Self-Directed Learning and Intrinsic Motivation Levels in MOOCs

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ABSTRACT

The aim of this study was to determine the relationship between the intrinsic motivation levels and self-directed learning levels of learners within a massive open online course environment. In addition, the relationship between these variables and the technology competences/average daily use times of technology were also studied. This study was conducted with predictive design, one of the relational design types. In this context, a personal information form, self-directed learning scale and intrinsic motivation scale were used as data collection tools. The study had 295 participants who completed at least one full course in "Akadema", the massive online open course platform of Anadolu University. The results obtained from the study indicate a near-medium level positive statistically significant level of correlation between the self-directed learning and intrinsic motivation levels of learners. Furthermore, the regression analysis conducted in the study resulted in the self-directed learning levels explaining intrinsic motivation levels at a 20.5% ratio. Based on the findings of the study, various recommendations were made regarding developing the technology competences and self-directed learning skills of students.

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INTRODUCTION

In this study, before self-directed learning levels and intrinsic motivation levels of learners participating in massive open online environments were examined, a literature review on the concepts of self-directed learning and intrinsic motivation was first conducted. After the literature review, the findings obtained from the literature on self-directed learning and intrinsic motivation were compiled below.

Based on the literature review, it may be stated that self-directed learning and intrinsic motivation are important for learners in massive open online courses. Intrinsic motivation, an important determinant of academic performance in online learning environments (Cerasoli, Nicklin & Ford, 2014), is an important factor for self-directed learning that initiates and sustains the individual learning of learners in online learning processes, thereby supporting the notion that self-directed learning skills and intrinsic motivation are similar or related variables for learners. Therefore, the need arises for research in which self-directed learning and intrinsic motivation are studied together (Kim, 2020). In this regard, this study is considered significant for the field as it evaluates both self-directed learning skills and intrinsic motivation.

Studies have documented relationships between self-directed learning skill levels and intrinsic motivation levels (Akbar, Claramita & Kristina, 2017; Bodkyn & Stevens, 2015; Prasert et al. 2011). In their study aiming to analyze the relationship between the intrinsic motivation levels and self-directed learning skills of students studying face-to-face at the Gadjah Mada University faculty of medicine, Akbar, Claramita and Kristina (2017) concluded that a low-level positive relationship existed between the intrinsic motivation levels and self-directed learning skills. Bodkyn and Stevens (2015) studied the effects of self-directed learning and intrinsic motivation on student performance with 485 students studying medicine at the West Indies University Faculty of Health Sciences, finding that intrinsic motivation and self-directed learning have an important positive effect on student performance. Prasert et al. (2011) conducted an experimental study to analyze the effects of intrinsic motivation on the development of self-directed learning skills. 86 students from the Chandrakasem Rajabhat University were separated into the control group and test group and a training program was established for learning with intrinsic motivation and developing the ability for self-directed learning. The study found that students in the test group who attended the training program had higher levels of self-directed learning skills than students in the control group.

The studies in the literature presented above which assert a relationship between self-directed learning skill levels and intrinsic motivation levels were all conducted in face-to-face learning environments. In the literature, two studies were found on the motivation and self-directed learning of students participating in MOOCs. One of these studies, conducted by Zhu and Doo (2022), found that the motivation of students participating in Coursera and FutureLearn courses positively affects students' self-directed skills. Another study was a meta-analysis conducted by Doo, Zhu, and Bonk (2023), who found that the three dimensions of self-directed learning (motivation, self-monitoring, and self-management) have a moderate effect on the learning outcomes of students participating in MOOCs. There is no study in the literature documenting a relationship between learners' intrinsic motivation levels and self-directed learning skills in flexible learning environments such as massive open online environments. In the literature, there is also no research finding indicating learners' self-directed learning skills predict their intrinsic motivation levels in flexible, open and distance learning environments such as massive open online environments. Therefore, research examining the relationship between self-directed learning levels and intrinsic motivation levels of students participating in MOOCs is needed. Based on this gap in the literature, this study was developed aiming to analyze the relationship between self-directed learning levels and intrinsic motivation levels of learners in massive open online environments.

Taking into consideration the term "self-directed learning" is primarily used in adult education (Garrison, 1997), the study of this variable in MOOC platforms with adult participants is considered an important need. Additionally, Garrison (1997) states that intrinsic motivation is related to self-directed learning levels. As such, this study aims to determine whether or not a relationship exists between intrinsic motivation and self-directed learning, and answer questions such as the degree to which self-directed learning levels explain intrinsic motivation. Accordingly, the following research questions were sought in order to achieve this goal:

1. Is there a meaningful relationship between the intrinsic motivation levels and self-directed learning levels of learners in massive open online course environments? If so, what is the level of this relationship?

2. Do the self-directed learning levels predict the intrinsic motivation levels of learners in massive open online course environments?

3. What is the relationship between the intrinsic motivation levels, the technology competences, and daily average use time of technological devices of learners in massive open online course environments?

4. What is the relationship between the self-directed learning levels, the technology competences, and daily average use time of technological devices of learners in massive open online course environments?

LITERATURE REVIEW

SELF-DIRECTED LEARNING

One of the fundamental needs of learners in online learning environments is self-directed learning skills (Garrison, 1997). Online learners, who have the opportunity to learn whenever and wherever they desire, must assume the responsibilities of planning, controlling and evaluating their own learning processes (Karataş & Arpacı, 2021; Moore & Kearsley, 2012). Due to the learner-centered nature of online learning environments, the fulfillment of responsibilities by learners is considered to increase the efficiency of learning processes. The notion that learners who self-direct themselves in online learning environments are more successful is also supported by research (Al Mamun, Lawrie & Wright, 2020; Kuo et al. 2014; Yükseltürk & Bulut, 2007).

Self-directed learning, which is also related to learners' motivations, is an important concept for online learning environments (Garrison, 1997; Misra & Mazelfi, 2021). Self-directed learning, which cannot be considered separately from the motivation status of learners, is related to intrinsic and extrinsic motivation through its theoretical structure (Garrison, 1997). In this regard, it may be stated that the element of active participation is important learners' motivation levels and within their learning processes. Learners who organize their own learning processes actively engage in learning processes during and after the actual learning process (Jansen et al. 2017). McLoughlin and Marshall (2000) state that learners must be self-directed for a successful online learning experience. Learners who are able to organize their learning processes in an online learning environment where learners are physically separated from instructors and other learners may achieve richer learning outcomes (Deraman et al., 2021). The flexible, learner-centered and autonomous nature of online learning environments compared with face-to-face learning environments requires an increased utilization of self-direction skills (Kuo et al., 2014).

The concept of self-directed learning, which emphasizes the responsibilities and autonomy of learners within their own learning processes emerged to the forefront in the 1980's (Garrison, 1997; Whipp & Chiarelli, 2004). Self-directed learning is a fundamental element of online learning and is a process requiring the knowledge and skills of the learner to control, audit and influence their own thought process (Dabbagh & Kitsantas, 2012). Self-direction entails determining goals, utilizing effective strategies for organization, encoding and repeating information, monitoring performance, requesting assistance when needed, having positive attitudes towards available skills and other similar processes (Yoo, 2020). A learner with self-direction is constantly planning, organizing, observing and evaluating (Chau, Law & Tang, 2021).

Research on self-directed learning in online learning generally focuses on how activities are organized in the learning process for the success of learners (Wolters, Pintrich & Karabenick, 2005). Within this process, learners are expected to engage in every stage of self-direction from determining goals to planning and organizing their time and successfully completing their courses. As such, learners with high levels of self-directed learning are also expected to have a collaborative constructivist approach as a result of good planning (Garrison, 1997).

A study by Geduld (2016) aimed to explore the differences between high and low-level online learning outcomes and self-directed learning outcomes. The data obtained within this study indicated that learners with high self-directed learning skills were more successful. Interviews with the high-achievement learners revealed that they may be considered active self-regulators.

Apparent differences were observed regarding learning strategies, awareness regarding learning, preparedness, and time, resource and peer support utilization between high and low achievers.

Argün (2021) stated that learners with high self-directions skills progressed in a more planned and systematic manner when establishing their study system, preferred individual work, and progressed towards the goal they set during their university selection process. The motivation levels of students in this group were found to be higher. In contrast, learners with low self-direction skills established their study system without planning, worked with notes obtained from their environment, preferred group work due to the reduced roles and responsibilities entailed, and followed familial direction and achievement scores during the university selection process. Learners in this group had lower motivation levels towards learning processes and struggled to concentrate in the online learning process. Another variable analyzed in this study was the intrinsic motivation levels of learners in online learning processes.

INTRINSIC MOTIVATION

Being one of the most important factors that influences the speed, intensity, direction and persistence of human behavior (Fırat, Kılınç & Yüzer, 2018), motivation is thereby also one of the most important components of learning processes (Chaiprasurt & Esichaikul, 2013; Miltiadou & Savenye, 2003). Defined as a process that initiates and sustains behaviors (McMillan & Forsyth, 1991), it assists learners to obtain information, develop social qualities, increase initiative, persist in activities, develop their performance and establish a sense of discipline (Singh, Singh & Singh, 2012). Motivation, defined by Schunk, Pintrich & Meece (2008) as the triggering and sustaining of a targeted activity, has a positive relationship with academic achievement, academic performance and willingness to learn (Kılınç, 2020). Keller (1979) describes motivation as stimulating, directing and sustaining behaviors. Based on these descriptions, motivation may be seen as the force that directs a person towards a specific target or goal.

Bozkurt (2021), revealed the current state of research on massive open online courses by applying data mining and analytical approaches to the research on massive open online courses, determining that one of the research topics that academic studies on massive open online courses focus on is learner motivation. Bayeck (2016) examined the factors which motivate learners to participate in massive open online courses and found that learners' friends taking the course, faculty members teaching the course, their need for the skills they will gain at the end of the course, and their personal interest in the course subject motivated them to participate in massive open online courses. For these reasons, motivation in online learning environments affects what, how and when learners learn (Barak, Watted & Haick, 2016; Deimann & Bastiaens, 2010). Therefore, it may be stated that there is a relationship between motivation and self-direction.

Researchers have shown that in online learning environments, highly motivated learners achieve success in situations with learning difficulties, enjoy the learning process, achieve deep learning, and are determined and creative (Semmar, 2006). Contrastingly, various studies have shown that low motivation negatively impacts online learning processes (Chen & Jang, 2010; Hartnett, George & Dron, 2011). Thus, it may be stated that motivation is an element that may increase sustained participation and interaction in online learning environments (Cerasoli, Nicklin & Ford, 2014).

Learners in an online learning environment feel the need for intrinsic motivation due to the fact that they are on their own and the environment lacks the extrinsic motivation factors available in face-to-face learning environments (Fırat, Kılınç & Yüzer, 2018). Fırat (2018) also states that in most cases involving e-learning environments, the intrinsic motivation factor is crucial for learners' success due to the absence of an instructor or advisor to direct and promote them throughout the learning process. Based on these findings, the study of intrinsic motivation in online learning environments is considered to be important.

METHODOLOGY

RESEARCH MODEL

In the study, in order to determine the relationship between distance learners' self-directed learning levels and intrinsic motivation levels, a predictive design from relational designs was used. Predictive design is used to predict one of the two variables determined to have a relationship between the variables considered in the research based on the findings of previous studies in the literature (Creswell, 2012).

PARTICIPANTS

This study was conducted on a total of 295 participants, 65% (n = 192) of whom were women and 34% (n = 103) of whom were men, who completed at least one full course program within Anadolu University's massive open online learning platform "Akadema". Participants were included in the study using the non-probability convenience sampling method. Convenience sampling, which is based on the principles of accessibility and suitability, is a sampling method that allows researchers to collect data quickly and efficiently. Researchers who use this sampling method work with individuals and participants who are easy to reach, and participate willingly of their own accord (Erkuş, 2005). 25.4% (n = 75) of the research participants were between ages 15–24 while 67.8% (n = 200) were 25–54 years old and 6.8% (n = 20) were between 55–64 years of age. The occupational distribution of the participants were 126 unemployed (42.7%), 84 public servants (28.5%), 55 privately employed (18.6%), 15 retired (5.1%), and 15 freelancers (5.1%). 9.5% (n = 28) of the participants had basic technology competence while 53.9% (n = 159) had medium, and 36.6% (n = 108) had high levels. 15.6% (n = 46) of the participants reported between 0–3 hours of daily use of technological devices while 33.6% (n = 99) reported 3–5 hours, 25.8% (n = 76) reported 5–7 hours, and 25.1% (n = 74) reported an average of 7 hours or more.

DATA COLLECTION PROCESS

For data collection, a personal information form, the Self-Directed Learning Levels Scale developed by Ayyıldız and Tarhan (2015), and the Intrinsic Motivation Levels Scale developed by Fırat, Kılınç and Yüzer (2018) were used within this study. The electronic questionnaire created using Google Forms was sent to learners who had completed at least one course program on the Akadema platform. The questionnaire was distributed based on voluntary participation and was limited to a single response per person, and participants were filtered to prevent any sampling bias. The participants were informed such that they would reliably respond to the questionnaire and were notified that the data collected would be used for research purposes. The reliability and validity of the data collection tools of the research were tested using a pilot study of 68 students. The data collection stage of the pilot study was also conducted using Google Forms. The main study uses data collected from a total of 295 participants.

PERSONAL INFORMATION FORM

The personal information form was created to determine the demographic characteristics of the participants of the study. The sex, age, employment, technology competence, average daily use of technological devices and similar questions designed to gather personal demographic information were included in this form.

SELF-DIRECTED LEARNING LEVELS SCALE

This scale is composed of nine sub-dimensions: "Attitude Towards Learning", "Learning Responsibility", "Motivation and Confidence", "Ability to Plan Learning", "Ability to Utilize Learning Opportunities", Ability to Manage Information", "Application of Learning Strategies", "Evaluating the Learning Process", and "Evaluating the Learning Success", and was developed by Ayyıldız and Tarhan (2015). The whole of the scale measures the self-directed learning levels of individuals. This scale is a 5-point Likert scale with a total of 40 items and 9 sub-dimensions. The items 1, 10, 40, 15, and 34 measure attitude towards learning; 13, 28, 35, 17, 21, and 16 measure learning responsibility; 6, 33, 36, 27, and 7 measure motivation and confidence; 38, 25, and 4 measure ability to plan learning; 8, 29, 11, 22, and 12 measure ability to utilize learning opportunities; 32, 5, 20, 24, and 9 measure ability to manage information; 30, 2, 14, and 26 measure application of learning strategies; 31, 19, 39, and 37 measure the evaluation of the learning process; and 18, 23, and 3 measure the evaluation of learning success. The reliability and construct validity of the scale was first tested using exploratory factor analysis (EFA). The analysis determined a Kaiser-Meyer-Olkin (KMO) value of 0.806, while the Bartlett test of sphericity result was χ^2 = 5331.374, df = 780, p = .000 < .001. Secondly, a confirmatory factor analysis (CFA) was conducted on the scale. The values obtained as a result of the analysis show that the scale is applicable to distance learners (χ^2 = 747.92, df = 704; RMSEA = .016, χ^2/df = 1.06, NFI = .86, NNFI = .99, CFI = .99, GFI = .87, AGFI = .85). To test the reliability of the scale, the Cronbach's Alpha intrinsic reliability value was calculated and found to be α = 0.86 (Ayyıldız & Tarhan, 2015).

In this study, the construct validity of the scale was determined using confirmatory factor analysis (CFA). The findings of the CFA conducted on 68 students revealed that the 9 sub-dimensioned structure of the scale was confirmed (χ^2/sd = 3.972, TLI = .929, CFI = .948, RMSEA = .072, SRMR = .0450). The Cronbach's Alpha intrinsic reliability coefficient of the Self-Directed Learning scale used in this study was found to be α = 0.91.

INTRINSIC MOTIVATION LEVELS SCALE

This scale developed by Fırat, Kılınç and Yüzer (2018) is composed of a total of 5 items and a single factor structure. The 5-point Likert scale measures the intrinsic motivation levels of individuals as a whole. The Kaiser-Meyer-Olkin (KMO) value of the scale was calculated to be 0.866 and the Bartlett sphericity test result was χ^2 = 6,497.322 ($p < .001$). The factor loads of the items in the scale were between a minimum of 0.753 and a maximum of 0.922, covering 75.817% of the total variance (Fırat, Kılınç & Yüzer, 2018).

As this study was conducted on a different population, CFA was conducted to test the construct validity and determine the goodness of fit values of the scale. Prior to the targeted main sample of the study, the scale was applied to a different group of students with similar characteristics for confirmation. The CFA conducted on 68 students using the AMOS 21.0 software package shows that the scale is confirmed (χ^2/sd = 2.372, TLI = .954, CFI = .920, RMSEA = .066, SRMR = .0446). Additionally, the Cronbach's Alpha intrinsic reliability coefficient of the intrinsic motivation scale was found to be α = 0.74 in this study.

DATA ANALYSIS

The data collected online through the study was initially input to the Microsoft Excel spreadsheet software and the necessary modifications and adaptations were made for it to work in IBM's SPSS 26.0 software package. The questionnaire conducted on a voluntary basis had a total of 495 participants, however 295 of those participants provided their approval for the questionnaire and were confirmed to have taken at least one course on the Akadema MOOC platform. Questionnaire data lacking consent or approval were removed from the study. Thus, a total of 295 questionnaires were included in the data analysis. The research data was coded in accordance with the responses participants provided to the personal information form, self-directed learning levels scale, and intrinsic motivation levels scale and input accordingly into the SPSS software program. The percentage value distributions, the relationship between variables, and the explanatory levels of the variables regarding each other were determined using measurement techniques such as descriptive statistics, Pearson's correlation analysis, Kendall's tau-b correlation analysis and simple linear regression analysis. The normalcy analysis studied the skewness and kurtosis of the data along with their histogram and z-scores. The normalcy analysis conducted on the data revealed their skewness and kurtosis values to be between –1 and +1, and that their z-scores did not exceed 3.29. The values calculated indicate that the data set displays normal distribution (Büyüköztürk, 2010; Huck, 2012). Prior to conducting Kendall's tau-b correlation analysis the ordinal variables were checked for monotony and the variables were found to be in a monotonous relationship. To determine the situation regarding multicollinearity, the tolerance and VIF values were analyzed in the study. Field (2005) indicates that the highest VIF value must be less than 10 while the tolerance value must be greater than 0.20 in order to conduct regression analysis. In this regard, the multicollinearity analysis conducted in the study revealed a tolerance value of 0.573 and a VIF value lower than 10. Additionally, regarding the core assumptions of regression analysis, the Mahalanobis value was found to be under 25 and the Durbin-Watson value was between 1.5–2.5 (DW = 1.674). Correlation analysis was conducted to determine the relationships between the scales. The correlation values expressing the relationship between values in correlation analyses take values between +1 and –1. In the analyses, the correlation coefficient between 1.00 and 0.90 was interpreted as a very strong relationship, between 0.89 and 0.70 as a strong relationship, between 0.69–0.50 as a moderate relationship, between 0.49–0.26 as a weak relationship and below 0.25 as a very weak relationship (Hinkle, Wiersma & Jurs, 2003).

FINDINGS

This section contains the statistical analyses conducted to determine the relationship status between the self-directed learning levels and intrinsic motivation levels of learners in massive

open online environments. The findings obtained regarding the research questions are presented and interpreted with the addition of tables.

The descriptive statistics regarding the self-directed learning and intrinsic motivation levels of learners are presented in Table 1. As the table portrays, the self-directed learning levels ($\bar{X}$ = 2,659) and the intrinsic motivation levels ($\bar{X}$ = 2.758) were found to be at medium levels.

SCALES	N	$\bar{X}$	S	MINIMUM	MAXIMUM	SKEWNESS	KURTOSIS
Self-Directed Learning	295	2.659	0.744	1.00	5.00	0.611	–0.40
Intrinsic Motivation	295	2.758	1.070	1.00	5.00	0.439	–0.686

Table 2 presents the findings regarding the relationship between learners' intrinsic motivation levels, technology competences, and average daily device use times. Based on the reference interval of the correlation values stated by Hinkle, Wiersma and Jurs (2003), a positive very weak relationship was found between the intrinsic motivation levels and the technology competences of learners participating in the study (τb = 0.113, p < 0.05). On the other hand, a very weak negative relationship was found between the intrinsic motivation levels of the learners participating in the study and their average daily technological device usage levels (τb = –0.003, p > 0.05).

VARIABLES		1	2	3
1.	Intrinsic Motivation	1		
2.	Technology Competence	0.113*	1	
3.	Average Daily Device Use Time	–0.003	0.359**	1

Table 3 presents the findings of the analysis between the self-directed learning levels, technology competences, and average daily use time of technological devices of the participating learners. The findings show a very weak positive statistically significant relationship between the self-directed learning levels, technology competences, and their average daily device use times (τb = 0.039, p < 0.05).

VARIABLES		1	2	3
1.	Self-Directed Learning	1		
2.	Technology Competence	0.039*	1	
3.	Average Daily Device Use Time	0.039*	0.359**	1

The results of the correlation analysis between the self-directed learning levels and the intrinsic motivation levels of the learners participating in the study are presented in Table 4. Looking at the table, it can be seen that a weak statistically significant relationship was found between the self-directed learning levels and intrinsic motivation levels of the learners (r = 0.453, p < 0.01, r^2 = 0.205).

VARIABLES	N	$\bar{X}$	S	SELF-DIRECTED LEARNING	INTRINSIC MOTIVATION
Self-Directed Learning	295	2.659	0.744	1	0.453*
Intrinsic Motivation	295	2.758	1.070	0.453*	1

Studying Table 5 shows that the self-directed learning levels as an independent variable is a statistically significant predictor of intrinsic motivation as a dependent variable (R^2 = .205, F = 75.75, p < 0.01). As such, the power of prediction for learners' self-directed learning levels on intrinsic motivation levels was determined to be 20.5%. Standardized effect size (f^2) value was calculated to determine the effect size of the results obtained. The f^2 value is a value obtained by dividing the multiple correlation coefficient (R) by the extracted value (1-R^2) (Cohen, 1988). As a result of the process, f^2 = 0.257 was found. According to Cohen's (1988) classification,

$0.02 \leq f^2 < 0.15$ indicates a small effect, $0.15 \leq f^2 < 0.35$ indicates a medium effect, and $0.35 \leq f^2$ indicates a large effect level. Therefore, it was determined that the findings obtained have a medium effect size.

	B	SH	β	t	p	R²	ΔR²	F	VIF	DW
Constant	1.026	0.207		4.961	.000	0.205	0.203	75.75	1000	1.647
Self-Directed Learning	0.652	0.075	0.453	8.703	.000					

Table 5 Simple Linear Regression Results of Learners' Self-Directed Learning Levels Predicting Intrinsic Motivation Levels.

The mathematical equation for intrinsic motivation of learners in massive open online environments predicting intrinsic motivation is as follows:

- Intrinsic Motivation = 1.026 + 0.652*(Self-Directed Learning)

ALL SOFTWARE PRODUCTS

Measurements such as descriptive statistics, correlation analyses and simple linear regression analyses were conducted using the SPSS 26.0 software package while confirmatory factor analysis (CFA) was conducted using the AMOS 21.0 software package.

CONCLUSION AND DISCUSSION

This study was conducted with the aim of analyzing the relationship between the levels of self-directed learning skills and the intrinsic motivation levels of learners in a massive open online course environment. The findings of this study are discussed regarding both national and international findings in the field below.

Learners participating in the study reported "medium" levels regarding the intrinsic motivation levels scale. It may be stated that these learners in massive open online environments tend to have medium levels of intrinsic motivation. These findings differ from those of Fırat Kılınç and Yüzer (2018), Ayduğ and Altınpulluk (2022), Bayrak (2022), Brown et al. (2022), and Hung et al. (2010).

In their study on 1639 distance education students in 22 programs at the Anadolu University Open Education system to determine the intrinsic motivation levels of open and distance learners, Fırat, Kılınç and Yüzer (2018) concluded that the intrinsic motivation levels of open and distance learners in e-learning environments were high. Ayduğ and Altınpulluk (2022), who analyzed the academic motivation levels of undergraduate students in distance learning during the pandemic period with various demographic and technological variables, concluded that the intrinsic and extrinsic motivation levels of undergraduate students studying through distance education were high. Bayrak (2022) analyzed the learning preferences, readiness for online environments, and satisfaction of 1288 first year students with online learning experience in different departments of a public university and found that the majority of students with online learning experience preferred online education for the remainder of their education, and students who preferred online education for the remainder of their education had high learning motivation levels as a sub factor of readiness for online learning environments compared to those who preferred face-to-face education. Brown et al. (2022) examined the learning experiences and perceptions of 208 ergotherapy undergraduate students in three Australian universities in both online and blended (online and face-to-face) education and found that the intrinsic motivation levels of students who participated only in online education were higher than those of blended learners. Hung et al. (2010) analyzed 1051 university students participating in five online courses in Taiwan to determine their readiness for online learning, finding that the students' learning motivation and computer/internet sufficiency levels were high.

Learners participating in the study reported "medium" levels regarding the self-directed learning levels scale, and these learners in massive open online environments may be stated to generally have medium levels of self-directed learning skills. These findings differ from those of Hung et al. (2010), Çivril and Aruğaslan (2022), Artsın, Koçdar and Bozkurt (2020), Bayrak (2022), Brown et al. (2022), and Yılmaz, Sezer and Yurdagül (2019).

Hung et al. (2010) found the self-directed learning levels of students low in their study of 1051 university students participating in five online courses in Taiwan. Aiming to analyze the self-directed learning skills of students participating in fully distanced education, Çivril and Aruğaslan

(2022) found that participants of their study had high levels of goal determination, assistance seeking, self-study strategies, physical environment management, and effort management as determined by the self-directed learning skills scale for learning at one's own pace developed by Koçdar et al. (2018). Artsın, Koçdar and Bozkurt (2020) sought to determine the self-directed learning skills of students in massive open online courses and found learners in massive open online courses to have high self-directed learning skills. Bayrak (2022) found that people who prefer to continue online learning for the remainder of their educational lives had high self-directed learning skills as a sub factor of online learning environment readiness compared to those who preferred face-to-face education. Brown et al. (2022) found that online-only students had higher self-directed learning levels compared to blended learning students. Yılmaz, Sezer and Yurdagül (2019) studied the e-learning readiness levels of first and final year students, determining that the students had high levels of self-directed learning. Taking a holistic approach to these studies in the literature, the general finding appears to be that learners in online learning environments have high levels of self-directed learning and intrinsic motivation. Another observation from this study and others in the field is that the characteristics of the participants, differences in the learning processes, differing instructional processes by the instructors during the learning process, and various other causes result in these values being medium level or low.

A very weak statistically significant positive relationship was found between the intrinsic motivation levels and technology competences of the learners participating in this study. It may therefore be stated that as the technology competence of learners in massive open online course environments increases, their intrinsic motivations also marginally increase. This finding coincides with the findings of Ayduğ and Altınpulluk (2022), who found statistically significant low-level positive relationships between the academic intrinsic motivations and technology competences of undergraduate students participating in distance education.

A very weak statistically significant relationship was found between participating learners' self-directed learning levels and technology competences. It may therefore be stated that as the self-directed learning levels of learners in massive open online course environments increases, their technology competence also increases a certain amount. A study of the research on self-directed learning in distance education environments such as massive open online environments revealed no other findings regarding the relationship between the self-directed learning levels and technology competence of learners. Therefore, this finding may be considered a first in the field.

A statistically significant weak positive relationship was found between the self-directed learning levels and intrinsic motivation levels of learners in massive open online environments participating in the study. This finding indicates that as the self-directed learning levels of learners increase, their intrinsic motivation levels also increase while the opposite is true for when their self-directed learning levels decrease.

Since learners in distance education environments have the opportunity to learn whenever and wherever they desire (Moore & Kearsley, 2012), they must make use of their self-direction skills due to distance education environments entailing more autonomy by being more flexible and learner centered than face-to-face learning environments (Kuo et al. 2014). Additionally, Moore (1993) stated that intrinsic motivation was important for learners who must initiate and sustain their learning on their own in distance education environments. Moore (1993) posits that intrinsically motivated learners participate more and are more willing to learn within courses in distance education environments. Similarly, Fırat, Kılınç and Yüzer (2018) expressed that intrinsic motivation was the most important component of learning as it triggers and sustains the interest of learners towards learning by themselves in e-learning environments. Hartnett (2016) also emphasized that the intrinsic motivation of a student was one of the most important components of online distance education applications. While no research in the field was found regarding the intrinsic motivation levels and self-directed learning skills of learners in flexible learning environments such as massive open online environments, a study on the intrinsic motivation levels and self-direction perceptions of workers with flexible work opportunities was found. Taş and Tortumlu (2021) analyzed the relationships between the self-control and self-direction perceptions, the intrinsic motivations in their work lives, and the happiness levels of staff in the information technology sector with flexible work environments resulting in the finding that a statistically significant positive relationship existed between the self-direction perceptions and intrinsic motivations of these workers. Based on the findings of Taş and Tortumlu (2021), it may be stated that as individuals are motivated, they may express

more self-direction skills. All these findings indicate a meaningful, positive relationship between the intrinsic motivations and self-directed learning skills in learning processes of learners with flexible learning opportunities in massive open online course environments as a distance learning environment. In this regard, it may also be stated that the motivation regarding learning processes of learners who can supervise themselves and efficiently and effectively participate in learning processes on their own are positively influenced during online learning. The positive progression of variables such as self-directed learning skills and intrinsic motivation which are among the important elements of online learning processes would also enrich the learning experiences obtained from online learning.

This study revealed that the evaluation of the learning process, the evaluation of learning success, and the self-direction skills of learning attitudes all together explained 20% of the intrinsic motivations of participating learners in massive open online environments. While research on self-directed learning skills predicting intrinsic motivation levels in flexible and distance learning environments such as massive open online environments was not found in the literature, three studies on the important effects of motivation on self-directed learning were found: Doo, Zhu, and Bonk (2023), Zhu and Doo (2022), and Bodkyn and Stevens (2015).

Doo, Zhu, and Bonk (2023) conducted a meta-analysis study to examine the effect of three dimensions of self-directed learning (motivation, self-monitoring and self-management) on the learning outcomes of students participating in MOOCs. As a result of the research, it was determined that the three dimensions of self-directed learning had a moderate effect on the learning outcomes of students participating in MOOCs. Zhu and Doo (2022) studied the relationships between motivation towards learning, self-supervision, self-direction and learning strategies in massive open online courses of students registered in a physiology course at Duke University on Coursera, an English course in Arizona State University, and a mathematics course on FutureLearn by the Davidson Science Education Institute in Israel. They found that the motivation levels of students positively influenced their self-directed learning skills (self-supervision, self-direction, and learning strategies). In order to analyze the effects of self-directed learning and intrinsic motivation on student performance, Bodkyn and Stevens (2015) conducted research on 485 students studying medicine at the West Indies University Health Sciences Faculty and found that intrinsic motivation and self-directed learning have important positive effects on student performance.

Within the scope of this study, the ability for self-directed learning skills to predict intrinsic motivation levels were analyzed and these skills were found to predict intrinsic motivation levels in massive open online course environments, as self-directed learning skills (Kuo et al. 2014) and intrinsic motivation levels (Hartnett, 2016) need to be higher compared to face-to-face learning environments. This is supported by the conclusions of Zhu and Doo (2022) that intrinsic motivation and self-directed learning have an important positive effect on student performance along with the findings of Bodkyn and Stevens (2015) in face-to-face learning environments.

RECOMMENDATIONS

Considering the relationships revealed between the intrinsic motivation levels and technology competences along with the relationships between the self-directed learning levels and technology competences of the learners participating in the study, participation in activities such as courses, seminars and symposiums to increase technology competence may be recommended.

The finding of a medium-level positive relationship between the self-directed learning levels and intrinsic motivation levels of learners participating in the study, along with the conclusion that their self-directed learning skills influence their intrinsic motivation levels, results in the recommendation that learners are openly presented learning analytics for constant feedback regarding their learning stages in massive open online environments so they evaluate their learning processes and achievements to increase their self-directed learning skills.

A better understanding and further findings regarding the intrinsic motivations and self-directed learning of learners in massive open online environments may build upon the findings of this study through the design and execution of further research using qualitative and mixed methods.

Further research comparing intrinsic motivation levels and self-directed learning levels of learners may be conducted with more demographic data of learners participating in massive open online environments.

LIMITATIONS

There are various limitations of this study. The data obtained within the scope of this research are limited to the data collected using the "Self-Directed Learning Levels Scale" developed by Ayyıldız and Tarhan (2015) and the "Intrinsic Motivation Levels Scale" developed by Fırat, Kılınç and Yüzer (2018). The research data consisting only of data obtained from these scales may be considered a limitation of the study. Supporting data from qualitative data collection tools may enrich the findings of this study. The research is limited to 295 learners who participated in at least 1 course of Anadolu University's massive open online course platform Akadema. It may be important to compare the data obtained solely from the Akadema MOOC platform with other MOOC platforms such as Coursera, EdX, and FutureLearn.

COMPETING INTERESTS

The authors have no competing interests to declare.

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