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Evaluation of academic procrastination behavior in management of personal learning environments within intelligent tutoring systems

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Abstract

In the study, it is aimed to investigate the academic procrastination behaviors of teacher candidates in the management of personal learning environments within intelligent tutoring systems. In the study, which was structured in the phenomenological pattern, included in the qualitative research method, the participants were formed from 52 teacher candidates studying at Hatay Mustafa Kemal University Faculty of Education with the 'criteria sampling' method. In line with the findings; teacher candidates are in the opinion that intelligent tutoring systems will have a significant role in the education systems of the future and that the characteristics of learners have altered in digital transformation. When the reasons of academic procrastination behaviors are examined, there are reasons such as low motivation, the design of the course, the digital competencies of the learner and the teacher, while as the solution strategies are examined, the motivation of the learners and teachers, increasing the level of interaction between the learners with intelligent tutoring systems, communication, time management, providing digital competencies. Furthermore, strategies such as providing technical competencies have been suggested by teacher candidates.

1. Introduction

Along with the development of information and communication technologies, educational processes have been restructured in the digital world. In this restructuring transformation, intelligent tutoring systems have gained importance and the effective use of intelligent tutoring systems in education processes has been a crucial factor in determining the quality of digital education. The guiding impact of school administrators and teachers on the transformation process has gained more importance. Since the management of teaching environments directly affect the quality of the teaching process, it is probable to indicate that digital alterations have an impact on quality management. Therefore, distance learning, online learning, digital skills, smart or intelligent systems, personal learning environments, instructional management systems have appeared in learning environments in the digital age. Within the scope of the research, intelligent tutoring systems, personal learning environments and academic procrastination behaviors were examined in terms of the effectiveness of educational administration. The management of intelligent tutoring systems, which we encounter in learning environments with digital changes, has gained importance in educational environments where learners are autonomous. In these systems, which are structured on the basis of learner

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autonomy, learners and educational institutions have more responsibilities than traditional education environments. According to Rasheed et al. (2020), these responsibilities covers structuring learning in accordance with the learners' own pace, learners' self-control skills and digital competencies; ın order for this whole teaching process to be efficient, creating digital competencies and technological infrastructure in online learning environments and effectively managing learning environments have taken their place among the new responsibilities of educational institutions. Autonomy in personal learning environments with intelligent tutoring systems sometimes causes this situation not to be managed by the student. This situation creates a justification for the emergence of academic procrastination behavior; therefore, in terms of the management of education, academic procrastination is considered as one of the negative situations that prevent teachers and learners from reaching their educational goals.

It is considered that determining the procrastination behaviors of learners in online learning environments where learners take the responsibility of learning at a higher level on the basis of learner autonomy is important in terms of turning the disadvantages of online learning into advantages. You (2015) stated that one of the reasons for academic procrastination is flexible learning environments, namely online learning environments. Therefore, it is important to examine academic procrastination behavior in online learning environments.

Given the studies, while there are studies investigating the relationships academic procrastination and time management (Nayak, 2019; Ocak & Boyraz, 2016; Van Eerde, 2015); self-efficacy (Steel, 2007); academic achievement (Hen & Goroshit, 2012); emotional intelligence (Deniz et al., 2009); and motivation (Brownlow & Reasinger, 2000; Klassen et al., 2008), there are limited studies examining procrastination behaviors of learners in online environments (Hong et al., 2021; Cheng & Xie, 2021). As stated by Balkıs (2006), teachers who have an important place in the management of learning; time planning skills, self-regulation, academic procrastination behavior tendencies are expected to be absent. It is thought that researching these behaviors expected from education administrators and teachers, who are determinative in the management of learning environments, through prospective teachers of today who will be education administrators and teachers of the future will contribute to the determination of effective education management strategies. Therefore, in this study, it is aimed to examine the academic procrastination behaviors of teacher candidates in the management of personal learning environments with intelligent systems. In line with the purpose, it is aimed to determine the place of intelligent tutoring systems in education, changing learner characteristics, causes of academic procrastination behavior and solution strategies.

2. Literature

2.1. Intelligent Tutoring Systems

In traditional learning environments, or in other words, in classrooms where face-to-face teaching takes place, the teacher is liable for the teaching process and the student is responsible for the learning process. And at the same time, since the teacher takes on responsibility for more than one learner in the classroom, teachers try to increase the learning motivation by ensuring the cognitive and affective adaptation of the students (Lehman et al., 2012). In online learning environments where learner autonomy exists, issues such as individual differences in learning, immediate correction of incorrect learning, interaction, and intelligent systems gain importance in order to eliminate the negative effects that may occur.

Intelligent teaching systems can be expressed as a learning environment based on artificial intelligence technology that enables student-specific individual teaching, taking the individual differences of each student into account in distance learning and teaching processes (Bernacki et al., 2014; Sarrafzadeh et al., 2008). Intelligent systems provide rapid feedback by combining the fields of education, psychology and artificial intelligence, and it also enables the student's learning to be individually structured according to a face-to-face learning environment where the level of interaction is high and learning has been analyzed,

(Kenny & Pahl, 2009; Phobun & Vicheanpanya, 2010; Popescu, 2010). For the structuring of the teaching process, the use of pedagogical strategies as well as information and communication technologies is considered as important in integrating the learning environment and technology (Knezek & Christensen, 2016).

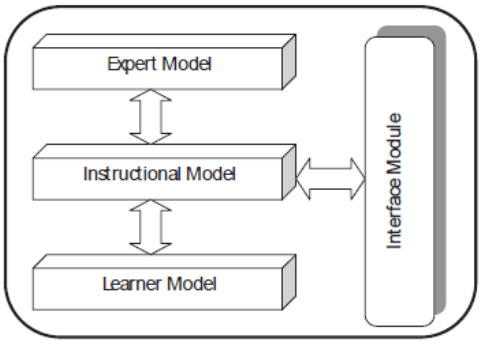

Fig. 1. Components of Intelligent Tutoring (Phobun & Vicheanpanya, 2010:4066)

Figure 1 shows the components of intelligent tutoring systems. When these components are examined, it is seen that there are four components as expert model, instructional model, learner model and interface module. The expert model includes subject information. The instructional model includes instructional strategies for the learner to achieve learning goals. The learner model records the learner's level of knowledge in the interaction between the learner and the course. The interaction between the system and the learner is provided in the interface model (Phobun & Vicheanpanya, 2010). Huang et al. (2019), on the other hand, evaluated intelligent systems as four components: domain expertise, wisdom, evaluation and error correction system.

2.2. Personal Learning Environments

Personal learning environments have been frequently the subject of studies carried out in recent years, especially in the period expressed as the digital age in digital transformation, and it appears as one of the relatively new topics for education (Hernández Fernández, 2016).

Personal learning environment, taking individual differences into account, provides learners with the opportunity to learn independently, as well as providing the opportunity for lifelong learning (Alharbi et al., 2013; Wheeler, 2012). Personal learning environments increase learner responsibilities and the behaviors of learners who construct their own learning become important in the teaching process (Attwell, 2007; Valtonen et al., 2012). When evaluated in terms of the management of education and the future of education, it is possible to state that it will ensure the development of a lifelong learning culture.

By establishing a connection between the learners and the learning objectives, personal learning environment can facilitate the learning of the learners, and consider the learner characteristics positively and also affects the learners (Afini Normadhi et al., 2018). In addition to this positive effect, personal environments can direct the student's attention to the right areas by shifting through the content depending on the student's preferences (Baylari & Montazer, 2009).

2.3. Academic Procrastination Behavior

Although it is a well-known fact, procrastination behavior, which occurs when people delay the work that covers within their area of responsibility (Ackerman & Gross, 2005), has been defined as a complex process to explain, which brings the failure of low performers, (Fee & Tangney, 2000; Steel, 2007). In procrastination, people cannot perform adequately to turn the thought of completing a task into a concrete situation, and therefore, the ability to complete the task remains only at the level of thought, when a situation of inconsistency arises between the behavior that is intended to be done and the behavior actually exhibited (Blunt & Pychyl, 2005). In other words, having a desire to do things but not being able to do them is related

to procrastination. It is significant to determine the reasons for postponing the behaviors that cannot be realized in order to prevent these behaviors.

With the development of technology, digital tools that can create a time trap have more place in our daily life (Heath & Anderson, 2010), and factors such as stress can boast procrastination behavior (Beleaua & Cocorada, 2016). It has been emphasized in studies that it is effective to investigate the procrastination behaviors of individuals, since increasing procrastination behaviors may cause negative situations such as interpersonal problems, increased anxiety level, stress, and depression in the future (Stead et al., 2010; Rozental & Carlbring, 2015). The question of why people tend to procrastinate turns into the question of why students tend to procrastinate in educational environments and learning processes. In this process, the predictability of the causes and possible consequences of academic procrastination is considered as an important requirement for the management of teaching processes in intelligent tutoring personal learning environments.

Academic procrastination behavior emerges when students postpone the fulfillment of academic tasks in the teaching process and expresses the delay of academic tasks by not fulfilling them on time (Hussain & Sultan, 2010; Steel & Klingsieck, 2016; Zhao & Elder, 2020). In this context, academic procrastination is considered as a common behavior problem (Klingsieck, 2013; Michinov et al., 2011) which significantly affects the success of university students (Hussain & Sultan, 2010; Hen & Goroshit, 2012; Howell & Watson, 2007; Kim & Seo, 2015; Setayeshi et al., 2017).

3. Methodology

3.1. Research Model/Design

In this study, which was structured with the basic qualitative research method, the phenomenology design was used. Qualitative research is a method that aims to reveal thoughts more deeply (Denzin & Lincoln, 1998; Patton, 2014). Phenomenology pattern, on the other hand, focuses on revealing people's experiences and perceptions (Gill, 2014; Merriam & Grenier, 2019). Since the primary objective of the research was to examine the academic procrastination behavior experiences of teacher candidates in the management of personal learning environments with intelligent systems, the phenomenological design, which is among the qualitative research methods, was preferred in determining the research model. The purpose of choosing this method is the place of intelligent tutoring systems in education, changing learner characteristics, and the causes of academic procrastination, which is more common in online learning environments than in traditional learning environments, depending on the learning experiences of teacher candidates who have experience in the distance education process and take their courses through online learning and to reveal the solution strategies in more depth.

3.2. Data Collecting Tools

A semi-structured interview form containing four questions was used as a data collection tool in the research. Interview is frequently preferred as a data collection tool in phenomenological qualitative research (Starks & Trinidad, 2007). The phenomenon is tried to be explained by conducting the interviews through a semi-structured interview form (Wimpenny & Gass, 2000). Interview forms allow participants to reveal their thoughts on the specified phenomenon (Greasley & Ashworth, 2007). Therefore, it is aimed to determine the opinions of the teacher candidates for the case by using the interview form as a data collection tool. Opinions were received from two faculty members in the field of Educational Administration and Computer Instructional Technologies in the creation of the interview form.

The first question is “With digital transformation, teaching processes are being restructured in a digital ecosystem in education, and the place of intelligent tutoring systems in the teaching process is increasing. In your opinion, what will be the impact of intelligent tutoring systems on the teaching process in this digital ecosystem?”, The second question is “Learning takes place rapidly on the basis of purposefulness and practicality, as information is in a rapid flow process with the spread of digital tools. In this context, how have the learning characteristics of learners changed with digitalization?”, the third question is “For what

reasons do you think academic procrastination behaviors, which emerge as one of the problems that arise in the education environment based on intelligent tutoring systems, arise?" and the fourth question "Which solution strategies can you develop to prevent academic procrastination behaviors?" The interview form was implemented for application.

3.3. Sampling or Study Group

Participants in the study were composed of 52 teacher candidates studying at Hatay Mustafa Kemal University, Faculty of Education. The teacher candidates who will participate in the research were determined by the "criteria sampling" method. Among the teacher candidates who have online course experience, being enrolled in the 'Open and Distance Learning' course was determined as a criterion. The criterion has been determined in line with the research purpose, and the information infrastructures have been made sufficient within the scope of the course regarding the research variables. In this context, the participants were composed of teacher candidates enrolled in the undergraduate elective course "Open and Distance Learning", which was given synchronously through distance learning in the spring semester of the 2020-2021 academic year. In the first stage, 99 teacher candidates who took the course were informed about the purpose and scope of the research. In the second stage, it was determined that there were 52 teacher candidates who wanted to participate on the condition of being voluntary, and the gender, undergraduate program and class of the teacher candidates who wanted to participate were determined. This information is given in Table 1.

Table 1.

Information Regarding Teacher Candidates

Gender	Number of Teacher Candidates	Class Level	Teaching Programs	Total Number of Teacher Candidates
Female	7	4	Classroom Teaching (CT)	*16*
Male	5	3		
Female	4	3		
Female	3	4	English Language Teaching (ELT)	*15*
Male	2	4		
Female	6	3		
Male	4	3		
Female	9	3	Elementary Mathematics Teaching (EMT)	*9*
Female	4	4	Art Teaching (AT)	*8*
Male	1	4		
Female	2	3		
Male	1	3		
Female	1	3	Social Sciences Teaching (SST)	*2*
Male	1	3		
Male	2	3	Psychological Counseling and Guidance Teaching (PCGT)	*2*

In the third stage, interviews with 52 teacher candidates were conducted in the online platform through voice interviews in line with their permission. As a result of the interviews with the teacher candidates, the research data consisting of a total of 402 minutes of audio recording were obtained.

3.4. Data Analysis

The data obtained in the research were analyzed by inductive content analysis. First of all, the 402-minute audio recording obtained as a result of the interviews with 52 teacher candidates was converted into text documents, and a single text file was obtained with the interview recording of each teacher candidate on separate pages. The page of each teacher candidates was coded by giving numbers according to the order

of the interview. The coding were structured in the "Teaching Programs- Number/G" format, including teaching programs, interview order (number) and gender (G). This coding style was also used when giving direct expressions.

In order to avoid the problem of conflict in the first stage in the creation of codes and categories (Guba, 1978 as cited in Patton, 2002), concepts that are compatible with each other during the coding stage were searched in the data set. Categories were created based on repetitive concepts. After the categories, themes were created. Since there was only one researcher in the study, two experts in the fields of educational administration and computer and instructional technologies were determined as additional coders. For reliability of coding, the formula "Reliability Percentage = [agreement code / (agreement code disagreement code)] X 100)" first put forward by Miles and Huberman (1994) and the Fleiss Kappa coefficient was used secondly. First, the reliability compliance percentage was 86.3% of the Reliability Percentage = [38/ (38 6)] X 100). Miles and Huberman (1994) stated that the percentage of compliance between encoders must be 80% or more in order to be considered reliable. Secondly, the Fleiss Kappa coefficient was calculated since there were three evaluators in total with the researcher (Fleiss, 1971). The calculator developed by Randolph (2008) was used to calculate the Fleiss Kappa coefficient. According to the resulting value, the Fleiss Kappa coefficient was 0.82. The criteria set by Landis and Koach (1977) were used to interpret the resulting value. Landis and Koach (1997) found that the coefficient value obtained between 0.81-1.00 indicated excellent numbness. According to the values obtained from both reliability calculation methods, intercoder compatibility is considered reliable. The codes, categories and themes were finalized by reaching consensus on the codes that emerged with the additional coders. In addition, in qualitative research, obtaining the consent of the participants is considered as one of the ways to be preferred in order to ensure the validity of the data obtained (Graneheim & Lundman, 2004). Therefore, participatory feedback was sought regarding the results obtained, the results obtained from the data were shared by the researcher in order to reach a consensus with the participants, and the teacher candidates approved the appropriateness of the results.

3.5. Findings and Discussions

The findings obtained in the research were gathered under the themes of the effect of intelligent tutoring systems on learning processes, changing learner characteristics in digital transformation, causes of academic procrastination behaviors and solution strategies.

The first theme, 'With digital transformation, teaching processes are being restructured in a digital ecosystem in education, and the place of intelligent tutoring systems in the teaching process is increasing. In your opinion, how will intelligent tutoring systems affect the teaching process in this digital ecosystem? What do you think?' The themes, categories and codes related to the question are given in Table 2.

Table 2

Categories and Codes Obtained Regarding the Theme of Impact on Learning Processes

		Category	**Code**
Themes	*Impact of Learning Process*	*Positive*	*Learner autonomy*
			Be independent of time
			Access from anywhere
			Increase motivation to learn
			Learning tracking
			Objective assessment
			Quick feedback
			Raising learner self-confidence
			Equality of opportunity in learning
			Facilitating learning

When we look at Table 2, the opinions obtained were gathered under the theme of 'influence on learning processes. It has been obtained that intelligent tutoring systems will have a positive impact on the teaching process in terms of learner autonomy, independence from time, access from anywhere, increasing learning motivation, learning tracking, objective evaluation, rapid feedback, increasing learner self-confidence, equal opportunity in learning and facilitating learning. The teacher candidates expressed their views on the positive effect of learner autonomy and learning motivation expressed by the teacher candidates as follows:

CT-3/M: *"…Students experience learning according to their own learning styles…"*

CT-6/F: *"…I think that the learning motivation of the students who adjust the learning process themselves will also increase…"*

ELT-20/F: *"…As the success evaluation of the student is determined according to completely objective criteria, there is no distrust of the student in the assessment and evaluation processes. In this respect, the teacher can also end the problems with the grade among the students…"*

The opinions expressed regarding the other codes obtained were as follows:

CT-6/F: *"…I had such an experience while I was preparing for the university exam. I can say that I was very productive when I was a student. Now, when I evaluate the teaching process as a teacher candidate, I think that we will often need to use these systems since these systems can be configured in accordance with the individual learning speeds of the students."*

EMT-34/F: *"…In the traditional environment, especially in crowded classrooms, when there are students who learn a little later, they have difficulty in compensating for their learning losses, and in these systems, the student uses all the information they need in such a way as to learn."*

AT-41/F: *"I think that with the standardization of the contents for each level, the discussions between students such as good school and good teacher will come to an end. Through these systems, every student realizes the learning process equally…"*

The second theme, 'Learning takes place rapidly on the basis of purposefulness and practicality, with the rapid flow of information with the widespread use of digital tools. In this context, how have the learning characteristics of learners changed with digitalization? The themes, categories and codes related to the question are given in Table 3.

Table 3

Categories and Codes Obtained for the Theme of Learner Characteristics

		Category	***Code***
Themes	*Learning Features*	*Digital Competencies*	*Digital collaboration*
			Digital tool choice
			Using social networks in learning
			Online learning preference
			Digital course materials
		Active in Learning	*Interactive learning*
			Audio-visual support
			Active in learning processes
		Speed	*More information soon*

Looking at Table 3, it is seen that the categories of digital competence, effective in learning, and speed were obtained under the theme of learner characteristics. In the digital competence category, digital collaboration, digital tool preference, using social networks in learning, online learning preference, digital course materials took place. In this category, teacher candidates expressed their views as follows:

ELT-27/F: *"…Students now feel the need to communicate in online environments, and this reveals the necessity of carrying teaching to these environments…"*

AT-48/F: *"Learners who use the internet frequently expect to access their lessons through digital tools…"*

CT-14/M: *"…I have seen the benefits of using social networks, especially in the distance education process. In this respect, social networks have an important place in learning for me…"*

ELT-25/M: *"I use the phone and computer for long hours during the day. This is reflected in my learning styles as well. Because I prefer tools such as telephones and e-readers rather than looking at books."*

EMT-39/F: *"Learners who use the internet frequently expect to access their lessons through digital tools…"*

Active learners took part in interactive learning, audio-visual support and learning processes in the category of being active in learning. In this category, teacher candidates expressed their views as follows:

EMT -35/M: *"…With the development of technology, learning environments that consist of four walls, which we describe as the traditional education system, and that are realized by transferring the subjects that a teacher has mastered to the student, have begun to leave their place to virtual environments, and in these environments, learning objectives can be achieved by being more active as students."*

The third theme, 'For what reasons do you think academic procrastination behaviors emerge as one of the problems that arise in the education environment based on intelligent systems?' The themes, categories and codes related to the question are given in Table 4.

Table 4

Categories and Codes Obtained for the Theme of Reasons for Academic Procrastination Behavior

Themes	**Category**	**Code**
Reasons of Academic Procrastination Behavior	Management of Teaching	*Low motivation*
		No interaction
		Inability to set a goal
		Not feeling responsible for learning
		Time traps
	Digital Competencies	*Low digital proficiency*
		Digital tool shortage
	Academic Competency	*Feeling of failure*
		Underestimate course content
	Quality of lesson	*Lesson design*
		Easy course content
		Difficult course content
	Manner	*Negative learning experiences*

When we look at Table 4, the causes of academic procrastination are the categories of management of instruction, digital competence, academic competence, quality of the course and attitude. It can be seen that there are factors that negatively affect the teaching process in the category of instructional management. These factors included low motivation, lack of interaction, inability to set goals, not feeling responsible for learning, and time traps. In this category, teacher candidates expressed their views as follows:

CT - 4/F: *"…The source may be phone, social media or personal reasons. Since the phone takes up too much of my time, I sometimes missed my classmates…"*

CT - 9/M: *"…When it is not meaningful for me to follow the lesson, when I do not have a purpose, the tasks related to the lesson that are not done on time pile up."*

ELT -17/M: *"… The question of why is one of the most important questions to be answered in learning, in my opinion. I do not think that students who cannot answer the question 'Why am I learning' can have high academic success in learning. I think that a student who does not have a learning goal will not be able to arrange his time and will always postpone his lessons with an excuse…"*

ELT - 29/M: "*…When teachers are reluctant and stagnant, or when they do not communicate and interact with students during the course, students may tend to postpone the subjects related to that course…"*

AT-41/F: *"…. If the student does not make a plan, he/she will postpone it all the time as whether or not he/she will attend the classes depends on his/her decision. Postponed lessons will increase more and more and it will seem like a huge burden when the student has to watch them. As in the proverb many a little makes a mickle, the course content, which was very few and simple at the time, will become more and more difficult..."*

Regarding the academic procrastination behavior stemming from digital competence, teacher candidates expressed their views as follows:

CT **-2/M: "…***Students with weak computer skills may hesitate to log in to the system. In time, they can stay out of the teaching process…"*

EMT**-33/M:** *"…I think that the lack of opportunities is reflected in the learning behaviors of the students. Not having devices that do not have their own computer or that are not new enough can drive the student away…"*

Regarding the academic procrastination behavior based on academic proficiency, teacher candidates expressed their views as follows:

CT-11/F: *"…At the same time, reasons such as fear of failure and thinking that homework is difficult can cause academic procrastination. That's why the student says he will do it on the last day anyway and delays it..."*

ELT-20/F: *"… During my distance education process, this situation created stress for me because there were too many types of homework and some of the homework were difficult. Even though I wanted to do it every day, I postponed it until the last time and after a while I had a hard time doing my lessons and homework…"*

Regarding the academic procrastination behavior due to the nature of the course, the teacher candidates expressed their views as follows:

EMT-35/M: *"…Some of the courses did not attract our attention due to reasons such as not paying attention to the content and the small and dense texts. Being in front of a screen can be pretty boring these days. And I didn't want to go to these classes most of the time…"*

The fourth theme, 'Which solution strategies can you develop to prevent academic procrastination?' The themes, categories and codes obtained for the question are given in Table 5.

Table 5

Categories and Codes Obtained for the Theme of Solution Strategies

Themes		Category	Code
	Solution Strategies	Management of Learning	*Interaction*
			Setting learning goals
			Reducing communication barriers
			Active feedback
			Identifying student needs
			Time planning
			Reducing time traps
			Mentoring
		Technical Equipment	*Digital tool supply*
			Internet infrastructure
		Digital Competency	*Increase digital competence*
			Data security

Looking at Table 5, it is seen that strategies are determined in the subjects of management of education, technical equipment and digital competence under the theme of solution strategies determined to prevent academic procrastination behaviors. Solution strategies were determined in the context of providing interaction, determining learning goals, reducing communication barriers, effective feedback, identifying student needs, planning time, reducing time traps and mentoring suggestions. In this category, teacher candidates expressed their views as follows:

CT-1/M: *"…I can plan the course contents and learning objectives in accordance with the expectations of the students …"*

CT-10/M: *"…Students who know what stage they are at in learning can make their own evaluations. For this reason, I attach importance to effective feedback…"*

EMT-36/M: *"…I think the most effective method as a solution to academic procrastination is to make a plan. Being certain of what to do when and the fact that the student feels a bit obligated will push him to do it on time."*

CT-12/F: *"…One of the factors affecting academic procrastination in the distance learning process can be technological tools. Arrangements should be made for the lack or restriction of stimuli that trigger procrastination, such as tablets, smartphones, computer games or television."*

ELT-21/F: *"…I think that there is a greater need for people who can guide students in digital environments compared to traditional environments. I would identify people who guide students in all learning processes without being able to use time efficiently…"*

ELT-28/F: *"…The internet should be turned off when it is not necessary during the lesson or while doing homework, and the distracting applications (e.g.: Netflix, Instagram, Twitter) should not be taken into consideration… I saw the bad effects of it, so I will try to follow the solutions I specified and try not to procrastinate. In short, all students, including me, should not leave today's work for tomorrow and do it on time. I think that academic success can only be achieved in this way."*

EMT-34/F: *"First of all, the biggest factor can be time management. Not being able to gain time management skills brings the habit of procrastination…"*

PT-39/F: *"…as much as possible, one room of the house should be reserved for study and there should be no distracting objects and belongings in the room, the household should support this issue and a disciplined working environment should be prepared…"*

SST-50/M: *"In order to solve this problem, students who have the habit of procrastination but are not aware of this habit and its negative effects will probably increase their motivation in parallel when they can establish a certain order in time management. Apart from that, I can say that teachers should pay attention to interaction in lessons, be as energetic and/or smiling as possible, and give more useful assignments instead of very superficial and non-contributing assignments…"*

SST-51/F: *"…People who show academic procrastination can make a schedule for themselves, or they can make a timeline and sort their work from the most important to the least important because they leave their homework and lectures to the last minute…"*

PCGT-52/M: *"…The internet should be turned off when it is not necessary during the lesson or while doing homework, and the distracting applications should not be taken into account… I saw the bad effects of it, so I will try to follow the solutions I specified and try not to procrastinate. In short, all students, including me, should not leave today's work for tomorrow and do it on time. I think that academic success can only be achieved in this way."*

In the category of technical equipment, teacher candidates who think that academic procrastination can be prevented by providing technical equipment have determined solution strategies for providing digital tools and internet infrastructure.

Teacher candidates who think that the behavior of increasing digital competence and ensuring data security can be prevented in the Digital Competence category expressed their views in this category as follows:

AT-40/F: *"…First of all, I find it important to increase students' technology literacy. In this direction, I can create programs that students can develop."*

4. Conclusion and Suggestions

In distance learning processes, while intelligent personal systems configure the learning process of learners through artificial intelligence and evaluating the effectiveness and efficiency of these systems, it is important to consider dimensions such as changing learner and learner roles, limitations and disadvantages of the system. In short, the excellence of these systems can be determined within the scope of learning management, teachers and learners; The goal is to achieve effective learning. The effective realization of learning depends on the management of these systems. The realization of the goals from the most general goal to the most specific goal in the learning processes is under the responsibility of the education administration. Therefore, learners, who are at the core of educational processes, are also the focus in intelligent tutoring systems and online learning environments. In this context, Bahceci and Gurol (2010) reveals that the basic element of these systems is the student and the variables that depend on the student are effective in the use of intelligent tutoring systems. In addition, Butz et al. (2006) states that intelligent tutoring systems are learner-centered systems created on the basis of constructivist education. Therefore, although academic procrastination behaviors are encountered in traditional learning environments, as stated by Cheng and Xie (2021), such procrastination behaviors will be encountered more frequently in online environments, and online environments are less likely to avoid such behaviors for reasons such as increasing individual learning and learner responsibility. It has been emphasized that it is more open to the effects of likewise, Michinov et al. (2011) reveals that learners in the distance learning process will stop following the lessons after a while. In this context, it is considered important to examine academic procrastination behaviors in the study and it was aimed to examine the academic procrastination behaviors of teacher candidates with distance learning experience in the management of intelligent tutoring systems and personal learning environments.

According to the obtained results, it has been revealed that in the educational processes restructured by the teacher candidates within the digital transformation they think that the use of intelligent tutoring systems within the education digital ecosystem will be positive. As a result of the research conducted by Ndukwe

et al. (2019), it has been stated that artificial intelligence gives very objective and accurate results when the results of artificial intelligence and human evaluation are compared in learning environments designed with intelligent systems. In other similar studies, rapid feedback has been evaluated as one of the positive aspects of intelligent tutoring systems (Bakeer & Abu-Naser, 2019). This result is similar to the result of the intelligent tutoring systems providing the opportunity for objective evaluation, which is stated among the positive effects by the pre-service teachers. In addition, studies have shown that digital environments integrated into the education process positively affect students' academic achievement (Yu et al., 2010).

In line with the findings, among these features in which the learner characteristics have changed with digitalization in education, there are learners who can take responsibility for learning, the desire to access information faster today, where it is important to increase the digital competencies of the learners and speed is even more important. Mohamed and Lamia (2018) stated that new technologies and new approaches should be used in education. The results obtained in this context revealed that the digital competencies of learners and teachers should be increased in digital transformation. Similarly, it has been stated that there are changing roles such as autonomy, flexibility, technology use proficiency, and problem-solving skills in learning with digitalization (Ndibalema, 2020; Rejón Guardia et al., 2020).

Among the reasons for academic procrastination, there were problems in the management of teaching, low level of digital competence, students' anxiety about academic competence, the quality of the course and the attitudes of the learners. Similar results were found in other studies as well. When these studies are examined, the reasons for academic procrastination are seen as low self-efficacy levels of learners (Di Paula & Campbell, 2002); low academic achievement and low self-confidence (Steel, 2007; Yerdelen et al., 2016), tasks that do not interest learners (Ackerman & Gross, 2005), negative attitudes towards learning and inability to focus (Balkıs et al., 2006), and inability to plan time (Balkıs et al., 2006; Swart et al., 2010; Díaz-Morales & Ferrari, 2015).

Considering the results in terms of solution strategies developed to prevent academic procrastination behavior, these strategies have been developed in terms of instructional management, technical equipment and digital competence. Burnam et al. (2014) revealed that the procrastination behavior of learners with planning skills decreased. The low level of motivation of learners was revealed as one of the reasons for academic procrastination in the study. Considering other studies showing similar results, there is a correlation between learners' motivation levels and academic procrastination behaviors, and an inverse correlation between motivation level and academic procrastination behavior tendencies (Balkıs et al., 2006; Lee, 2005; Rakes & Dunn, 2010; Vij & Lomash, 2014); ıt has been revealed that while low motivation increases academic procrastination behaviors, increased intrinsic motivation significantly prevents academic procrastination behaviors (Hee Seo, 2013; Lee, 2005). In this context, it can be said that increasing the motivation of the learners will significantly prevent academic procrastination behaviors, as was obtained in the study. As a result of the research, interaction, which is among other solution strategies, is an issue that maintains its importance in intelligent tutoring systems. Similarly, Gregori et al. (2018) emphasized that the interaction between the learner and the teacher is very important in intelligent tutoring systems. It has been revealed that the social and technical competencies of the learners are important in the interaction between humans and machines (Siemens, 2005). In order to ensure this interaction, it is necessary that the digital skills and information literacy of the learners are at the desired level (Molotsı, 2020; Špiranec & Zorica, 2010). In addition, web 2.0 tools have an important place in intelligent systems and personal learning environments (Kompen et al., 2019; Laakkonen, 2011; Rahimi et al., 2015). The effective use of these tools in digital environments depends on digital competencies. For this reason, increasing the digital competencies of learners will provide an important solution for academic procrastination in the management of personal learning environments with intelligent tutoring systems, while at the same time, it will also ensure that important problems can be solved in digital environments. In this context, it will be an important issue for teachers and learners, especially education administrators, to maximize digital competencies, to foresee the problems that may be encountered in the online learning

environment, to develop digital management strategies in line with the vision for the management of education in digital environments, for effective management of educational processes in the future.

Suggestions based on the results are given below.

- ✓ Revealing results that do not reflect the real situation determination in the success evaluations of the students, which are easy according to both academic failure anxiety and student level, may cause students to exhibit academic procrastination behaviors. For this reason, course contents and assessment and evaluation processes can be planned in accordance with student levels.
- ✓ Raising digital proficiency levels in the management of learning environments of education managers, teachers and students can be included in the strategic plans of institutions.
- ✓ Interaction has been found to be a factor that may hinder academic procrastination behavior. Therefore, course designs can be created to effectively enable interaction in order to prevent academic procrastination behavior.
- ✓ In order to prevent academic procrastination behaviors, needs analysis can be carried out to improve the material and physical conditions of learners such as infrastructure and digital vehicle supply.
- ✓ Although adaptable and customizable intelligent tutoring systems have superior aspects compared to traditional environments, it is important to identify the problems that have a negative impact on the management of the teaching process. For this reason, feedback mechanisms should be used effectively among education administrators and teachers. In addition, education administrators can use data-based decision systems.
- ✓ Educational administrators can manage this process by educating themselves on issues such as digital safety, digital security, and digital ethics, and by creating modules for students to reach a sufficient level in information security and digital ethics.

Limitations

There are limitations in the research. The first of these limitations is that the data obtained are limited to the teacher candidates in the working group. Researchers can perform studies with students at different universities using different sampling methods. In addition, researchers can work with a working group of teachers and school administrators from a broader perspective. Evaluation of the management of intelligent systems and personalized learning environments are limited to the academic snooze behaviour variable. This was considered the second limitation of the research. Researchers can uncover different variables that can have an impact on the management of learning environments in intelligent personalized learning environments. The third limitation of the research is that it was designed by qualitative method. Researchers can design their research in different patterns or mixed methods within qualitative research methods.

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