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Author Contribution Statement

¹ Abdullah Yasin GÜNDÜZ 

Assist.Prof.Dr.
Uşak University, Turkey

Conceptualization, literature review, methodology, implementation, data analysis, translation, and writing

Abstract

Lifelong learning starts in childhood and youth, continuing throughout adulthood and old age. It encompasses formal learning in settings such as schools and training centers, informal and non-formal learning derived from colleagues and workplace trainers, and unintentional learning stemming from spontaneous social interactions. In today's fast-paced world, students need to acquire 21st-century skills and be lifelong learners. Therefore, it is crucial to understand the relationship between students' perceptions of 21st-century skills and their effective lifelong learning levels. This research aims to investigate the following questions: "What are the students' levels of success in lifelong learning and their perceptions of 21st-century skills? Is there a relationship between them?" and "Do students' perceptions of 21st-century skills predict their levels of success in lifelong learning?". The results indicated that students' levels of success in lifelong learning and 21st-century skills have a strong correlation. Students have high characteristics that will enable effective lifelong learning, and their perceptions of 21st-century skills are moderate. In addition, students' perceptions of 21st-century skills predict their success levels in lifelong learning at a high rate.

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Research Article**The Importance of Investigating Students' Lifelong Learning Levels and Perceptions of 21st-Century Skills ***Abdullah Yasin GÜNDÜZ ¹ **Abstract**

Lifelong learning starts in childhood and youth, continuing throughout adulthood and old age. It encompasses formal learning in settings such as schools and training centers, informal and non-formal learning derived from colleagues and workplace trainers, and unintentional learning stemming from spontaneous social interactions. In today's fast-paced world, students need to acquire 21st-century skills and be lifelong learners. Therefore, it is crucial to understand the relationship between students' perceptions of 21st-century skills and their effective lifelong learning levels. This research aims to investigate the following questions: "What are the students' levels of success in lifelong learning and their perceptions of 21st-century skills? Is there a relationship between them?" and "Do students' perceptions of 21st-century skills predict their levels of success in lifelong learning?". The results indicated that students' levels of success in lifelong learning and 21st-century skills have a strong correlation. Students have high characteristics that will enable effective lifelong learning, and their perceptions of 21st-century skills are moderate. In addition, students' perceptions of 21st-century skills predict their success levels in lifelong learning at a high rate.

Keywords: Lifelong learning, 21st-century skills, perception**1. INTRODUCTION**

In today's ever-changing and competitive world, it is important to prioritize lifelong learning to excel and succeed. Lifelong learning refers to the desire and ability to keep learning throughout one's life. It facilitates continuous growth and adaptability in a world that is rapidly changing. Believing in oneself and having the confidence to perform tasks is crucial for individuals to acquire and effectively utilize new skills. Factors such as technological advancements, globalization, environmental changes, digitalization, and unforeseen events like the COVID-19 pandemic make lifelong learning significant (Organisation for Economic Co-operation and Development [OECD], 2021).

Develop a new skill by taking a personal course through online education or class-based course (e.g., learning a new language, cooking, programming, etc.), learning a new sport or activity (such as cycling, diving, gym activities, etc.) or learning to use new technology (smart devices, new software applications, etc.) can be shown as some examples to lifelong learning (Boeren, 2017). At the same time, to succeed in today's society, people need various skills. These 21st-century skills include critical thinking, collaboration, creativity, communication, and technological proficiency. These competencies are essential for solving complex problems, adapting to new ideas, and thriving in a job market that is constantly evolving (Gonzales, 2020).

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¹ Assist. Prof. Dr., Uşak University, abdullah.gunduz@usak.edu.tr, Uşak, Türkiye
Corresponding Author e-mail adress: abdullah.gunduz@usak.edu.tr

Digital literacy is one aspect of 21st-century skills that supports the development of other competencies. However, it is not the sole determinant of developing 21st-century skills in students. Digital competence is a supporting factor for mastering these skills, which should be introduced and taught in schools (Rizaldi, Nurhayati & Fatimah, 2020). This highlights the importance of integrating digital literacy into educational curricula to enhance student's overall skill set. Furthermore, collaborative teaching and learning approaches are effective in developing 21st-century skills. These approaches emphasize problem-solving, self-regulated learning, collaboration, and information literacy (Chelliah & Clarke, 2011).

This study will explore how lifelong learning is connected to acquiring and using 21st-century skills. We will also examine how students' self-belief and ability to develop these abilities are linked. To prepare students for success in today's world, we have to understand what skills are necessary and improve the education system accordingly. To achieve our goals, we will analyze the titles "Lifelong Learning" and "21st-Century Skills and Competencies" separately.

1.1. What is Lifelong Learning?

Multiple authors have discussed and defined the concept of lifelong learning. Field's (2011) definition pertains to the ongoing learning process and personal growth throughout an individual's lifetime. This type of education is self-initiated and not associated with formal institutions like schools or universities. Boeren (2017) adds that this process is driven by personal interests and goals and is a voluntary, self-directed pursuit of knowledge and skill development. Merriam, Caffarella, and Baumgartner (2007) provide a comprehensive guide to learning in adulthood, including lifelong learning. They define lifelong learning as "the ongoing, voluntary, and self-motivated pursuit of knowledge for personal or professional reasons." They highlight that lifelong learning is not limited to a specific age or stage of life but encompasses learning opportunities that can be pursued at any point.

The European Commission (2001) states that lifelong learning is "all learning activities undertaken throughout life, to improve knowledge, skills, and competencies within a personal, civic, social and/or employment-related perspective." United Nations Educational, Scientific and Cultural Organization [UNESCO] (2015) defines lifelong learning as "the continuous building of skills and knowledge throughout a person's life, to promote personal development and fulfillment, and to contribute to society's social and economic development." While no standardized definition of lifelong learning exists, these authors agree it is a self-initiated and continuous personal development process. It is not limited to formal education but can occur through various means such as reading, attending workshops or seminars, engaging in online courses, or participating in community-based learning activities.

Lifelong learning has become increasingly important in today's knowledge-based economy, where technological advancements and work changes require individuals to upgrade their skills and knowledge continually. It has numerous benefits, both for individuals and society as a whole. For individuals, it can lead to increased employability, higher earnings, improved health, and personal fulfillment. On the other hand, it can increase productivity, innovation, and social cohesion in society. Despite its benefits, lifelong learning poses challenges, particularly for disadvantaged groups such as low-income individuals and disabilities. Financial constraints, geographic location, and lack of awareness or motivation limit access to lifelong learning opportunities (Field, 2011).

1.2. 21st-Century Skills and Competencies

The 21st-century skills and competencies refer to skills and knowledge deemed essential for success in today's rapidly changing and increasingly interconnected world. These skills and competencies are often grouped into three broad categories: learning and innovation skills, digital literacy skills, and life and career skills (Trilling & Fadel, 2009). Some key skills and competencies that fall under these categories include critical thinking and problem-solving, creativity and innovation, communication and collaboration, information literacy, media literacy, technological

literacy, adaptability, initiative, self-direction, social and cross-cultural skills, and leadership and responsibility.

To achieve success in both the professional and personal realms, students must embrace the concept of lifelong learning. This involves selecting areas where they can improve their proficiency and demonstrating a readiness to acquire new skills as needed. Students can maintain competitiveness and adaptability in an ever-changing environment by adopting a proactive approach to self-directed learning. Because due to fast technological advances, globalization, and immigration, twenty-first-century skills have become more critical. These skills should help citizens become lifelong learners who flexibly respond to change, proactively develop their competencies, and thrive in collaborative learning and working environments (Gijsbers & van Schoonhoven, 2012; Kaya & Mertol, 2022; Scott, 2015).

There is a growing consensus among universities and employers that these 21st-century skills and competencies are critical for individuals to succeed in a rapidly changing and increasingly complex world. As such, there has been a push to integrate these skills and competencies into educational curricula and workforce development programs. Therefore, it is crucial to understand the relationship between students' self-efficacy perceptions of 21st-century skills and their effective lifelong learning levels. This research investigates the following questions:

- What are the student's levels of success in lifelong learning and their perceptions of 21st-century skills? Is there a relationship between them?
- Do student's perceptions of 21st-century skills predict their levels of success in lifelong learning?
- Do student's learning and renewal skills predict their levels of success in lifelong learning?
- Do student's life and career skills predict their levels of success in lifelong learning?
- Do student's information, media, and technology skills predict their levels of success in lifelong learning?

2. METHOD

2.1. Research Design

This research was designed with the predictive correlational research model. In correlational research, the relationships among two or more variables are studied without any attempt to influence them (Fraenkel & Wallen, 2009).

2.2. Study Group

The research study included 66 pre-service teachers majoring in Computer Education and Instructional Technologies at a state university in Turkey. There were 30 male and 36 female participants aged between 18 and 21.

2.3. Data Collection Tools

The introduction of the online scales includes confidentiality statements, ensuring that answers will only be used for this study and not shared with anyone. The scales were voluntarily answered by 68 out of 100 people who received the forms through a link. Data collection tools are as follows:

2.3.1. Personal information form: The personal information form prepared by the researchers included two questions about the gender and age of the students.

2.3.2. Effective lifelong learning scale (ELLS): The effective lifelong learning scale was developed by Günüç, Odabaşı, and Kuzu (2014) to measure the lifelong learning success of teacher candidates and the level of having the characteristics that will enable an individual to realize effective lifelong learning. The scale consists of 33 items and a single structure. Based on a five-point Likert scale (1= completely disagree, 5= completely agree), the lowest score obtained from the scale is 33, and the highest score is 165. Low scores indicate that pre-service teachers have a low propensity for effective lifelong learning, while high scores show that these tendencies are high. There is no negative

item on the scale. The Cronbach's alpha value of the scale, which could explain 41.68% of the variance in the target structure, was calculated as .96. With the data obtained within the scope of this research, the internal consistency coefficient of the scale was calculated as 0.94.

2.3.3. *21st-Century skills and competences scale*: The scale developed by Anagün, Atalay, Kılıç, and Yaşar (2016) aims to measure the perceptions of teacher candidates about 21st-century skills. Consisting of 42 items and three sub-factors, the "Learning and Renewal Skills" factor is measured with 16 items, the "Life and Career Skills" factor with 18 items, and the "Knowledge, Media and Technology Skills" factor with eight items. The scale is a five-point Likert type (1= Never, 5= Always). The lowest score that can be obtained from the scale is 42, and the highest score is 210. Low scores indicate a low perception of skill competence for the relevant factor, while high scores indicate a high perception of competence for these skills. There is no reverse item in the scale, and it can explain 51.30% of the variance of the target structure. While the Cronbach alpha value of the scale was found as 0.89 in the reliability study, this value was calculated as 0.85 for the "Learning and Renewal Skills" factor, 0.83 for the "Life and Career Skills" factor, and 0.81 for the "Knowledge, Media and Technology Skills" factor. In this study, the internal consistency coefficient Cronbach's alpha value was calculated as 0.91 for the whole scale and 0.88, 0.80 and 0.84 for the factors, respectively.

2.4. Data Analysis

Analysis of data was done using IBM SPSS 23.0. Normal distribution was confirmed through Kolmogorov-Smirnov tests and histograms. Two outliers were removed from the data set, and analysis was conducted on the remaining 66 participants using various techniques, including ANOVA, Pearson product-moment correlation, and simple linear and multiple regression analysis. The assumptions of Pearson product-moment correlation and simple linear and multiple regression analyzes were tested.

3. FINDINGS

This study examined the relationships between university students' 21st-century skills and competencies (21CSC) and levels of Effective Lifelong Learning (ELL) characteristics. Also, it investigated the impact of 21CSC and its sub-factors on their ELL characteristics. The results are presented question-wise.

3.1. What are the Students' Levels of success in Lifelong Learning and their Perceptions of 21st-century skills? Is there a Relationship between them?

Table 1 shows that students' ELL average (4.08) is higher than the 21CSC average (3.98) based on total scores (N=66). The students got the highest score of 165 (full score) and the lowest score of 102 from ELL. While no students get a full score from the 21CSC scale, the highest score is 204, and the lowest is 131.

Table 1. Descriptive statistics for study variables

	Items	Min	Max	X	Sd	Item average.
ELL	33	102.00	165.00	134.50	14.84	4.08
21CSC	42	131.00	204.00	167.17	15.21	3.98
L&IS	16	43.00	76.00	59.83	7.86	3.74
L&CS	18	55.00	88.00	73.08	6.95	4.06
IM&TS	8	25.00	40.00	34.26	3.95	4.28

ELL: Effective Lifelong Learning, 21CSC: 21st Century Skills and Competences, L&IS: Learning and Innovation Skills, L&CS: Life and Career Skills, IM&TS: Information, Media and Technology Skills.

An ELL average of 4.08 out of 5 indicates that students have a high level of characteristics that will enable effective lifelong learning. A 21CSC average of 3.98 means that students' perceptions of 21st-century skills are moderate. Upon examining the sub-factors of the 21CSC scale, it is found that students consider themselves most competent in Information, Media, and Technology Skills (IM&TS), followed by Life and Career Skills (L&CS) and Learning and Innovation Skills (L&IS).

Table 2. Correlations for study variables

	1	2	3	4	5
1. ELL	-				
2. 21CSC	.77**	-			
3. L&IS	.69**	.81**	-		
4. L&CS	.59**	.86**	.46**	-	
5. IM&TS	.53**	.72**	.32**	.65**	-

Note. N=66. **p<.01

As a result of Pearson Product-Moment Correlation Analysis, positive significant relationships were found between all the study variables with a confidence interval of .01 (Table 2). ELL and 21CSC had a strong correlation at the $r=.77$ level regarding total scores. When the sub-factors were examined, it was seen that L&CS had the strongest relationship with 21CSC ($r=.86$), L&IS had a relationship at the level of $r=.81$, and IM&TS at the level of $r=.72$. L&IS had the strongest correlation with ELL ($r=.69$), followed by L&CS ($r=.59$) and IM&TS (.53), respectively.

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3.2. What are the Students' Levels of Success in Lifelong Learning and their Perceptions of 21st-century Skills? Is there a Relationship between them?

A simple linear regression was calculated to predict ELL based on 21CSC. A simple linear regression determines the amount of variance in a dependent variable explained by an independent variable (Field, 2009). Preliminary analyses were performed to ensure no violation of assumptions (normality, linearity, and multicollinearity).

Table 3. Linear regression result predicting ELL based on 21CSC

Predictors	Unstandardized coefficients		Standardized coefficients	t
	B	Std. Error		
(Constant)	9.43	13.14		.72
21CSC	.75	.08	.77	9.56*
R ²	.59			
Adjusted R ²	.58			
F	91.29*			

Note. N=66. **p<.01

The results of the regression (see Table 3) suggested that 21CSC explained 59% of the variance, $R^2 = .59$, $F(1,64) = 91.29$, $p<.01$. 21CSC significantly predicted ELL, $\beta = .77$, $t=9.56$, $p<.01$.

3.3. What are the Students' Levels of Success in Lifelong Learning and their Perceptions of 21st-century skills? Is there a Relationship between them?

This study was also interested in examining the impact of sub-factors of 21CSC on ELL to figure out which sub-factors were significantly contributing to the outcome of 21CSC. A multiple linear regression was calculated, and preliminary analyses were performed to ensure no assumptions were violated (normality, linearity, and multicollinearity).

Table 4. Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.69 ^a	.48	.47	10.77	.48	59.41	1	64	.00
2	.77 ^b	.59	.58	9.64	.11	16.87	1	63	.00

^aPredictors: (Constant), L&IS ^b Predictors: (Constant), L&IS, IM&TS

Based on the stepwise multiple linear regression analysis, it can be deduced that two factors, namely L&IS and IM&TS, have a substantial impact on ELL. The adjusted R² value of .58 (as shown in Table 4) further reinforces this observation. However, it is worth noting that the software employed for the analysis excluded the L&CS sub-factor as it did not contribute to the model's overall effect.

Table 5. Anova

Model	Sum of Squares	Df	Mean Square	F	Sig.
1	6891.27	1	6891.27	59.41	.00 ^b
	7423.23	64	115.99		
	14314.50	65			
2	8459.19	2	4229.59	45.51	.00 ^c
	5855.31	63	92.94		
	14314.50	65			

a. Dependent Variable: ELL b. Predictors: (Constant), L&IS c. Predictors: (Constant), L&IS, IM&TS

Based on the data presented in Table 5, it appears that the regression equation has produced a statistically significant outcome at a level of $p < .01$ ($F(2,65) = 45.51$).

Table 6. Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	56.13	10.253		5.48	.00
	L&IS	1.31	.17	.69	7.71	.00
2	(Constant)	23.75	12.10		1.962	.05
	L&IS	1.10	.16	.58	6.87	.00
	IM&TS	1.31	.32	.35	4.11	.00

a. Dependent Variable: ELL

According to the findings obtained through stepwise multiple linear regression analysis, it was observed that there is a positive correlation between the increase in L&IS and IM&TS scores and the ELL of students. Specifically, for each point increase in L&IS and IM&TS, the ELL of students increased by 0.58 and 0.35, respectively. These results are presented in Table 6 for reference.

4. DISCUSSION and CONCLUSION

In today's rapidly changing world, lifelong learning and acquiring modern skills are crucial for personal and professional growth. This study explored how university students' perceptions of 21st-century skills affect their lifelong learning characteristics. After analyzing the data, we gained valuable insights that explain the relationship between these essential concepts.

As supported by several studies, our findings underscore the positive correlation between 21st-century skills and lifelong learning. Darling-Hammond, Flook, Cook-Harvey, Barron and Osher (2019) discuss the implications for educational practice based on the science of learning and development. They emphasize the importance of well-vetted strategies that support relationships and learning opportunities to promote children's well-being, healthy development, and transferable learning. This suggests that developing 21st-century skills can contribute to lifelong learning by providing individuals with the necessary tools and abilities to continuously learn. Zorlu and Zorlu (2021) conducted a study on preservice science teachers and found a positive correlation between their 21st-century learner skills and science learning self-efficacy beliefs. This suggests that individuals who possess 21st-century skills are more likely to have higher self-efficacy in their ability to learn and succeed in science education. Additionally, the study found that the preservice science teachers' 21st-century skills and science learning self-efficacy beliefs predicted each other, indicating a reciprocal relationship between these factors.

Furthermore, Mawas and Muntean (2018) discuss various pedagogies that contribute to developing and mastering 21st-century competencies and skills. These pedagogies, such as Problem-Based Learning, Flipped Classroom, and Self-Directed Learning, support lifelong learning by fostering critical thinking, collaboration, and adaptability (Mawas & Muntean, 2018). As students cultivate their proficiency in Learning and Innovation Skills, Life and Career Skills, and Information, Media, and Technology Skills, they are better positioned to engage in a dynamic and rapidly changing world. The strong predictive power of 21st-century skills in determining lifelong learning characteristics echoes the significance of integrating forward-thinking competencies into educational curricula.

In conclusion, there is a positive correlation between 21st-century skills and enhanced lifelong learning. The development of 21st-century skills can provide individuals with the necessary tools and abilities to engage in continuous learning throughout their lives. Studies have shown that individuals with 21st-century skills have higher self-efficacy in learning and succeeding in various domains. Additionally, pedagogies that promote the development of 21st-century skills have been found to support lifelong learning by fostering critical thinking, collaboration, and adaptability. Therefore, it is important for educational institutions to prioritize the development of 21st-century skills to ensure that individuals are equipped with the necessary competencies to thrive in a rapidly changing world and engage in lifelong learning.

While this study provides valuable insights into the intricate relationship between 21st-century skills and lifelong learning, it also paves the way for further exploration. Furthermore, findings will help educators design curricula and instructional practices that enhance students' self-efficacy perceptions of 21st-century skills and effective lifelong learning levels. Future research endeavors could explore the impact of various educational interventions on these constructs and their influence on diverse demographic groups across different contexts. One area of further exploration could be the examination of changes in students' use of lifelong learning skills during problem-based learning

projects. Problem-based learning is a teaching methodology that develops learners' capacity for and disposition toward lifelong learning (Dunlap, 2008). By studying how students' use of lifelong learning skills evolves during such projects, educators can gain a deeper understanding of how to effectively foster lifelong learning in their students.

Another avenue for future research could be the exploration of the relationship between goal orientation, information literacy self-efficacy, and lifelong learning outcomes among adult learners. Adult learners play a crucial role in the development of the country's socio-economy and are recognized as potential contributors to the generation of a knowledge-based economy (Hee, Ping, Rizal, Kowang & Fei, 2019). Understanding how goal orientation and information literacy self-efficacy influence lifelong learning outcomes can inform the design of educational programs and interventions targeted at adult learners. Additionally, it would be valuable to investigate the impact of team-learning behaviors on employees' self-efficacy and perception of individual learning in teams. A study conducted in a retail firm found that employees' individual-level self-efficacy was positively associated with their perception of individual learning in teams (Yoon & Kayes, 2016). This suggests that fostering team-learning behaviors can enhance employees' self-efficacy and promote individual learning within teams.

Ethics Committee Decision

Ethical approval and written permission for this study were obtained from the Social and Human Sciences Scientific Research and Publication Ethics Committee of Uşak University with the decision dated 11/02/2022 and numbered 2022-33.

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