistically significant difference between the pre-test and post-test scores of the experimental group participants. Likewise, Jan (2015) investigated the relationships between computer self-efficacy, satisfaction, academic self-efficacy, prior online learning experience, and whether these varied by age and gender. Based on the findings, it was revealed that there was no significant difference between the overall computer self-efficacy mean scores of males and females. In another research study, Şeker and Karagül (2023) aimed to examine students' online learning self-efficacy within the scope of demographic variables and tried to identify factors influencing their perceptions of online learning self-efficacy. No statistically significant relationship was revealed between learners' online self-

efficacy and gender. In addition, Holcomb et al. (2004) examined the roles of technology self-efficacy, distance education self-efficacy, and self-regulation on distance education learning of both graduate and undergraduate students, and the results showed that there was no statistically significant difference between genders. Nevertheless, in another study, Chang et al. (2014) investigated whether 87 undergraduate students' internet self-efficacy levels affected their learning performance and motivation in an online course. The results showed that students with higher levels of perceived internet self-efficacy performed better on the final exam than other students with lower levels, and the first group was more confident in completing the online course. Furthermore, significant differences emerged according to the gender variable. Males had higher levels of perceived internet self-efficacy and self-confidence, while females exhibited greater participation in online discussions and achieved higher final exam scores.

The results related to the third research question showed that there was no statistically significant difference between the pre-test and post-test scores of the groups in terms of their prior experiences with Web 2.0 technologies. In a similar vein, Ortiz Rojas et al. (2017) aimed to analyze the impact of gamification using badges on engineering students' learning performance, self-efficacy, intrinsic motivation, and engagement along with student background variables such as gender, previous experience with gaming, and GPA (grade point average). As a result of the findings, they did not observe a significant effect on any of the variables. In contrast, Alhassan (2017) investigated whether there is a relationship between teachers' self-efficacy in using Web 2.0 tools and various demographic variables and revealed a statistically significant relationship between teachers' self-efficacy and their previous experiences with educational technologies. This discrepancy in findings may be attributed to differences in the type or level of experience among participants in the two studies.

Conclusion and Recommendations

Within the digital transformation framework that has brought significant changes in educational practices over the years, particularly during the global pandemic, it is thought that the practices or methods applied in online learning environments or platforms will continue to reshape instructional practices in the following period. In this respect, in Türkiye, the decision taken by the Council of Higher Education (CoHE) titled "Procedures and Principles Regarding Distance Education in Higher Education Institutions" states that the courses specified in Article 5-i, including Compulsory Foreign Language, and a maximum of 40% of the courses in the programs can be delivered through both formal and distance education in universities. Therefore, this study aimed to provide insights into online learning environments and to present online applications since many higher education institutions in Türkiye have decided that compulsory courses, including Foreign Language, will be given synchronously via online platforms and will continue to be delivered in online learning environments in the coming years.

This study has various implications in today's digital world, where information can be accessed from anywhere, and individuals need to get used to changing/evolving structures every day. Therefore, all levels of the educational institution should provide interactive learning environments that arouse interest in their students and motivate them for a more dynamic engagement process. Instructors can provide individual and instant feedback to students using Web 2.0 tools. Reflecting on the impact of the global

pandemic on instructional processes, educators must integrate Web 2.0 tools into course material development and teaching content (Kul et al., 2022). The current study is expected to offer an alternative way to reduce the increase in dropout rates, especially in online courses, with course content enriched with Web 2.0 tools. Furthermore, various elective courses on different methods and practices for online learning environments can be offered for pre-service teachers in English Language Teaching Education Programs. In this vein, Alhassan (2017) emphasizes that in-service teachers may find it challenging to integrate Web 2.0 tools into the educational process without engaging in professional development, indicating the need for continuous in-service training sessions for modern instructional technologies, especially Web 2.0 tools. In addition, several seminars and in-service training programs can be organized for faculty members, English language teachers, tutors, trainers, and any stakeholders in the field of education to promote learners' self-efficacy and interest in online learning environments, and technology teaching courses can be designed for educators at various teaching levels.

Considering the limitations of the study, since it was collected from 60 first-year university students studying at a state university in Türkiye, the findings may not be generalizable to other students in different contexts. Furthermore, since the effects of gamification in online learning environments with Web 2.0 tools were investigated in terms of variables such as gender and previous experiences with Web 2.0 tools in the current study, future research could explore other influencing factors. The present study was conducted with some selected gamification tools, but a larger-scale online learning experience can be created through different Web 2.0 tools. Further studies can be conducted using different methods and designs and with different levels of participants, such as younger learners in different subject areas. Furthermore, future research could investigate the long-term effects of gamified tools in online learning to better understand their sustained impact on student engagement and learning outcomes.

Finally, based on the research findings and the idea that online education will shape the years to come, it is recommended that educators and policymakers adopt gamification tools in education, training programs, and curricula. This is particularly important in online learning environments, where dropout rates tend to be high.

Declarations

Ethical statement: In this study, all rules specified within the scope of the "Higher Education Institutions Scientific Research and Publication Ethics Directive" were followed. None of the actions mentioned under the title of "Actions Contrary to Scientific Research and Publication Ethics", which is the second part of the directive, have been carried out.

Before collecting the research data within the scope of the research, permission dated 08/12/2020 and numbered E-84026528-050.01.04-2000184621 was obtained from Çanakkale Onsekiz Mart University Ethics Committee.

Conflict of interest: The authors have no conflicts of interest.

Data availability: Data are available upon request from the authors.

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