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WHAT MAKES STUDENTS SUCCESSFUL IN ONLINE LEARNING? A CORRELATIONAL STUDY OF SATISFACTION, SELF-REGULATION, AND GRIT

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Abstract
As a result of the spread of Covid-19, online learning is fast expanding in popularity throughout the world. To ensure that the learning process is effective, teachers must be aware of the personal factors that are associated with academic achievement. According to some theories, qualities such as learning satisfaction, self-regulated learning, and grit are all significant predictor variables of academic achievement in online learning. Among other things, the goal of this research is to ascertain the correlation between these three factors and academic achievement, identify their combined influence, and determine the extent to which each factor contributes to academic achievement. This study employs a quantitative methodology, employing a non-experimental correlation design with 153 students. Data on learning satisfaction, self-regulated learning, and grit were collected via a questionnaire survey, whereas data on learning outcomes were gathered from the results of the final semester exam. The collected data were then processed using multiple regression analysis statistical techniques. The findings of this study indicate that only learning satisfaction is strongly correlated with learning outcomes, that the three predictor factors together have little effect on learning outcomes, and that only learning satisfaction variables contribute the most to learning outcomes. This research uses a convenience sampling technique because the constraints on the researchers' available time and resources. Therefore, future research should use more survey participants in order to achieve more robust inferences.

Keywords: grit, learning achievement, learning satisfaction, self-regulated learning

Introduction

The COVID-19 pandemic marked a significant transformation in the world of education. One example is the widespread adoption of online learning, replacing face-to-face learning. Online learning systems pose challenges for educational institutions. Sen-akbulut et al. (2022) found that several educational institutions, still inexperienced in implementing this mode, were busy adapting, such as adjusting curricula, learning tools, assessment and evaluation instruments, rescheduling classroom learning, teacher training, etc. It is reinforced by other studies that state that online learning requires thorough preparation and familiarization, at least familiarizing students with digital learning platforms and different learning schedules than before. Thus, besides preparing reliable technological infrastructure, online learning also presents challenges in aspects of learning design, readiness of learning personnel, and so on.

In addition to aspects related to curriculum restructuring and the learning environment, an important aspect often overlooked when considering online learning is students' internal conditions or factors, which are strongly relevant to online learning outcomes. According to Jansen et al. (2020), online learning provides students with complete learning autonomy, so learning outcomes are primarily determined by their willingness and independence. Several studies also report on key internal factors to online learning success (Abubakari, Nurkhamid, & Priyanto, 2022). The Self-Determination Theory perspective states that students' motivation and learning

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engagement increase when they experience learning satisfaction (Ryan & Deci, 2000). In their article, Wu et al., (2015) reported that they surveyed 547 students and found a significant relationship between satisfaction and students' desire to continue their studies. In fact, learning satisfaction has long been recognised as a determining factor for students in deciding whether or not to drop out of online learning. Fredericksen et al. (2000) observed a significant difference in the level of learning satisfaction between the two, even though they were in the same class and subject. Several researchers have suggested that students should experience learning satisfaction both during and after learning. Finally, online learning administrators are expected to continue innovating to improve student learning satisfaction, as this significantly impacts their attitudes toward the effectiveness of online learning.

Online learning requires students to be proactive and independent learners, which is a fundamental difference from traditional classroom settings where the teacher often takes the lead. This independence is crucial for e-learners, who must navigate and manage their learning processes without the constant physical presence of instructors. Moreover, online learning is typically structured within a computer-based learning environment (CBLE), which often presents information in a multimedia format and utilizes a non-linear, sometimes disorganized approach to content delivery. Gerjets et al. (2008) emphasized that this nonlinearity requires students to exercise more control over their learning, selecting and processing information based on their needs. As a result, students are expected to employ self-regulated learning (SRL) strategies, such as goal-setting, time management, and self-monitoring, when engaging with these environments. The application of SRL in online learning is critical, as it enables students to manage their own learning effectively in a flexible yet potentially isolating. SRL strategies are essential skills for students navigating online learning. Adequate SRL skills are a crucial foundation for maintaining attention, engagement, and responsibility for learning, given that they have complete control over their learning.

Empirical research results show that students' self-regulated learning strategies play an important role in their academic achievement. The theory of self-regulated learning implies that learners must have certain self-regulatory attributes to succeed in their learning environment (Zimmerman, 2010). As e-learners, they often experience a sense of isolation because there is no interaction with lecturers and other students. Consequently, to be successful in learning, they rely on individual abilities to regulate their learning, because self-regulation is one of the important predictors of the grit aspect in online learning. Broadbent & Poon (2015) observed that students with effective SRL strategies were able to understand the structure and methodology of a science, making it easier for them to understand the material they were studying. Thus, self-regulated learning is an important predictor in the online learning environment.

One of the advantages of online learning is that it offers a wide range of flexibility and convenience, making it particularly suitable for busy students with their work and family responsibilities. However, one of the classic problems of online learning is the dropout problem by students, namely the failure of students to complete their studies or study programs. According to several studies, the dropout rate of online learning is higher than traditional learning (Levy, 2007; Muljana & Luo, 2019). Many online institutions are challenged to retain their students beyond the first few courses, even in the earlier stages of their semester of study. Many studies have examined the factors that cause dropout among college students. Based on the report by Duckworth & Quinn (2009), the leading cause is a lack of perseverance or grit among today's students.

The study of persistence as a predictor of academic achievement became an attraction for psychologists in the second half of the 20th century. Duckworth et al. (2007) define grit as a level of persistence and passion for achieving long-term goals and is a predictor that determines

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achievement in various challenges. In their view, achievement is a product of talent and effort, and effort is a function of the intensity, direction, and duration of exertion towards a goal. In other words, an individual must always be able to use his talents continuously to achieve a high achievement. The statement of Duckworth et al. is confirmed by Morris et al. (2005), which says that there is a significant difference between students who complete and those who do not complete their studies in terms of the frequency and amount of time spent in their online learning activities. Moreover, Balke (2021)mentions grit as the main key in online learning. Those study on grit suggests that online learning requires a strong will to follow the learning process from its participants. Grit reflects the internal motivation that differentiates those who merely participate from those who are deeply dedicated to the learning process.

Although several research results have tested these three constructs (satisfaction, self-regulated learning, and grit), either individually or in pairs with other constructs. However, our literature review found no studies that have tested the combination of these three variables on learning outcomes. The study aims to determine the correlation between the variables of satisfaction, self-regulated learning, and grit, and their impact on learning achievement. It also seeks to assess the effect of these three predictor variables simultaneously on learning outcomes and identify which predictor variables contribute most strongly to student learning outcomes. The study seeks to broaden insights and identify factors essential to optimal student achievement in online learning. Furthermore, this research has practical implications for structuring students' internal factors before instructors manage the external factors essential to online learning.

Literature Review

Learning satisfaction

Satisfaction is an intangible and abstract feeling. Learning satisfaction refers to a positive feeling resulting from a learning process that has met learners' initial expectations. They can feel satisfied when they believe that learning activities meet or exceed their expectations; conversely, when these activities do not meet expectations, they feel dissatisfied (Lee et al., 2021). As a positive psychological state, online learning satisfaction encompasses the entire online learning process, beginning with expectations and evolving through the comparison of those expectations and outcomes. Online learning satisfaction can enhance learning and maintain interest in learning. Online learning satisfaction is influenced by various factors, including students' intellectual development, learning motivation, and emotional growth, all of which positively affect their learning satisfaction (Choe et al., 2019). In short, interaction in online learning is a key requirement for student satisfaction. She, Ma, Jan, Sharif Nia, & Rahmatpour (2021) reported that student learning satisfaction during COVID-19 was determined by positive interaction and engagement between teachers and students during the learning process. However, other technical factors, such as internet quality, online learning platform performance, and learning design, also influence satisfaction (Ho, Cheong, & Weldon, 2021). Therefore, this study aims to reveal the extent to which students' learning satisfaction contributes to their learning achievement.

Self-Regulated Learning

Self-regulated learning (SRL), has become essential for academic achievement in online education. At its core, SRL involves learners setting their own goals, monitoring their understanding, managing their time, and exercising self-discipline—skills that have been emphasized in educational research, notably by (Zimmerman, 2010). The shift to online learning

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during the COVID-19 pandemic threw students into environments where independent learning is not just helpful; it is necessary. With instructors much less present, students need to take charge of their own learning processes. Growing evidence confirms that students who develop and apply SRL strategies tend to perform better academically in online courses. There is not a single formula for success, but it is clear that SRL is a foundational component of effective online learning.

Self-regulated learning (SRL) involves a variety of complementary strategies to enhance the success of online learning. Setting clear goals and structuring the learning environment are crucial, as they help students become more directed and focused. Studies on university students in Thailand show that these two aspects are positively correlated with learning outcomes (Kanoksilapatham, 2023). Furthermore, self-directed learning (SDL)—as part of SRL—has a moderate effect on online learning achievement; motivation and self-monitoring are more dominant than self-management, indicating the importance of active student engagement in monitoring progress and maintaining motivation (Doo & Zhu, 2023). From a control value theory perspective, cognitive, motivational, and perceived control factors influence SRL, while effective feedback and an interactive learning environment support interpersonal communication and learning autonomy (Dong et al., 2023). Time management strategies and metacognition have also been shown to be positively correlated with academic outcomes because they enable planning, monitoring, and evaluation of the learning process (Broadbent & Poon, 2015). Research on SRL profiles indicates a variety of skills—from super self-regulators to minimal self-regulators—that explain differences in academic success levels among learners (Barnard-Brak, Paton, & Lan, 2010).

Grit

Grit, which consists of consistent interest and persistent effort, plays a crucial role in academic success in online higher education. While consistent interest does not directly impact academic performance, it has been shown to predict exam effort and academic progress. Students with consistent interest tend to be more engaged in their studies and persist in their learning efforts (Neroni, Meijs, Kirschner, Xu, & de Groot, 2022). Persistence of effort, as a component of grit, is closely related to self-regulated learning strategies, which are crucial for success in online education. It suggests that persistent effort influences engagement in self-regulated learning, which in turn plays a role in academic achievement (Wolters & Hussain, 2015).

Furthermore, the adaptability associated with grit positively impacts academic resilience, which includes the ability to overcome daily academic challenges, especially in the demanding context of online learning that requires self-motivation without the physical support of a classroom (Montano, 2023). Grit also acts as a mediator that increases student engagement in learning, ultimately leading to better academic outcomes (Hodge, Wright, & Bennett, 2018). Finally, longitudinal studies have shown that grit developed over time can improve academic performance, with students who exhibit higher levels of grit tending to maintain better academic performance, indicating the importance of developing grit early for sustained academic success, particularly in the dynamic and self-paced nature of online learning (Postigo, Cuesta, Fernández-Alonso, García-Cueto, & Muñiz, 2021).

Methodology

Research design and approach of the study

This study aims to determine whether the predictor variables contribute to predicting the criterion variable or not. This study uses a quantitative approach, non-experimental correlation design to examine the relationship between predictor variables such as satisfaction, self-regulation

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learning, grit, and the criterion variable is learning achievement. A quantitative approach is appropriate since the study examines psychological attributes—learning satisfaction, self-regulated learning, and grit—that cannot be ethically manipulated but can be measured and analyzed numerically. The correlational design is suitable for exploring the degree of association among these predictors and learning achievement, as well as determining their unique and combined contributions through multiple regression analysis. It ensures the chosen design aligns with the study's purpose, which is to evaluate how personal factors influence students' academic outcomes in online learning.

Research site and participants

A convenience sampling method, non-probability, was used to determine 153 fourth semester students of the Tafsir Tarbawi course at the Islamic Religious Education Study Program, the Universitas Islam Malang and Universitas Islam Negeri Maulana Malik Ibrahim Malang, as participants in this study. A convenience sampling method, a form of non-probability sampling, was employed to recruit participants in this study. This approach was chosen because the researchers had direct access to the target population and limited time and resources to reach a broader sample, which makes convenience sampling both practical and widely used in educational research (Creswell & Creswell, 2018; Etikan, 2016). The participants came from four classes, as many as 40 participants (14 men and 26 women) from class A, as many as 44 participants (20 men and 24 women) from class B, as many as 32 participants (6 men and 26 women) from class C, and 37 participants (17 men and 20 women) from class D. Participants in this study were selected based on their participation in the fourth-semester Tafsir Tarbawi course. It is assumed that students have similar characteristics. This homogeneity was considered to mitigate research bias further.

Table 1. *Demographic Information of Study Participants*

Variables	Category	n	%
Gender	Male	57	37.25%
	Female	96	62.75%
Class Distribution	Class A	40	26.14%
	Class B	44	28.76%
	Class C	32	20.91%
	Class D	37	24.18%
Age	Mean (SD)	20 (±0.8)	—
	Range	19–21 years	—

The students involved in this study were in their fourth semester taking the Tafsir Tarbawi course in the Islamic Religious Education study program, and their ages ranged from 19 to 21. Given the similarities in all three aspects (semester, course, study program, and age range), it was expected that the distribution of participants would not be too large, thus maintaining the assumption of homogeneity.

Data collection and analysis

We collected all data by surveying students using a questionnaire throughout the even semester of the 2023/2024 school year. The SOL-Q (Jansen et al., 2016) scale is used to measure the level of self-regulated learning in students in online learning, Grit-S (Duckworth & Quinn, 2009) scale is used to measure persistence and passion for long-term goals, SOLIE (Davis, 2014)

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scale is used to measure satisfaction in online learning. Before distributing the three questionnaires to participants, the researchers conducted a translation process, given that all questionnaires were in English. Fellow lecturers from the English study program then validated the translated results. After receiving recommendations and making revisions, the questionnaires were piloted on a small group of 33 students who were not part of the study but had similar characteristics to ensure the instrument's reliability.

To test the validity of the learning outcomes of the Tafsir Tarbawi course, the lecturer developed 20 multiple-choice questions to measure understanding. These questions underwent construct and content validity tests through expert review and were then revised. The reliability of the questions was then tested by distributing the questions to a small group of students outside the study participants.

Satisfaction of Online Learning Instrument Effectiveness (SOLIE)

The SOLIE scale is used to measure satisfaction in online learning. It has eight subscales, namely effectiveness of the feedback, timeline of the feedback, use of discussion boards, dialogue between instructors and students, perceptions of online experiences, instructor characteristics, the feel of a learning community, and computer-mediated communication (Davis, 2014). The instrument consists of twenty-four items. The students were required to answer several question items, such as, "I am satisfied with the online learning experience because effective feedback on class assignments is always given in terms of how to correct problems that are not correct in the assignment," and "I am satisfied with the online learning experience because I able to communicate effectively with my instructor for a full semester" using a 5-point, Likert-type scale that ranges from (1) strongly disagree to (2) strongly agree. This instrument has a high level of internal consistency with Cronbach's alpha coefficient above .98 on each of the scales and for the entire instrument.

The Self-regulated Online Learning questionnaire (SOL-Q)

The SOL-Q scale is used to measure the level of self-regulated learning in students in online learning, emphasizing subscale constructs of metacognitive skills, environmental structuring, help-seeking, time management, and persistence (Jansen et al., 2016). This instrument consists of 36 items. Students are required to answer several questions, such as "I think about what I should study before starting an assignment in this online course," and "I am persistent in getting help from the instructor of this online course," using a 7-point Likert-type scale. The scale ranges from (1) not at all true for me to (7) very true for me. This instrument has an internal consistency level ranging from = .68 to = .91 for each scale.

Short Grit Scale (Grit–S)

The Grit-S scale is used to measure persistence and passion for long-term goals. It consists of two subscales: consistency of interest and persistence of effort (Duckworth & Quinn, 2009). This instrument consists of 8 items. Students were expected to answer several question items, such as "setbacks don't discourage me," and "I often set one goal but then choose to pursue another goal," using a 5-point, Likert-type scale that ranges from (1) not at all like me to (5) very much like me. Both subscales show a sufficient level of internal consistency and a very strong correlation with each other, $r = .59$, $p < .001$.

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Data analysis

The statistical analysis method used in this study is simultaneous multiple regression. This technique was used because the researcher wanted to examine the relationship between the predictor variables and criterion variable. In addition, it determine which predictor variables contributed significantly to the multiple regression model formed by comparing two or more independent variables to ensure the predictive power of each variable (Hair, Black, Babin, Anderson, & Tatham, 2019). Researchers tested the research data using the SPSS 25 application program. Figure 1 describes the data analysis steps.

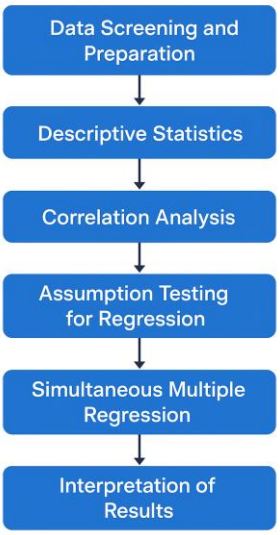

Figure 1. *Data analysis steps* (Hair et al., 2019).

After the researchers obtained data from the questionnaire, they conducted a series of data processing steps before concluding. The first stage is Data Screening and Preparation. In this stage, the researchers tested the dataset for missing values, outliers, and normality. The second stage is Descriptive Statistics. In this stage, the researchers determined the central tendency values (e.g., means, standard deviations, etc.) of all variable distributions to determine the characteristics of the data and ensure there were no outliers that could impact the analysis results. The third stage is Correlation Analysis. In this stage, the researchers calculated the correlation coefficient to determine the bivariate relationship between the predictor and criterion variables, testing for issues of multicollinearity. The fourth stage is Regression Assumption Testing. In this stage, the researchers first tested for linearity, homoscedasticity, and multicollinearity as requirements for conducting multiple regression analysis. The fifth stage is Simultaneous Multiple Regression. At this stage, researchers enter all variables into the regression model simultaneously to obtain R2 values, beta coefficients, and significance values. These results explain the contribution of each predictor variable to the criterion variable and the proportion of variance it explains. Finally, the Interpretation of Results stage. At this stage, researchers interpret the regression output to determine which predictor variables have a dominant influence on the criterion variable and to assess the magnitude of the correlation between the predictor variables and the criterion variable, both individually and collectively.

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Results

Descriptive statistic

The analysis process starts from descriptive statistical analysis for the four variables described in Table 2. Note that N is 153 because five participants had one missing score on one or more variables. The average value for student learning achievement is 77.72, satisfaction is 3.34, self-regulated learning is 5.25, and grit is 3.44.

Table 2. *Descriptive statistic*

	Mean	Std. Deviation	N
Learning Achievement	77.72	8.924	153
Satisfaction	3.3421	.73439	153
Self-Regulated Learning	5.2562	.71385	153
Grit	3.4384	.49428	153

Correlation between each predictor variable and the student learning achievement variable

The subsequent analysis is the correlation analysis between each predictor variable and the student learning achievement variable in Table 3, described in this paragraph. Based on the table, the correlation between learning achievement and satisfaction is 0.024. Because the value is lower than 0.05, there is a significant correlation between the two variables. The correlation between learning achievement and self-regulated learning is 0.307. Because the value is greater than 0.05, there is no significant correlation between the two variables. The correlation between learning achievement and grit is 0.390. Because the value is greater than 0.05, there is no significant correlation between the two variables.

Table 3. *Correlation between each predictor variable and the student learning achievement variable*

		Learning Achievement	Satisfaction	Self-Regulated Learning	Grit
Pearson Correlation	Learning Achievement	1.000	-.239	-.062	-.034
	Satisfaction	-.239	1.000	-.058	-.049
	Self-Regulated Learning	-.062	-.058	1.000	.174
	Grit	-.034	-.049	.174	1.000
Sig. (1-tailed)	Learning Achievement	.	.024	.307	.390
	Satisfaction	.024	.	.319	.343
	Self-Regulated Learning	.307	.319	.	.076
	Grit	.390	.343	.076	.

The effect of satisfaction, self-regulated learning, and grit simultaneously on learning achievement

The subsequent analysis is to determine how far the influence of the variables of satisfaction, self-regulated learning, and grit simultaneously on learning achievement. In Table 4 (in column Sig), it can be seen that the value of F = 1.478 and the significance value of 0.229, which means p

> 0.05. It shows that the three predictors together have no significant effect on learning achievement.

Table 4. *The effect of satisfaction, self-regulated learning, and grit simultaneously on learning achievement*

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	345.913	3	115.304	1.478	.229b
Residual	5069.855	65	77.998		
Total	5415.768	68			

The contribution of individual satisfaction, self-regulated learning, and grit uniquely to learning achievement

The subsequent analysis is to determine the contribution of individual satisfaction, self-regulated learning, and grit variables to learning achievement. In Table 5 in the Standardized Coefficients Beta column, it can be seen that the satisfaction variable has the highest value (-0.245) and has a significance value of 0.046, which means $p < 0.05$, which means it is the predictor variable that has the most significant effect on learning achievement, as well as self-regulated learning, and grit, respectively. However, the last two variables have no significant effect on learning achievement.

Table 5. *The contribution of satisfaction, self-regulated learning, and grit uniquely to learning achievement*

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	94.372	11.518		8.194	.000
Satisfaction	-2.971	1.462	-.245	-2.032	.046
Self-Regulated Learning	-.873	1.525	-.070	-.573	.569
Grit	-.619	2.202	-.034	-.281	.780

Discussion

This study provides information on how strong the relationship is between several predictor variables (satisfaction, self-regulated learning, and grit) with learning achievement variables. In addition, the most important thing is that the results of this study produce a model that can provide information about several important predictor variables that affect student learning achievement in online learning. Understanding the important factors that can predict student learning success in online courses has significant implications for online designers and educators.

Based on the results of the correlation analysis described above, it can be seen that the satisfaction variable is significantly correlated with learning achievement. However, the correlation value obtained is relatively small. The results of this study are also strengthened by the results of studies from (Khiat, 2013) which examined the relationship between academic achievement and learning satisfaction of non-traditional students. According to Khiat, non-traditional students do not feel the satisfaction of learning from good academic results because academic activities are very competitive and stressful businesses, so they do not get comfortable with their activities. Even Khan & Iqbal (2016) reported that learning satisfaction was not correlated with student learning outcomes. They both argue that an important factor in online learning satisfaction is the

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characteristics of the students, maybe because the lack of interaction between students and instructors creates a bad perception in the minds of students, especially for those who are just getting to know the learning process in distance learning programs.

The correlation between self-regulated learning variables and learning achievement is not significant. This study certainly contradicts the results of other relevant studies (see Barak et al., 2016; Cho & Shen, 2013; Renée S Jansen et al., 2019; Yamada et al., 2017). However, the results of this study are in line with the results of a meta-analysis study by Broadbent & Poon (2015), which reported that of the nine self-regulated learning strategies investigated by online learners in universities: metacognition, time management, effort regulation, peer learning, elaboration, rehearsal, organisation, critical thinking, and help-seeking, only metacognition, time management, effort regulation, and critical thinking were significantly correlated although weakly with learning outcomes, with a correlation (r) ranging from 0.05 to 0.14. Regarding the results of the correlation between these two variables can be explained by several arguments. First, the influence of these strategies (and indeed all self-regulated learning strategies) is eroded in the online learning environment because the self-regulated learning strategies themselves were originally developed on traditional face-to-face learning models, which are very different from online learning. Cetin (2020) also highlights that too many factors in this construct make the correlation between self-regulated learning and learning outcomes insignificant. Second, we should not assume that online learning alone enhances the use and development of self-regulated learning strategies among learners. Nor do we assume that changing the design of traditional teaching materials to an online teaching environment will always produce the same learning outcomes. Lecturers should be able to take advantage of all the advantages of an online learning environment, such as flexibility, simplification, efficiency, to design and develop an online learning environment to improve students' self-regulated learning abilities.

The relationship between the grit variable and learning achievement is also not significantly correlated. Although the results of this study contradict the results of other similar studies, the same results as this study were also obtained from several other studies (Fox, Barrerra, Campos, & Reid-Metoyer, 2019). This result is not surprising when considering the context in which this study was conducted, as the students' dropout rate is higher in the online learning model compared to the face-to-face learning model (Stephen, Rockinson-Szapkiw, & Dubay, 2020). Students tend to work individually in online learning, especially if the interaction between students and lecturers is not intensive. According to Stekel & Tobias (1977), grit and learning outcomes are not correlated in the context of individual learning. This study is also in line with the results of a study by Palisoc et al. (2017), who reported no significant correlation between grit and academic success. However, students who have high scores on the grit aspect have a great opportunity to continue their studies to a higher level.

The results of this study indicate that the combination of the variables of satisfaction, self-regulated learning, and grit could not predict student learning achievement because the model did not significantly affect learning achievement. This result may feel counterintuitive when compared with the results of previous studies. However, Elumalai et al. (2019) state that administrative support, lecture content, lecture design, instructor characteristics, learner characteristics, social support, and technological support are important factors that need to be considered in designing and developing online learning to improve academic achievement. Moreover, if we pay attention to the partial analysis results of the effect of the three predictor variables on learning achievement, this will make more sense.

Testing for the B coefficient on all predictors shows a negative value, with only the satisfaction variable significantly influencing learning achievement. It can be interpreted that when students are satisfied with online learning, they still get low learning achievement and vice versa.

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Some research results may explain it. Considering that this study was conducted during emergency remote teaching (Kawasaki et al., 2021). Hashemi (2021) explained that the majority of students prefer face-to-face learning to online learning so that this harms their learning satisfaction and academic achievement. Moreover, this study was carried out on lecture activities carried out in full through the Zoom application.

A more detailed examination of the question items on the instruments used in this study can also explain the results of this study. In the instrument, three questions (item numbers 4, 5, and 6) emphasize feedback on student work or assignments that are always given by the lecturer promptly. Given the characteristics of online learning, which relies heavily on learning resources and infrastructure, especially internet signals, some students can receive feedback promptly, but not for some students in areas with limited internet access. The findings of Elshami et al. (2021) also stated that timely feedback is very important to increase student learning satisfaction. However, technical problems can reduce their level of learning satisfaction. Other factors that cause dissatisfaction with online learning are limited internet access and lecturers' lack of care and guidance (Surahman & Sulthoni, 2020). In general, teachers have difficulties building relationships and communication with students during the distance learning process (Akar & Erden, 2021). Lwin et al., (2022) concluded that the main challenge of online learning is accessibility and the support service factor occupies the fifth position of the challenge of online learning.

The test for the B coefficient on the predictor of self-regulated learning shows a negative value and does not significantly affect learning achievement. In other words, the higher the self-regulated learning aspect possessed by students, the lower their academic achievement. However, this inference is rare in real life because it is very contrary to logic, especially since the resulting coefficient value is very small and the test results are insignificant (Huck, 2012). Why did this result occur? Stephen et al. (2020) argue that some items on the environment subscale can be used as an excuse. Jansen et al. (2016) included several question items in this construct regarding the learner's ability to choose an online learning location that is comfortable and away from distractions. Even though they know how and where is the ideal place for them to study (Kulusakli, 2022), this does not mean that they can easily access this environment. Geographical factors where students live also affect the comfort of their learning because it is very dependent on internet access. In addition, the negative impact of participating in online learning for too long makes students often feel isolated and lonely, which affects their academic achievement (Johnson, 2005). Cetin (2020) also states that factors such as intelligence, reasoning skills, attitude, and study habits have a greater impact on learning achievement than self-regulated learning alone.

The test for the B coefficient on the grit predictor also shows a negative value and does not significantly affect learning achievement. Of course, the results of this test are also very contrary to the results of many other studies with different results. However, Steinmayr et al. (2018) revealed that based on empirical evidence, the effect of grit on achievement is inconsistent or rare, especially when it comes to academic achievement. The effect of grit on academic performance ranges from weak to moderate (Tang, Wang, Parada, & Salmela-Aro, 2021). Furthermore, Tang et al. explained that many other studies found a weak relationship between grit and academic achievement. However, the combination of grit and academic goal commitment affected academic achievement even though this combination was unpopular, unstable, and influenced by internal and external factors. These internal factors are related to personal aspects such as extraversion, agreeableness, conscientiousness, openness, neuroticism or better known as The Big Five personality factors (Rimfeld, Kovas, Dale, & Plomin, 2016). According to Rimfeld et al., The Big Five personality factors can explain 6% of the variance of academic achievement. Meanwhile, grit can only explain 0.5% of the variance of academic achievement. These findings suggest that grit contributes little to the prediction of academic achievement when other personality factors are controlled.

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Regarding the results of this study, Credé et al. (2017) argue that several theoretically plausible moderators could explain the weak relationship between grit and performance in almost a variety of contexts. First, Macnamara et al. (2014) explained that a high level of grit would be very useful when an individual faces a difficult but well-defined task, and is not a relatively easy or new task, and is ill-defined. In other words, continuous effort is required for success, and achieving that success is relatively clear. However, if the task at hand is relatively easy (thus requiring no grit) or the task is new and ill-defined, grit is not a predictor of individual success in doing something. This argument is very relevant to the context of this study. This study was conducted at the beginner level Tarbawi interpretation course. For students who graduate from Islamic boarding schools or Madrasah Aliyah (MA), this course may seem relatively easy, because in general, they already have initial knowledge of the material. However, for students who are not graduates from Islamic boarding schools (high school graduates or the equivalent) or do not have prior knowledge, this course is difficult because they are generally not familiar with the material. Thus, the level of task difficulty can moderate the effect of grit on academic achievement.

Second, the relationship between grit and performance can be moderated by other individual differences such as ability (cognitive, metacognitive, affective, psychomotor, Etc.) and problem-solving skills. A high level of grit may not always be adaptive if it is not accompanied by potential or general abilities in a domain as well as the ability to organize, monitor, and reflect on oneself (Zimmerman, 2010), the ability to initiate, plan, implement, and evaluate a job, also the ability to learn from the social environment (Bandura, 1986). Rovai (2003) also said that online learners' needs, skills, and characteristics are central to grit. In the context of this study, it is possible for students who come from pesantren or MA graduates to be familiar with the Tarbawi interpretation course material beforehand so that their metacognitive abilities have been formed. However, for those from public schools, their metacognitive abilities have not yet been formed because they are still busy recognizing and understanding new material.

Third, although the ability to seek help is an important factor for the construct of self-regulated learning (Pintrich, & Karabenick, 2006), a high level of grit can be dysfunctional when it makes a person reluctant to ask for help others when facing difficulties because help-seeking behaviour is closely related to academic success (Qayyum, 2018). In addition, individuals with high grit levels try to be more persistent than their peers when they want to find solutions to unsolved problems, thus sacrificing other tasks(Lucas, Gratch, Cheng, & Marsella, 2015). This evidence points to the 'dark side' of grit. In the context of this study, it is possible that students who come from pesantren or MA graduates already have prior knowledge so that it is easier to absorb the material being taught. It makes them too confident, so they are reluctant to ask friends and lecturers to do relatively more difficult tasks.

Conclusion and recommendations/implications

The results of this study yielded surprising facts, as some contradicted the proposed literature review. First, of the three proposed predictor variables, only one variable had a significant relationship with the learning achievement variable, namely satisfaction. Second, none of the three proposed predictor variables had a simultaneous effect on the learning achievement variable. Finally, of the three proposed predictors, only satisfaction had a significant effect on the learning achievement variable individually. This study generally breaks the theories from the results of other studies that we have used as references for a long time. Many studies have proven the effectiveness of the predictor variables of satisfaction, self-regulated learning, and grit in predicting learning achievement in online learning, but this study produces different conclusions. The combination of the three predictors did not significantly affect student learning outcomes. However, only the

satisfaction variable contributes significantly to learning achievement. Although this result is shocking if we refer to the results of studies on the efficacy of these three predictors on learning achievement, scientific arguments can answer this phenomenon. The results of this study are not too surprising if we refer to the current world conditions which are being hit by a prolonged pandemic. This pandemic creates a new learning concept experienced by most educational institutions in the world today. Experts call it emergency remote teaching. In this emergency remote teaching, the learning process is not designed, developed, implemented, and evaluated carefully. In addition, the inhibiting factors on the part of the students also contributed to the results of this study. So important factors in online learning, such as the three predictors, are not correlated and significantly affect student learning achievement.

This work has relevance to various stakeholders. For future research, the results imply the necessity of probing into other determinants—digital literacy, access to learning environments, and social support—using larger and more diverse samples or longitudinal studies. For the teachers, and especially for lecturers and instructional designers, this suggests (1) the importance of creating satisfaction among students by providing timely responses, accessible resources, and interactive activities; (2) continuing to develop self-regulation competence and grit as lifelong learning skills. The study recommends that policymakers and administrators at all levels enhance digital infrastructure by focusing on faculty training in online pedagogy and making access to electronic resources affordable. Collectively, these implications show that improving online learning outcomes requires shared responsibility among researchers, educators, and institutions.

Disclosure statement

This research is entirely my own and my colleagues' own. It was conducted during the COVID-19 pandemic, when learning was implemented proactively. Some sections of this article are taken from AI-generated text platforms, but have been paraphrased and rewritten.

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