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Abstract

This study was conducted to examine the relationship between distance education students' cognitive flexibility levels and their distance education motivations. In the study, cognitive flexibility levels and distance education motivations were also investigated in terms of several variables (gender, age, computer and internet usage time, time spent weekly in distance learning environment and frequency of participation to synchronized classes). The participants of the study consisted of 615 students enrolled in the Turkish Language course which is carried out at a private university in Istanbul. Cognitive Flexibility Scale (Altunkol, 2011) and e-Learning Motivation Survey (Yıldırım, 2012) were employed for data collection. Study results revealed that there is a low level of positive relationship between cognitive flexibility levels of distance education students and their distance education motivations. Time spent in distance learning environment and the frequency of participation to synchronized classes are found as the factors that affect students' distance education motivation. Computer usage time is found as the only factor that affects students' cognitive flexibility level. There is not a significant relationship found between gender, age and internet usage time for cognitive flexibility and distance education motivation.

Introduction

Distance education is the education given to individuals with different levels and readiness in accordance with various goals and purposes by different institutions in the world and Turkey. It is defined as the teaching activity in which the learner and the teacher are in different places and education is given simultaneously or at a different time using current information and communication technologies (Moore & Anderson, 2007). The education opportunity that becomes limited due to geographical location, physical obstacles, employedness etc. becomes possible due to the fact that distance education can be made regardless of time and place. Distance education environments provide flexible and efficient learning environments that make it easier for the learner to form, investigate and learn information so learners start to be able to learn by themselves (Alper & Deryakulu, 2008). Distance education has an important role in the society's lifelong learning expectation as it provides a flexible learning environment which makes it possible for the learners to learn independent of place and time, at their own pace and non-linearly (Lou, 2004).

Motivation in education is an important factor that affects student's learning results (Chen, 2001; Karahan & Roehrig, 2016). Studies made show a positive correlation between motivation and success (Öncü, 2000; Uğuroğlu & Walberg, 1979; Henderlong & Lepper, 1997; Çakır, Şahin & Şahin, 2000; Jacobsen, Eggen & Kauchak, 2002; Çetin & Kırbulut, 2006). Various studies in the literature underline the great importance of motivation and satisfaction in distance learning applications as well (Deimann & Bastians, 2010; Hart, 2012; Huett, J., Moller, Young, Bray & Huett, 2008; İbicioğlu & Antalyalı, 2005; Jokelova, 2012; Olowo et al., 2020; Sahin & Shelley, 2007, 2008; Smith, 2008). İbicioğlu and Antalyalı (2005) in their experimental study showed that motivation is a primary factor in the success of distance learning. Because when students have motivation towards learning they put in more effort instead of giving up (Schunk, 2009). Due to this reason, learner motivation should be certainly supported in distance education (Moore, 1993). Polat and İşman (2013) state in their study that distance education requires more motivation. A study made by Hart (2012) state that motivation affects consistency in learners that learn in open and distance learning environments.

Some of the learners in educational institutions are enthusiastic towards finding a solution to a course, subject or a problem that has been faced while some are unsuccessful in classes and they most of the time prefer running away from a problem instead of searching for a solution (Akbaba, 2006). This difference between students can

be associated with students' different cognitive flexibility levels. This is due to the fact that cognitive flexibility determines how an individual demonstrates their knowledge and which one of the options they are going to choose when faced with a problem (Altunkol, 2011). Moreover, cognitively flexible individuals can fully focus to the subject and they are open to change (Jonassen & Grabowski, 1993).

Cognitive flexibility theory encourages people that learn from different perspectives and allows information to be transferred to different areas. Learners learn information in a linear content, they form new information by being given important concepts and simultaneously presented examples. Cognitive flexibility theory includes the transfer of information and pre-learning. That way, learners learn main concepts and theories in a linear manner. When advanced information gain occurs, this provides basis for learning related to a not-so-well-defined area to occur. Therefore, the surfacing of the structures given as complicated in a more flexible and personal manner, rather than a rigid content, is related to cognitive flexibility. For learners to reach cognitive structures that allow them to be flexible in cognitive processes, in other words be cognitively flexible, a flexible learning environment has to be provided. Since distance education is a flexible learning environment that has an immediate service and success support (Odabaş, 2003), it is being thought that the features laid out above will be possible by distance education.

With this study, the relationship of distance education students' cognitive flexibility levels and distance education motivations has been investigated. Relevant literature shows a lack of studies that investigates cognitive flexibility and motivation together therefore this study is thought to be important because it will be leading the way in that area. In this framework, the question asked is "Is there a significant relationship of the university students' cognitive flexibility levels in distance education programs and their distance education motivations?" In addition to that, the relationships between university students' distance education motivations and their cognitive flexibility levels with their gender, age, computer usage time, internet usage time, time spent weekly in distance learning environment and frequency of participation to synchronized classes have been analyzed.

Purpose

General purpose of this study is the investigation of distance education students' cognitive flexibility levels and distance education motivation levels and then revealing the relationship between these two parameters.

In accordance with this purpose, questions below are tried to be answered:

1. What are the cognitive flexibility levels and distance education motivation levels of distance education students?
2. Is there a significant relationship between cognitive flexibility levels and distance education motivations of distance education students?
3. Do the cognitive flexibility levels of distance education students differ according to various parameters (gender, age, computer usage time, internet usage time, time spent weekly in distance learning environment and frequency of participation to synchronized classes)?
4. Do the distance education motivations of distance education students differ according to various parameters (gender, age, computer usage time, internet usage time, time spent weekly in distance learning environment and frequency of participation to synchronized classes)?

Method

In this research, relational survey model has been used, which is a type of relational model (Karasar, 2011). Relational survey model is a research model that aims to determine the existence and/or the level of covariance between two or more variables (Karasar, 2011; Fraenkel & Wallen, 2009). The model used in this study is a type of relational survey model and it provides results that demonstrate whether if variables change at the same time and how the change is.

Study Group

Study group of this research is formed with 615 students (297 female, 318 male) that are enrolled to Turkish Language class on associate degree or bachelor's degree level. Of the 615 students, 394 are associate level and 221 are bachelor's level. Most of the students are freshmen. Average age in the study group is around 20.

Data Gathering Tools

The questions asked to gather study data have been formed in three sections. In the first section there are questions that formed to learn participants' demographic information. These questions gather data on gender, age, computer usage time, internet usage time, time spent weekly in distance learning environment and frequency of participation to synchronized classes. In order to investigate whether if cognitive flexibility level and distance education motivations change according to these variables, these questions have been added to the questionnaire formed by the researcher.

In the second section, 6-point Likert type Cognitive Flexibility Scale was used that had been developed by Martin and Rubin (1995) and adapted to Turkish by Altunkol (2011) in order to determine students' cognitive flexibility levels. When making scoring, 2nd, 3rd and 10th questions have been reversed. Lowest score that can be gotten from the scale is 12 and highest score is 72. High score from the scale indicate high level of cognitive flexibility and low scores indicate lower cognitive flexibility. Different studies made on the scale demonstrate Cronbach alfa coefficients between .72 and .82 (Altunkol, 2011).

In the third section, which is study's final chapter, e-Learning Motivation Survey has been used. Scale had been developed by Kim (2005) and adaptation had been made by Yıldırım (2012). This motivation questionnaire has been prepared in four sections that are towards e-learning environments. Questions are 5-point Likert type in which (5) is "Completely Agree" and (1) is "Completely Disagree". Various validity and reliability studies give a reliability coefficient between .78 and .81 (Yıldırım, 2012).

Data used in the study have been obtained via an online form. Scales have been transferred into online medium and online scale questionnaires have been sent to students that are in the sample. E-mails have been sent to 2256 students of which 755 have answered. 140 students have filled the form improperly and thus excluded from the sample. Scale forms from 615 students have been used as data source for the research.

Data Analysis

In the study SPSS 22 version of a statistics package program was used in which the relationship between cognitive flexibility levels and motivation towards distance education was investigated. In the data analysis, first step was to determine the scales' reliabilities using Cronbach's Alpha reliability coefficients. For both scales descriptive statistical values have been calculated and median and standard deviation levels have been determined. Statistical significance in the study is found .05 ($p < 0.05$).

In the study descriptive statistics was used for the analysis of demographic information and Pearson Correlation Test has been used for the determination of relationship between cognitive flexibility and motivation. The relationship between gender, age, computer usage time, internet usage time, time spent weekly in distance learning environment, frequency of participation to synchronized classes and cognitive flexibility have been determined using Spearman Correlation Test. Also the relationships between these variables and motivation towards distance learning have been determined using Spearman Correlation Test.

Results and Discussion

Findings Related to Demographic Information

Since educational activities in distance learning environments are conducted via the internet, internet usage level is considered as an important parameter. In accordance with this consideration, participants have been asked their weekly computer usage and their weekly internet usage. According to the study findings more than half (52.4%; $n=322$) of the participants have been using computer for seven or more years (see Table 1). As for weekly internet usage majority of the participants are concentrated in two different categories. 22.4% ($n=138$) of the participants use internet for 2-5 hours and 22.3% of the participants use internet for 31 or more hours.

Various studies suggest that there is a positive correlation between computer usage frequency and the development of positive attitude towards computer (Alharthi, 2020; Aşkar & Usluel, 2003; Çelik & Bindak, 2005; Elliston, 2020; Erdener & Kandemir, 2019; Erkan, 2004; Keskin, Akcay, & Kapici, 2020; Kiru, 2018; Pambayun et al., 2019; Serhan, 2019). Moreover, computer usage level is found to be a factor affecting learning in distance learning environments (Mungania, 2003; Lee, Hong & Ling, 2002). The results showed that more

than half of the participants have been using computer for seven years or more than seven years. Therefore, it can be said that this could show that the participants of this study which were distance education students are enthusiastic towards using computer.

Table 1. Distribution of Participants According to Their Weekly Computer and Internet Usages

| Computer Usage Time | Frequency (f) | Percentage (%) |
|---------------------|---------------|----------------|
| Less than 1 year | 98 | 15.9 |
| 1-3 years | 62 | 10.1 |
| 4-6 years | 133 | 21.6 |
| 7+ | 322 | 52.4 |
| Total | 615 | 100 |

| Weekly Internet Usage | Frequency (f) | Percentage (%) |
|-----------------------|---------------|----------------|
| 0-1 hours | 31 | 5 |
| 2-5 hours | 138 | 22.4 |
| 6-10 hours | 127 | 20.7 |
| 11-20 hours | 108 | 17.6 |
| 21-30 hours | 74 | 12 |
| 31 hours and above | 137 | 22.3 |
| Total | 615 | 100 |

When participants' weekly time spent at distance learning environment is investigated, it has been found that 66.2% (n=407) of them spend less than one hour (see Table 2). Investigation of participation in synchronized classes also showed a low participation rate. 55.4% (n=391) of the participants said that they sometimes participate in synchronized classes and 25% (n=391) of them said that they had never participated. The reason for the frequency of distance education participation of students to be "never" or "sometimes" and their time spent at distance learning environment to be one hour or less can be attributed to the flexibility provided by distance education and students being lacking in self-learning.

Similar phenomenon has been observed by Özgöl, Sarıkaya and Öztürk (2017) that the authors stated students did not show attention to the course because of the lack of a motivating factor. Low amount of weekly time spent at distance learning system and lack of participation in synchronized classes may also be attributed to issues such as technical problems with the system, lack of computer or internet access in that time period, classes overlapping with working hours and classes overlapping with family time. In a study made by Özyürek, Bedge, Yavuz and Özkan (2016), low distance learning participation frequency has been attributed to frequent disconnection of internet connection, students having to work during class hours and family-related factors.

Table 2. Participants' Distribution Regarding Having Distance Learning Experience Before

| Time Spent Weekly at Distance Learning Environment | Frequency (f) | Percentage (%) |
|--|---------------|----------------|
| Less than 1 hour | 407 | 66.2 |
| 1-3 hours | 171 | 27.8 |
| 4-6 hours | 27 | 4.4 |
| 7-9 hours | 7 | 1.1 |
| More than 9 hours | 3 | 0.5 |
| Total | 615 | 100 |

| Frequency of Synchronized Classes Participation | Frequency (f) | Percentage (%) |
|---|---------------|----------------|
| Never | 154 | 25 |
| Sometimes | 391 | 55.4 |
| Usually | 98 | 15.9 |
| Frequently | 22 | 3.6 |
| Total | 615 | 100 |

Findings Regarding Distance Education Students' Cognitive Flexibility Levels and Distance Education Motivation Levels

Students' scores about cognitive flexibility and motivation have been calculated and presented in Table 3.

Table 3. The Scores Achieved by Distance Education Students from Cognitive Flexibility Scale and Motivation Survey

| Variable | X | SS | Minimum – Maximum |
|-----------------------------|--------|-------|-------------------|
| Motivation Score | 108.22 | 19.09 | 42-165 |
| Cognitive Flexibility Score | 47.27 | 8.04 | 17-69 |

According to study findings it can be said that students' distance education motivation level is medium ($X = 108.22$, $SS = 19.09$). When the cognitive flexibility scores of the students are examined, it can be said that this score is above the middle and close to high ($X = 47.27$, $SS = 8.04$). As lowest possible score from the scale is 12 and highest possible score is 72, a group average of 42 ($X = 47.27$) points indicate an above average. And it can be interpreted that the cognitive flexibility level of the participant group is above the average.

Findings Regarding the Relationship between Distance Education Students' Cognitive Flexibility Levels and Distance Education Motivations

In the study at which the relationship between cognitive flexibility levels of distance education students and distance education motivation levels is investigated, Pearson Correlation Test has been applied since data shows a normal distribution. Correlation analysis is a very common analysis type that shows whether if there is a relationship between variables (see Table 4).

Table 4. Results of Correlation Analysis

| | | | Cognitive Flexibility Score | Motivation Score |
|--------------------------|-----------------------------|-------------------------|-----------------------------|------------------|
| Pearson Correlation Test | Cognitive Flexibility Score | Correlation Coefficient | 1.000 | 0.455 |
| | | Sig. (2-tailed) | | <0.001 |
| | | N | 615 | 615 |
| | Motivation Score | Correlation Coefficient | 0.455 | 1.000 |
| | | Sig. (2-tailed) | <0.001 | |
| | | N | 615 | 615 |

According to the data obtained as a result of the analysis, a moderate and positive correlation was found between students' cognitive flexibility level and their distance education motivations. According to the analysis there is a 45.5% positive relationship between participants' cognitive flexibility skills and distance education motivations.

Findings Regarding the Cognitive Flexibility Levels of Students According to Various Parameters (gender, age, computer usage time, internet usage time, time spent weekly in distance learning environment and frequency of participation to synchronized classes)

The existence of meaningful relationships between the participants' cognitive flexibility level and their gender, age, internet usage time, time spent weekly in distance learning environment and frequency of participation to synchronized classes have been analyzed by Spearman Correlation Test. According to the analysis results, there is not a statistically significant relationship investigated between cognitive flexibility level with age and gender of the participants (see Table 5). Among parameters such as participants' computer usage times and internet usage times ($p=0.409$), their time spent weekly at distance learning environment ($p= 0.409$) and their frequency of participating in synchronized distance learning classes ($p= 0.361$), only parameter that affects cognitive flexibility is computer usage time ($p= 0.048$).

Table 5. The Relationship of Participants' Cognitive Flexibility Levels with Different Variables

| | | | Cognitive Flexibility Score |
|---|--|-------------------------|-----------------------------|
| Spearman Correlation Test | Gender | Correlation Coefficient | 0.048 |
| | | Sig. (2-tailed) | 0.276 |
| | | N | 615 |
| | Age | Correlation Coefficient | 0.030 |
| | | Sig. (2-tailed) | 0.500 |
| | | N | 615 |
| | Computer Usage Time | Correlation Coefficient | 0.087 |
| | | Sig. (2-tailed) | 0.048 |
| | | N | 615 |
| | Internet Usage Time | Correlation Coefficient | 0.036 |
| | | Sig. (2-tailed) | 0.409 |
| | | N | 615 |
| | Weekly Time Spent at Distance Learning | Correlation Coefficient | 0.052 |
| | | Sig. (2-tailed) | 0.234 |
| N | | 615 | |
| Frequency of Participating in Distance Learning Classes | Correlation Coefficient | 0.040 | |
| | Sig. (2-tailed) | 0.361 | |
| | N | 615 | |

Findings Regarding the Distance Education Motivations of Students According to Various Parameters (gender, age, computer usage time, internet usage time, time spent weekly in distance learning environment and frequency of participation to synchronized classes)

Analysis of variables such as gender, age, computer usage time and internet usage time showed that these variables do not have a statistically significant correlation with distance education motivation (see Table 6). Although participants' computer usage time ($p=0.913$) and internet usage time ($p=0.633$) do not affect distance education motivation, on the other hand, weekly time spent in the distance learning environment ($p<0.001$) and frequency of participation to distance education classes ($p<0.001$) show a significant correlation with distance education motivation. It can be said that weekly time spent in the distance learning environment and frequency of participation to distance education classes are the parameters that affect distance education motivation.

Table 6. The Relationship of Participants' Distance Education Motivations with Different Variables

| | | | Motivation Score |
|---|--|-------------------------|------------------|
| Spearman Correlation Test | Gender | Correlation Coefficient | 0.036 |
| | | Sig. (2-tailed) | 0.388 |
| | | N | 615 |
| | Age | Correlation Coefficient | 0.048 |
| | | Sig. (2-tailed) | 0.261 |
| | | N | 615 |
| | Computer Usage Time | Correlation Coefficient | 0.005 |
| | | Sig. (2-tailed) | 0.913 |
| | | N | 615 |
| | Internet Usage Time | Correlation Coefficient | 0.020 |
| | | Sig. (2-tailed) | 0.633 |
| | | N | 615 |
| | Weekly Time Spent at Distance Learning | Correlation Coefficient | 0.561 |
| | | Sig. (2-tailed) | <0.001 |
| N | | 615 | |
| Frequency of Participation to Distance Learning Classes | Correlation Coefficient | 0.528 | |
| | Sig. (2-tailed) | <0.001 | |
| | N | 615 | |

Conclusions and Suggestions

In this study at which the relationship between distance education students' cognitive flexibility levels and distance education motivations has been investigated, students' cognitive flexibility levels have been found as high. And there is a low level positive relationship has been found between cognitive flexibility levels and distance education motivations. It can be predicted that cognitively flexible individuals have a belief of success and this might have supported them in developing a positive view towards their distance education lessons. As Bilgin (2009) has stated, individuals with cognitive flexibility approach the situations they face more positively, with more tolerance and they are more open to change. Moreover, it is the characteristics stated in the literature that cognitively flexible students prefer to self-regulate and prefer self-learning (Alper & Deryakulu, 2008).

As these are taken into consideration, these features are clearly in alignment with main features distance education students are expected to have. Study results indicating a high cognitive flexibility level of distance education students support this claim. As relevant literature is investigated, it can be seen that there is lack of studies that investigate the relationship between cognitive flexibility and distance education motivation. However, there are studies that investigate those two concepts separately with different variables. Liu and Wang's (2014) study with 32 university students has investigated cognitive flexibility and motivation together and reported that motivation supports cognitive flexibility. Elliot, Faler, McGregor, Campbell, Sedikides and Harackiewicz's (2000); Kasser's (2002) and Milkulincer's (1994) studies indicate that motivation is related to cognitive flexibility, positive emotions and self-esteem. In another study that investigates positive and negative personality traits with cognitive flexibility, it has been reported that there is a positive correlation between cognitive flexibility and positive traits and there is a negative correlation between cognitive flexibility and negative traits (Serpın Eşiyok, 2016).

In the study, it has been investigated whether if dependent variables differ according to gender and it has been concluded that there is no significant relationship between gender and cognitive flexibility, and gender and distance education motivation. While there are different results in the literature (Sapmaz & Doğan 2013), many studies also did not find a significant relationship between gender and cognitive flexibility (Alparslan Kardeş, 2016; Bilgin, 2009; Çelikkaleli, 2014; Çuhadaroğlu, 2011; Dağgeçen Başsu, 2016; Diril, 2011; Laçın, 2015; Martin & Rubin; 1995; Öz, 2012; Zong, et. al., 2010). Since cognitive flexibility is a feature that is affected by cognitive structures and schemes that are formed until individual's childhood period, it can be argued that gender does not play a factor in development of cognitive structures and therefore does not play a significant role in cognitive flexibility level. According to study results there is not a significant relationship between gender and distance education motivation. In accordance with the study results, Keklik and Erdem-Keklik's (2012) study showed that students' gender do not affect their motivation scores towards distance education. While there are studies in the literature that support this claim by stating that there is not a significant relationship between gender and motivation in distance education environments (Ayub, 2010; Bektaş & Karagöz, 2017; Karagöz Bolat, 2007; Yerlikaya, 2014), there are also studies that have found that males have higher motivation scores (Karataş & Erden, 2012; Lai, Chan & Wong, 2006) or females have higher motivation scores (Britner & Pajares, 2001; Özbey & Dağlıoğlu, 2017). Different results achieved about the gender variable suggest that there are different mediating variables for the relationship between gender and motivation. For example, Wigfield, Battle, Keller and Eccles (2002), in their study that investigate motivation and gender variation, have suggested that males and females achieve different motivation results at different activities and academic duties. In short, the school context has different effects on girls and boys which result in different outcomes regarding motivation.

According to the study results, participants' age do not play a role in their cognitive flexibility levels and distance education motivations. As cognitive flexibility significantly change during pre-school period, most significant change is between the ages of 3 and 5, cognitive flexibility continue developing after infancy period and there is a steady curve of development during childhood and it starts deteriorating at later ages (Dick, 2005; Dick, 2014; Kloo, Parner, Aichorn & Schimhuber, 2010), it can be said that since participants' ages are very close to each other there could not be any difference observed because of that. According to relevant literature, many studies suggest that there is not a significant relationship between age and cognitive flexibility (Altunkol, 2011; Asıcı & İkiz, 2015; Alparslan Kardeş, 2016; Dağgeçen Başsu, 2016). Altunkol (2011), Asıcı and İkiz (2015), in their study with university students, have reported that there is not a significant difference in cognitive flexibility scores and students' age. These results support the findings of the study. According to the study results also there is not a significant relationship between distance education motivation and age. This finding is supported by various studies in the literature (İhtiyaroğlu, 2017; Erdem Keklik 2012; Ayub, 2010; Bektaş & Karagöz, 2017; Karagöz Bolat, 2007; Yerlikaya, 2014). The lack of a relationship between distance education motivation and age may be caused because of the participants' age range is very close to each other.

Bektaş and Karagöz (2017), and Sendur (1999) have also reported that participants' motivation levels do not differ according to age.

According to study results participants' cognitive flexibility levels and weekly time spent at distance education environment, internet usage time and frequency of participating in distance education lessons do not have a significant relationship. However, there is a relationship between cognitive flexibility and computer usage time. Study showed that students' cognitive flexibility levels positively change according to computer usage times. In other words, increase in students' cognitive flexibility is parallel to the increase in students' computer usage times.

Study results suggest that there is a moderately positive correlation between participants' distance education motivations and their weekly time spent at distance education environment and frequency of participating in distance education lessons. This result shows that either as students spend more time in distance education environment and participate more in the classes they become more motivated towards distance education or vice versa. In the study of İbicioğlu and Antalyalı (2005), it was concluded that sufficient time spent in distance education provided motivation for students. This results support the findings obtained in the study. There is no relation between participants' distance education motivations and computer and internet usage times.

This study was done in Istanbul with 615 students studying at a private university's different departments. Study investigated the relationship between cognitive flexibility levels and their distance education motivations of students. According to study results there is a slight positive relationship between distance education students' cognitive flexibility levels and their distance learning motivation. It should be noted that the research findings have been created in accordance with the personal opinions and choices of distance education students in the selected university and it should be taken into consideration that each university has its own academic and social fabric. In accordance with all the results that had been obtained, and as current technologic developments are kept in mind, it can be seen that students also have different learning needs and technology shapes learning environments. Lessons and programs designed with different models for distance education are becoming more widespread day by day. Therefore, current students have to be prepared for these environments and their motivations for them should be supported. In order to increase students' motivations towards distance learning environments supporting activities for cognitive flexibility levels can also be organized in schools. Similar studies can be applied with fully distance education programs and comparisons can be made with these findings. Also in the next studies qualitative analyses can be conducted in addition to quantitative analyses like those conducted in this study. This way, the relationship between cognitive flexibility and motivation can be analyzed more in depth. Findings obtained from studies made with students studying at different universities can be compared to this study's finding and detailed evaluations can be made.

Note

This study has been produced from the master thesis titled "The investigation of motivation levels towards distance education of students with different cognitive flexibility levels" and completed in Gazi University Institute of Educational Sciences with the supervision of Assoc. Prof. Dr. Aslihan Kocaman Karoğlu.

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