

**IBN HALDUN UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF GUIDANCE AND
PSYCHOLOGICAL COUNSELING**

MASTER THESIS

**INVESTIGATING THE ROLE OF DIGITAL TOOLS
AND ARTIFICIAL INTELLIGENCE USED IN THE
LEARNING AND TEACHING PROCESSES ON
UNIVERSITY STUDENTS' SELF-REGULATED
LEARNING SKILLS**

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**THESIS SUPERVISOR
ASSIST. PROF. MEHMET AKIN BULUT**

İSTANBUL, 2024

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LEARNING SKILLS**

by

NUREVŞAH KAYA

**A thesis submitted to the School of Graduate Studies in partial
fulfillment of the requirements for the degree of Master of Arts in
Guidance and Psychological Counseling**

**THESIS SUPERVISOR
ASSIST. PROF. MEHMET AKIN BULUT**

İSTANBUL, 2024

APPROVAL PAGE

This is to certify that we have read this thesis and that, in our opinion, it is fully adequate, in scope and quality, as a thesis for the Master of Arts in Guidance and Psychological Counseling degree.

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This is to confirm that this thesis complies with all the standards set by the School of Graduate Studies of Ibn Haldun University.

Date of Submission

Seal/Signature

ACADEMIC HONESTY ATTESTATION

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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ÖZ

ÖĞRENME VE ÖĞRETME SÜREÇLERİNDE KULLANILAN DİJİTAL ARAÇLARIN VE YAPAY ZEKÂNIN ÜNİVERSİTE ÖĞRENCİLERİNİN ÖZ- DÜZENLEMELİ ÖĞRENME BECERİLERİ ÜZERİNDEKİ ROLÜNÜN İNCELENMESİ

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21. yüzyıldaki teknolojik ilerlemeler, eğitim sisteminin dijital bir çerçeveye entegre edilmesine yol açarak, bireylerin öğrenme süreçlerinde aktif roller üstlenmelerini ve öğrenme süreçlerini bağımsız bir şekilde yönetme yeteneği kazanmalarını gerektirmiştir. Yüksek öğretimde meydana gelen dijital dönüşüm sürecinde ve içerisinde yer aldığımız bilgi çağının bireylere sunduğu hayat boyu öğrenme yolculuğunda, birey için oldukça gerekli olan öz-düzenlemeli öğrenme becerilerinin öneminin farkına varılması, öğrenme ve öğretme süreçlerinde kullanılan dijital araçlar ve yapay zeka uygulamalarının bireylere öz-düzenlemeli öğrenme becerileri kazandırmada olumlu bir işlevinin olabileceğini düşündürmüştür. Bu kritik noktadan hareketle, bu çalışma, öğrenme ve öğretme süreçlerinde kullanılan dijital araçların ve yapay zeka uygulamalarının üniversite öğrencilerinin SRL becerileri üzerindeki rolünü araştırmayı amaçlamaktadır. Nitel araştırma yönteminin kullanılmış olduğu bu çalışmada bir vakıf üniversitesinde bulunan 10 üniversite öğrencisi ve 5 öğretim üyesiyle yarı yapılandırılmış görüşmeler yapılarak derinlemesine bilgi toplanmıştır. Katılımcılardan elde edilen veriler tematik analiz yöntemi ile incelenmiş ve dijital araçlar ile yapay zeka uygulamalarının öğrenciler ve akademisyenler tarafından hedef belirleme ve planlama, öğrenme materyallerini düzenleme, akademik performansı izleme, öğrenmeyi pekiştirme, bilgi ve yardım arama, çevresel yapılandırma, öz-

değerlendirme ve motivasyon gibi öz-düzenlemeli öğrenme-becerilerini geliştirici bir yaklaşımla kullanılabileceği sonucuna ulaşılmıştır. Araştırmadan elde edilen bulgular, dijital araçların ve yapay zekanın yükseköğretim bağlamında öğrencilerin SRL becerilerini geliştirmedeki rolünün daha iyi anlaşılmasına katkıda bulunmakta ve bu doğrultuda nasıl kullanılması gerektiğiyle alakalı hem öğrenciler hem de akademisyenler için bir rehber niteliği taşımaktadır.

Anahtar Kelimeler: Dijital Araçlar, Eğitim, Öğrenme, Öz Düzenleme, Yapay Zeka.



ABSTRACT

INVESTIGATING THE ROLE OF DIGITAL TOOLS AND ARTIFICIAL INTELLIGENCE USED IN LEARNING AND TEACHING PROCESSES ON UNIVERSITY STUDENTS' SELF-REGULATED LEARNING SKILLS

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The technological advancements of the 21st century have led to the integration of the education system into a digital framework, requiring individuals to take on active roles in their learning processes and gain the ability to manage their learning independently. Within the digital transformation process occurring in higher education and the lifelong learning journey of the information age we are in, there has been a recognition of the importance of self-regulated learning skills for individuals. This has prompted the consideration that digital tools and artificial intelligence applications utilized in the learning and teaching processes could have a positive function in equipping individuals with SRL skills. Building upon this critical point, this study aims to investigate the role of digital tools and AI applications on university students' SRL skills. In this study, which employed a qualitative research method, in-depth data were collected through semi-structured interviews with ten university students and five faculty members at a private university. The data obtained from the participants were analyzed using thematic analysis, and it was concluded that digital tools and AI applications could be used in an enhancing approach by students and academics for goal setting and planning, organizing learning materials, monitoring academic performance, enhancing learning, seeking information and assistance, environmental structuring, self-assessment, and motivation. The findings from the research contribute to a better understanding of the role of digital tools and AI in enhancing students' SRL

skills in the context of higher education and serve as a guide for both students and academics on how they should be utilized accordingly.

Keywords: Artificial Intelligence, Digital Tools, Education, Learning, Self-Regulation.



DEDICATION

In the name of Allah, the Entirely Merciful, the Especially Merciful.

1. By the morning brightness,
2. And [by] the night when it covers with darkness,
3. Allah has not taken leave of you, [O Muhammad], nor has He detested [you].
4. And the Hereafter is better for you than the first [life].
5. And Allah is going to give you, and you will be satisfied.
6. Did He not find you an orphan and give [you] refuge?
7. And He found you lost and guided [you],
8. And He found you poor and made [you] self-sufficient.
9. So, as for the orphan, do not oppress [him].
10. But as for the favor of Allah, report [it].

(Surah Ad-Duhaa 1-11)

"To all fellow travelers guided by the light of the Surah Ad-Duhaa, striving to find the right path and making it their mission to share the blessings of Allah through acts of kindness with others..."

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In this study, which results from long efforts, I would like to express my deepest gratitude to my invaluable advisor, Assist. Prof. Mehmet Akın Bulut. His dedication, wisdom, and guidance have been a beacon of light for me at every step of this journey. He has been not only an academic advisor but also a mentor and a friend. Every moment spent with him has inspired me to discover new horizons and fulfill my potential. The support and trust he has given me along this path are priceless. Working with him has been an honor and a privilege for me.

I am also grateful to my beloved mother, father, and brother, who have always supported me with their loving hearts and turned this challenging time into a source of joy. Every moment spent with them has been the most precious gift of my life. Thank you for consistently strengthening me with your presence.

Nurevşah Kaya
ISTANBUL, 2024

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LIST OF SYMBOLS AND ABBREVIATIONS

AI	Artificial Intelligence
ICT	Information and Communication Technology
LMS	Learning Management System
MOOC	Massive Open Online Course
OECD	Organization for Economic Co-Operation and Development
SMS	Short Message Service
SRL	Self-Regulated Learning
TÜBİSAD	Turkish Informatics Industry Association
YÖK	The Council of Higher Education



CHAPTER I

INTRODUCTION

1.1. Background of the Study

It is conceivable to assert that the teaching methods and techniques, instructional tools, and materials, as well as the student-academic profiles of higher education institutions around the world, are profoundly influenced by the geographical and historical context within which they are situated. Based on this point, it can be stated that the rapid and radical changes that have occurred throughout history have led to the transformation of the traditional structure in the field of education as in every field, paving the way for the establishment of an innovative and up-to-date system in line with the contemporary era (YÖK, 2021).

Notably, the technological developments that have taken place in the current 21st century referred to as the ‘digital age’, have enabled the education system to be integrated into a digital framework. This situation has led to the differentiation of teaching-learning processes and the emergence of the current student profile in contemporary higher education institutions, shaped by the new generation of students labeled as digital natives by Prensky (2001). There is also a focused emphasis on enhancing teaching-learning quality through the active utilization of digital tools and AI throughout the education process (Parlak, 2017)

According to the report published by the OECD in 2019, the rapid changes that have occurred in the field of technology have almost made it obligatory for individuals to

use digital tools and resources in the context of learning (OECD, 2019). In this context, higher education institutions, which are of critical importance in ensuring social change and fostering qualified human resources, have undergone a digital transformation process and adopted a new structure under the name of Education 4.0, which refers to the ‘Design and innovative use of technology in education’ (Taşçı & Taşlıbeyaz, 2021). With the transition to Education 4.0 in higher education institutions, Web 2.0 tools, virtual and augmented reality applications, game-based applications, Mobile technologies, virtual assistants, cloud computing systems, wearable technologies, simulations, and AI have started to be used by both students and academics in the learning and teaching process (Akgündüz et al., 2021; Karoğlu et al., 2020). Furthermore, it has become crucial for academics facing 21st-century students to adapt their teaching methods and pedagogical approaches by embracing differences and incorporating digital and AI tools into their instructional process (Robertson, 2020). According to the Digital Transformation Index of Turkey published by TÜBİSAD in 2022, all these processes have resulted in an increase in the utilization rate of Information Processing Technologies in the education sector from 2,78/5,0 in 2019 to 3,20/5,0 in 2022 (TÜBİSAD, 2022).

In today’s era, where digital transformation is gaining momentum and open access to information is easily facilitated, one of the most significant objectives of higher education institutions is to support students on the path to becoming independent learners and to provide them with lifelong learning skills. The most important reason for this objective is that in today’s society, individuals who can take responsibility for their own learning, possess the ability to learn independently regardless of time, place, and person, and can self-motivate for continuous learning play a crucial role in societal and national development. These skills that higher education institutions aim to instill in individuals are explained by the concept of ‘self-regulated learning,’ introduced in the literature by different researchers in the 1980s (Zimmerman & Schunk, 2011).

According to Zimmerman, one of the researchers who first proposed the SRL model, SRL, in the most general terms, is directly related to individuals' ability to regulate and control their emotions, cognitions, behaviors, and environmental factors during learning experiences (Zimmerman & Pons, 1986). Individuals with SRL skills are considered to have advanced metacognitive abilities, enabling them to plan, organize, execute, observe, and evaluate every stage of their learning (Özmenteş, 2008). In each stage, they frequently ask themselves questions such as what is it that I am going to learn, why am I learning this, from whom can I seek help while learning, where can I learn most effectively, how will what I am learning be helpful to me, what have I not learned yet, and what obstacles are hindering my learning progress?

All these abilities provide individuals with the opportunity to go beyond being passive recipients of information and actively construct knowledge by processing it through various cognitive and behavioral strategies (Sarı & Akınoğlu, 2009). In an academic study conducted by Demircan (2014), it was found that students with high SRL skills have higher academic achievements, self-efficacy perceptions, and feelings of responsibility compared to students with lower SRL skills. Furthermore, in another study conducted by Richardson et al. (2012) with the aim of revealing the factors predicting undergraduate students' academic achievements, SRL skills were determined as the most influential factor. However, despite the importance of SRL on students' academic success, Bembenutty (2011) highlighted in a study that university students are lacking in basic SRL skills such as setting academic goals, selecting appropriate strategies in the learning process, and being able to motivate themselves to learn.

Considering the fact that the SRL skills of students can be improved when appropriate opportunities are provided (İğci & Özdemir, 2017), the approach that academics teaching in higher education institutions adopt in this regard has become another

significant issue that needs to be addressed. In line with this issue, it is a matter of curiosity to what extent today's academics implement the fact, envisioned by Duderstadt in his article as early as 1998, that academics teaching in higher education institutions in the digital age should set aside their traditional teaching roles. They should provide a teaching experience that enables students to take responsibility for their own learning and ultimately improve their self-regulated learning (SRL) skills.

The most important way to achieve this is to use digital tools and AI in instructional processes with an awareness of enhancing students' SRL skills. However, research conducted on this issue has revealed that despite the widespread presence of technology in most higher education institutions today, the utilization of digital and AI tools in instructional practices to empower students' learning is quite limited due to the lack of guidelines and frameworks that can be provided to educators about the digital competencies (Tsz Kit Ng et al., 2023). According to Kay and Kummerfeld (2019), when educators' digital skills are enhanced through various guidelines and frameworks, reaching a level that enables them to provide a practical teaching experience for the new generation of students referred to as digital natives, digital tools and AI technologies used in teaching will play a facilitative role in fostering students' SRL skills such as planning, monitoring, and evaluation.

Therefore, it is crucial for academics not only to use digital tools and AI in their teaching actively but also to employ these technologies with an awareness that fosters the development of students' SRL skills. Teaching without such awareness prevents students from viewing their teachers as role models in using digital tools and AI in a way that contributes to their own learning. In such a case, digital tools and AI remain more of a trend of the contemporary age rather than fulfilling the desired benefits for students.

Considering the information provided above, it is essential to address and investigate the following questions: How do the increasing use of digital technologies and AI in higher education institutions affect students' SRL skills, perceived as a factor for enhancing academic performance (Boekaerts, 1996), what effect does the use of digital tools and AI in the teaching process have on students' SRL skills, and how do academics use digital tools and AI to enhance students' SRL skills in the teaching process? In this study, an attempt will be made to seek answers to these research questions.

1.2. Statement of the Problem

A comprehensive review of the existing literature reveals a notable pattern in which the majority of studies mainly focus on investigating the effect of digital tools and AI on students' SRL skills in the context of online learning environments (Alhalafawy & Zaki, 2022; Araka et al., 2021; Chelghoum, 2017; Viberg et al., 2020; Johnson & Davies, 2014). On the other hand, there is a remarkable research gap in examining the effect of digital tools and AI employed as methods for learning and teaching on students' SRL skills within traditional classroom settings. Hence, this study attempts to address this academic gap by exploring in depth the impacts of digital tools and AI on students' SRL skills, with a specific focus on real classroom settings.

Furthermore, upon a detailed literature review, it is seen that the majority of studies on the subject focus on the importance of having SRL skills when using digital tools and AI. Additionally, these studies investigate the effectiveness of SRL skills in enhancing students' performance in digital learning settings (Anthonysamy et al., 2020). However, in contrast to existing research, the primary purpose of this study is to reveal the role of the use of these tools in the learning process on university students' SRL skills.

Moreover, after an extensive review of the literature, it becomes evident that a prevailing theme within academic studies concerning the integration of digital tools and AI into education revolves around broad issues, notably examining the advantages and disadvantages associated with the utilization of digital tools and AI within educational settings (Chang et al., 2023). However, this research aims to shift the focus to a more specific aspect, which is the role of digital tools and AI in shaping and influencing the SRL skills of university students. The motivation for this specific emphasis comes from the noticed limitation in the literature, where comprehensive research on the effect of the use of digital tools and AI on students' SRL skills is quite limited.

1.3. Purpose of the Study

The fundamental aim of this research is to elucidate the role that digital tools and AI play in the SRL skills of university students within the learning and teaching process. In the 21st century, characterized as the age of information, the necessity for higher education institutions, which are at the forefront of knowledge transfer and sharing, to adapt to digital transformation has mandated the use of digital tools and AI in both learning and teaching (Gümüšođlu, 2017).

In this regard, there has been an increase in the use of digital tools and AI in universities, both for students and teachers (Karođlu et al., 2020). The increasing use of these technologies has been predominantly addressed by researchers in terms of their positive and negative impacts on students. However, there have been very few studies on how these digital technologies can be used with an approach that enhances students' SRL skills (Chang et al., 2023). Also, it has not been conclusively answered yet whether Web 2.0 tools and AI applications, frequently used by students in their learning and by academics in their teaching, are utilized merely for the aim of adapting

to the digital age or if there is a purpose and awareness to improve SRL skills in both students and teachers while using these tools.

Taking into consideration the critical academic gap points mentioned above, this research will aim to shed light on these points by seeking answers to the research questions provided below:

- i. What effect does the use of digital tools and AI in the learning process have on students' SRL skills?
 - Which SRL skills were observed in students depending on the use of digital tools and AI?
- ii. What effect does the use of digital tools and AI in the teaching process have on students' SRL skills?
 - Which SRL skills were observed in students depending on the use of digital tools and AI in the teaching process?
- iii. How do academics use digital tools and AI to enhance students' SRL skills in the teaching process?

1.4. Significance of the Study

It is undeniable that the changes and transformations brought about by the digital age have facilitated human life in many areas, and there is no doubt that one of the most significant areas affected by these changes is education. With the changes occurring in education due to digitalization, various digital tools and AI applications have started to be widely used in the learning and teaching process. Moreover, in order to promote the digitalization of universities in Turkey, various projects have been initiated by the Higher Education Council, such as “YÖK Goes Digital,” “Digital Transformation in Universities,” and “Raising Strong Generations for the Next 10 Years”. These projects aim to modernize university infrastructure with advanced digital tools, integrate technologies like AI, MOOCs, open educational resources, and cloud computing into

education, and prepare students with essential digital skills and competencies. The overall goal is to create a more interactive, accessible, and data-driven educational environment, enhancing the quality of higher education in Turkey (Karoğlu et al., 2020).

Despite the steps taken towards the digitalization of education and the widespread use of digital technologies and AI in the learning and teaching processes, can we assert that we have reached the desired level in higher education? This research basically will reveal some pathways in line with the purpose of reaching the desired education level mentioned in the question.

The most crucial aspect of this study is that it will find out whether the digital tools and AI used in the learning and teaching by students and academics in higher education institutions are employed in a manner that fosters students' SRL skills, which are considered a paramount criterion for academic success. Also, thanks to this study, insights into how digital tools and AI can be used in a way that improves SRL skills will be identified based on critical themes obtained from interviews conducted with students and academics in the research sample, and these findings will be shared with the literature. Thus, both students and academics will be able to have a guide-like knowledge on how to use these tools in a manner that supports self-regulated learning skills.

It is also believed that the guide-like knowledge that the findings of this study will provide can alleviate some of the adverse effects, such as stress, time management issues, attention problems, etc., that digital tools and AI usage may cause on students and academics. In this way, it is believed that there will be changes in the attitudes of academics who are hesitant towards the use of digital technologies during their instruction.

Another significant point of this study is shedding light on the optimal use of digital tools and AI in education to achieve the desired maximum benefit for both students and academics. Through this research, awareness regarding the use of digital tools and AI will be created, and this awareness will lead to an increase in students' SRL skills,

ultimately contributing to the improvement of their academic performance and general life skills.

Finally, by demonstrating the effect of the teaching methods and techniques employed by academics on the development of SRL skills, this research will highlight the importance of academics serving as role models for their students in this regard. Besides, exemplary teaching methods that can serve as examples for other academics will be shared, emphasizing the importance of a collaborative approach in fostering students' SRL skills. It is believed that all these processes will complement some of the shortcomings found in studies related to the subject in the academic literature and guide future, more comprehensive research endeavors.

1.5. Assumptions of the Study

It is acknowledged that the studies conducted within the scope of the research were carried out in accordance with the assumptions listed below.

- The higher education students and academics whose opinions and thoughts are consulted actively use digital tools and AI in their academic studies.
- The questions in the semi-structured interview form prepared within the scope of the research are deemed sufficient for revealing the participants' views and experiences
- The method used in the research is appropriate for achieving the research objectives.
- The study group involved in the research possesses the adequacy to represent the population of the research.
- Participants of the research have sincerely and accurately responded to the semi-structured interview questions posed to them.
- The findings obtained from the research support the research objectives.

1.6. Limitations of the Study

The limitations of the studies conducted within the scope of this research are provided below.

- The population of this study comprises only undergraduate students and academics enrolled in a foundation university in İstanbul, exclusively during the academic year 2023-2024. Therefore, the findings obtained from the participants cannot be generalized to past or future years.
- As the research method, only the questions in the semi-structured interview form prepared by the researcher were used. Therefore, the research findings may have been influenced by the researcher's subjectivity.
- Due to the limited sample size of the research, the results are typically context-specific and may not be easily generalized to larger populations or different settings.

1.7. Definitions

The definitions of the key concepts used in this research are provided below.

Self-Regulation: It is the ability of an individual to set goals in any area of life, develop methods to achieve these goals, and subsequently monitor the effectiveness of these methods (Risemberg & Zimmerman, 1992).

Self-Regulated Learning: It is an active and constructive process where students have awareness about their own learning goals, possess the ability to regulate their cognition, motivation, and behaviors accordingly, and utilize the capability to make environmental changes in order to achieve learning objectives (Pintrich, 2000).

Self-Regulated Learning Strategies: They refer to any actions that students employ during their learning experiences to acquire information involving cognitive and metacognitive processes (Pintrich, 1991).

Digital Tools in Education: They encompass multimedia content, interactive learning platforms, online learning environments, etc., providing students access to a wide variety of educational resources and offering a personalized learning experience. They also enable instructors to enhance their teaching methods and provide more interactive and engaging teaching experiences (Haleem et al., 2022).

Artificial Intelligence in Education: It refers to machines' ability to perform tasks requiring human-like intelligence, such as developing content and curriculum, teaching, solving problems, reviewing students' assignments, grading, providing feedback, and other educational performances through various programs like ChatGPT, Learning Management Systems, Chatbots, etc. (Chen et al., 2020).

CHAPTER II

LITERATURE REVIEW

2.1. Introduction

In this section of the study, the focus will be on the relevant literature, and the research topic will be examined in depth from various perspectives. Accordingly, the topics to be addressed will be Self-Regulated Learning, Self-Regulated Learning in Different Theories and Approaches, Self-Regulated Learning Models, Self-Regulated Learning Strategies, Characteristics of Self-Regulated Learners, Teaching Methods Supporting Self-Regulated Learning Skills of Students, Digitalization in Education, and Artificial Intelligence in Education. Additionally, at the end of this section, relevant research conducted on the research topic will also be discussed.

2.1.1. Self-Regulated Learning

It is a well-known phenomenon that despite attending the same education program and receiving education from the same instructor, notable differences in achievement levels are observed among students. Also, it is commonly noted that while some students fail to achieve success despite expending significant effort and dedicating extensive study periods, others can attain the desired level of success with little effort within a shorter time frame. At this point, the question of what makes a student successful has begun to be asked. The research conducted in the 19th century provided answers to this question, such as innate abilities, intelligence, and diligence, while studies conducted in the 20th and 21st centuries have revealed that a crucial factor that makes students successful and brings about differences in their academic achievements is their levels of SRL skills (Aydın & Atalay, 2015; Üredi & Üredi).

Furthermore, in today's world, where access to information is easily facilitated through millions of sources compared to the past, contemporary education demands much more

from students than merely memorizing information. It aims for students to acquire skills such as discerning which among the millions of knowledge sources is most suitable for their own learning without getting lost among them, understanding how to comprehend information most efficiently through which learning method, and recognizing the practical utility of various pieces of knowledge. All of these processes highlight the necessity for students to acquire SRL skills.

According to Zimmerman (2013), the concept of ‘self-regulated learning’ emerged in the 1980s with the aim of addressing the question, “How can students become the masters of their own learning?” based on the work of Albert Bandura, who introduced the concept of SRL within the framework of his “Social Cognitive Learning Theory” (Eker, 2014). Bandura (1986) defines SRL as the ability of an individual to have control over their own emotions, thoughts, and behaviors, and the capacity to regulate them as desired.

Upon its recognized importance in education, the concept of SRL became a widely studied topic, particularly in the 1990s and 2000s, and it has been defined in various ways by different researchers.

According to Pintrich (2000), a prominent figure in significant studies on SRL, SRL is defined as an active and constructive process in which students establish learning goals, motivate themselves to achieve these goals, monitor and regulate their behaviors accordingly, and subsequently evaluate and control the outcomes. Students who carry out all these processes with conscious awareness know what path to follow in order to achieve their learning goals and what motivates them along this path.

Another researcher who made essential contributions to the field of self-regulation, Zimmerman (2002), describes SRL not only as a mental ability or academic performance skill but also as the ability of learners to transform their mental abilities into academic performance. According to him, SRL involves individuals making plans while achieving their learning goals and cyclically applying the thoughts, emotions, and behaviors they have self-generated during this process (Zimmerman, 2000).

Similar to Zimmerman's definition, Boekaerts (2002) argues that SRL entails the systematic utilization of students' emotions, thoughts, and behaviors generated by students, taking into account the conditions they are in to achieve learning goals. As evident in both definitions, the most crucial factor provided by SRL to students is the ability to manage their learning process independently. The notion of independent learning mentioned here should not be perceived as a situation opposed to the teaching process and the presence of teachers. Instead, it primarily highlights students being conscious of situations that enable them to facilitate their own learning (Sarı & Akinoğlu, 2009). At this point, it is essential to organize educational environments to foster students' abilities to independently carry out their learning, with teachers assuming more of a guiding role (Turan & Demirel, 2010).

Drawing inspiration from Albert Bandura's observational learning approach, Schunk (1996) indicates that SRL occurs in three stages: observation, judgment, and response. In line with this definition, it can be stated that individuals who observe their surroundings to determine their learning goals make a judgment about how to achieve these goals and then take action to reach them.

Looking at the definitions of SRL in research conducted in recent years, Gümleksiz and Demiralp (2012) provide a broader perspective on the concept. They define SRL as the ability of individuals to develop a sense of responsibility and to be successful by being able to control their lives and think independently. On the other hand, Goetz and others (2013) have adopted a more limited perspective and proposed SRL as the process through which students acquire knowledge and skills in a motivated manner and independently from others. With a more detailed definition, Cheng (2011) expresses that SRL is a process in which students set learning goals, make plans to achieve these goals, develop appropriate learning strategies for themselves, make predictions about the learning outcomes, question themselves in the face of learning difficulties, and engage in reflection.

Although the concept of SRL has been defined in various ways above, there are some common points of agreement among researchers about this concept. Common points noticed in the definitions of SRL include cognitive strategies that students use to recall or comprehend a subject, metacognitive strategies used to plan, monitor, and regulate

these cognitive strategies, behavioral strategies used to control and manage learning processes, and motivational strategies that actively engage students in all of these processes (Pintrich & De Groot, 1990). Based on this, it is conceivable to indicate that SRL has cognitive, metacognitive, affective, social, and behavioral components.

The cognitive component of SRL refers to all mental activities individuals undertake to achieve their learning objectives and engage in knowledge and skill acquisition (Pintrich, 2004). Weinstein and Mayer (1991) indicate that the cognitive component consists of processes such as repeating information until it is memorized (rehearsal strategies), understanding the information (elaboration strategies), and integrating schematic information in the mind (organizational strategies). The metacognitive aspect of SRL encompasses individuals being aware of their learning processes and being able to control, regulate, monitor, and evaluate themselves. In the most general sense, it refers to being able to learn how to learn (Gelen, 2004). The affective component of SRL entails individuals having internal motivation towards learning, believing in their own competence for acquiring knowledge and skills, and deriving pleasure from the process of learning (Schunk & Zimmerman, 1997). According to Zimmerman (1989), self-efficacy, which denotes individuals' belief in their own abilities, is a highly crucial factor that enhances the affective component of SRL. The social component, another element of SRL, emphasizes the significance of social resources, learning through modeling, and seeking assistance from supportive resources in acquiring SRL skills (Florez, 2011). Lastly, the behavioral component of SRL encompasses behaviors such as individuals making plans in line with their learning goals, exerting effort in learning, managing time, and organizing learning environments (Pintrich, 2004; Schunk & Zimmerman, 1997).

These components, which address SRL from different aspects, are in constant interaction with each other, and an individual aiming to foster SRL should possess the requirements of all these components.

As seen above, various researchers have provided different definitions of SRL since the 1980s. A common point among all these definitions is the emphasis on their cognitive, metacognitive, behavioral, and motivational components.

2.1.2. Self-Regulated Learning in Different Theories and Approaches

In order to enhance the quality of education, which plays a crucial role in imparting 21st-century skills and determining the level of a country's development, numerous theoretical and applied research studies have been conducted in the field of learning. Many researchers have mainly focused on how learning occurs and what the most effective learning methods are. In these studies, the concept of SRL has been highlighted as a significant factor in enhancing students' academic achievement. Starting with Bandura, who emphasized the importance of self-regulation in the learning process through his Social Cognitive Learning Theory, studies have been continued by various researchers, leading to the emergence of different approaches to SRL such as 'Behaviorist Approach,' 'Phenomenological Approach,' 'Information Processing Theory', and 'Constructivist Approach' (Bates, 2006).

According to the 'Behaviorist Approach,' founded on Skinner's (1953) studies, SRL consists of stages where the individual decides which behaviors are necessary to acquire for themselves, creates distinctive stimuli for the emergence of these behaviors, participates in the learning process, monitors performance, checks whether the performance meets standards, and utilizes reinforcements (Öz, 2020). All these processes are categorized under three headings by Schunk and Zimmerman (2012), namely self-monitoring, which refers to individuals monitoring their own behaviors; self-instruction, which means the process of managing behaviors to be acquired; and self-reinforcement, which is employed to increase the frequency of behaviors.

The 'Phenomenological Approach,' pioneered by Edmund Husserl, asserts that SRL can only occur through understanding the essence behind appearances. In this context, it emphasizes the importance of concepts such as self-monitoring, self-evaluation, and self-awareness. In this approach that highlights self-directedness, individuals play an active role in learning tasks such as setting goals, making plans, determining learning strategies, demonstrating performance, and evaluating themselves throughout the learning process, thanks to the awareness and knowledge they possess about themselves (McCombs, 2013).

The founder of the 'Social Cognitive Learning Theory,' Albert Bandura, views learning as a product of the interaction between the individual, the environment, and behavioral factors, which he explains through the concept of "reciprocal determinism," and he emphasizes that individuals have the capacity to control and regulate their behaviors, thoughts, and environments while they are learning (Bandura, 1986; Zimmerman, 1989).

Furthermore, in his Social Cognitive Learning Theory, Bandura asserts that in the process of acquiring behavior through observation, the individual first needs to pay attention to the behavior to be modeled, then encode this behavior into memory, restructure it in various aspects, use it when necessary, and be motivated to perform this behavior (Bandura, 1986). The behavior that emerges in individuals as a result of all these cognitive processes is filtered through some critical components of SRL, such as self-observation, self-evaluation, self-reaction, and self-efficacy (Bandura, 1991).

According to the Information Processing Theory, which is concerned with the processes of how new information is externally received, processed, stored in the long-term memory, and recalled, SRL consists of four stages: goal setting, planning, determining methods and techniques, and adapting to the metacognitive processes (Winnie, 2005).

Lastly, in the Constructivist Approach, SRL entails the active participation of the individual in every stage of learning and encompasses a process of questioning, interpreting, and analyzing information to facilitate the construction and internalization of knowledge (Karadağ et al., 2008).

In the theories presented by different researchers regarding individuals' learning processes, each researcher has outlined their perspectives on how learning takes place and their approaches to effective learning methods.

2.1.3. Self-Regulated Learning Models

The increasing importance of SRL in educational psychology since the 1980s, defined as individuals making cognitive, motivational, and behavioral adjustments based on

their personal characteristics and determining appropriate learning strategies, has led researchers to propose numerous different models on this topic (Sarioğlu & Akın, 2009). Examining different SRL models in the literature, Pintrich (2000) pointed out that while these models differ from each other in some aspects, they share common points. These common points include the active involvement of the individuals in the learning process, setting goals, monitoring, regulating, and controlling their behaviors, and being influenced by the cognitive, motivational, and behavioral factors in their learning (Pintrich, 2000).

On the other hand, Bembenutty and his friends (2015) have pointed out that among the SRL models found in the literature, models attributed to Winne, Boekaerst, Pintrich, and Zimmerman stand out and these models seek answers to five common questions.

- What are the factors that motivate students to self-regulate during their learning?
- Which processes provide students with self-awareness and self-reactivity skills?
- How are students' SRL skills affected by their social and physical environment?
- What are the key processes that enable students to achieve their academic goals?
- When learning occurs, what is the capacity of students' self-regulation?

Although there are various studies in the literature on SRL models proposed by different theorists such as Boekaerts, Borkowski, Winne, and Kanfer, in this study, the SRL models developed by Zimmerman and Pintrich, which have emerged as the most prominent in the literature, will be explained in detail.

In studies related to SRL models, Zimmerman, who has made significant contributions to the field, has explained SRL with three different models: the “Three-Phase Model of Self-Regulation,” the “Social Cognitive Model,” and the “Multi-Level Model” that he has developed.

In Zimmerman’s first SRL model, known as the “Three-Phase Model of Self-Regulation,” Zimmerman (1989) proposes that learning occurs through the interaction between the individual, behavior, and environment. Behavioral self-regulation entails an individual observing oneself and making adjustments, implicit (individual) self-regulation involves monitoring and regulating one’s cognitive states, and environmental self-regulation pertains to an individual observing and adjusting environmental conditions (Zimmerman, 2000). In this model, SRL is placed at the center of cyclical changes in individual, behavioral, and environmental factors throughout the learning process, and the individual monitors, regulates, and controls himself/herself through the changes occurring in these factors (Yıldızlı & Saban, 2015).

The interaction between the individual, behavior, and environment in the learning process is demonstrated below.

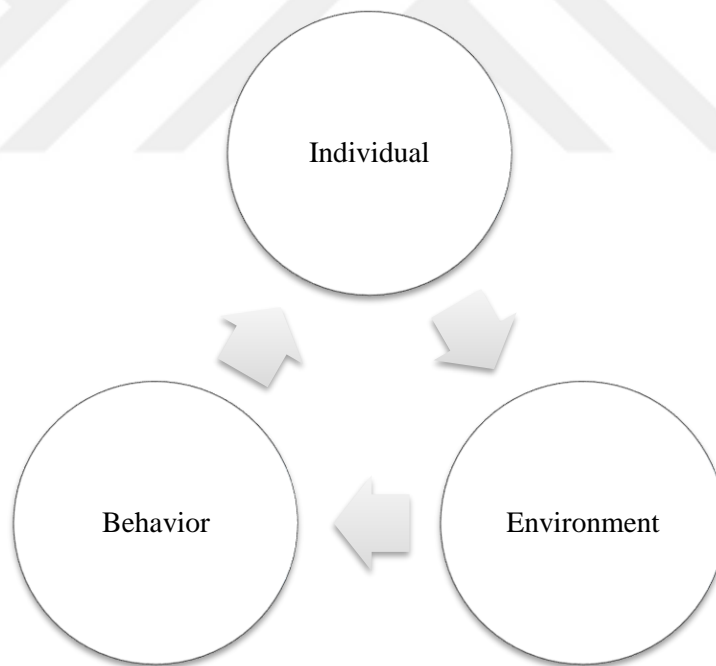


Figure 2.1. A Social-Cognitive View of Self-Regulated Academic Learning

Source: Zimmerman, 1989

The second model created by Zimmerman for SRL is the “Social Cognitive Model,” which was developed in 2000 and inspired by Albert Bandura’s social cognitive

theory. According to this model, SRL consists of three cyclically occurring stages: the Forethought Phase, the Performance Phase, and the Self-Reflection Phase.

The figure below illustrates the phases and sub-stages of the “Social Cognitive Model.”

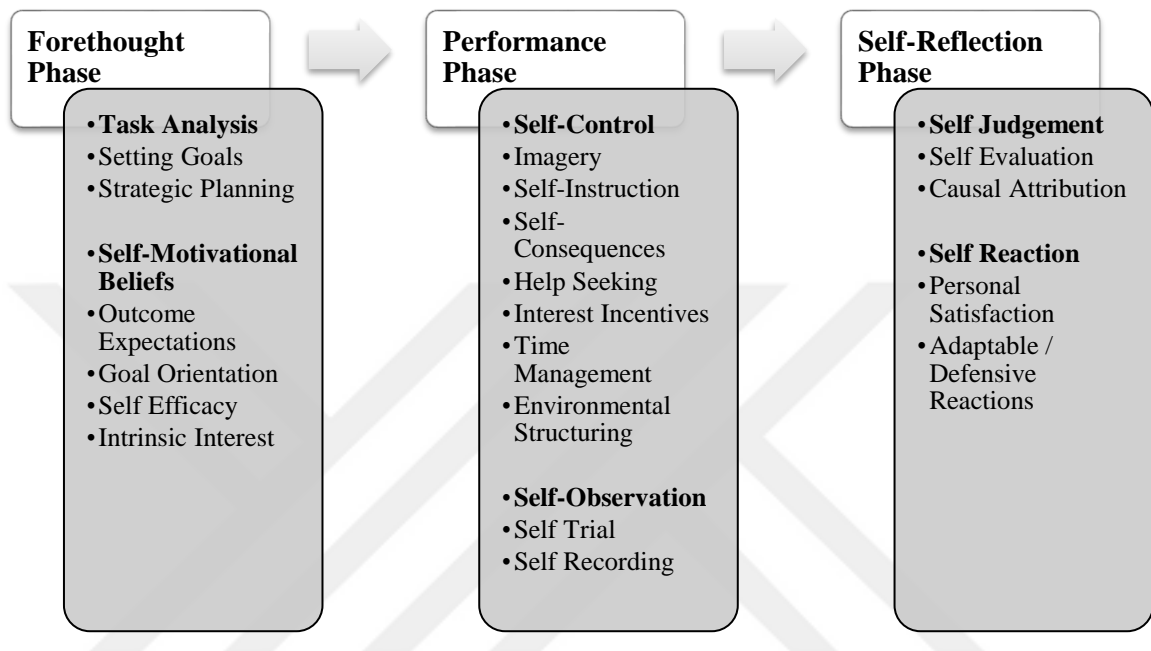


Figure 2.2. The Phases and Sub-Stages of the Social Cognitive Model

Source: Zimmerman & Moylan, 2009

The explanations of the stages and substages depicted in the figure are provided below.

i. Forethought Phase: It represents the processes and thoughts preceding the effort expending for learning and consists of two sub-stages: task analysis and self-motivational beliefs (Sarı & Akınoğlu, 2009).

- a) Task Analysis: It refers to the stage where students analyze their learning tasks, set goals, and make plans (Zimmerman & Moylan, 2009).
- b) Self-motivational beliefs: It encompasses students’ self-efficacy beliefs regarding their personal abilities, outcome expectations, and their ability to direct their learning objectives (Bandura, 1997).

ii. Performance Phase: It refers to the processes that emerge during the behavioral implementations of learning and consists of two sub-stages: self-control and self-observation (Zimmerman, 2002).

- a) Self-Control: In this stage, learning methods and strategies determined during the forethought phase are put into practice, and students concentrate on their learning goals and expend efforts for learning (Sarı & Akınoğlu, 2009).
- b) Self-Observation: This stage indicates students systematically monitoring and recording their own performances during the learning processes (Zimmerman, 1989).

iii. Self-Reflection Phase: This phase includes the processes that occur after the learning effort and comprises two sub-stages: self-judgment and self-reaction (Zimmerman, 2000).

- a) Self-Judgment: It refers to students judging their own performance after the learning process by comparing it with another student's performance or with a criterion and expressing causal explanations regarding their failures or successes.
- b) Self-Reaction: It represents the stage in which students develop feelings of satisfaction or dissatisfaction regarding their learning performance. Students who reach a judgment of satisfaction regarding their learning performance adapt the strategies they have used to other learning situations and continue the cycle. On the other hand, students who reach a judgment of dissatisfaction regarding their learning performance develop defensive responses such as academic procrastination, helplessness, etc. (Zimmerman, 2000).

The last model developed by Zimmerman for SRL is the "Multi-Level Model," which reduces self-regulation competencies into four stages: observation, imitation, self-control, and self-regulation. According to this model, students engage in the following stages in their learning processes: observing a social model, imitating the behaviors performed by the model, self-monitoring while implementing the behavior, and demonstrating the behavior without the model (Zimmerman, 2013).

Another researcher who has made significant contributions to SRL with the model of “General Framework for Self-Regulated Learning,” based on Bandura’s Social-Cognitive Theory, is Pintrich. In this model, self-regulation processes are classified into the domains of cognition, motivation, behavior, and context, and it is proposed that in the learning process, each of these domains go through ‘forethought, planning, and activation,’ ‘monitoring,’ ‘control,’ and ‘reaction-reflection’ phases. The phases and domains of Pintrich’s SRL Model are shown in the table below.

Table 2.1. Phases and Domains of Pintrich’s Self-Regulated Learning Model

Self-Regulation Phases	Self-Regulation Domains
<p>1) Forethought, Planning, Activation</p> <p>It refers to the phase in which individuals activate their perceptions regarding the task and content.</p>	<p><i>Cognition:</i> Goal setting, activation of prior knowledge, and metacognition.</p> <p><i>Motivation:</i> Goal orientation perceived self-efficacy, perception of task difficulty, activation of task value, and activation of interest.</p> <p><i>Behavior:</i> Planning time and effort, planning behavioral self-observation.</p> <p><i>Content:</i> Perception of task and perception of content.</p>
<p>2) Monitoring</p> <p>In this phase, individuals determine the requirements needed for the learning process by examining the environment in which learning will occur, the duration, and various aspects of the task.</p>	<p><i>Cognition:</i> Metacognitive awareness and monitoring cognition.</p> <p><i>Motivation:</i> Monitoring of awareness and motivation along with practical features.</p> <p><i>Behavior:</i> Monitoring of awareness, effort, time utilization, and help-seeking, as well as self-observation of behavior.</p> <p><i>Content:</i> Monitoring of task and contextual situations.</p>

Table 2.1. (cont.)

<p>3) Control</p> <p>In this phase, individuals make the necessary adjustments for their learning by controlling the various aspects of the task.</p>	<p><i>Cognition:</i> Selection and adoption of cognitive strategies for learning.</p> <p><i>Motivation:</i> Selection and adoption of strategies for managing motivation.</p> <p><i>Behavior:</i> Increasing or reducing effort, giving up or persevering, and seeking help behavior.</p> <p><i>Content:</i> Modifying the task.</p>
<p>4) Reaction, Reflection</p> <p>It reflects the evaluation of the cognitive performance, motivation, and learning behaviors exhibited by the learners throughout the learning process (Batdı, 2013).</p>	<p><i>Cognition:</i> Cognitive judgments.</p> <p><i>Motivation:</i> Affective reactions.</p> <p><i>Behavior:</i> Behavior preference.</p> <p><i>Content:</i> Evaluation of the task.</p>

If the table above is summarized, it can be stated that according to Pintrich (2004), SRL occurs in four stages. In each stage, individuals interact with different process patterns cognitively, affectively, behaviorally, and contextually.

In conclusion, Zimmerman and Pintrich, who have played pioneering roles in the field through their studies on SRL skills, have contributed significantly to the literature with various models mentioned above. They have provided valuable insights into how SRL occurs, its stages, and its components.

2.1.4. Self-Regulated Learning Strategies

While SRL theories provide individuals with theoretical knowledge about SRL, strategies grounded in these theories reflect the practical aspect of SRL and ensure individuals with a roadmap for acquiring SRL skills (Öz, 2020). Zimmerman and

Martinez Pons (1986) have identified SRL strategies that individuals can use in their learning process. These SRL strategies, which are the most commonly encountered in the literature and on which the interview questions in the study were based, are explained below.

- *Goal Setting and Planning:* This strategy refers to the process where the learner, prior to engaging in the learning process, identifies their learning deficiencies and formulates the necessary steps to address these deficiencies. In this regard, the individual plans what and how to learn and determines elements such as time, resources, environment, and methods that are necessary for their learning. With clearly identified goals and a strategic plan, the learner progresses systematically throughout the learning process, staying on track without deviating and ultimately achieving success.
- *Environmental Structuring:* This strategy means that the individual organizes the learning environment according to their own needs in order to facilitate the learning process. Within the scope of environmental structuring, the individual can organize the clutter in the environment where learning takes place, reduce noise, ensure that factors such as temperature and light are at optimum levels, and bring in the resources necessary for learning.
- *Organizing and Transforming:* Zimmerman and Martinez-Pons (1986) define the strategy of organization and transformation as the set of processes in which an individual undergoes to arrange information in different forms. In this strategy, learners restructure the newly encountered information by using their prior knowledge in order to make it more understandable for themselves and use some techniques such as making comparisons, classifying, grouping, showing similarities and differences, summarizing, and mapping.
- *Seeking Information:* This strategy, which reflects the ability to access accurate information quickly and efficiently, encompasses stages such as identifying potential sources of information, determining the appropriate source of information for one's own needs, and organizing the acquired information. In today's technological age, although it is perceived as an advantageous situation

in which information sources are diverse and information acquisition has become relatively easy, it has become more critical for individuals to have the ability to access accurate information through the appropriate source.

- *Keeping, Reviewing Records, and Monitoring:* Ader (2014) defines this strategy as students systematically monitoring and reviewing the learning process and resulting outcomes according to the learning goals they have set and attempting to keep records of information that they think may be useful for their own purposes in various ways such as note-taking, audio-recording, etc. during these processes.
- *Rehearsing and Memorizing:* Within the scope of this strategy, individuals resort to methods of rehearsal and memorization to transfer the information they have learned to their long-term memory in order to ensure its permanence. Students can use this strategy through different methods, such as verbally repeating information, summarizing, highlighting, visualizing, and solving questions.
- *Seeking Assistance:* During the learning process, it is inevitable for students to encounter specific difficulties and uncertainties. In such a situation, students become aware that they need assistance in order to overcome these difficulties and uncertainties, decide to seek help, and employ various strategies to seek and receive support (Newman, 2023). According to Newman (2002), seeking assistance can prevent potential failure, lead to task success, and increase the likelihood of long-term mastery and autonomous learning. Students can seek assistance in a variety of ways, such as asking someone, using AI tools, watching videos, reading books and articles, etc.
- *Self-Evaluation and Self-Consequences:* Self-evaluation can be expressed as the individuals' evaluation of their own performance and the learning process by identifying strengths and weaknesses to achieve the goals they set before learning. On the other hand, self-consequences refer to students setting rewards for themselves to increase their motivation toward learning or imposing

penalties on themselves when they fail to achieve the targeted performance (Ader, 2014; Öz, 2020).

As seen, Zimmerman, who explains strategies for acquiring SRL skills through concrete behaviors such as goal setting and planning, environmental structuring, and organization, has provided individuals with a guiding framework to develop these behaviors.

2.1.5. Characteristics of Self-Regulated Learners

Students with high levels of SRL skills exhibit specific differences that set them apart from other students. The most prominent characteristics of these students who take an active role in managing their learning processes include their ability to use appropriate learning strategies to achieve the learning goals and their capacity to take responsibility for their own learning (Banerjee & Kumar, 2014). They are aware of what they know and do not know, as well as the methods and strategies they need to follow in order to learn. Being aware of their learning processes enables these students to have a systematic and controlled approach to their learning, facilitating their ability to adapt and respond to any difficulties or changes they encounter (Banerjee & Kumar, 2014).

These individuals can motivate themselves internally throughout their learning processes. External factors such as grades and rewards are not as crucial for motivating them to learn. They are more driven by their curiosity and interest in their pursuit of knowledge (Sarı & Akınoğlu, 2009). Moreover, students with high SRL skills are ahead of others in areas such as planning, time management, effective note-taking, creating a productive study environment, and accessing appropriate learning resources (Zimmerman & Martinez-Pons, 1986).

According to Kuo et al. (2010), self-regulated learners cognitively engage in continuous learning, actively seek information, explore the ways to be successful in the face of difficulties, are able to accept failure, recognize problems, and seek ways to solve them. Alongside all these characteristics that facilitate students being task- and success-oriented, monitoring the learning performance and making evaluations of

the learning outcomes are other features that these students possess (Üredi & Üredi, 2007).

Furthermore, many studies attempting to uncover the impact of SRL skills on students' academic performance have demonstrated that students with high levels of SRL skills exert less effort while learning and achieve higher academic success (Zimmerman, 1990). For example, in a study conducted by Demircan (2014), it was revealed that students with high levels of SRL skills also exhibit high academic success, active participation in classroom activities, and high levels of self-efficacy while experiencing low levels of exam anxiety.

Another significant point that sets self-regulated learners apart from others is their advantageous position in acquiring lifelong learning skills. Lüftenegger et al. (2012) have defined lifelong learning skills as having a continuous desire for learning and actively participating in learning processes. Considering that self-regulated learners make continuous learning a way of life, it is possible to state that these individuals will remain open to learning throughout their lives and will be engaged in a continuous process of development.

To summarize, upon reviewing the literature, it can be concluded that students with high SRL skills exhibit the following characteristics (Zimmerman, 2002; Zimmerman & Martinez-Pons, 1986).

- Their interest and motivation for learning are high.
- They trust in their own competencies and are aware of their abilities.
- They can create appropriate learning environments for themselves and eliminate distracting elements from their learning environments.
- They are aware of their own strengths and weaknesses. They do not hesitate to accept their weaknesses and failures and seek ways to improve their shortcomings.
- They are open to collaborative learning. They seek out appropriate resources that can assist them in their learning processes.
- They set learning goals that align with their individual characteristics and can choose learning strategies that are suitable for achieving these learning goals.

- They manage their time effectively and progress in their learning systematically through the plans they make.
- They continuously monitor their learning performance, and in cases of failure, they engage in self-reflection and evaluation to identify ways to achieve success.
- They actively participate in class activities.
- They are not hesitant to ask questions and critique.
- They know what motivates them and reward themselves when they succeed.
- They are knowledgeable about effective listening, studying, and note-taking skills.
- When faced with difficulties and obstacles in their learning processes, they overcome these challenges and do not give up their passion for learning.

2.1.6. Teaching Methods Supporting Self-Regulated Learning Skills of Students

Although SRL is defined as a more individualized process in which the individuals actively manage and control their own learning, it is possible to assert that many other factors besides the individual also play a role in this process and influence the individuals' SRL skills. Additionally, considering the fact that SRL is not an inherent trait but rather a competence acquired later (Kitsantas et al., 2008), it is possible to support the acquisition of these skills in every student through various strategies and methods.

One of the strategies that teachers can implement in classroom environments to enhance students' SRL skills is the "Know-Want-Learn (K-W-L)" strategy developed by Ogle in 1986. In this strategy, the questions "What do I Know? What do I Want to Learn? and What I Learned?" are assigned to students as an instructional activity for each new topic to be learned (Ogle, 1986). The answers provided to these questions enable students to develop critical competencies of SRL, such as relating prior knowledge to new information, setting learning goals, and evaluating learning outcomes.

Another instructional implementation that improves students' SRL skills is for teachers to present information to students from different sources and in various

formats (Üredi & Üredi, 2007). This allows students to become knowledgeable about different learning sources and methods, giving them the opportunity to experiment and determine the most suitable learning method for themselves.

Furthermore, a study conducted by Ley and Young in 2001 identified four teaching principles to foster students' SRL skills. These fundamental principles are listed below.

- a) Guiding students to create an effective learning environment,
- b) Structuring instruction and activities during the lesson in a way that reinforces the cognitive and metacognitive processes of students,
- c) Using instructional objectives and feedback to provide students with the opportunities to monitor themselves,
- d) Providing students with continuous information about evaluation processes and offering opportunities for self-evaluation.

As seen, the instructional methods provided above for enhancing students' SRL skills are predominantly applicable to periods when traditional methods prevailed and before the widespread implementation of digitalization in education. However, in today's context with the ongoing digitalization in education, it is necessary to provide information about whether digital tools and AI used in instruction are utilized to improve students' SRL skills.

The instructional elements summarized in Baldan's (2017) study, which supports the SRL skills of students, are presented in the table below. It is believed that integrating relevant digital tools and AI applications into these instructional elements by teachers will serve as a good role model for students in terms of using these tools with an awareness of enhancing their SRL skills.

Table 2.2. The Instructional Elements Supporting Self-Regulated Learning Skills of Students

<p>Instructional Process</p>	<ul style="list-style-type: none"> • Planning multidimensional activities • Setting learning objectives • Presenting information in various and multifaceted formats • Providing learning experiences that foster creativity. • Incorporating peer instruction • Offering problem-based learning activities • Implementing collaborative learning activities
<p>Classroom Management</p>	<ul style="list-style-type: none"> • Facilitating social interaction • Encouraging help-seeking behaviors • Maintaining positive and supportive attitudes
<p>Evaluation Process</p>	<ul style="list-style-type: none"> • Providing effective feedback on students' learning performance • Using reinforcements for students' success and progress

If teachers use digital tools and AI applications appropriate to the relevant instructional elements while implementing the teaching methods given in the table, students will also use these tools and applications with the same consciousness and purpose.

A study conducted by Chelghoum (2017) aimed at examining the impact of digital tools used in the classroom on students' SRL skills has revealed that teachers, through the use of digital tools, can enhance students' academic achievement, life-long

learning skills, and consequently, their ability to become self-regulated learners, enabling them to learn independently regardless of time and place. Moreover, another study conducted by Abbasnasab et al. (2012) has demonstrated that teachers can impart learning skills such as remembering, rehearsal, elaboration, and organization, which are also components of SRL, to students using appropriate digital tools such as videos, quizzes, games, etc.

As seen, it is of great importance for educators, who can develop students' SRL skills through various methods that can be integrated into teaching practices, to act in accordance with this critical role they play.

2.2. Digitalization in Education

According to Myers (1999), technology has changed the lives of everyone who is connected to the Internet in such a way that whether there is good preparation for teaching through technology, individuals will eventually use it as a learning tool. As Myers pointed out, as early as 1999, it was inevitable that developments in technology would not affect education. Especially in contemporary education environments, the presence of students who are perceived as the 'Digital Natives' (Prensky, 2001), the 'Net Generation' (Tapscott, 1998), and the 'Millennial Learners' (Oblinger & Oblinger, 2005) has made the occurrence of digitalization in education indispensable.

The digital transformation in education has gone through four processes: 1.0, 2.0, 3.0, and 4.0 over time. The information about these processes is given below.

- *Education 1.0:* During this process, education was shaped by taking into consideration the needs of agricultural society, and knowledge was transferred from teachers to students and taught through memorization (Puncreobutr, 2016).
- *Education 2.0:* During this process, with the development of industrial society, a transformation occurred in education aimed at meeting the needs of the workforce, and the teaching of technologies that could be used on an industrial basis became widespread (Pooworavan, 2015).

- *Education 3.0*: This period reflects the transition from an industry-based society to a technology-based society. In this process, which aims to build a knowledge and production-oriented society, the Internet, especially Web 2.0 tools, started to be used intensively in education. Also, with the introduction of technology into the educational environment, teaching approaches based on individualized learning began to be accepted instead of traditional teaching methods (Harkins, 2008).
- *Education 4.0*: This process represents the transformation occurring in education during the innovative age that we are in. In this period aimed at the design and innovative use of technology in education, the use and design of new approaches and technologies such as digital tools, personalized data, mobilization, open-source access, cloud computing, smart agents, augmented reality, etc. are essential to be taught (Karoğlu et al., 2020).

As can be seen, digitalization in education has not occurred suddenly but has developed through certain phases over time. Based on this, it can be stated that while digitalization had not yet emerged in the Education 1.0 period, the teaching of digital technologies started to gain importance in the Education 2.0 period. Also, while the use of digital technologies became widespread in the Education 3.0 period, the design of digital technologies became prominent in the Education 4.0 period.

With the digital transformation taking place in education, there have also been changes in the digital tools utilized within the processes of learning and teaching. The changes occurring in digital tools have led to their classification as Web 1.0, Web 2.0, Web 3.0, and Web 4.0 tools.

- *Web 1.0 Tools (1995)*: They are basically search browsers that enable individuals to access information. These tools provide users with the ability to access web pages by using the Internet. The users of these tools are in the position of passive readers who merely receive information (Kavasoğlu, 2022).
- *Web 2.0 Tools (2000)*: These tools encompass platforms that are based on user-community interaction and active participation, allowing users to create online

information and materials, such as blogs, wikis, social networks, forums, chat rooms, photo albums, network presentations, etc. Users of these tools are not only passive readers of the content but also in an active position to intervene in the content (Çelik, 2021).

- *Web 3.0 Tools (2010)*: They facilitate the communication between computers by using cloud technologies that occur independently of user control. These tools provide content based on keywords collected from previous searches, tailored to the individual's interests and preferences (Kavasoğlu, 2022).
- *Web 4.0 Tools (2020)*: These tools involve technologies integrated with big data, augmented reality, machine-to-machine communication, cloud computing, and AI (Ersöz, 2020).

In a study conducted by Horzum (2010), it was revealed that Web 2.0 tools are actively used in education by both students and teachers. According to Elmas and Geban (2012), the reason for the use of Web 2.0 tools in the learning and teaching process lies in their ease of use in accessing information, social interaction, collaborative work, and providing feedback. Kavasoğlu (2020) states that Web 2.0 tools encompass a variety of resources for educational purposes, including research, presentation, video, audio, image, slideshow, music, writing, drawing, mapping, organization, testing, test creation, file storage, etc. Moreover, features such as ensuring active class participation, making the lesson enjoyable, fostering motivation, providing innovative assessment methods for teachers, and enhancing the creativity and problem-solving skills of students have made the use of these tools appealing in educational environments (Vaughan, 2010).

Ala-Mutka and his colleagues (2008) indicate that Web 2.0 tools can be used to develop new learning strategies that enhance self-directed learning. In this regard, it is possible to propose that individuals who engage in self-directed learning also have competencies reflecting SRL strategies, such as setting learning goals, organizing the learning environment, choosing appropriate learning methods, and monitoring and evaluating the learning process. The fact that Web 2.0 tools provide a range of opportunities that can assist both students and teachers in the educational process and

can be easily integrated into every course has enabled these tools to be diversified and equipped with features suitable for different purposes.

The table classifying some of the Web 2.0 tools used in the learning and teaching process according to their area of usage is given below.

Table 2.3. Web 2.0 Tools Used in the Learning and Teaching Process

Area of Usage	Web 2.0 Tools
Goal Setting and Planning	Todoist, Trello, Asana, Google Calendar, etc.
Environmental Structuring	Computer Display Organization, Noise Preventing Apps, Digital Tools and Chronometer, File Folders, Offscreen Apps, Google Drive, Dropbox, etc.
Organization and Transformation	Miro, MindMeister, Coggle, ClickUp, Edraw Mind Map, Evernote, Blogger, Trello, Notion, Google Keep, MicrosoftOneNote, AppleNotes, Padlet.
Seeking Information	Google Scholar, E-Libraries, ResearchGate, etc.
Keeping, Reviewing, and Monitoring	Canvas, Google Classroom, Voice Recorder, Day One, Google Calendar, Todoist, Toggle Track, Calendar Notify, Desktop Reminder, Remember the Milk, Microsoft To-Do, etc.
Rehearsing and Memorizing	Quizlet, Kahoot, Socrative, Quizizz, etc,
Seeking Assistance	Canvas, E-Mail, WhatsApp, etc.
Self-Evaluation and Self-Motivation	Quizlet, Kahoot, Socrative, Quizizz, ProProfs Quiz Maker, Edpuzzle, Canvas, Motivation-Daily quotes, Fabulous, etc.

The tools listed in the table above are just some of the examples of Web 2.0 tools used in the learning and teaching processes. The active use of these tools in education is crucial for achieving digital transformation in education and adopting an approach that is suitable for the innovative era. However, at this point, it is important to consider for which purposes these tools are used by students and teachers and to be aware of the impact of this usage on the learning and teaching process.

As can be seen, this part of the research only mentions the integration of digital tools into education within the framework of digitalization without touching upon digital education types such as online education, blended learning, asynchronous learning, etc. The reason for this is that the focus of the digitalization approach in education addressed in this research is limited to the use of digital tools and does not encompass digital education types.

2.3. Artificial Intelligence in Education

AI, an output of the digital revolution, has profoundly affected many areas of societal life. In this regard, it would certainly not be wrong to claim that AI, which has created transformations in many fields such as economy, health, communication, and industry today, is also blowing the winds of transformation in the field of education. Before addressing the implications of AI on education, it is important to talk about how the concept of AI emerged and what it represents.

The origins of the concept of AI can be traced back to an article written by British computer scientist Alan Turing in “Can Machines Think?” in 1950. In this article, Turing sought an answer to the question of whether machines can perform abilities such as problem-solving and decision-making that humans can perform through their logic and knowledge (Turing, 1980). According to another view, the concept of AI was first used in 1956 during a two-month workshop organized by mathematics professor John McCarthy at Dartmouth College in the USA (McCarthy, 2007). McCarthy (2007) defines AI as computers’ ability to perform high-level cognitive skills such as problem-solving, making inferences, reasoning, learning, comprehending, generalizing, etc.

On the other hand, the emergence of AI in the field of education has been associated with machines that immediately show the test results to students and guide them on the correct answer, which Pressey (1950) mentions based on the principle in Thorndike's law of effect that "tests used to assess learning should have immediate feedback" (Thorndike, 1927). Later, in 1958, the development of a "teaching machine" by Skinner, a pioneer of the Behaviorist Approach, which was equipped with a mechanism for posing questions to students and providing the correct answer after their response, stands as the most concrete example of the use of AI in education. Thus, AI has become integrated into the field of education as well, and along with the evolving technology of today, it has diversified to serve the various educational needs of both students and teachers. Especially the increasing competition among universities and the necessity to survive in the global arena have made it almost mandatory for universities to integrate AI into their educational processes.

According to quantitative research which was conducted by Garrel and Mayer (2023) with 6300 university students, it was revealed that almost two-thirds of students use AI-based tools in their studies for various purposes such as exam preparation, research, text creation, translations, visualization, and explanation of subjects. Furthermore, the Times Newspaper report (2023) indicated that half of the students at Cambridge University use ChatGPT and similar AI tools for their studies.

The widespread use of AI in universities has brought many benefits along with it. The benefits that the use of AI can provide in educational processes for students and teachers are listed below (Taşçı & Çelebi, 2020).

- It can be used to personalize student learning and make adjustments based on students' learning levels, learning methods, and learning pace.
- It enables students and teachers to monitor and evaluate learning performance.
- It provides immediate feedback to the students and teachers.
- It can be used to assist students in improving their academic skills.
- It can identify areas where students are lacking and provide them with the help they need.
- It can create a plan for students by taking into consideration the course loads and guiding them accordingly.

Also, according to a study which was conducted by Marzuki et al. (2023) in order to investigate the impact of AI tools such as ChatGPT, Quillbot, Copy ai., and WordTune on students' writing skills, it was found that these tools improve students' content and organization skills.

International University of Applied Sciences (2023) categorizes the types of AI tools that can be used in education within three categories: AI-based "learning management systems," which provide students personalized learning opportunities and track their progress; "tutoring tools" that act as a mentor by offering explanations, feedback and analyzing students' responses, and "language learning" which provides students interactive language learning experiences.

In a study examining the widely used AI applications in learning and teaching processes, Fitria (2021) has stated that these applications include functions such as Virtual Mentor (e.g., Blackboard Collaborate), Voice Assistant (e.g. Google Assistant, Siri, and Cortana), Smart Content (e.g. Cram 101 and Netex Learning), Presentation Translator, Global Courses (MOOCs, Udemy, Google AI, Alison, Khan Academy, edX, Udacity, Coursera, etc.), Automatic Assessment (Moodle Quiz, Canvas Quiz, and Gradescope), Personalized Learning (Khan Academy and Edmodo), Educational Games (Duolingo and Quick Brain), and Intelligent Tutoring System (ITS), or Intelligent Computer-Aided Instruction (ICAI).

As mentioned above, considering the various uses of AI applications in educational processes and the benefits they bring to learning and teaching practices, the importance of widespread adoption of these applications becomes clearer.

2.4. Related Research

In this section of the study, findings obtained from the relevant literature review regarding studies similar to the research topic are presented.

Marcelo and Rijo (2019) conducted a study to explore whether university students use digital technologies to improve their SRL skills. Within the scope of the research, they administered a questionnaire to 140 students in Seville and 150 students in the

Dominican Republic. As a result of the research, they found that although students use digital technologies for purposes such as searching on the internet and sharing information, the use of these technologies is not a determining factor in SRL.

Also, in a study in which Damyanov and Tsankov (2018) examined the purposes for which 190 students use digital technologies in their learning activities, they reached the following results.

- 61.6 % of the students believe that through the use of digital technologies, they can easily and quickly access the learning content. (Seeking Information)
- 33.7 % of the students use digital technologies for the purpose of learning a language. (Rehearsing and Memorization)
- 23.7 % of the students use digital technologies for training on observation and thinking. (Reviewing and Monitoring)
- 51 % of the students utilize digital technologies for social purposes, such as creating communities and sharing the results of their academic studies. (Seeking Assistance)
- 57.9 % of the students indicate that the gamification elements in digital technologies are crucial to motivating themselves. (Self-Motivation)

Furthermore, the research results show that digital technologies provide students with freedom and responsibility, but their full potential is not used in education. The majority of students prefer more effective use of digital technologies in education and more support from teachers in this regard.

Besides, in a study conducted by Domínguez and Marcelo (2017), aimed at investigating whether university students use digital tools for the purpose of organizing and planning their learning, which are essential components of SRL skills, a “Survey of Self-Regulated Learning with Technology at the University” was administered to 711 students from various universities in Spain. The research findings revealed that although university students frequently use digital tools, they are not inclined to use these tools to regulate their learning processes, albeit a small group of students exhibit such tendencies. Furthermore, according to the research outcomes, students primarily use digital tools for social support, internet research, and communication purposes.

On the one hand, Kızıl and Savran (2016) conducted research with 777 students to explore the impact of digital tools on SRL skills. As a result of their research, they observed that students who utilized digital tools during their learning process exhibited various dimensions of SRL. Specifically, these dimensions included goal orientation, which refers to the ability to set and pursue learning objectives effectively; emotional regulation, which involves managing emotions to maintain motivation and focus during learning tasks; and resource management, which entails efficiently utilizing digital resources to enhance learning outcomes. This study highlighted how digital tools can influence and enhance different aspects of students' SRL strategies.

Moreover, in a study examining students' note-taking skills in the digital age by reviewing the literature, Stacy and Cain (2015) stated that students' use of digital note-taking tools could enhance their organizational and structuring skills through features such as drawing, text highlighting, etc. which are among the strategies of SRL. However, they also concluded that the use of digital note-taking tools could distract students' attention, negatively impact their comprehension of lectures, and reduce their ability to recall conceptual knowledge.

Furthermore, Valentin et al. (2013) surveyed 543 undergraduate students in a study on university students' motivation and learning strategies in the use of ICT and found that there are significant relationships between different types of ICT use and students' expectations and satisfaction. These findings suggest that ICT use can influence students' motivation and increase their engagement in learning processes.

Additionally, in their experimental study conducted in Iran, Rahimi and Bigdeli (2013) investigated the impact of digital technologies on self-regulated learning (SRL) skills among 60 students. The study involved an experimental group, which received education using digital technologies, and a control group, which received education through traditional methods. The findings revealed that students in the experimental group, who were exposed to digital technologies during their educational experiences, demonstrated higher levels of SRL skills compared to their counterparts in the control group. This study underscored the potential of digital technologies to enhance and support students' autonomy and effectiveness in managing their own learning processes.

Vrocharidou and Efthymiou (2012) investigated how technology-enabled communication applications such as e-mail, instant messaging, and social networking sites are used by students to meet their social and academic needs. The study, which was conducted by surveying 195 students at a Greek University, shows that email is preferred by students for academic task-oriented communication, such as getting information about course materials, communicating about assignments, and asking questions to their professors.

In a study examining the effect of short messaging services (SMS) on university students' SRL skills, Goh et al. (2012) divided the participants into two groups: the experiment and control groups. The experimental group received SMS intervention during the learning process, while the control group did not. Both groups were administered the Motivated Strategies for Learning Questionnaire (MSLQ), and it was revealed that the students in the experiment group had improved help-seeking behaviors, one of the SRL strategies, while the students in the control group had significantly lower levels of time and study environment management strategies compared to the other group.

In their research conducted on language learners in Turkey, Çelik et al. (2012) explored the utilization of digital tools in the learning process. They observed that students actively employed digital tools for several key learning activities, including enhancing listening comprehension, memorizing vocabulary, and refining writing skills. These digital tools were noted for their ability to provide interactive and engaging learning experiences, which contributed significantly to students' motivation in the learning process. Furthermore, the researchers emphasized that these tools played a significant role in fostering autonomy among students by empowering them to manage and monitor their learning progress.

Lai and Gu (2011) investigated how students organize their learning by using technology in the language learning process through a study with a sample of 279 students at the University of Hong Kong. As the methodology of the research, they used a mixed method approach and implemented an online survey together with semi-structured interviews. At the end of the research, they concluded that students use

technology to plan their learning progress, improve social connections, expand learning resources, increase cultural understanding, and motivate themselves.

Kauffman et al. (2011) examined the impact of note-taking and self-monitoring tools on university students' SRL skills, and they revealed that students using web-based types of these tools were more advanced in pertinent information selection and academic achievement compared to those using conventional ones. They highlighted that these tools facilitated better organization and retrieval of information, improved self-monitoring capabilities, and supported students in setting and achieving their academic goals more efficiently. Kauffman et al.'s findings highlighted the potential of digital technologies to influence students' SRL skills in higher education settings positively.

In a study examining students' SRL skills in technology-integrated learning environments, Bernacki et al. (2011) asserted that a technology-integrated learning experience has a facilitative role in enhancing students' SRL skills. They emphasized that technology integration supports students in setting clear learning goals, effectively managing their time and resources, monitoring their own progress, and adjusting their learning strategies as needed. The study underscored the role of technology in providing tools and platforms that fostered active engagement, personalized learning pathways, and opportunities for collaborative learning.

Greene et al. (2010) carried out a study exploring students' opinions about the learning process and found that students demonstrated more than thirty SRL processes while learning with digital tools. These processes encompassed goal setting, planning and organizing learning activities, monitoring progress, regulating emotions, seeking help and resources, and reflecting on learning outcomes. The findings underscored the richness and complexity of SRL behaviors that are supported and enhanced through the use of digital tools in educational settings.

Dettori and Persico (2010), in their study on "Fostering Students' Self-Regulated Learning Skills with Information and Communication Technologies," indicated that digital tools, including learning resources, tracking functions, communication modes, and automatic reminders, foster the practice and development of SRL skills.

In a study, Hirata (2010) conducted a language training program integrated with digital technologies for Japanese students for 12 weeks in order to evaluate their attitudes toward self-directed learning. The research findings indicated notable improvements in students' SRL skills, specifically in the areas of evaluation, planning, and monitoring. As a result of the research, it was revealed that through the use of digital technologies within the language training program, students demonstrated enhanced abilities to evaluate their own learning progress critically, effectively plan their learning activities, and systematically monitor their performance.

Parson et al. (2009) conducted a study with 93 undergraduate students from the Department of Psychology at Aston University and concluded that students viewed podcasts and vodcasts as helpful resources for learning, mainly when used in combination with lecture slides and for revision/evaluation. They noted that integrating podcasts and vodcasts into educational practices can enhance learning experiences by providing accessible and supplementary learning materials that support student comprehension.

Dabbagh and Kitsantas (2005), in a study with 65 students, aimed to examine whether different types of web-based pedagogical tools support students' SRL skills and students' perceptions about the usefulness of these tools in completing specific learning tasks. The quantitative analyses within the research affirmed that different categories of web-based pedagogical tools support different SRL skills. Specifically, content creation and delivery tools (resources, design documents, readings, assignments, etc.) support task strategies, goal setting, and help-seeking behaviors, while collaboration and communication tools (Email and discussion) facilitate goal setting, time planning and management, and help-seeking behaviors. Moreover, administrative tools (calendar and homepage) support time planning and management, self-control, self-assessment, and help-seeking behaviors, while assessment tools (check grades) facilitate self-assessment and self-control behaviors. Additionally, the qualitative analyses within the research complement the quantitative results and provide findings about the usefulness of web-based pedagogical tools in completing specific learning tasks.

On the other hand, there are several studies on the use of AI applications in educational processes and the effect of this usage on students' SRL skills. One of these studies was conducted by Jin and his colleagues (2023) using the exploratory design method. In this study, 16 university students from various departments were provided with the use of 10 AI applications in their learning process, and then semi-structured interview questions were applied. As a result of the research, it was revealed that the use of AI applications in the learning process was beneficial for students' metacognitive, cognitive, and behavioral regulation but was not effective in motivation regulation.

Molenaar et al. (2023) reviewed the studies conducted by 63 authors over the last five years on the impact of AI applications on students' SRL skills and emphasized that AI tools can be used in learning analytics indicators to understand students' learning performance and progress.

Huang and his colleagues (2022) reported that AI-based applications used in higher education for SRL have a significant impact on students' self-evaluation, self-efficacy, learning gain, and self-satisfaction. The results obtained from this study, which used an AI system offering instant feedback and personalized learning opportunities to students, revealed that monitoring student behavior through AI leads to improvements in students' self-regulation skills.

Somasundaram et al. (2020) argued that a learning experience with AI applications can predict learning gaps by analyzing students' historical data in their educational process and can suggest possible actions to improve their performance, thus providing a personalized learning opportunity. They also emphasized that the opportunity for personalized learning not only addresses individual learning gaps but also promotes adaptive learning strategies that are geared toward the specific needs and strengths of each student.

In a study conducted by Azevedo et al. (2019), it was indicated that AI-based applications such as virtual reality, instructional games, and smart teaching systems improve students' learning capacity and provide them with the autonomy to control various metacognitive, cognitive, affective, motivational, and social areas.

Hussein et al. (2014) stated that the AI-based automatic question generation system they developed can enhance students' individualized learning processes and improve their self-learning skills. Hussein and his colleagues conducted an experimental study using their developed Automatic Question Generation System (OpenNLP). They stated that when this system is used in an educational setting, it provides students with a personalized learning experience on topics from different fields.

In addition to all this, there are also studies on how academics utilize digital tools and AI in the teaching process in a way that enhances students' SRL skills.

Akgündüz and Kınık-Topalsan (2024) conducted a survey with 391 academics at a university in Turkey and found that academics frequently use MS Office, university academic information systems, and meeting and course management tools for various purposes such as student evaluation, content creation, interactive learning, supervision of applied activities, and facilitating students' access to course materials, but they have low competencies, especially in the use of blogs, animation and simulation, virtual reality and augmented reality tools.

Thomas et al. (2023) surveyed 344 academics in higher education institutions in South India and concluded that academics use communication and content delivery tools such as LMS, Google Classroom, mobile apps, WhatsApp, online testing platforms, and Google Meet to improve their teaching skills, increase productivity, facilitate tasks, and deliver topics more clearly and understandably to students.

Simelane-Mnisi (2023) collected data from 116 academics from University of Technology in South Africa through a questionnaire with open-ended and closed-ended questions and interviews and found that academics use digital tools such as Learning Management Systems, discussion forums, groups, Collaborate Ultra, Microsoft Teams chats, WhatsApp, personalized emails, commented slides, interactive videos, game-based learning applications, online quizzes and discussion forums to increase students' access to learning materials and encourage their active participation in the learning process emotionally, behaviorally, cognitively and socially.

In a study conducted with 180 academics using a quantitative research method and a descriptive survey research design, Ugwuanyi et al. (2022) reported that academics used digital tools such as Google Forms, Poll Everywhere, Padlet, Kahoot, Plickers, and Vocaroo to increase students' active participation, assess learning outcomes, monitor students' progress, provide immediate feedback, and enhance students' performance.

Letchumanan et al. (2020) conducted a study with eleven faculty members from two public universities in Malaysia, using quantitative and qualitative data collection methods, and revealed that faculty members were using various ICT tools such as desktop applications, presentation software, e-portals learning, social networks, programming software, and learning software (e.g. Geogebra), for presenting lecture notes, conducting quizzes and group discussions, playing educational games, communicating with students, uploading lecture notes and assignments, sharing videos related to lectures, and organizing forums in their teaching processes.

This section presents a review of studies on the use of digital technologies and AI in developing students' SRL skills. Marcelo and Rijo (2019) found that students used digital tools for internet research and information sharing, but these tools did not significantly improve SRL. Similarly, Damyanov and Tsankov (2018) observed that digital technologies support access to learning content and social purposes, but their full potential is not used in education. Several studies, such as Yot-Domínguez and Marcelo (2017) and Şahin Kızıl and Savran (2016), have shown mixed results on the effectiveness of digital tools in enhancing SRL components such as goal setting and emotional regulation. The use of AI applications in education has shown promising results in improving cognitive, metacognitive, and behavioral regulation (Jin et al., 2023; Molenaar et al., 2023). Moreover, research on academics' use of digital tools highlights the role of these tools in improving teaching efficiency and student engagement (Akgündüz & Kınık-Topalsan, 2024; Thomas et al., 2023). Overall, although digital and AI tools offer potential benefits for SRL, their effective integration into educational processes requires further research and support.

CHAPTER III

METHODOLOGY

3.1. Introduction

The aim of this chapter is to explain the methodology undertaken within the study in order to investigate the role of digital tools, and AI used in learning and teaching processes in improving university students' SRL skills. Accordingly, this chapter will present the sampling, data collection procedure, research methodology, and data analysis process of the research. Finally, it will mention the trustworthiness and credibility processes that are taken into consideration during the research.

3.1.1. Working Group

The working group of the research consists of 10 university students studying at a foundation university located in Istanbul and five faculty members lecturing at the same university. Purposive and convenience sampling, among the non-random sampling methods, were utilized. The purposive sampling method refers to conducting research with a person or a group of people who meet specific criteria and have particular characteristics that will provide the researcher with plenty of information about the subject to be researched, depending on the purpose of the study being conducted (Sharma, 2017). In this regard, students and faculty members who actively use digital tools and AI in their learning and teaching processes were purposely selected within the scope of the research.

As a criterion for the active use of digital tools and AI, it was determined to select students and academics who have taken the "Educational Technologies" course and participated in the training on digital tools, AI, technology, and SRL organized by the Coordinatorship of Innovative Learning and Teaching-Artificial Intelligence at the

university and received support in this regard. On the other hand, convenience sampling refers to the researcher's selection of the sample group by taking into account factors such as geographical proximity, easy accessibility, time availability, and willingness to participate in the research (Etikan et al., 2016). Within this context, the working group selected for the research consisted of students and academics at Ibn Haldun University, which ensures geographical proximity and easy accessibility to the researcher. The students in the working group are undergraduate students who are enrolled in a bachelor's degree program and are between 18 and 23 years old. On the other hand, the academics in the working group consist of individuals from various departments with ages varying across different ranges. The tables below provide a more detailed representation of the demographic information of the research participants.

Table 3.1. Demographic Characteristics of University Students

Demographic Characteristics		Frequency
Gender	Male	1
	Female	9
Age	18-23	10
Department	Guidance and Psychological Counseling	10
Educational Status	Bachelor's Degree	1
	Master's Degree	9

Table 3.2. Demographic Characteristics of Faculty Members

Demographic Characteristics		Frequency
Gender	Male	4
	Female	1
Age	30-40	4
	40-50	1
Department	Guidance and Psychological Counseling	1
	Media and Communication	1

Table 3.2. (cont.)

	Educational Technology	2
	Educational Management	1

3.1.2. Data Collection

In the data collection process of this study, in which the qualitative research method was used, the semi-structured interview questions were posed to the participants, both face-to-face and online. Semi-structured interview questions allow participants to elaborate on their answers to the questions they are being addressed and give them the freedom to express their own experiences, thoughts, and feelings in a detailed way (Conroy, 2010). Before the interviews were conducted with the participants, information about the study was forwarded to the relevant unit of Ibn Haldun University. The necessary ethical permission for the interviews was obtained on 26.03.2024, with document number 39015. The relevant document pertaining to the Ethical Board Decision is included in Appendix A.

Also, before the interview started, the participants were given information about the purpose, process, confidentiality, possible risks, and benefits of the research, as well as the rights they hold, as outlined in the informed consent form of the study, and their signature indicating that participation in the research is voluntary was obtained. It was also explained to the participants that the information obtained during the interview could only be shared by keeping the identity information of the person confidential and not giving any personal clues that would lead to the recognition of the person by others. Moreover, along with the interview, an attempt was made to treat each participant in the same way in terms of interview skills, such as tone of voice, body language, empathy, and unconditional acceptance. In addition to this, it was ensured that the interviews took place in an environment where the participants could feel comfortable and safe. Lastly, the interviews were recorded with the permission of the participants to be analyzed afterward.

3.1.3. Research Method

In this study, the qualitative research method was purposely selected to explore the role of digital tools and AI used in the learning and teaching process on university students' SRL skills. The reason for adopting a qualitative approach within the scope of this research is to gather in-depth information on this relatively new topic and to fill the gap in the literature regarding this issue. Creswell (2021) defines qualitative research as the exploration and understanding of the meaning that individuals ascribe to any situation or problem. The qualitative research process involves identifying the research question about the topic to be researched, collecting information from the participants through methods such as interviews, observations, and document analysis, and analyzing the collected data from general to specific with a deductive approach to derive themes and concepts, and creating a report by making interpretations about the data obtained by the researcher (Creswell, 2012). The following is a figure in which Creswell indicates the steps to be followed in the qualitative research process. These steps were also adopted within the scope of this research.

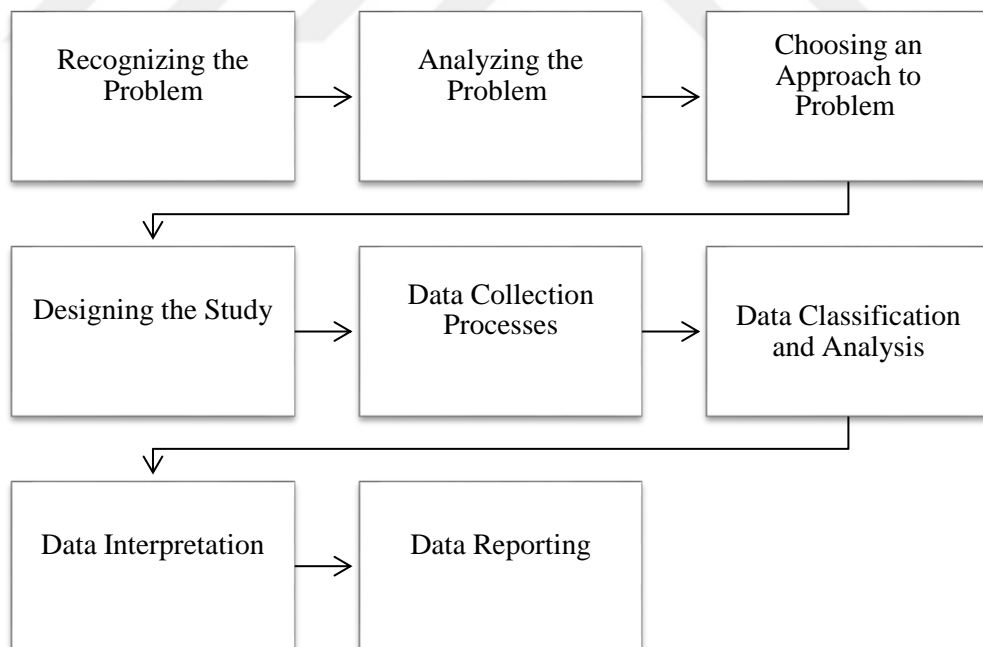


Figure 3.1. Research Design Steps

Source: Creswell, 2021

Furthermore, in this research, the case study design, which involves the in-depth exploration of a specific situation, process, event, individual, or group through various data collection procedures (Stake, 1995), has been used. Accordingly, data were collected from participants by using semi-structured interview questions. The reason for using semi-structured interview questions, which is one of the data collection techniques of the qualitative research method, is that this interview technique provides comprehensive and holistic data on the research topic by enabling access to unobservable information such as the individual's experiences, attitudes, thoughts, intentions, interpretations, and reactions (Bengtsson, 2016). It also provides flexibility to the participants during the interview process, and in this way, the researcher has the chance to obtain more information from the participants regarding the research topic (Conroy, 2010).

3.1.4. Data Analysis

The data collected from the participants during the research were analyzed using thematic analysis, which is one of the qualitative analysis methods. The thematic analysis method involves the processes of identifying, analyzing, and reporting the patterns (themes) in the data obtained as a result of the research. Thematic analysis reduces the complexity of the data collected during the research, provides the researcher with in-depth, comprehensible, and holistic information about the research topic, and reveals the relationships between different components of the dataset (Braun & Clark, 2006).

In the initial stage of analyzing the research data, transcripts of the audio recordings obtained through interviews with the participants were generated, and the notes taken during the interviews were reviewed. In the second stage, the transcribed data were critically read, and a list of essential points about the content of the data was created. Subsequently, systematic work was carried out on the generated list, and codes representing patterns within the dataset were created (open coding process). In the third stage, the created codes were examined, and it was focused on how these codes could be categorized under more inclusive headings. Correspondingly, the codes were classified into categories according to their similarities and differences, and the themes encompassing these categories were determined (axial coding process). A concept map

was used to categorize the codes under specific themes. In the fourth stage, the concept map was reviewed, and the codes and themes were organized appropriately through processes such as eliminating some themes and making changes in the themes of some codes. In the fifth stage, the themes identified were defined and further simplified, and the dimension of the data set reflected by each theme was analyzed. In the final stage of the analysis, a clear and understandable analysis report was written with comprehensive interpretations of each theme based on the research data and example findings/quotations from the data.

As is known, trustworthy data analysis is critical in scientific research. Therefore, in this study, two methods other than manual analysis of the data were used to ensure the correct interpretation of the data and the trustworthiness of the results. One of these is the use of AI tools. AI tools were one of the methods used in this study because they can quickly analyze large datasets and identify patterns. In accordance with this, a prompt was provided to the AI tool ChatGPT, involving the uploading of transcripts for conducting thematic analysis within the framework of research questions. Similar results were encountered when comparing the themes obtained within the data submitted to the ChatGPT with the themes obtained manually.

Another method of establishing reliability was to share data with a different researcher and ensure independent analysis of the data sets. The results were then compared, and the consistency of the analyses was examined. At this point, the similarity formula, which is called internal consistency in the Miles and Huberman model and conceptualized as the consensus between the coders (Miles & Huberman, 1984), was applied to the themes obtained by the independent researchers, and the consensus between the coders was determined as 80%.

3.1.5. Trustworthiness and Credibility

In scientific qualitative research, criteria of validity and reliability are not measured by numerical data as in quantitative research but by the degree of trustworthiness of the research. Guba and Lincoln (1982) categorized the criteria for trustworthiness under four main headings: credibility, dependability, confirmability, and transferability.

Creswell (2013) indicates that at least one of these criteria should be fulfilled in qualitative research.

Firstly, in this research, prolonged involvement with the research setting and participants, which is an important criterion for enhancing the credibility of research, was ensured. The researcher has an in-depth understanding of the participants and research setting. Also, there is a relationship of trust and unconditional acceptance between the researcher and the participants that minimizes prejudice and hesitation during the interview. Moreover, in order to eliminate subjective assumptions that the researcher may have and to prevent misunderstanding of the data, the information provided by the participants during the interview was checked by methods such as summarizing and asking questions about whether what was understood was correct (member checking). Furthermore, information and feedback about the research method and analysis were obtained from a person who has knowledge of the research topic and is an expert in qualitative research methods (peer debriefing).

For the dependability of the research, the data source triangulation method was applied, and data were collected from two different participant groups on the same topic. With the aim of enhancing the confirmability of the research, all stages and procedures applied within the scope of the study were tried to be reflected thoroughly by taking into consideration the audit trail. Finally, in order to improve the transferability criterion of the research, the views of the participants were explained in detail, direct quotations were used, and descriptive language was adopted.

Besides the general reliability and validity criteria mentioned above, the interview questions prepared within the scope of the research were also subjected to specific processes to ensure their reliability and validity. During the preparation of the semi-structured interview questions, first of all, the relevant literature was reviewed, and a question pool consisting of 25 questions was created. The question pool was based on the 14 strategies identified by Martinez-Pons and Zimmerman about SRL. The reasons for selecting the 14 strategies identified by Martinez-Pons and Zimmerman in the formulation of the interview questions are that there are many digital tools and AI applications for implementing these strategies today. They reflect various processes in learning and teaching in a comprehensive and systematic way, and they are concrete

and simple in structure that can be easily understood by both students and academics. Afterward, the 25 semi-structured interview questions were sent to 3 academics, who are experts in the field, via e-mail, and both written and verbal feedback was received.

As a result of the feedback received, it was agreed that the 25 questions to be asked to students and academics should be reduced to 18 because some questions were not clear enough, and some questions expressed the same meaning. When the final number of questions was determined, the questions were sent by email to two experts, one in English and one in Turkish, and the meaning of a few questions was corrected, and the words in some questions were changed. As a result of the revisions that were made, the pilot interviews were conducted with one university student and one academic who were not included in the sample group of the study, and controls were ensured for the functionality of the data collection tool. After all these processes were completed, it was decided that the semi-structured interview questions were functional and that they would be administered to the participants during the data collection process.

Furthermore, when sharing participant views related to themes derived from the analysis, different names were used to protect the confidentiality of participants. These names were randomly chosen for each participant without considering any specific criteria for the selection process.

3.1.6. Researcher's Role

As a researcher, I actively participated in every stage of this thesis and assumed various responsibilities to achieve the research objectives. Firstly, I conducted a literature review to define the research questions and objectives. During the literature review process, I utilized different databases to perform a comprehensive analysis and thereby shaped the methodology of the research. During the data collection process, I employed qualitative methods. By applying the thematic analysis technique to the collected data, I interpreted the findings and provided contributions to the literature based on the results. I meticulously managed the ethical approval process and completed my research while safeguarding the rights of the participants.

CHAPTER IV

FINDINGS

In this section of the study, the findings obtained are in line with the purpose of the research, and its sub-problems are presented.

Firstly, the most commonly used digital tools and AI applications by students and academics in the learning and teaching processes are presented, aiming to provide information about the relevant tools that play a role in SRL skills.

Then, to address the first sub-problem of the study, 'What effect does the use of digital tools and AI in the learning process have on students' SRL skills?' and the second sub-problem, 'What effect does the use of digital tools and AI in the teaching process have on students' SRL skills?' opinions were elicited through a total of 11 semi-structured interview questions directed at ten university students and the relevant findings are presented in the second and third sections.

Finally, to address the third sub-problem of the research, 'How do teachers use digital tools and AI to enhance students' SRL skills in the teaching process?' opinions were revealed through a total of 7 questions directed at five academics, and the findings are presented in the fourth section.

4.1. The Most Commonly Used Digital Tools and Artificial Intelligence Applications by University Students and Academics

When the ten university students and five academics interviewed within the scope of the research were asked which digital tools and AI applications they use in their learning and teaching processes, the information given is shown in the pie charts below based on the frequency of the tools used.

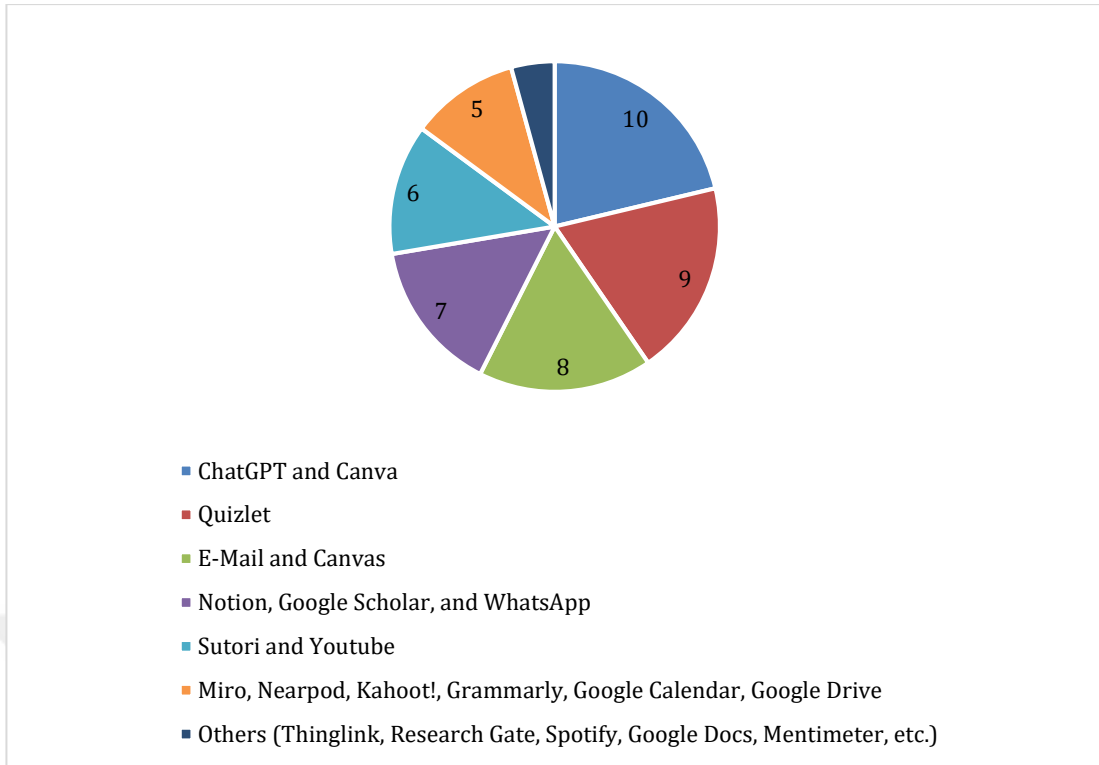


Figure 4.1. The Most Commonly Used Digital Tools and AI Applications by Students

As shown in Figure 4.1, the tools that are most commonly used by university students in their learning processes are identified as ChatGPT and Canva. All of the ten students interviewed have stated that they use these tools for various purposes in their learning processes. The comprehensive functionalities of these applications and their ability to provide a wide range of learning services through a single platform have placed these tools in the most preferred tools category. Following these tools, students use the Quizlet application to test their learning, the E-Mail application as a means of communication for getting support in their learning processes, and Canvas as a learning management system for organizing their learning on a structured platform. In addition to these, students also mentioned other digital tools and AI applications such as Notion, Sutori, Miro, Mentimeter, Nearpod, etc.

Some of the answers obtained regarding the digital tools and AI applications used by university students are given below.

"I can say that the most frequently used application for me is Canva. Whether it is preparing presentations or benefiting from its features, I always use Canva. Of course, there are some other digital tools that I integrate with Canva. What are they? Padlet, for example. There are other applications I use to prepare mind maps, like Miro..."
(Emily)

"First of all, we have been using the Canvas system since undergraduate education at school. I use Canva when I make presentations. Again, I use an application called Sutori when I make presentations. There is Nearpod. I use Google Docs. I also use Google Drive. I also use ChatGPT, an AI application. I think about what else is there... There is Grammarly. I use translation apps. There are some summarizing AI tools, like SciSpace..." (Diana)

"For example, lately, I have been using Notion, where I plan my lessons and what I need to do. I usually use some applications to prepare presentations and produce content. I use Canva a lot, and I like to use the templates there. Most recently, I started using gamma a lot because it is visually beautiful, and I like the ability to add information. I also use ChatGPT to generate ideas and get extra information. I do not outsource all my work to it, but I use it a lot to give me ideas, to show me how to proceed, and to strategize. These are the apps I have been using the most lately, and I really enjoy using them." (Ashley)

As a result, university students commonly use tools like ChatGPT and Canva for various learning purposes, with other popular applications including Quizlet for testing, E-Mail for communication, Canvas for management, and several other AI tools like Notion, Sutori, Miro, Mentimeter, and Nearpod.

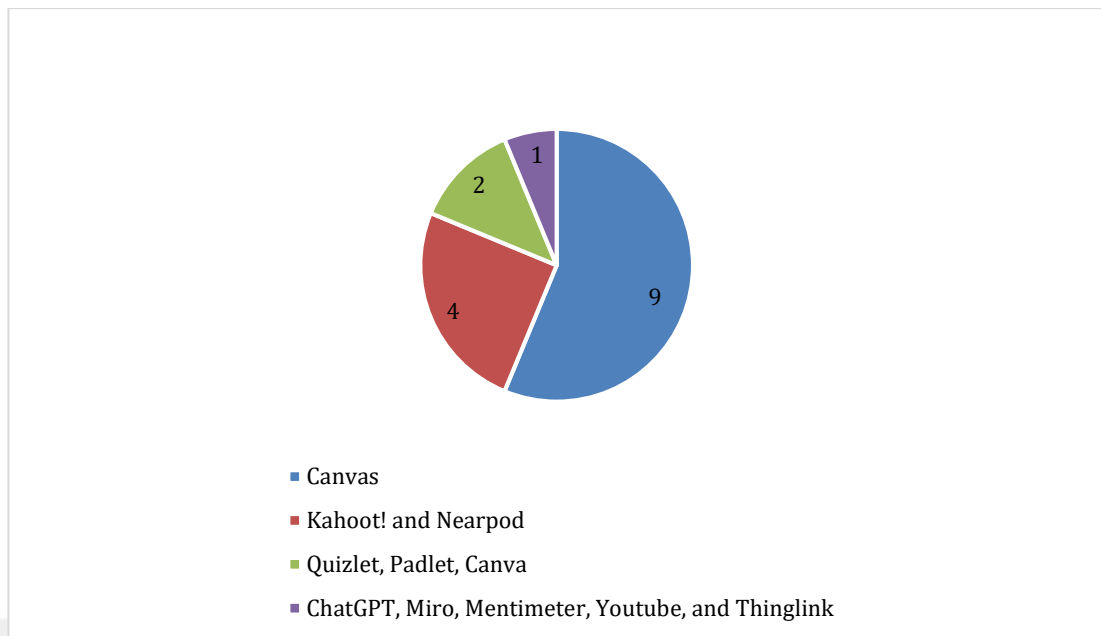


Figure 4.2. The Most Commonly Used Digital Tools and AI Applications by Faculty Members (Based on Students' Answers)

Figure 4.2 reflects the responses to the question posed to students regarding which digital tools and AI applications their teachers use in the teaching process. Based on students' answers, Canvas is indicated as the tool that is most used by academics during the teaching process. The fact that Canvas provides many conveniences, such as sharing learning materials, submitting assignments, conducting discussions, and making exams on a single platform, has led academics to use this platform frequently. Besides, Kahoot! and Nearpod are the second most widely used applications by academics. Thanks to the features of these applications that increase interest and motivation in learning by making the course more interactive, academics commonly use them. On the other hand, it is noteworthy that the use of ChatGPT, which is a prevalent AI application, as a teaching tool by academics is less than that of other tools.

Some of the responses of university students regarding the digital tools and AI applications used by academics during their courses are listed below.

“Our teachers use Canva a lot as a digital tool. Apart from that, one of our teachers used Padlet a lot. He was using the Padlet to assess what we had learned. He was also using Nearpod, which was very useful to have more interactive lessons.” (Sarah)

“We were using Nearpod a lot in one of our classes, and while using Nearpod, following the system created by our lecturer made me feel very nice and very enjoyable.” (Ashley)

“Some of our professors used Canvas actively, and it was beneficial in our classes. One of our teachers was very organized in this sense. Everything was determined in the syllabus, and the activities she would send week by week were clear. She was posting activities on Canvas that everyone could add text to. Thanks to this system, I could follow the progress of the class electronically.” (Jessica)

In conclusion, Canvas is the most utilized tool by academics for teaching, followed by Kahoot! and Nearpod, which are favored for their interactive features, while ChatGPT is less commonly used as a teaching tool, according to student responses in Figure 4.2.

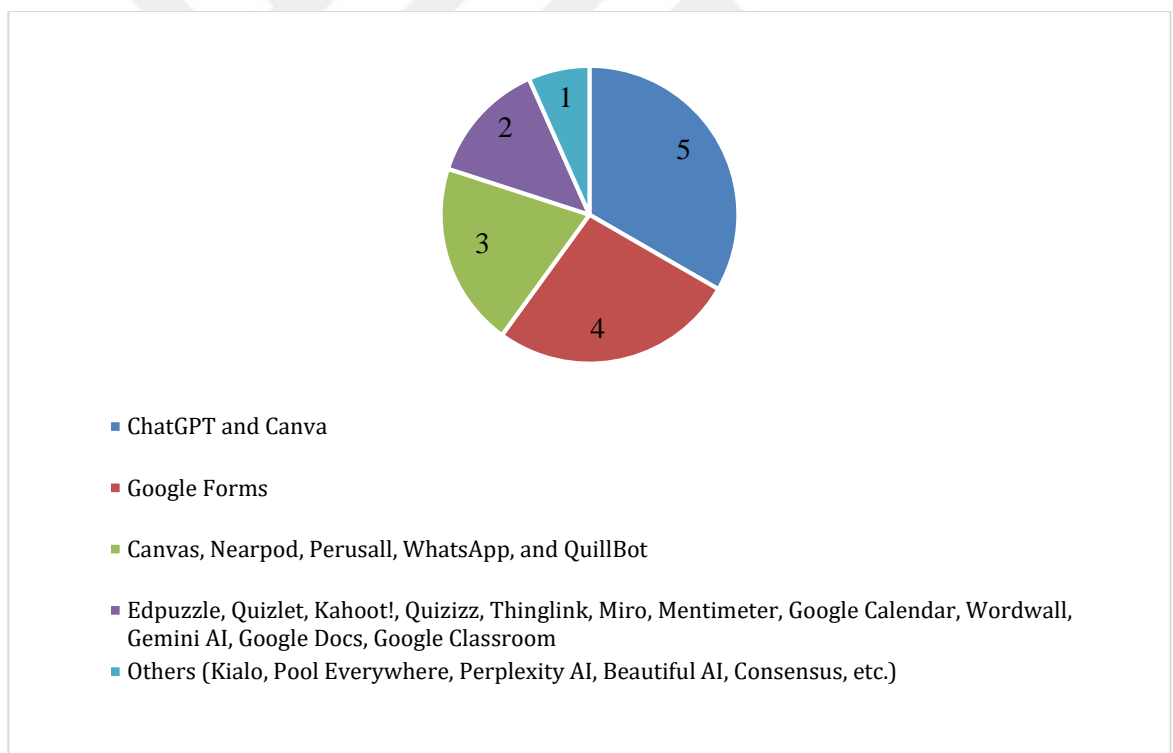


Figure 4.3. The Most Commonly Used Digital Tools and AI Applications by Faculty Members

Figure 4.3. illustrates the digital tools and AI applications that academics prefer to use most in the teaching process. Upon examination of the figure, it is evident that

academics integrate various tools into the course teaching process. Accordingly, the most commonly used tools by academics are ChatGPT, Canva, Google Forms, Canvas, Nearpod, Perusall, WhatsApp, and QuillBot. In contrast, applications such as Kialo, Poll Everywhere, Perplexity AI, Beautiful AI, and Consensus are less frequently preferred in the teaching process.

Some of the answers regarding the digital tools and AI applications used by academics during teaching are provided below.

“I used Canvas, Google Forms, Google Studio, Google Drive... At the time, I also used blogging platforms like Blogspot and various flashcard applications like EdPuzzle. I also preferred online quiz applications like Quizlet. I used interactive lecture tools like Nearpod. I made my lectures more interactive by using platforms like Kahoot!, Quizizz, and Socrative. I also used visually enriched tools like ThingLink. I actively used AI tools such as Gamma. I also preferred AI-based Lesson Planners. In addition, I experienced AI-supported tools such as ChatGPT, Bing AI, and Gemini AI.”
(Andrew)

“For example, if I want to open a survey, I use Poll Everywhere. If I want to ask students for their opinions on something, I use Mentimeter. After that, let me see what else I use. I also use Canvas. I already use it very actively. When I use Canvas, my approach is that the student who cannot come to class can follow it from here. So, this is generally my expectation. I try to use it as actively as possible. For example, what I used in discussions. I used Mindmap. I often use Miro, so I usually use it if I have divided the class into groups like this, and if a common product comes out, I use it if they present it to each other. I use Kialo. I usually use it if I am going to have a pros and cons discussion.” (Nadia)

“The use of ChatGPT, which everyone knows, is already inevitable in the teaching process. However, I also widely use tools such as Perusall, Canvas, Quizizz, Quizlet, Wordwall, Thinglink, and Nearpod.” (Addison)

To summarize, Figure 4.3 shows that academics commonly use tools like ChatGPT, Canva, Google Forms, Canvas, Nearpod, Perusall, WhatsApp, and QuillBot in their teaching processes, while others such as Kialo, Poll Everywhere, Perplexity AI, Beautiful AI, and Consensus are less preferred.

4.2. Findings Related to the First Sub-Problem of the Research

As a result of the questions asked to the participants to reveal their opinions on the first sub-problem of the study and the subsequent analysis, different themes such as ‘Goal Setting and Planning Skills,’ ‘Organizing and Keeping Learning Materials,’ ‘Seeking Information,’ ‘Monitoring Academic Performance/Tasks,’ ‘Motivation,’ ‘Learning Reinforcement,’ ‘Self-Evaluation,’ ‘Environmental Structuring,’ and ‘Seeking Assistance’ were obtained. In naming the themes, the SRL strategies developed by Zimmerman and Martinez Pons (1986) that individuals can use in their learning processes were taken as a basis.

Table 4.1 shows the frequency and percentage of students using various tools for goal setting and planning.

Table 4.1. Goal Setting and Planning Skills

Codes	Frequency (f)/10	Percentage (%)
Use of note-taking apps to determine and create learning goals	9	90
Using calendar apps to set goals and schedule events	7	70
Using ChatGPT to get quick information and generate ideas for planning and goal-setting	5	50
Monitoring of LMS modules to facilitate goal achievement by providing structured and guided learning paths	1	10
Using the Canva app to create visually appealing and personalized plans	1	10
Creating mind maps to organize concepts visually	1	10

When Table 4.1. is examined, it is seen that university students implement several practices to improve their goal-setting and planning skills with the use of digital tools and AI. Accordingly, the most common practice that students use as a way to enhance their goal-setting and planning skills is the use of various note-taking apps. Besides the use of note-taking applications, setting goals by using various calendar applications

stands out as the second most commonly used method by students. In addition to these methods, students also utilize other methods, such as getting help in planning by using ChatGPT, following the LMS, creating personalized plans through visual applications, and using mind maps.

Some of the students' expressions regarding the codes that emerged on this issue are presented below.

"I specifically use Notion for planning and learning goals. I have a separate template for general daily tasks, as well as a table I created at the beginning of the year or semester. I use it to track everything for all my courses, such as which courses I have, how many exams I have, and what assignments I have. I input all of this even if the dates are not fixed. As the dates become clear, I update them. So, instead of managing everything throughout the semester, it is all visible there from the start. Additionally, I use something for weekly tasks. I move tasks for the week to that section and delete them once completed." (Denisse)

"When planning the processes I want to learn, the first step is, of course, to establish the structure of the topic or process I want to learn. I need to determine which headings to divide it into and how many stages to break it down into. Typically, when I reach my plan, I use Notion and Miro. I like using both platforms because they allow me to visualize the plan in a map-like format and customize it to suit my needs." (Ashley)

"There are some calendar and planning apps on my phone like W Notes, and there is a calendar there, too. I can underline it, set times, set intervals, and remind myself. I can even synchronize W Notes with the phone's own calendar and the cloud. So, an important day I write in the calendar also appears in W Notes. Even if I take notes in different places, I can see them all in the same place. Moreover, I also separate tasks from each other. There are also different categories like Home, School, or others." (Emily)

"In my academic life, I use ChatGPT a lot to help me on learning journeys or creative endeavors, to plan for me, or to show me which paths to take. For example, if I have a presentation, I might say, "I have a presentation on these topics. What are the

resources I need to make this presentation? What resources do I need to learn about this topic? Alternatively, how can I plan this presentation?" Moreover, it guides me step by step. It says, "Go explore these resources, learn about them," and then it explains how to plan the presentation following these steps." (Sarah)

"I use Google Calendar very actively. Whether it is class time, exam time, assignment deadline, meeting time, etc, it is a necessity for both the school and the institution where I work. Additionally, various activities, projects, workshops, and events in various civil society organizations have caused changes in my calendar. Honestly, managing this intensity in the calendar satisfies me. It helps me be prepared for what is ahead, like knowing what is happening today, having a work shift in two days, or having an exam in three days. Apart from that, I actively use the Notion app for lesson planning. I like it because it is visually appealing, especially with the support of emojis. When I learned about Notion, it seemed appealing to me, so I tried to use and learn it." (Zain)

As seen above, students utilize various tools for planning and managing learning goals, such as Notion for task tracking, Miro for visual mapping, calendar apps like W Notes for scheduling, ChatGPT for guidance in learning processes, and Google Calendar for organizing academic and extracurricular activities.

Table 4.2 shows the frequency and percentage of students using various methods to organize and keep learning materials.

Table 4.2. Organizing and Keeping Learning Materials

Codes	Frequency (f)/10	Percentage (%)
Use of note-taking apps to make learning materials more easily accessible and organized	10	100
File organization to systematically arrange learning materials	6	60
Organizing and structuring written materials with online writing apps	4	40
Google Drive storage to securely keep documents	3	30
Computer file sorting to classify materials and easily find necessary resources for specific goals	2	20
Use of article organizer apps to organize articles collected from various sources and gather information for specific goals	2	20
Excel categorization to organize and analyze information in tables	1	10
Concept mapping to visually organize learning materials	1	10

Table 4.2. shows how students use digital tools and AI to organize and keep their learning materials, such as lecture notes, readings, and assignments. Having organized learning materials brings students several advantages, such as better comprehension, memory retention, and ease of access to information. As seen in Table 4.2, students use a variety of methods to accomplish this. The most prominent method is the use of note-taking apps. The capabilities of note-taking applications, such as titling and categorizing, enable students to organize their lecture notes effectively. The second most common method is file organization. Students state that keeping learning materials in separate folders helps them maintain a more organized approach to studying. Alongside these, other widely used methods include using online writing and

storage applications like Google Docs and Google Drive for saving documents. Additionally, practices like using article organizer apps and mind mapping are found to be less preferred by students when organizing their learning materials.

The following are some of the students' statements regarding the codes that emerged in this regard.

“When I am preparing for an assignment, presentation, or any task, I used to take notes on paper, but they would often get mixed up and disorganized. Now, for example, I write down all the article titles I find on a page in Notion. As I read the articles, I added important points to Notion. Then, I uploaded all the articles to Mendeley and directly got quotes and references from there. Sometimes, I also prepare a mind map for clarity.” (Denisse)

“I study online using Google Docs. I have been doing this since preparatory school. Even if I have Microsoft Word on my computer, I find it absurd to write, save, and keep documents in folders using it. What I am used to is writing on Google Docs, where I can write everything, and it stays there. I mean, I can access even the simplest essays I wrote back in 2017 during preparatory school. This allows me to compare my progress over time, which I really like. Plus, the chance of the file getting lost when it is like this is very low. Sometimes, I remember back then, when I was writing, there were moments when the computer crashed and the file was gone. However, when you work online, there is no chance of that happening.” (Diana)

“I use the Notion app. For instance, I organized it by subject. It is nice to have all the courses gathered there. Plus, I can access my notes anywhere on the internet, unlike having documents saved on the computer. That is great. In fact, for certain classes with many participants, we even shared notes through it. That worked out nicely.” (Jessica)

“My most used tool is Notion. It is truly a lifesaver for me. For example, I have sections titled Literature Review there. I list the names of the articles I have read, their authors, publication years, the analyses they used, the variables they employed, and their

results, all in separate columns. I write down everything that's important for me, like what I can use and where.” (Alyssa)

“Now, two digital tools come to mind. One is Miro for mind mapping. The other is Webjet. In Webjet, we can gather all our resources in one place. Similarly, in Miro, for mind mapping, we can gather all the resources on a topic. I also use Google Drive to store course materials.” (Sarah)

“My most used tool is Google Docs. Yes. It is where I classify and can find everything. I am also cautious about naming. I mean, I do not just name a document randomly. If it is for a specific class, I include its code or something I will remember, like not just the code but what task it was. Was it an assignment or a quiz? What assignment was it? Because I save it with its name, even years later, it stays the same. For example, if someone asks me, I can immediately pull out that document from its name or the course code. This also helps me a lot.” (Emily)

In conclusion, students use various digital tools to organize and keep learning materials, including Notion for note-taking and organizing, Google Docs for online document storage, Mendeley for reference management, Miro for mind mapping, Webjet for resource gathering, and Google Drive for secure storage and easy access.

Table 4.3 highlights the frequency and percentage of students using various methods to seek information, with the utilization of digital tools and AI-supported platforms for accessing scientific articles and ChatGPT for information queries being the most common (90% each), followed by educational videos (30%), LMS like Canvas (20%), forums and blogs (20% each), and social media for current information (10%).

Table 4.3. Seeking Information

Codes	Frequency (f)/10	Percentage (%)
Utilization of various digital tools and AI-supported platforms for accessing scientific articles	9	90

Table 4.3. (cont.)

Utilization of ChatGPT for accessing information and answering queries	9	90
Gaining knowledge by watching educational videos on platforms like YouTube	3	30
Use of LMS like Canvas for accessing course materials and educational resources	2	20
Browsing forums for discussions on specific topics and reading blogs	2	20
Accessing current information, expert opinions, and discussions on social media platforms	1	10

When Table 4.3. is examined, two important methods that university students use the most in terms of obtaining information stand out. One of these is the use of various digital and AI tools that provide access to scientific articles, while the other asks ChatGPT questions. Apart from these two methods, watching educational videos on platforms such as YouTube and accessing information through learning materials integrated into Canvas are other preferred methods. On the other hand, the use of social media for obtaining information is seen to be a less preferred method compared to the mentioned methods.

Some student views on the emerging codes on this theme are shared below.

“I use ChatGPT a lot. Last semester, during the earthquake period, when we had online classes, we were given many take-home assignments. I needed to understand the questions, but it was not easy to do research when I did not fully grasp the question. In such a case, I would use ChatGPT to explain the question. I would direct questions like “What does this question want from me?” to ChatGPT, and it would give me explanations under different headings and categories. This categorization method helped me a lot. ChatGPT is the only AI tool I use to find ideas. As for information

gathering, I use Google Scholar a lot, especially when finding articles. There is also an application called Researcher, which I saw on Twitter. This app has up-to-date articles, and they are handy to me.” (Jessica)

“Using ChatGPT is very helpful. It answers every question we ask. To make these answers more useful, we often need to give detailed explanations. For example, if I want help with an assignment, I first explain what the course is, and then I explain in detail who I got the assignment from and what kind of thing I want. Giving a good prompt is very important to get better results. In this sense, I actively use ChatGPT. As for finding articles, Google Scholar is incredibly useful. Whenever I need an article, I type the topic, and it gives me many articles. I choose the most relevant ones and use them. The archives and libraries of international universities are also very helpful for my research.” (Zain)

“There is a way of getting information that I have discovered recently. Whenever I come across a topic that I do not understand, I write to ChatGPT and ask him to explain it to me as if he were explaining it to a five-year-old. ChatGPT is a really great storyteller; he puts everything in its place very well. That is what I like about it, and that is why I consult it the most, especially when I need it to give me definitions. ChatGPT is certainly not one hundred percent accurate; I do not accept it as such, but it is usually very reliable with definitions. I turn to it when I want to get the first information, when I want to explain something, or when I want to summarize a paragraph. Alternatively, sometimes I need more clarity on a single sentence to understand it better.” (Alyssa)

“I use AI applications such as ChatGPT and Bard a lot. I also get information from platforms like YouTube and Instagram, and I use Consensus to find articles. Consensus is also an AI tool. It can find articles written about a certain topic in a certain time period. I trust it because it finds real articles.” (Sarah)

“I use Google Scholar especially a lot to access articles, get ideas, and see which authors have written what. When I find an article, I usually go on from there. I also use an app called Connected Papers, which, when I find an article and its topic is

related to my research area, presents me with many other articles on that topic. This is very useful for me. I also search for topics by browsing blogs and forums.” (Emily)

“For example, when I ask ChatGPT for information on a topic or when I am given a specific topic, it gives me the article titles related to that topic. When I ask it to write an article that includes the literature, the introduction, and the topic, it suggests an article. When I read this article, I see which titles are included, and I fill in the template with my own information. I think this is a method that speeds up the process and makes writing easier. It also makes it easier for those who do not like to write articles. This templating feature relaxes me, makes me feel better, and helps me work in a more organized way.” (Diana)

To summarize, students extensively utilize AI tools like ChatGPT and platforms such as Google Scholar and Consensus for accessing information, finding articles, and streamlining research processes, often employing detailed prompts to enhance effectiveness.

Table 4.4 details the frequency and percentage of students using various methods to monitor academic performance and tasks, with tracking on Learning Management Systems (LMS) being the most common (90%), followed by creating reminders on calendars (60%) and recording tasks in note-taking apps (40%).

Table 4.4. Monitoring Academic Performance/Tasks

Codes	Frequency (f)/10	Percentage (%)
Tracking course materials, assignments, and exams on LMS	9	90
Creating reminders on calendars to remind class schedules, assignment due dates, and exams	6	60
Recording academic tasks in note-taking apps	4	40

As demonstrated in Table 4.4, which reflects the methods used by university students to monitor and track their performance and responsibilities in the academic process, LMS plays the most significant role at this point. Students use LMS the most to keep track of their tasks, course materials, assignments, exams, etc. Creating reminders through various calendar applications comes in second place. Students can keep track of their academic responsibilities through notifications they receive via calendar applications. In addition, recording academic tasks on various note-taking applications also stands out as a method preferred by students, albeit less frequently.

The following are some of the students' comments on how they use digital tools and AI to monitor their academic performance and tasks.

“At the beginning of the semester, I put all my plans on the calendar and add reminders. I receive reminders a week or two days in advance and prepare accordingly. This is very useful for assignments or meetings. I also actively use tools like Google Drive, Notion, and Keep to monitor my notes.” (Zain)

“At the beginning of the semester, since I saved all my plans in Notion, I can see how much work I have done during the semester. Because I can see all the information, I can review everything from there. Also, all my notes are there now. If I need something, I can search for it directly from there. I can also see what we have done in which classes. It is also beneficial for keeping track of grades and remembering assignment deadlines. At least I have not missed any deadlines. I sort them by date, and when I add something new, I can easily see and check it.” (Denisse)

“I use the computer's own notification screen as a reminder. The more I take notes and the more places I see them, the more memorable they are and the more attentive I am to the tasks I have to do and the deadlines I have to meet. Therefore, taking notes is convenient for me. I also use Canvas, an application offered by our university, quite often. I keep track of dates and announcements on Canvas. When I enter the main screen, notifications automatically appear on the right side. Even if I am on Canvas for a particular course, I can remember my other tasks.” (Emily)

“I use Notion because it is very efficient to use the calendar there. I write my exams directly there, and I can see all the details of the month, which is very useful.” (Ashley)

Students utilize various tools such as Notion, Google Drive, Keep, and Canvas to effectively monitor academic schedules, assignments, and deadlines throughout the semester.

The codes belonging to the motivation theme, which means willingness and interest in learning, are clearly shown in Table 4.5.

Table 4.5. Motivation

Codes	Frequency (f)/10	Percentage (%)
Interacting with ChatGPT	5	50
Using visual design tools	4	40
Feeling accomplished by deleting completed tasks on digital platforms	3	30
Interacting with social media platforms	2	20
Consuming motivational media content (Podcasts, music)	2	20
Applying the Pomodoro technique integrated into YouTube	1	10
Receiving notifications to stay updated and engaged	1	10
Playing educational games to learn and have fun	1	10

When the table is examined, interacting with ChatGPT, which is related to how digital tools and AI are used to increase students' motivation, is determined as the most preferred learning practice. Students stated that they felt more motivated when they learned using ChatGPT. Secondly, the use of visual design tools is identified as another method that motivates students. These methods were followed by practices such as deleting completed tasks from the digital environment, using social media, and consuming motivational content.

Some student opinions regarding the codes determined in the table are presented below.

“There is a vocabulary app I use to learn English. The words there are really tricky, but it gamifies the learning experience. It asks over and over again, and when you get one wrong, it prolongs the section a bit like a punishment. However, thanks to gamification, each time you complete a set, it moves to a new level and motivates learning.” (Alyssa)

“In particular, I am motivated by having weekly goals in language learning apps or competing with players at a similar level. Apart from that, completing a task can also be motivating. Also, platforms like Google Scholar or ResearchGate sometimes send notifications that new articles have been published. When I receive such an email, I am motivated by the fact that research has been done on that topic. Sometimes, even seeing the title of the article can spark new ideas. Such notifications can be motivating because they arouse curiosity.” (Jessica)

“I find it more interesting to study on the computer because the light and other features of the computer attract my attention. Besides, even receiving welcome messages in applications like ChatGPT can be motivating because it makes me feel as if I am being given a special service.” (Elisa)

“For me, one of the most important ways to stay motivated is to have a plan and follow it step by step. I make big tasks more manageable by dividing them into parts, and getting help from ChatGPT is also very useful in this regard. It helps me plan or break things down into steps.” (Sarah)

“Music motivates me the most. I cannot be so motivated without music. That is why apps like Spotify are critical to me. Furthermore, even WhatsApp is used because we send motivational songs to each other with our friends. It plays a big role here. Social media platforms like Instagram also come into play in this process. These can also be used for educational purposes. At least they reach me in ways that will positively affect my learning.” (Diana)

“When I prepare a presentation or content, these achievements make me proud. Lately, I’ve been using Canva a lot, and I often integrate other small apps, like Mentimeter, Word Clouds, Slido, etc., into Canva because it allows me to bring different features together and share them quickly. This multi-purpose usage satisfies me and boosts my motivation.” (Emily)

“For me, motivation increases when digital tools are involved in the learning process. Because boring and monotonous tasks become more fun with digital tools. Sometimes, it can be difficult for me to focus because our attention spans are different. It can be challenging to sit alone and just write. So, I use digital tools to help me stay focused. Being interested in something, like playing a game on the computer or watching a movie, allows me to study without distractions. At this point, it is important not to do the same thing all the time. For example, after reading an article, I prepare a test for myself. Then, I went back to Notion to check what I had learned. This way, I understand better what I need to do. I go back to the beginning and test myself at the end. This way, I am more motivated to study.” (Ashley)

Students find motivation through various digital tools and techniques such as gamified language learning apps, setting weekly goals in language apps, receiving notifications from research platforms, interacting with ChatGPT, using music and social media for motivation, and integrating diverse tools like Canva into their learning processes.

Table 4.6 illustrates the frequency and percentage of students using various methods for reinforcing learning.

Table 4.6. Learning Reinforcement

Codes	Frequency (f)/10	Percentage (%)
Using interactive quiz apps for review and comprehension of topics	8	80
Watching educational video platforms	5	50
Using ChatGPT	4	40

Table 4.6. (cont.)

Highlighting important points through the use of interactive presentation tools such as Mentimeter	1	10
Creating a digital mind map to understand and relate topics	1	10
Watching course videos recorded in LMS	1	10
Using educational mobile apps	1	10

When Table 4.6. is analyzed, it is observed that there are many codes related to how university students use digital tools and AI to reinforce their learning. Accordingly, students indicated that they mostly used quiz applications to reinforce their learning. After that, watching educational video platforms came to the forefront as the second practice that reinforced students' learning. ChatGPT is another important method used by students to support their learning and provide a personalized learning experience. In addition to these, although Mentimeter, digital mind maps, LMS course videos, and educational mobile applications are less frequently used, it is seen that these applications also play a role in meeting the learning needs of students.

Some student opinions related to the theme are given below.

“Engaging in conversations with ChatGPT is a very effective learning method for me. For example, I give it a statement and ask it to challenge me on it. I say, “Ask me relevant questions and test if I have understood correctly. Learning through dialogue is really great.” (Alyssa)

“I am currently in the process of studying for an exam, and I usually do my studies on YouTube. I watch review videos on YouTube; I even listen to them like podcasts. When I am on my way to my internship, which is far away, I listen to them on the bus. Instead of listening to music, I listen to these videos because they are very easily accessible. I can go on YouTube and immediately access the video I want. I reinforce the topics by watching the lesson repetitions in a single video.” (Maria)

“I use Quizlet. Additionally, I use Duolingo and other similar apps to study English. Tools like flashcards available on the App Store are beneficial as well. These methods significantly help in memory retention. By reviewing and reinforcing the material, I can remember it better. Furthermore, on YouTube, I usually watch videos with audio explanations. Sometimes, I even record my own voice and listen to it while walking or traveling.” (Jessica)

“We used to use Quizlet a lot to memorize English vocabulary during the preparatory period. Apart from that, I also like to find cartoon drawing videos on YouTube. Especially in psychology courses, for example, at Khan Academy, the lessons are taught in a conversational style, and I really like these kinds of lectures. I open these lectures and watch them for reinforcement; they help me memorize and understand. I also try to listen to podcasts in Turkish; I prefer the ones on psychology conversations or therapy topics. I am also very interested in this kind of content.” (Zain)

“The fact that our lectures are recorded feels like a huge blessing to me. As you advance in your undergraduate studies, it can be challenging to get used to three-hour lectures, and it is inevitable that your attention will waver. Therefore, being able to listen to the lectures again through Canvas is very beneficial for reviewing the lesson. Additionally, since I do not fully support mandatory attendance, I can make up for the classes I miss at a later time. In this sense, lecture recordings are really great.” (Elissa)

As seen, students reinforce their learning through various methods such as engaging in dialogue with ChatGPT, watching educational videos on platforms like YouTube, using apps like Quizlet and Duolingo for language learning, and accessing recorded lectures on platforms such as Canvas for review and comprehension.

Table 4.7. includes codes related to how digital tools and AI are used to enable university students to make self-evaluations.

Table 4.7. Self-Evaluation

Codes	Frequency (f)/10	Percentage (%)
Using content quality tools to assess the accuracy, consistency, and overall quality of written content	7	70
Using the Student Information System to evaluate grades, attendance, and other academic data	5	50
Review of the LMS to assess academic progress	4	40
Receive feedback on academic work through ChatGPT	3	30
Getting expert opinions on academic work through online documents	2	20
Receiving feedback through various communication tools	2	20
Using test applications to assess academic performance	2	20

When the table is analyzed, it is seen that the tools that students can use to evaluate the quality of their academic products are the most used methods. The evaluation of academic performance and progress as a result of the data on the student information system and LMS are other methods used significantly by students. ChatGPT's capacity to provide personalized feedback to students also made it another frequently used self-assessment tool. Other methods, such as expert opinions, communication tools, and test applications, are considered practices that have the potential to meet students' self-assessment needs, although they are among the less preferred methods.

Some views on how students are involved in the self-evaluation process through digital and AI tools are listed below.

“I provide this through the use of the Student Information System. I can see how the annual average has increased or decreased. This is really helpful for tracking my progress. Additionally, I use tools like Grammarly and Turnitin to get feedback about my assignments.” (Jessica)

“Through Canvas, we can receive feedback from our professors on our studies. When we upload an assignment or content, whether it is a discussion post or a regular assignment, professors can comment and grade directly on the platform. This allows us to receive feedback. The student information system serves as a significant digital tool, not only Canvas. It is an application where we both give and receive feedback. Additionally, we evaluate our professors’ courses. These evaluations are beneficial for preparing for future semesters, helping professors update their courses, and allowing us to adjust our expectations and prepare for the classes. I use the school's student information system for these purposes.” (Emily)

“I constantly receive feedback from the place where I do internship. For example, I write something using Google Docs. Then, I shared the link to the document so that they could access it, and they provided feedback to me there. So, I usually receive feedback through Google Docs. Also, if we communicate via WhatsApp, they give me feedback directly. I generally use these methods to evaluate myself.” (Maria)

“I communicate with my professors via email to rectify any deficiencies or errors in my academic studies. Also, I could allow ChatGPT to examine my article in more detail and comprehensively than I could and then engage in a question-answer communication with it, just like with a professor, to inquire about any academic deficiencies in the assignments that I upload to it.” (Zain)

“If you are a student, keeping track of the grades you receive through the Student Information System can be quite important. You can see your grades class by class and semester by semester over the four years. It can be valuable to see how successful you have been in different credit courses. For instance, when you review past courses, you might think, "Wow, we took this course, and it was quite challenging, but I managed to succeed. Good job, me!" Also, learning management systems like Canvas can be quite functional when receiving feedback. It is much easier now to get feedback

from teachers. By uploading your assignments or exams to these systems, both parties can see and comment on them.” (Diana)

Students utilize various digital tools such as the Student Information System, Canvas, Google Docs, and ChatGPT for receiving feedback on their academic work, managing grades, and improving their learning outcomes through communication and evaluation.

Table 4.8. reflects the theme of environmental structuring, which refers to strategies aimed at optimizing university students' learning environments and practices.

Table 4.8. Environmental Structuring

Codes	Frequency (f)/10	Percentage (%)
Listening to focus-boosting music	5	50
Applying the Pomodoro technique to increase focus through YouTube	3	30
Using off-screen apps	2	20
Watching "Study with Me" videos	2	20

According to the table, students use listening to music to increase their attention and focus, which is the most common environmental structuring method. Then, the Pomodoro technique, a learning method based on the principle of studying and taking breaks at certain intervals, which is applied on YouTube, stands out as the second important method that increases learning efficiency. Apart from these two methods, Off-screen applications and “Study with Me” videos were used less frequently, but they were stated as other environmental structuring methods that students used for their personal learning needs.

Some examples of environmental structuring strategies used by students to optimize their learning are given below.

“There is an app called Offscreen. I use this app to block access to any other apps for a certain period of time. I use Offscreen quite frequently, and it helps me a lot with both timing and focus. When I use this app, I can study very effectively.” (Alyssa)

“I often use Spotify while studying. Spotify offers some music and playlists specifically designed to enhance focus. I study by listening to these playlists.” (Sarah)

“I primarily use YouTube. There are certain contents and videos on YouTube that motivate me, such as 'Study with Me' videos. 'Study With Me' videos are motivating for me while I study and help me focus because I feel like I am not alone. Since I also enjoy ASMR videos, Study with Me videos provide consistent and planned sounds, like the sound of flipping pages, the sound of the pen on paper, and the timer ticking, which I find soothing. I can see that the creators of the 'Study with Me' videos implement different study methods, such as the Pomodoro technique. They plan out the video, saying things like, 'I will study for 50 minutes in this video, take a 10-minute break, then study for another 50 minutes.' I stay focused for the entire 50 minutes because I am engaged with this plan. The small bell sound in the background does not bother me; instead, it helps me focus. Moreover, if I am wearing headphones, it further isolates me from the surrounding noise and allows me to focus solely on the study sounds. This enhances my concentration because I am not paying attention to the surrounding noise. Lately, I have been in quite a noisy environment, especially at home, and these types of videos help me block out the noise and focus better on my studies.” (Emily)

To summarize, students utilize specific tools like the Offscreen app, Spotify's focus playlists, and YouTube's 'Study With Me' videos to enhance their study focus and productivity. Table 4.9. presents the codes regarding which tools university students prefer when contacting resources that support their learning process.

Table 4.9. Seeking Assistance

Codes	Frequency (f)/10	Percentage (%)
Using various communication tools to seek help and ask questions during the learning process	10	100
Using ChatGPT to generate new ideas and get help with complicated issues	9	90
Collaborating with others on social media platforms for learning purposes	3	30

When examining the table, it is clear that all students resort to various communication tools to seek help and ask questions during their learning process. Another significant method identified is ChatGPT. Accordingly, it has been determined that students resort to ChatGPT to generate new ideas and get help with sophisticated issues. Although using social media platforms for collaboration and learning is less preferred compared to other methods, it has been revealed that some students still utilize this method to get support during their learning processes.

The following examples provide a better understanding of how students integrate digital tools and AI to seek assistance in their learning process.

“Reaching out to our professors via WhatsApp has become quite common nowadays. While some professors may consider WhatsApp to be a more informal means of communication, they usually respond when they are available. I believe this speeds up the communication process. Using WhatsApp to communicate when we do not understand something or are unsure about what to do is important. Additionally, platforms like Canvas are important. They provide an environment where course materials are uploaded, and you are actively engaged in the learning process. Canvas facilitates communication and access to information for both teachers and students, as they can see and comment on materials simultaneously.” (Diana)

"We use emails to communicate with professors at school. However, we can also reach them through faster communication channels like WhatsApp. Additionally, academics are now actively using social media. They have YouTube channels and Twitter accounts. We can also reach out to them through these platforms." (Jessica)

"When it comes to accessing research articles, platforms like ResearchGate and Academia are pretty useful. However, sometimes, we may want to access the full text of a paper, learn about other works by that author, or directly contact them. These platforms, especially ResearchGate, make it easy to reach out. Additionally, platforms like Toad provide contact information for survey respondents, allowing us to communicate with them. If there is a professor whose work I admire or want to follow,

I can visit their university's website to find their contact information and email them directly. I often use Google for this purpose. When I search, I come across platforms like ResearchGate, professor profiles, and even social media accounts. Platforms like Twitter and Instagram also help with accessing content. Professors often share content on LinkedIn, where I can connect and send messages." (Emily)

"When researching a topic, I first search on Google and various websites to get ideas on what to write about, which areas to focus on, or what points to address. Then, if I need more ideas, I ask ChatGPT. For example, I directly query for information on the basic factors of the topic. I frequently use these two sources." (Maria)

In conclusion, students use various digital platforms such as WhatsApp, Canvas, ResearchGate, Academia, and social media channels like YouTube, Twitter, LinkedIn, and Google to communicate with professors, access course materials, reach out to researchers, and gather information, enhancing their academic endeavors through diverse online resources.

4.3. Findings Related to the Second Sub-Problem of the Research

As a result of the questions asked to the participants to reveal their opinions on the second sub-problem of the study and the subsequent analysis, different themes such as 'Strategies that Enhance Planning and Organization Skills,' 'Strategies that Enhance

Self-Evaluation Skills,’ ‘Strategies that Increase Motivation,’ and ‘Strategies that Reinforce Learning’ were obtained. In the scope of this sub-problem, university students indicated the role of the teaching methods applied by academics through digital tools and AI on their SRL skills.

Table 4.10. reflects the instructional practices integrated with digital tools and AI that academics apply in the instructional process and which students believe to have an impact on their planning and organization skills.

Table 4.10. Strategies that Enhance Planning and Organization Skills

Codes	Frequency (f)/10	Percentage (%)
Having a technical ability to use the LMS effectively	3	30
Integrating course materials into the LMS to ensure that students can easily access all resources from a centralized platform	3	30
Planning weekly modules within the LMS to help students clearly see what topics they will be studying within a given timeframe	2	20
Using digital tools to communicate the overall course flow and critical points to students, enabling them to follow the course structure better	2	20
Using concept maps to help students visually organize information and understand connections better	1	10

According to the table, using the LMS effectively and providing access to all resources on a single platform by integrating course materials into the LMS were identified as the two most common instructional practices that enhance students' planning and organizing skills. In addition, the creation of weekly modules within the LMS was another important planning skill-enhancing factor, as it enabled students to see which

topics they would be studying within a given time frame. Moreover, delivering the course flow through different digital tools and using visual tools such as concept maps were also found to be crucial for effective organization and management of academic tasks.

The following are the perceptions of the students on how the teaching practices of the academics affect their planning and organizing skills.

“I think it is a good thing for teachers to directly put the course outline or lesson plan on the Canvas system for 14 weeks. Nevertheless, I believe breaking down these 14 weeks into headings and uploading their materials there really helps organize the students' minds. Moreover, it shows the flow. So, I can see what will happen in those 14 weeks right from the beginning of the semester. For example, I get an idea of the content of the lesson. Where I might struggle, where I might not. Maybe I want to prepare in advance. I have free time then. I might want to do the readings beforehand. It also affects my view of the teacher more. The teacher seems more systematic. This means this teacher prepared everything at the beginning of the semester right and knows what he is doing. It also gives a sense of trust to the student, and I think it increases the success of that course. Moreover, it sets an example, I think. In the future, I should organize myself like this. I should proceed in a systematic way. I should proceed with a planned approach; it will become a role model.” (Diana)

“For example, one of our teachers used mind mapping applications like Miro. This helped me to internalize concepts better and to be more organized in planning what to do or learn before each topic, presenting it systematically with headings.” (Emily)

“Additionally, the use of Canvas was also very beneficial. I am actually more satisfied with the instructors who actively use Canvas because everything I need, like important documents and syllabi, is already there. I do not have to ask people for information; it is all right there on Canvas. I think all teachers should really get accustomed to using Canvas. Having just the syllabus, there is one thing, of course, but some instructors use it very actively, and I like that. It is an important aspect, in my opinion. For example, there are teachers who divide the 14 weeks into modules and embed all kinds of content, materials, and so on.” (Alyssa)

“Using Canvas actively was really beneficial, in my opinion. One of our teachers was very organized in that regard, with everything outlined clearly and activities sent out week by week...Her Canvas was so well-structured that even when I was studying alone, I knew exactly how to proceed, what to look at, how deeply to delve into it, and how much time to allocate for each task.” (Jessica)

Students appreciate instructors who utilize platforms like Canvas to systematically organize course materials, lesson plans, and activities, fostering clarity, preparedness, and trust in their teaching approach.

Table 4.11 shows the methods applied by academics during the teaching process, using digital tools and AI, that impact students' self-evaluation skills.

Table 4.11. Strategies that Enhance Self-Evaluation Skills

Codes	Frequency (f)/10	Percentage (%)
Using digital tools that assist students in summarizing course materials and understanding concepts better	3	30
Using quiz apps that help students assess their prior knowledge, preparedness for the course, and current level of learning	3	30

According to the table, students have indicated that the use of specific digital tools like Padlet, which allows them to summarize course materials, enables them to assess their learning. In particular, they have highlighted that the summarization practice conducted at the end of the course is highly beneficial for them. Besides, students have noted that the use of some quiz applications, which help them to assess their prior knowledge, preparedness for the course, and current level of learning, enhances their self-evaluation skills.

Some of the student expressions obtained about the theme are provided below.

“Using tools like Padlet to evaluate what we learned during the lecture allowed me to see my progress. Through this process, I can say that it enhanced my self-regulated learning skills.” (Sarah)

“I believe that the applications used by teachers, such as Quizlet and Kahoot, truly measure our learning. Additionally, using Canvas to grade us or conducting discussions there to check if the material was understood in class also reveals whether we have learned the subject or not.” (Maria)

Students find educational tools like Padlet, Quizlet, Kahoot!, and Canvas valuable for assessing their learning progress and understanding enhancing their SRL skills through active engagement and feedback mechanisms.

Table 4.12 outlines the frequency and percentage of strategies employed to increase motivation among students.

Table 4.12. Strategies that Increase Motivation

Codes	Frequency (f)/10	Percentage (%)
Using digital-based interactive learning activities	7	70
Making the learning experience more enjoyable and motivating by gamifying the teaching process through digital tools	2	20
Using online discussions where students interact and exchange ideas on course materials	2	20

As can be seen in Table 4.12, some digital and AI-based practices applied by academics in their teaching processes play a significant role in increasing students' motivation. In particular, making the learning process more interesting by using digital-based interactive learning activities constitutes the most common motivational factor for students. Apart from this, providing students with a fun and competitive

learning environment by gamifying the learning process by using digital tools and online discussions where students interact and exchange ideas on course materials were identified as other essential teaching practices that motivate students.

The following examples of student opinions more clearly illustrate ways in which academics can increase students' motivation through various digital and AI-supported teaching strategies.

“For example, there were some professors who had directly set up Canvas. In the discussion section of Canvas, they were asking us to summarize the lesson or the reading in three words at the beginning or end of the class. This increased my motivation to learn because it ensured that I was prepared for the class and had done my readings. Throughout the class, it served as a good motivation for me to listen to the lecture as well.” (Denisse)

“One of our teachers used an application called Slido at the end of the class to conduct tests and evaluate how much students had learned from the course materials. Through this application, he organized a mini competition for the students, where they could use their own animated characters to race each other, either climbing a mountain or running in a certain place. Moreover, small gifts were given to the students who achieved top scores, further enhancing motivation. These applications encouraged active participation from every student in the class, even those who would not normally engage in such activities.” (Emily)

“In language education, they used to utilize platforms like Kahoot! and Quizlet, which made learning a lot more enjoyable. I remember there were times when I used to complain about the lack of games, especially in Arabic classes. Every time I asked if there were no games, the teachers always found ways to create motivating games for us, which was great.” (Alyssa)

“We used Nearpod a lot in one of our classes, and following the system created by our teacher while using Nearpod made me feel excellent and enjoyable.” (Ashley)

As it is clear, students describe various educational technologies such as Canvas discussion summaries, Slido competitions, Kahoot!, Quizlet, and Nearpod used by their instructors to enhance motivation through active engagement, gamified learning, and enjoyable classroom experiences.

Table 4.13. presents the role of various methods applied by academics during teaching in reinforcing students' learning from the perspective of students.

Table 4.13. Strategies that Reinforce Learning

Codes	Frequency (f)/10	Percentage (%)
Presenting course content to students using different applications	3	30
Using the discussion section within the LMS to provide feedback to students and foster learning through discussion	2	20
Employing quiz applications to reinforce learning	2	20

When the table is reviewed, it is seen that academics' transmission of course materials to students through various digital tools has the most crucial role in reinforcing the learning process by making it more enriched and interactive. Afterward, providing feedback to students by using the discussion section in the LMS and encouraging learning through discussion, as well as the use of quiz applications that allow students to test what they have learned and repeat the topics of the course, have been found as other practices that help students to reinforce their learning.

The following student opinions reflect the instructional practices used by academics, which students believe are effective in reinforcing their learning.

“One of our professors used to prepare activities on Canvas related to the topic of the week, which we could research. Every week, for instance, we had to follow those discussions. So, when the exam time came, I took the exam knowing what we had done throughout the weeks, prepared, and familiar with all the subjects. Even though I had

not studied for the exam, I had participated in discussions every week, and the exam was based on the topics we had discussed throughout the weeks. That is why it went very well. So, actually, I did not put in any extra effort myself. You were already prepared, you know.” (Denisse)

“Using digital tools like Nearpod and Padlet really helped me to be active during the lessons. Especially the interactive nature of Nearpod made it easier for me to focus and participate more in the class. This facilitated following the flow of the lesson and learning more effectively.” (Sarah)

“After the class ends, we summarize briefly on Canvas about what we have learned, maybe just a sentence or three words. That reinforces our learning. By doing these things, I mean without even studying for finals or midterms based on what I learned in class, even though I am not usually someone who can focus well in class. I cannot listen to most classes. However, somehow, without thinking about whether I should listen or not, I could listen to myself. With those things we did, I could take the exam without studying and still get a pretty high score.” (Elissa)

As a result, students highlight the beneficial impact of digital tools like Canvas, Nearpod, and Padlet in facilitating active participation, reinforcing learning through interactive activities, and achieving high exam scores by engaging consistently with class discussions and materials.

4.4. Findings Related to the Third Sub-Problem of the Research

As a result of the questions asked to the participants to reveal their opinions on the third sub-problem of the study and the subsequent analysis, different themes such as ‘Enhancing Planning and Organization Skills,’ ‘Ensuring Academic Performance/Task Monitoring,’ ‘Ensuring Reinforcement of Learning,’ ‘Ensuring Self-Evaluation,’ ‘Developing Seeking Information Skills,’ and ‘Increasing Motivation’ were obtained. Within the scope of this sub-problem, academics highlighted the role of teaching methods through digital tools and AI on students’ SRL skills.

Table 4.14. shows the instructional practices that affect students' planning and organization skills.

Table 4.14. Enhancing Planning and Organization Skills

Codes	Frequency (f)/5	Percentage (%)
Breaking down the course plan into weekly modules and integrating them into the LMS	5	100
Using the discussion section within the LMS for planning	2	40
Incorporating the use of AI-based ChatGPT for planning processes and guidance	2	40
Employing note-taking applications for planning and organization	2	40
Utilizing calendar applications for planning and organization	2	40
Developing timelines in planning processes to schedule activities and tasks effectively	1	40
Leveraging WhatsApp for coordination in planning processes	1	20
Using visual tools in planning and organization processes to ensure more precise and more understandable processes	1	20

As seen in the table, the most frequently used method to enhance students' planning and organizational skills is the academics' integration of the lesson plan into the LMS by dividing it into weekly modules. All of the interviewed academics stated that this practice helps students become systematic learners. Additionally, some of the academics agreed that tools such as the discussion section within the LMS, ChatGPT, note-taking, and calendar applications, which allow students to actively participate in the planning process and exchange ideas, have an essential role in providing students

with planning and organizational skills. They also reported that the timeline, WhatsApp, and visual tools have a beneficial effect on students' planning skills.

The following statements of academics reflect the instructional practices that affect students' planning and organizational skills.

“In Canvas, there are elements such as planning, setting deadlines, and determining which tools to use for specific tasks. Without these, you cannot be effective in teaching. So, planning is vital. Therefore, I use Canvas to ensure that students are organized and plan their studies accordingly.” (Addison)

“The first thing I use is Canvas. It is very effective for students to see and plan their entire 14-week education process and to go back if necessary. When creating a course, I first set up my modules in Canvas. For example, I add an introduction module, a closing module, and a midterm module. Then, I add discussions in between. This is what I do during course design. This planning is actually for the students as well, as they can see it there. For example, they can see what we will do next week. Next week, we have a group presentation, and they need to prepare for it. I think it provides good feedback. It is also good because students can see the timeline. They can see how much time they have left. For example, there is a to-do list showing the tasks that need to be completed. When they look at the list, they can see what assignments they have and what needs to be done.” (Nadia)

“I prefer to use Canvas for students. I ask them to develop a timeline using a platform like Mindmap Miro and embed it into Canvas. I also integrate various content from my courses into Canvas. For instance, I give instructions such as, “Write your plan related to this lesson here, in four steps, five steps, six steps.” On the discussion platform, I ask everyone to write their semester plans. I also created a list in Canvas where I added a 14-week course schedule. Under this schedule, I create sections for each student’s name and assign their tasks there. For example, I give tasks for specific weeks, such as week 3, week 5, week 9, week 11, and week 14. This way, I plan each student's tasks for specific weeks, providing a clear structure for them to follow and manage their responsibilities.

I also ask students to use tools like ChatGPT to create a planner. I want them to use ChatGPT as if they are receiving guidance or counseling, writing down their problems, challenges, expectations, and tasks for this term. For example, setting goals like "I will finish five books this term, watch a series, and read and summarize five articles." I encourage them to ask ChatGPT how to achieve these goals." (Andrew)

"First of all, everything in Canvas follows a certain module flow. It automatically reminds you of what needs to be done, when, and how to keep track. It sends notifications, reminding you of deadlines and other important dates. Of course, they allow for these kinds of notifications, and they definitely serve as reminders like an assistant would, helping students to stay organized. Additionally, what I do is, especially in Canvas, week by week, all the content, files, and flow are prepared. When a student enrolls in the course, they can see how their journey will unfold from the first week, and they can prepare accordingly. From this perspective, I find these tools to be highly effective." (Michael)

Academics emphasize the effectiveness of Canvas in facilitating organized course planning, setting timelines, integrating interactive tools like Miro and ChatGPT for student engagement, and providing structured content flow and reminders to enhance learning management and student preparedness.

Table 4.15 demonstrates the instructional practices applied by academics that enable students to monitor their academic performance and tasks.

Table 4.15. Ensuring Academic Performance/Task Monitoring

Codes	Frequency (f)/5	Percentage (%)
Using the LMS effectively to provide students with all information relevant to their courses and progress	5	100
Enabling students to monitor their learning process with the use of Perusall	3	60
Providing students with the opportunity to send reminders and monitor their progress through various online applications	2	40

Table 4.15. (cont.)

Using mind maps to present students' academic tasks	1	20
Tracking tasks via various communication tools	1	20
Using AI-based apps	1	20

The most common practice, agreed upon by all academics, is the effective use of the LMS, which provides students with all the information related to their courses and progress. This is followed by the use of Perusall, which enables students to monitor their academic performance. Additionally, the use of reminders and various online applications, organizing tasks more clearly and visually with mind maps, helping students track their tasks and responsibilities more effectively through various communication tools, and providing support for academic tasks with AI-based applications are other methods utilized by academics.

The following views of academics clearly present some of the instructional practices that will enable students to monitor their academic performance and tasks.

“For example, the Canvas that universities use allows students to upload their assignments and discuss ideas with each other. Additionally, there is an application called Perusall, where a PDF file is uploaded. Students can see how much of it they have read and can even ask each other questions. These applications enable us to monitor students' participation in the course, track their assignment submissions, and see when they engage with the material. This way, we can follow the student's progress throughout the course.” (Addison)

“I use the flipped classroom principle as much as possible in my classes. We cannot learn everything during the class. There is a one-week period between classes, which I consider the entire learning period. During this one-week period, I usually assign some tasks via Canvas. For example, find a news article, share it with me, and discuss the topic. Or, I might say, “I saw something like this; what do you think? Let us discuss.” This approach is more flexible, aiming to create an environment where everyone can talk to each other. I try to bring up topics that are open to discussion,

not black-and-white issues. I encourage this as a learning gain during the one-week period between the two classes. I even grade these assignments on Canvas. For example, 10 points, just a small participation score.” (Nadia)

“In Canvas, there are assignments and discussions. To track how much they participate in these discussions, I mark weekly entries in a Google Sheet to indicate whether they have completed their tasks. I do this either through WhatsApp or email. Sometimes, I also send them the latest version of the sheet via WhatsApp to remind them. I let them know that some of them have a lot of missing entries. This is because it is one of my evaluation criteria, and I do this to ensure that their grades are not affected negatively. It is not just about threatening them with lower grades but also about encouraging them. I want to show them that they are being monitored and that their participation matters.” (Michael)

Academics employ Canvas and additional tools like Perusall and Google Sheets to enhance student engagement and track progress through assignment submissions, discussions, and feedback mechanisms, fostering a collaborative and monitored learning environment.

Table 4.16. includes various strategies used by academics to reinforce students' learning.

Table 4.16. Ensuring Reinforcement of Learning

Codes	Frequency (f)/5	Percentage (%)
Conducting group discussions via various applications	4	80
Using technology-integrated interactive teaching methods	3	60
Enabling students to criticize the information provided by ChatGPT	2	40
Using AI apps for learning	2	40

Table 4.16. (cont.)

Reinforcing learning through interactive quiz applications	2	40
Enhancing learning by facilitating easy access to course materials through the LMS	2	40
Allowing students to reinforce learning by following various online educational platforms	1	20
Enabling students to summarize and share courses/articles on discussion platforms	1	20
Providing students with ways to access information resources	1	20
Enabling students to access various educational videos on Youtube	1	20

According to the table, the majority of academics point out that having group discussions through various applications and using technology-integrated interactive teaching methods are very effective methods to reinforce learning. Another application that draws attention to the table is the reinforcement of learning by criticizing the information provided to students by ChatGPT. In addition to these methods, the use of AI applications that contribute to students' learning processes, the use of quiz applications that help students test their knowledge, sharing materials through LMS, and following online education platforms and educational videos were also identified as essential practices that contribute to students' learning processes.

The opinions of academics on the theme are given below.

“I usually use a summative quiz, and I use a few methods for that. I use Google Forms very often, but I have started to use Canvas actively now. Canvas has its own quiz, and now there are some technical, or rather practical, differences between these two. Also, I use Kahoot! Kahoot! is more fun with music and stuff like that, but it is more informal.

Canvas is more formal and taken more seriously. For example, it is good to be able to apply different question styles; I can ask open-ended questions, true, false, or multiple choice. Secondly, and most importantly, I think the students who take my course can repeat the process up to that point anywhere in the 14 weeks because everything is on Canvas. I mean, I put all the discussions; I even put the thing. Let us say we prepared a cut-and-paste board that we made in class, and I took a photo of it and put it on Canvas. So that the student who cannot come to class can follow it.” (Nadia)

“I ask students to use Google Docs to summarize their work and readings and to upload these summaries to Canvas. I also use ChatGPT to generate summaries and ask for critiques on certain assignments. Outside of class, students are encouraged to find and watch relevant videos on YouTube, embedding these videos into their projects and incorporating them into their studies. For instance, they might embed a YouTube video into a project on Edpuzzle, add 200 related questions, and then review these with their classmates. We also use AI tools like Lesson Planner AI and Gamma to revisit and reinforce the lessons. These tools often provide additional content from AI, helping students to both recall and strengthen their understanding.” (Andrew)

“Nearpod and Mentimeter are indeed perfect tools for this purpose. Instead, especially in Mentimeter, I love using controversial topics for students. By using such topics, I encourage them to engage in discussions, form groups, and become more involved in the subject matter. Because controversial topics are often effective in keeping students engaged and awake, even with potentially dull subjects.” (Michael)

As a result, academics use a variety of digital tools such as Canvas quizzes, Google Docs, ChatGPT for summaries and critiques, YouTube integration with Edpuzzle, AI tools like Lesson Planner AI and Gamma, and interactive platforms like Nearpod and Mentimeter to enhance student engagement, facilitate learning flexibility, and encourage active participation.

Table 4.17. presents various strategies applied by academics to enhance students' self-evaluation skills.

Table 4.17. Ensuring Self-Evaluation

Codes	Frequency (f)/5	Percentage (%)
Using various quiz applications	3	60
Conducting peer assessments via digital tools	2	40
Providing feedback via communication tools	2	40
Offering feedback to students via the LMS	2	40
Encouraging self-assessment by utilizing plagiarism detection programs	2	40
Utilizing content quality applications to assess the quality of students' work	2	40
Offering evaluation criteria through the LMS to guide self-assessment	1	20

The majority of the academics noted that quiz applications allow students to evaluate their knowledge levels and learning processes. In addition, it is clearly seen on the table that methods such as peer assessment through digital tools, communication tools, and providing feedback through LMS also stand out as practical strategies that encourage self-assessment. Apart from these methods, various plagiarism detection programs and content quality applications were found to help students produce original works and evaluate themselves. Finally, it was determined that the evaluation criteria offered through the LMS enabled students to understand what they should pay attention to in the evaluation process.

The practices used by academics to develop self-evaluation skills are better understood with the example responses given below.

“Canvas has an efficient rubric preparation section. I find it very useful. Again, in Canvas, there is a grade section that shows the students what grades they got in the whole semester. I find this very practical, too. I mean, the student sees that I did this, I got this score, I did not do this, I did not get this score, so he sees it very transparently

there. You can add comments to the exam from there, and there can even be a dialog. Then the student writes again, and you write again. And so on, this is an efficient system. It even makes it easier to give feedback.” (Nadia)

“I use tools like flashcard applications and integrate various materials on Canvas. Students are asked to embed their content into Canvas using platforms like Nearpod and other similar online tools. I have them create quiz questions on these platforms. Some questions are open-ended and added to Nearpod, some are formatted for discussion boards, some are matching questions, and others are multiple-choice or gamified competitive questions. Through these methods, students are able to evaluate themselves and their peers. This approach has proven to be incredibly beneficial.” (Andrew)

“There is a great feature in Canvas for this. You can divide students into groups and have them participate in blind peer review. For example, in a communication theories course, I assign a research article as the final assignment, and I want this article to be evaluated by their peers before submission.” (Michael)

To summarize, academics use Canvas features such as rubric preparation, grading transparency with feedback options, and integration of diverse educational tools like flashcard applications, Nearpod, and peer review functions to enhance student assessment, engagement, and self-evaluation in their courses.

Table 4.18 illustrates the frequency and percentage of strategies employed to develop information-seeking skills among students.

Table 4.18. Developing Seeking Information Skills

Codes	Frequency (f)/5	Percentage (%)
Employing diverse digital and AI tools to retrieve articles and relevant content	5	100
Using AI applications to improve the ability to find and utilize relevant information	4	80

Table 4.18. (cont.)

Using digital libraries for accessing a wide array of materials	2	40
Utilizing communication tools to collaborate, exchange ideas, and gather insights from peers and experts	2	40
Using the LMS to access educational resources and enhance information retrieval abilities	1	20

According to Table 4.18, which includes strategies to foster students' information-seeking skills, all of the interviewed academics stated that using various digital and AI tools to obtain articles and related content during teaching improves students' information-seeking skills. Moreover, the use of AI applications, which is one of the most frequently used sources for accessing information quickly and effectively, is one of the most preferred methods by academics. In addition, academics expressed that accessing a wide range of materials using digital libraries, collaborating using communication tools, and accessing educational resources using LMS also have an improving effect on students' information-seeking skills.

Some of the views of academics on the theme are as follows.

“Platforms like Google Research Gate, Google Scholar, and various libraries and databases are incredibly beneficial resources for users. Additionally, Chatbot platforms also provide valuable data. There are fantastic resources available on platforms like SciSpace as well. I encourage and support students in their quest for knowledge using these resources. At the beginning of the classes, I often initiate activities where everyone, for instance, will find two articles from Research Gate and three from SciSpace. This approach triggers curiosity and engagement. I also encourage students to find resources on their own using various tools. This method, which combines both teacher-directed and student-directed learning, yields remarkable outcomes.” (Andrew)

“Here, the most common ones are platforms like WorldCat and Google Scholar. Additionally, within our university, there are many online and open-access websites available, such as the Taylor & Francis digital library. These resources can be found in the library section of university websites. Furthermore, ChatGPT support is also available. Assistance can be provided through ChatGPT when asked for recommendations on a topic. There are many options available. I recommend these.”
(Addison)

Academics use diverse digital platforms like Research Gate, Google Scholar, SciSpace, WorldCat, Taylor & Francis, digital library, and ChatGPT to enhance students' research skills and foster engagement.

Table 4.19 summarizes the frequency and percentage of strategies aimed at increasing motivation among students.

Table 4.19. Increasing Motivation

Codes	Frequency (f)/5	Percentage (%)
Utilizing technology-integrated gamification strategies to boost motivation	3	60
Implementing interactive and collaborative teaching methods	3	60
Using AI applications	2	40
Using visual tools to make learning more engaging	2	40
Engaging students with Perusall	1	20

One of the most important ways for learning to take place is to increase the interest in the course in various ways. When Table 4.19., which reflects the strategies that academics believe have an increasing effect on students' motivation, is examined, it can be concluded that making lessons more fun and engaging with gamification and using interactive and collaborative teaching methods that encourage active participation are the most commonly used methods in this regard. Furthermore, AI

applications that provide students with personalized learning experiences and the use of visual tools that make information more understandable and attractive were identified as other vital practices that increase students' motivation. Apart from these methods, a small number of academics stated that the use of Perusall, a platform that allows students to analyze and comment on texts together, is effective in motivating students.

Sample views of academics on the use of digital tools and AI applications during teaching on students' motivation are provided below.

“For example, in one instance, I made a presentation. However, I did not read it myself. I used AI to create a video. There was a female teacher, for example, and it really caught their attention. Although functionally, it did nothing special. I mean, another woman on the screen was reading the work I did, but it caught their attention a lot. Sometimes, for instance, I use visuals like Canva. Using Canva seems to be more visually appealing compared to a classic PowerPoint presentation.” (Nadia)

“There are learning-teaching systems integrated with AI that support gamification. In these systems, even if you do not manually assign points, automatic scoring can still be done. However, you can still choose the criteria for scoring in the background. For instance, scoring can be based on the number of times a student logs in, the time a student spends on a text, the level of response to a question you ask, communication between students, and submitting assignments on time. One example of these gamification systems is the TalentLMS. I used it in some of my courses to motivate students, and I found it to be truly motivating.” (Owen)

As it is seen, academics use AI-generated videos and visual tools like Canva to enhance presentations, focusing on engagement and implementing AI-integrated gamification systems such as TalentLMS to motivate students through automated scoring and interactive learning.

CHAPTER V

CONCLUSION, DISCUSSION, AND RECOMMENDATIONS

In this section of the study, the conclusion, discussion, and recommendations regarding the findings obtained in line with the three problems investigated within the scope of the research are presented.

Based on the information gathered from interviews with university students and faculty members, it has been determined that the most frequently used digital tool by both students and academics is Canva, a web-based design application, while the most commonly used AI tool is ChatGPT. It is pretty striking that both groups predominantly use the same digital tool and AI application. Considering both Canva and ChatGPT, it is anticipated that their popularity among participants may be due to the fact that these tools offer users the opportunity to perform many different functions on a single platform.

The consistency between the responses of students and academics regarding the most frequently used digital tools and AI applications in the teaching process is also noteworthy. Tools such as Canvas, Kahoot!, Nearpod, and ChatGPT have been frequently mentioned by both academics and students as being commonly used in the teaching process.

The responses from participants suggest that various digital tools and AI applications are widely integrated into learning and teaching processes. In particular, it has been observed that students who have taken courses such as 'Information Technologies' and 'Educational Technologies and academics who have participated in training provided by the university's Coordinatorship of Innovative Learning and Teaching-Artificial Intelligence use digital tools and AI applications with a conscious approach to developing SRL skills. While widespread digitization affects all aspects of life is

expected to yield positive outcomes in the educational field, the unconscious, ineffective, and inconsistent use of these tools by both students and academics may hinder the desired benefits. The current educational approach, which aims to develop individuals' abilities to control and manage the cognitive, emotional, and environmental factors they encounter throughout their learning processes, can potentially play a significant role in making education functional. To realize this potential, it is crucial that digital tools and AI applications introduced into learning and teaching processes through educational digitalization are used with the aim and awareness of improving various SRL skills.

In line with the first research problem, which aims to uncover the impact of digital tools and AI applications used in the learning process on SRL skills and to provide examples of practical approaches for their use with the aim of enhancing these skills, highly functional findings have been obtained from the participants.

The conclusion of this study indicates that technology-based tools used by university students in the learning process, such as note-taking applications, calendar applications, ChatGPT, LMS, visual design applications, and mind maps, are tools that can be utilized to enhance goal-setting and planning skills, which are essential components of SRL. Some studies in the literature also emphasize the supportive role of various digital tools and AI applications in acquiring goal-setting and planning skills, which provide individuals with knowledge on what, when, and how to do things, thereby systematizing the learning process (Dabbagh & Kistansas, 2005; Lai & Gu, 2011).

On the other hand, the study by Yot-Domínguez and Marcelo (2017) investigating whether university students use digital tools to plan their learning found that contrary to this study's findings, university students, despite frequently using digital tools, do not tend to use these tools to organize and plan their learning processes. As can be seen, while some studies in the literature support the findings obtained by this research, others do not. The critical point to emphasize here, as revealed in this study, is the fact that digital tools and AI applications have the potential to enhance goal-setting and planning skills. However, whether these tools are used for this purpose depends on the individual's awareness level and willingness to use them.

Another SRL skill highlighted by the findings of this research is the organization and retention of learning materials. The systematic organization of learned information is crucial for students, as it facilitates the mental integration of knowledge and its recall when needed. The findings from the interviews have revealed that students employ various methods to achieve this purpose, such as using note-taking applications, organizing files, utilizing Google Drive, and creating concept maps. Similarly to this study, the research conducted by Stacy and Cain (2015) also found that students' use of digital note-taking tools can enhance their organization and structuring skills through features such as drawing and text highlighting. The categorization and titling features of these applications play a functional role in the organization of information.

Also, in today's world, where it is possible to access information through almost any source, the ability to access accurate information and determine which information is needed among the abundance of available information has been categorized under the theme of seeking information based on the findings of this research. Responses from students reveal that various digital tools and AI applications that provide access to scientific articles, which are the most important sources of information in the academic world, are widely used. In addition to these tools, it is observed that students also prefer ChatGPT, educational videos, LMS, and social media for information seeking. Considering the process of obtaining helpful, concise, and essential information, one of the critical indicators of effective and efficient study, the use of these tools, given their functions, can be said to be highly beneficial. Individuals who know which source to use to obtain specific information can manage their learning processes effectively and acquire the necessary information in a short time. Indeed, some studies have shown that digital tools and AI applications play a supportive role in students' information-seeking processes (Damyanov & Tsankov, 2018; Kauffman et al., 2011).

Another result of the research is that students utilize various digital tools and AI applications to monitor their academic performance and conduct self-evaluation during the learning process. Monitoring academic performance and self-evaluation involves individuals observing and evaluating their own learning experiences, behaviors, thoughts, and emotions. Through this skill, individuals can determine what they need to bring themselves closer to their learning goals and make necessary adjustments to their learning process. Practices such as tracking courses, assignments,

exams, etc., via LMS, receiving feedback through applications like ChatGPT, communication tools, content quality control tools, and testing tools play a significant role in equipping students with these skills. These applications allow students to both monitor their academic performance and perform self-assessments regarding their learning.

Several studies such as those by Dettori and Persico (2010), Hirata (2010), Molenaar et al. (2023), Chang et al. (2023), and Somasundaram et al. (2020) in the literature also have highlighted that digital and AI tools with features like self-monitoring, communication modes, automated reminders, personalized feedback, and learning analytics significantly enhance SRL skills, improve learning performance, and address learning deficiencies.

One of the most critical components of a successful learning process is the provision of motivation, which is another significant opportunity that digital tools and AI applications can offer to students, according to research findings. In an era where traditional learning methods are losing their prevalence, the need for methods that actively engage individuals in the learning process and make learning enjoyable has increased. At this point, the interactive, visual, engaging, and gamified features of digital tools and AI applications are attributed as elements that enhance individuals' willingness to learn. Indeed, participant opinions within the research scope and numerous studies in the literature support this point. For example, Damyanov and Tsankov (2018) found that 57.9% of students considered gamification elements crucial for motivation, while Valentin et al. (2013) showed that integrating ICT into education positively influenced motivation and active participation; similarly, Çelik et al. (2012) observed that digital tools facilitated goal attainment and self-motivation through enjoyable learning experiences.

On the other hand, in contrast to the research findings, Jin and his colleagues (2023) conducted a study indicating that the use of AI applications in the learning process was beneficial for students' metacognitive, cognitive, and behavioral regulations but not effective in motivational regulations. This could be attributed to students potentially having developed a habituation to such applications, leading to decreased motivation.

To address this issue, it is recommended to blend the use of these applications with traditional methods in the learning process, maintaining a certain balance.

Considering that learning does not occur in a single instance but rather unfolds over a process, various practices such as repetition, review, and memorization that support learning within this process are preferred by students as part of their SRL skills, facilitated through digital tools and AI applications. Research findings have revealed the significant role of tools such as quiz applications, educational videos, LMS, and ChatGPT in reinforcing students' learning.

A review of the literature reveals many studies supporting this result. Based on this, the studies state that while students find podcasts and vodcasts particularly beneficial when used alongside lecture slides for review and assessment purposes, AI-based automatic question-generation systems have the potential to enhance students' personalized learning processes and foster SRL skills. Additionally, findings indicate that AI-based applications such as virtual reality, educational games, and intelligent tutoring systems foster students' learning capacity, and students utilize digital tools for purposes such as listening practice, vocabulary acquisition, and writing skill development (Azevedo et al., 2019; Çelik et al., 2012; Hussein et al., 2014; Parsons et al., 2009).

While various study examples demonstrate the positive impact of digital tools and AI applications on supporting the learning process, Stacy and Cain (2015) pointed out that the use of note-taking tools, a type of digital tool, could distract students, negatively affect their understanding of lessons, and reduce their ability to recall conceptual information. Although this result contradicts the findings of the conducted research, considering the historical context in which the result was obtained, it can be explained that today's new generation of students is actively using digital tools in all aspects of their lives, and since they are accustomed to using these tools and this usage is considered normal for them, it may not be perceived as a disruption to the learning process for the current situation.

Another notable skill facilitated by the use of digital tools and AI applications by students is environmental structuring. Within the realm of this skill, which involves

practices aimed at optimizing the learning environment and process, students have reported resorting to methods such as listening to attention-enhancing music, implementing the Pomodoro technique, and utilizing off-screen applications. The awareness of such applications among students and their integration into their learning processes serve as one of the most significant indicators that they are cognizant of using technology in a manner that enhances SRL skills. Studies in the literature on this subject also support the research findings. Goh et al. (2012) have noted that digital tools have a positive impact on students' ability to manage study environments.

Moreover, the research findings indicate that students actively utilize various digital tools and AI applications to seek assistance during times when they require support in their learning processes. According to the research, students access resources that can assist them in understanding, seeking support, gathering ideas, and receiving guidance through various communication tools, ChatGPT, and specific social media platforms. Students who are aware of which information they can obtain from which source and how to access these sources demonstrate success in using digital tools and AI applications for this purpose. Consistent with these research findings, other studies in the literature revealed that technology-mediated communication applications such as email, instant messaging, and social networking sites are used by students to obtain information about course materials, communicate about assignments, and ask questions to their professors (Dabbagh & Kistantas, 2005; Vrocharidou & Efthymiou, 2012).

In conclusion, it is possible to assert that a significant majority of studies conducted in the field exhibit consistent results with the findings obtained from the research. According to this conclusion, the conscious and consistent use of digital tools and AI applications, particularly in enhancing SRL skills, proves to be effective. Indeed, in a study aimed at uncovering students' perspectives on the learning process, Greene et al. (2010) observed that students exhibited over thirty self-regulatory learning processes while learning with digital tools, serving as an indication of its efficacy.

However, the use of each digital tool and AI application may not yield the same desired effect due to different reasons. For example, Marcelo and Rijo (2019), in their study investigating whether university students use digital technologies to enhance SRL

skills, found that although students used digital technologies for purposes such as internet searching and information sharing, the use of these technologies was not a determining factor in SRL. Additionally, Yot-Domínguez and Marcelo (2017) found in their research that despite university students frequently using digital tools, they were not inclined to use these tools to regulate their learning processes, except for a small group of students exhibiting such tendencies. As evidenced by the findings of these studies, while some students find the use of digital tools and AI applications effective in enhancing SRL skills, for others, utilizing these tools may not play a decisive role in acquiring SRL skills. Here, it is crucial to pay attention to three fundamental aspects. Firstly, are students aware that they can use digital tools and AI applications in a manner conducive to developing their SRL skills? Secondly, does the use of these tools exhibit continuity? Lastly, are these tools not only utilized by students but also by teachers in the instructional process?

The importance placed on these details within the scope of the research reveals that the participating students were aware of their ability to use digital tools and AI applications in a manner conducive to enhancing their SRL skills. It was also found that they consistently utilized these tools in their learning processes and that their teachers frequently incorporated these tools into their instructional process. When these three critical conditions are met, it is evident that the positive impact of these tools on SRL skills will be observed.

Taking into account the belief that unilateral usage of digital tools and AI applications by students alone would not benefit SRL skills, the research also revealed technology-based instructional practices that academics believed could have an enhancing impact on students' SRL skills. To ensure the reliability and validity of the findings, discussions were held with both students and academics regarding these instructional methods. It was concluded that the responses from both groups were consistent with each other.

The results obtained from the study conducted by Damyanov and Tsankov (2018) indicate that the full potential of digital technologies in education is not being utilized. The majority of students express a desire for more effective use of digital technologies in education and seek more significant support from teachers in this regard. In line

with these findings, below are the insights gathered from the academics interviewed in the research regarding how digital technologies are utilized in a manner conducive to enhancing students' SRL skills. The findings obtained from the interviews revealed that some practices implemented by academics through digital tools and AI applications as instructional methods are effective in enhancing students' SRL skills. These practices include facilitating students' ability to plan and organize, monitoring academic performance, reinforcing learning, enabling self-evaluation, developing information-seeking skills, and increasing motivation. Among the instructional practices commonly employed by academics to impart all these skills to students, there are many practices such as effective utilization of Learning Management Systems (LMS), utilization of visual design tools, use of calendar applications, utilization of various communication tools, use of various AI tools, mind mapping, conducting discussions via digital platforms, utilizing various quiz applications, integrating educational videos into the course content, etc.

According to the responses given, both academics and students highlighted that the most impactful practice on SRL skills is the effective use of LMS. LMS possesses features that enable the development of numerous skills, such as planning, accessing learning materials, tracking course progress, monitoring academic performance, conducting self-assessment, and reinforcing learning. Specifically, integrating the course syllabus into the system in weekly modules and frequently using the discussion section within the system are methods that academics consistently apply and that students find highly beneficial in their learning processes. Additionally, the use of technology-based interactive teaching methods has emerged as another practice that is frequently preferred by academics. As seen, academics utilize digital tools and AI applications in a manner that contributes to students' SRL skills.

Considering that educators are expected to lead the way in educational institutions, where the impact of digitalization is increasingly felt, the use of innovative and technology-based instructional practices is inevitable. Therefore, it can be stated that educators who act as role models for the proper use of these technologies bear significant responsibilities in their functional use. One of the most important ways to ensure this functionality is to adopt an attitude that enhances students' SRL skills. Consequently, students who have a role model for the proper and functional use of

digital technologies will continue to adopt the same attitude in their own learning processes.

A review of the literature shows that academics have instructional practices that enable them to act as role models for students and teach them ways to develop their SRL skills. Similar to the findings obtained from this study, academics employ various instructional practices, utilizing digital tools such as LMS, discussion forums, collaborative platforms, and messaging apps, alongside interactive materials like annotated slides and game-based learning apps, to enhance students' access to learning resources, promote active participation, assess learning outcomes, monitor progress, provide feedback, and enhance academic performance (Letchumanan et al., 2020; Simelane-Mnisi, 2023; Thomas et al., 2023; Ugwuanyi et al., 2022).

As evidenced by the results obtained from the literature and this study, it has been demonstrated that academics integrate practices aimed at enhancing students' SRL skills through digital tools and AI applications into their teaching processes.

In summary, this research has been conducted with the aim of exemplifying the effective use of digital tools and AI applications, which are increasingly prevalent in educational institutions today, to ensure the desired benefits for student learning in an era where digitalization in education is accelerating. The study originates from the recognition that, in the current information age, individuals are expected to become independent learners, acquire accurate information, develop lifelong learning skills, and engage in metacognitive learning. Therefore, this research seeks to offer a guide-like knowledge for both students and educators on how to utilize educational digital tools and AI applications, in which millions of investments are made to support these competencies.

The findings of the study reveal that digital tools and AI applications possess numerous features that enhance individuals' SRL skills. It was determined that these tools are highly effective in fostering independent learning when their features are well understood and consistently and actively utilized by both students and educators. Besides, this research aims to provide not only theoretical insights but also practical

applications, serving as a guide for students and educators on how to leverage digital tools and AI to develop essential SRL skills.

The research findings can be summarized in the following general statements:

- It has been observed that university students actively and continuously use digital tools and AI in their learning process.
- It has been revealed that students are aware of the self-regulatory learning skills of digital tools and AI applications and their ability to enhance them.
- It has been concluded that taking courses such as 'Information Technologies' and 'Educational Technologies' increases students' knowledge levels about digital and AI tools and their usage.
- It has been found that the use of digital and AI tools by academics during classes increases students' awareness and knowledge levels about these tools and their usage.
- It has been concluded that students' learning processes become more organized and systematic through the use of digital and AI tools.
- It has been revealed that incorporating digital and AI tools into the teaching process leads to positive contributions to learning performance and motivation by providing students with an interactive learning experience.
- It has been concluded that when academics integrate digital tools and AI applications into the teaching process, they can better monitor student performance.
- It has been found that the use of digital tools and AI makes it easier for academics to facilitate teaching and evaluation processes.
- It has been concluded that students who actively use digital tools and AI in the learning process develop independent learning skills.
- It has been concluded that the use of digital tools and AI makes the learning and teaching process more enjoyable and exciting.
- It has been concluded that participating in training sessions organized by units such as Artificial Intelligence-Innovative Learning and Teaching contributes positively to the development of practical teaching skills integrated with digital and AI tools.

Based on the conclusions of the study, the following recommendations are presented.

For Researchers;

- Based on the research conducted using qualitative research methods, it is suggested that the topic could also be investigated using quantitative research methods to provide a more comprehensive understanding and to triangulate findings across different methodological approaches.
- A comparison can be made by conducting the research in a private foundation university and a state university to reveal the impact of digital and AI tools used in the learning and teaching processes on students' SRL skills. This comparative approach will help to identify potential differences in the effectiveness and adoption of these technologies across diverse educational contexts.
- The differences in SRL skills between participants who actively use digital and artificial intelligence tools and those who do not can be examined. By exploring these differences, the research can provide insights into the potential benefits or challenges associated with the integration of digital and AI tools in educational settings, highlighting their impact on students' SRL skills.
- In this study, Zimmerman and Martinez-Pons' research on SRL skills has been relied upon. An examination from different perspectives can be made based on the SRL skills identified by different researchers in their studies. This approach allows for a broader understanding of SRL skills beyond a single theoretical framework, incorporating diverse perspectives and findings from various researchers, thereby enhancing the validity and applicability of the research findings.

Based on the research results, despite the widespread use of digitalization in higher education institutions, as mentioned in the literature, digital tools and AI are not being used in an approach that enhances learning (Tsz Kit Ng et al., 2023), and university students are deficient in fundamental SRL skills such as goal setting, selecting appropriate strategies during the learning process, and maintaining learning motivation (Bembenuddy, 2011), the following steps can be recommended;

For Instructional Designers;

- Education packages can be organized regarding how students and academics can use digital tools and AI applications in an SRL skills-enhancing approach.
- A guidebook containing scenarios and practical application examples can be prepared for both students and academics on how digital tools and AI can be used to enhance SRL skills in learning and teaching processes.

For University Support Services;

- A consultancy and mentoring process integrated with digital tools and AI aimed at improving SRL skills can be provided to students and academics.

For University Administrators;

- Because the research revealed that students and academics participating in the training organized by Artificial Intelligence-Innovative Learning and Teaching use digital tools and AI in a way that enhances SRL skills, units like these can be established at universities.

For Educational Technologists;

- Educational videos can be prepared for both students and academics on how digital tools and AI can be used to enhance SRL skills in learning and teaching processes.

For University Management;

- Incentives can be provided to academics who actively use digital tools and AI in the teaching process to promote their widespread adoption.
- It is recommended that university management allocate more financial resources to digital tools and AI applications used in education to enhance teaching effectiveness and foster innovation in learning methods.

For Curriculum Development Committees;

- Because the research revealed that students who took Educational Technology classes use digital tools and AI in a manner that improves SRL skills, a common or elective course on 'Educational Technologies' can be added to university curricula across all academic departments.



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APPENDIXES

APPENDIX A *ETHICAL BOARD DECISION*

Evrak Tarih ve Sayısı: 26.03.2024-39015



T.C.
İBN HALDUN ÜNİVERSİTESİ
Sosyal ve Beşeri Bilimler Bilimsel Araştırma ve Yayın Etiği
Kurulu Başkanlığı



Sayı : E-71395021-050.04-39015
Konu : Etik Kurulu Kararı - Nurevşah
KAYA

26.03.2024

İLGİLİ MAKAMA

Kurulumuza başvuran Nurevşah KAYA'nın, "Investing the Role of Digital Tools and Artificial Intelligence Used in Learning and Teaching Processes on University Students' Self-Regulated Learning" isimli projesi; amaç, araştırma türü, veri toplama araçları, süreç ve işlemler, veri analizleri dikkate alınmak suretiyle 15.03.2024 tarihinde değerlendirilerek 2024/03-04 karar numarası ile etik açıdan uygun bulunmaktadır.

Bilgilerini ve gereğini arz/rica ederim.

Prof. Dr. Alev ERKİLET
Başkan

APPENDIX B
INFORMED CONSENT FORM

You are invited to participate in the research titled “Investigating the Role of Digital Tools and Artificial Intelligence Used in Learning and Teaching Processes on University Students’ Self-Regulated Learning Skills,” conducted by Nurevşah Kaya under the supervision of Dr. Mehmet Akın Bulut, Head of the Department at the Faculty of Educational Sciences. The aim of this research is to reveal the role of digital tools and artificial intelligence applications used in learning and teaching processes on students' self-regulated learning skills. You are requested to allocate approximately 20 minutes for this study. Participation in this study is entirely voluntary. To achieve the purpose of the study, you are expected to answer all questions completely, without any pressure or influence, and to provide the most sincere answers that best suit you. Reading and approving this form signifies your consent to participate in the research. However, you have the right to not participate or to withdraw from the study at any time after joining. The information obtained from this study will be used solely for research purposes, and your personal information will be kept confidential; however, your data may be used for publication purposes. If you need more information beyond what has been provided about the purpose of the research, you can ask the researcher now or contact them via the email address and phone number provided to you at the end of the interview. If you wish to receive general or personalized results once the research is completed, please inform the researcher.

I have read the information provided above, which must be given to the participant before the research, and I understand the scope and purpose of the study, as well as the voluntary responsibilities I am undertaking. The written and verbal explanations about the study have been provided by the researcher(s) named below. I have been verbally informed about the possible risks and benefits of the study. Sufficient assurances have been given regarding the careful protection of my personal information.

Under these conditions, I voluntarily agree to participate in the aforementioned research without any pressure or influence.

Researcher's;

Name:

Contact Information:

Participant's;

Name:

Surname:

Sign:



APPENDIX C
INTERVIEW QUESTIONS

For Students;

1. Which digital and AI tools do you use in your learning process?
2. How do you use digital tools and AI to set learning goals and make plans?
3. How do you use digital tools and AI to organize your study environment as you prepare to study?
4. How do you use digital and AI tools to organize your studies and course materials?
5. How do you use digital and AI tools to look for information and do research for your studies?
6. How do you use digital and AI tools to keep records and track of your academic studies (such as notes, course materials, assignments, grades, etc.) and to review during your studies?
7. How do you use digital and AI tools to rehearse and memorize (sophisticated) information for your academic studies?
8. How do you use digital and AI tools to seek assistance for your studies?
9. How do you use digital and AI tools to assess your academic performance/progress?
10. What do you do through digital and AI tools to motivate yourself to meet your learning objectives?
11. Which method used by your teachers through digital and AI tools in the teaching process do you think increases your self-regulated learning skills such as goal setting, planning, note taking, memorizing, organizing, reviewing, etc.?

For Faculty Members;

1. Which digital and AI tools do you use in your teaching process?
2. How do you use digital and AI tools in your teaching practices to enhance students' planning and organizing skills?
3. How do you use digital and AI tools in your teaching practice to enable students to track/monitor their studies in and out of class?

4. How do you use digital and AI tools in your teaching practice to enable students to rehearse and memorize their academic studies?
5. How do you use digital and AI tools in your teaching practice to enable students to evaluate their academic performances?
6. How do you use digital and AI tools in your teaching practice to enable students to seek information and assistance?
7. How do you use digital and AI tools in your teaching practice to motivate students for learning?



CURRICULUM VITAE

Personal Information

Name - Surname: Nurevşah Kaya

E-mail (1):

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Education:

2017-2022 BA in Guidance and Psychological Counseling, Ibn Haldun University, Türkiye

2022-2024 MA in Guidance and Psychological Counseling, Ibn Haldun University, Türkiye

Experience:

2023- Research Assistant, Faculty of Educational Sciences, Ibn Haldun University

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Publications:

Kaya, N., & Bulut, S. (2022). Investigation of students' career choices in stem fields. *Journal of Psychology & Clinical Psychiatry (JPCPY)*.

Kaya, N., & Bulut, S. (2022). Artificial intelligence and education: An overview. *Psychology & Psychological Research International Journal (PPRIJ)*.