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Correlation of Self-regulated Learning on Blackboard and Academic Achievement of Islamic Studies Students

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Abstract. Focusing on learners' active roles has brought Self-regulated Learning (SRL) to attention. Since its introduction in the mid-eighties, research has discussed several models and conceptual frameworks pertaining to SRL. Yet, more studies are required to explain how students achieve SRL and how it associates with academic achievement. Additionally, the potential of modern learning tools such as the Blackboard Learning Management System LMS and their role in promoting SRL are highly valued. To this end, the current study adopted a 27-item questionnaire based on different SRL models. It surveyed a sample of 165 students regarding their use of SRL strategies while they were engaged in online courses through Blackboard. The correlation between students' use of such strategies and their academic achievement was ultimately calculated. It was found that students with higher academic performance apply a broader range of SRL strategies. Also, a variance can be seen in the type of strategies used. These findings are traced back to the features afforded by Blackboard, which result in SRL if they are appropriately deployed. Accordingly, teachers are called to utilise LMSs to promote SRL strategies and train their students in their use. These results are considered significant as most previous research has focused on the SRL concept rather than its effect on academic achievement. However, further empirical research on LMS features and their impact on developing SRL is recommended.

Keywords: Autonomous Learning; Learner Autonomy; Learning Management Systems; Learning Strategies; Self-regulation

1. Introduction

Modern advancements in pedagogical approaches and learning environments entail competencies and skills known generally as twenty-first-century learning skills. At their utmost objective, these competencies foster lifelong learning, reinforcing the *learning-how-to-learn, personal management and well-being skills*.

Accordingly, students are expected to utilise a set of processes and skills "to initiate, sustain, and assess their learning towards goal achievement"(Gafaro, 2022, p. 64). These processes and skills are called self-regulated learning (SRL). It has been widely agreed that SRL enhances students' performance. Consequently, it has been considered "one of the ultimate goals of the educational process for a long time" (Nguyen & Thi, 2021, p. 12) that helps to support lifelong learning (Hyppönen et al., 2019).

Moreover, these transformations in the requirements of learning approaches are accompanied by a massive technological advance reflected in all aspects of life. The advent and development of e-learning have presented greater opportunities for students to perform SRL skills and practice learner autonomy. Consequently, many research studies have explored the effect of this advance in technology on students' learning practices and outcomes. Generally, it is believed that "online learning environments may be conducive to the development of this autonomy considering they provide students with access to self-directed learning" (Cárcamo & Pérez, 2022, p. 449). This is reflected in a positive impact on the students' self-regulation strategies (Al-Hawamlehet al., 2022) as well as students' higher attainment and improvement in learning skills (Albogami, 2021), combined with positive attitudes towards learning (Zhu et al., 2020).

Among the features that mark the new development of e-learning is the use of Learning Management Systems (LMSs). Existing research has found that LMSs foster learners' self-regulated learning skills (Nguyen & Thi, 2021) as they increase the frequency of behaviours related to taking charge of their own learning process (Cárcamo & Pérez, 2022), thus creating a productive learning environment (Mehmet, 2016). However, few studies investigate the correlation between these behaviours and student achievement, as most have focused on the characteristics of learners' SRL or students' perceptions of it. Accordingly, the current study attempts to explore this point by utilising a structural analysis approach that computes the correlation between SRL skills and Islamic Studies students' academic achievement reflected by their GPA. The study seeks to test the following hypotheses:
H_1. Self-organisational skills significantly correlate with higher academic achievement levels of Islamic Studies students.

H_2. Cognitive skills significantly correlate with higher academic achievement levels of Islamic Studies students.

H_3. Self-evaluation skills significantly correlate with higher academic achievement levels of Islamic Studies students.

The hypotheses are based on the assumption that SRL skills and academic achievement are associated in that the independent variables (SRL skills) affect the dependant (academic achievement). Accordingly, the study aims to explore these variables by outlining strategies that can comprise SRL over the Blackboard LMS. To achieve this, these strategies can be classified into 1) Cognitive, 2) Organizational, and 3) Self-evaluation strategies. Although no clear-cut

boundaries can be assumed between these sets of strategies, they can be adopted as a guide to building a scale to measure students' application of SRL.

1.1 Cognitive strategies:

It has been widely supported that students who self-regulate their learning know how to apply cognitive strategies. Models of SRL development are typically grounded in a social cognitive perspective (Effeneyet al., 2013), including memorisation, elaboration, rehearsal, and organisation (Zimmerman, 1989). Referring to Zimmerman and Moylan's (2009) model, cognitive strategies are deployed in the forethought phase, where students strategically plan, set their goals and analyse tasks (Vilkova, 2019). Students also apply different cognitive strategies during the performance phase to manage timing and control tasks.

1.2 Organisational strategies

Organisational strategies are interrelated strategies that can contribute to different phases of SRL. They can be considered major cognitive strategies (Pintrich, 2000). They are also required throughout the whole process of SRL as different behaviours and actions need to be organised and controlled to cope with each phase of the learning process.

1.3 Evaluation strategies

The third category of strategies is concerned with self-evaluation. This type of skill is found to be crucial in SRL (Toering, 2011), as it is continually applied to adapt to goals and set new ones. However, as with other strategies, self-evaluation overlaps with other SRL skills as it "depends on such personal processes as self-efficacy, goal setting, and knowledge or standards, as well as self-observed responses" (Zimmerman, 1989, p. 334). These skills are applied in all phases of the SRL process. Subsequently, it was found that higher-ranked students use self-evaluation strategies more effectively (Effeney et al., 2013), verifying the importance of this category.

To fulfil its aims, the paper firstly outlines the theoretical foundations of SRL and learning through LMSs and reports on the methodological approach followed. Then, the generated results will be reported, followed by a discussion of their implications and suggestions for further research. The urgency of the study topic stems from the transformation of learning and the orientation to strengthen the competencies of educational agents. The currently adopted pedagogical framework entails that "students can successfully learn with minimal direct support, supervision and micromanagement" (Mapuya, 2022, p. 65). Accordingly, students nowadays urgently need to develop robust and combined knowledge of how to be, how to do, how to act and how to live together and enhance autonomous learning (Hernández et al., 2021). These findings are assumed to be novel as using LMSs, in general, is a relatively contemporary practice, hence investigating its correlation with and impact on SRL is unprecedented and wide-ranging. Accordingly, it can contribute to developing instructional design on the Blackboard and teachers' and students' practice while using LMSs.

2. Literature Review

2.1 Self-regulated learning

Because SRL is investigated from many psychological, social, and educational perspectives, there are many definitions to it. Nevertheless, it is agreed that SRL, directly and indirectly, affects the learning process (Karaca & Bektas, 2022). At its basic level, SRL can be defined as a set of skills that enable students to be "metacognitively, motivationally, and behaviourally active participants in their own learning process" (Zimmerman, 1989, p. 329). Similarly, Pintrich (2000) defined SRL as a constructivist process whereby students first set their own goals and objectives for learning and then regulate their cognition and behaviours to control these. Yet, a more detailed definition is that it is:

> *A form of acquiring knowledge and skills in which the learners are independent and self-motivated. Learners independently choose their own goals and learning strategies that will lead to achieving those goals. It is through evaluating the effectiveness of one's learning strategies – comparing one's current state with the target state - that learning can be modified and optimised* (Goetzet al., 2013, p. 126).

As this definition suggests, the decisive factor of successful SRL lies in selecting and implementing appropriate skills that suit each stage of the learning process and further monitoring the effect of these strategies on learners' performance and adapting them when necessary. Zimmerman and Moylan (2009) suggested a cyclical model that includes introductory, performance, and reflective stages, as shown in Figure 1 below.

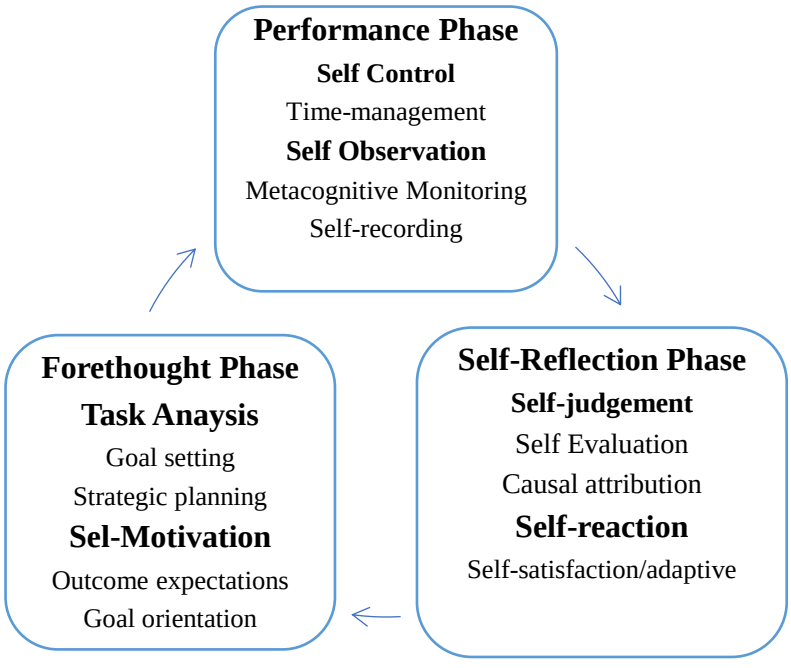

Figure 1: Zimmerman and Moylan's cyclical Model of Self-regulation,

Note. Adapted from "Self-Regulation: Where Metacognition and Motivation Intersect, "by B. Zimmerman and A. Moylan, 2009, In D. Hacker, J. Dunlosky, & A. Graesser (Eds.), Handbook of Metacognition in Education. Routledge. https://www.routledgehandbooks.com/doi/10.4324/9780203876428.ch16

According to this model, students' personal feedback informs them of how and to what extent they are achieving their learning goals. Accordingly, they can adapt their learning strategies and skills. This metacognition process incorporates two sets of activities related to learners' awareness of the cognitive strategies they should use and how to regulate these activities (Gafaro, 2022). Therefore, a repertoire of skills is needed to achieve independent goal setting and strategy selection. Some of these required competencies are suggested by Goetz et al. (2013) to confirm handling these activities. Examples of these competencies include the ability to set reasonable goals, diagnostic skills that enable the learner to monitor and evaluate attainment, and cognitive skills that reduce the gap between students' current level and the target level (Winne, 1995).

Over the past decades, many research studies have explored students' SRL utilisation. The problem, however, was the absence of an agreed-upon scale of how to measure SRL practices and skills. Yet, some attempts were made to construct a theoretical model to facilitate the design of an assessment instrument for SRL. For example, Pintrich (2000) suggested areas for SRL that are summarised in Table 1 below.

Table 1. Areas for Self-Regulated Learning

Phases	Cognition	Motivation/Affect	Behaviour	Context
Forethought planning and activation	Target goal setting. Prior content knowledge activation. Metacognitive knowledge activation.	Goal orientation adoption Efficacy judgments Ease of Learning judgements Perceptions of task difficulty Task value activation Interest activation	(Time and effort planning) (Planning for self-observations of behaviour)	(Perceptions of task) (Perceptions of context)
Monitoring	Metacognitive awareness and monitoring of cognition.	Awareness and monitoring of motivation and affect	Awareness and monitoring of effort, time use, need for help Self-observation of behaviour	Monitoring changing task and context conditions
Control	Selection and adaptation of cognitive strategies for learning, thinking	Selection and adaptation of strategies for managing motivation and affect	Increase/decrease effort Persist, give up Help-seeking behaviour	Change or renegotiate task Change or leave context
Reaction and Reflection	Cognitive judgments Attributions	Affective reactions Attributions	Choice behaviour	Evaluation of task Evaluation of context

Note. Adapted from "Multiple goals, multiple pathways: The role of goal orientation in learning and achievement," by P.Pintrich, 2000, Journal of Educational Psychology, 92(3), 544-555. http://dx.doi.org/10.1037/0022-0663.92.3.544

This model suggests four phases for regulating learning which are 1) Planning, 2) Monitoring, 3) Control, and 4) Reflection. Each of these phases includes four areas: 1) Cognition, 2) Motivation, 3) Behaviour, and 4) Context. Through these stages and enabling such activities, students are believed to plan for setting goals, monitor their performance, evaluate their achievements and adapt their goals accordingly.

Relying on similar models, researchers have attempted to compose a reliable instrument for measuring the self-regulation of learning as a disposition. For example, Toering (2011) composed a scale to measure SRL processes. His scale comprises six sub-scales: planning, self-monitoring, evaluation, reflection, effort and self-efficacy. After implementing this with a sample of 1201 participants, the confirmatory factor analysis showed that his SR scale was reliable and valid.

Another example of such an instrument is the SRL questionnaire (Oz & Sen, 2018). It is a five-construct questionnaire that incorporates 38 items. The composing factors are 1) Studying Method, 2) Self Evaluation, 3) Receiving Support, 4) Time Management and Planning, and 5) Seeking Information. Similarly, the confirmatory factor analysis conducted on a sample of 688 students supported the reliability and validity of the instrument.

Similar instruments were used to test students' perspectives, attitudes, and other related research variables. Among the earlier studies in this strand is that by Zimmerman and Pons (1990), who investigated student differences in SRL. After investigating 90 gifted students and a similar number from regular schools for their use of 14 self-regulation strategies, it was found that gifted students surpassed their counterparts in SRL strategy use. Also, it was found that 11th-grade students exceeded 8th graders, who in turn outperformed 5th graders. A more interesting result is that students who applied SRL effectively had higher verbal and mathematical efficacy and adopted more positive perceptions towards it.

Recently, many empirical studies have investigated the effect of SRL on different learning aspects. For example, Aladl and Polpol (2020) investigated the impact of SRL strategies utilising an experimental method of two 4-student groups. They found that the experimental group had developed robust creative thinking and academic self-efficacy after applying such techniques. Also, Qi (2021) explored the effect of SRL on students' reading literacy. The research sample was composed of 15-year-old students from Shanghai. The researcher measured those students' cognitive strategies (elaboration and memorisation), metacognition, and motivational beliefs. The findings showed that both elaboration and memorisation were highly correlated with the control strategy. Moreover, a positive correlation existed between motivational beliefs, cognitive strategy and metacognition.

Another study has descriptively investigated variables related to SRL, such as sources of strategies (Effeneyet al., 2013). This study found that high SRL use originated at home and from early habit-forming experiences. Teachers were also

essential for SRL strategies, especially during the first three school years. Also, the correlation between SRL and academic achievement has been investigated by many studies (e.g. Sardarehet al., 2012). The study examined 82 students' use of SRL strategies and their correlation with academic achievement. The findings revealed a strong correlation between the two variables.

Moreover, it was found that female participants outperformed males in both strategy application and academic achievement. A similar study, conducted by Hyppönen et al. (2019), examined 230 university students' self-regulation concerning their academic achievement in a Flipped classroom learning context. The study revealed that high self-regulation was related to high learning achievement. Additionally, highly self-regulating students reported high time management, low lack of regulation and low task avoidance.

Based on the above review, it can be observed that most previous literature on SRL has focused on either the taxonomy of SRL strategies or on developing tools for measuring it. These findings are insightful since they provide significant implications for teachers, course developers and learners. Nevertheless, they raise further questions related to SRL's correlation with students' academic achievement, especially in an online environment and for Islamic Studies students. LMSs provide the broad potential for employing SRL, which entails comparable research, and Islamic Studies courses are rarely studied in terms of students' behaviours while learning.

The importance of SRL has increased with modern teaching methods and styles adopting Computer-Mediated Communication (CMC) LMSs. There are two main discussion points in relation to this. First, the web-based instruction environment, likely to isolate learners, requires students to regulate their learning more effectively (Kumar et al., 2016). Second, new tools and technologies provide better features for students to use SRL strategies and hence realise an active role within their online learning environments (Avcı & Ergün, 2022).

2.2 Learning Management Systems

One of the recent significant developments in web-based teaching and learning is using less. Using such systems has made teaching and learning more effective because it primarily "promotes both synchronous and asynchronous interactions between faculty and students" (Onodipeet al., 2020, p. 4). They are also found to be "a lot more practical, exciting and innovative in higher education" (Dulkman & Ali, 2016, p. 37). Many features have been acknowledged in the previous literature as advantages of LMSs, including more significant interaction with teachers and peers, more effective course delivery, and the availability of synchronous and asynchronous communication. However, the relevant LMS characteristic of the current study is its capability to foster SRL (Dabbagh & Kitsantas, 2013; Steiner et al., 2013; Egan & Sadera, 2018; Onodipe et al., 2020). Some of the reasons to claim that LMSs promote SRL strategies lie in the features they provide to students that are relevant to strategies suggested by previous SRL conceptual models. Table 2 summarises some of these features and explains their association with SRL strategies.

Table 2. LMS Features Promoting SRL Strategies

LMS Component	LMS Feature	SRL Strategy
Collaborative & communication tools	• discussion forums • chats • wikis	• Goal setting • Time management
Content creation & delivery	• Course & assignment resources • Feedback uploads	• Tasks (rehearsal, elaboration and organisation)
Administrative tools	• administer quizzes • tracking and journaling	• Self-monitoring • Help-seeking
Assessment tools	• quiz tools • self-assessment tools	• Self-evaluation • Self-monitoring
Learning tools	• Search Features • web links	• Task strategies (rehearsal, elaboration & organisation)

Note. Adapted from "University Students' Perception on the Usefulness of Learning Management System Features in Promoting Self-Regulated Learning in Online Learning," by E. Araka, E. Maina, R. Gitonga, R. Oboko, and J. Kihoro, 2021, *International Journal of Education and Development using Information and Communication Technology*(1), p. 49, http://files.eric.ed.gov/fulltext/EJ1285531.pdf

The mentioned components and related features cover all stages and aspects of SRL, making LMS a good candidate for investigating its direct effect on students' learning practices and associated behaviours. Previously, LMS has been found to be impactful on students' motivation through self-assessment and forums (Steiner et al., 2013). It was also agreed that LMSs are significant metacognitive tools that aid students' learning performance (Dabbagh & Kitsantas, 2013). Ultimately, LMSs contribute effectively to promoting students' high academic achievements (Mehmet, 2016), though this impact is not always apparent in their information literacy (Avcı & Ergün, 2022).

The current study utilises these features as a platform to investigate students' use of SRL strategies and its effect on their academic achievement.

3. Methods

The present study adopted a descriptive design to investigate its variables. The selected design is deemed suitable since the research data is quantitative and was observed cross-sectionally.

3.1 Participants

The study sample incorporated 165 participants selected randomly from three colleges of Prince Sattam bin Abdulaziz University (PSAU), Saudi Arabia. The researcher used a stratified sampling technique to select the proper sample size. Following the method, the researcher firstly assigned three colleges where the targeted courses (Islamic Studies) are taught, and the teaching technique (Blackboard) is fully adopted. Table 3 reports the participants' statistics.

Table 3. Characteristics of the Participants

Gender	College 1	College 2	College 3	Total
Male	0	65	0	65
Female	58	0	42	100
Total	58	65	42	165

All the participants were junior or senior students majoring in Islamic Studies (no first-year students included). This standard was applied to guarantee that they have a cumulative GPA and that they had studied for at least two semesters through the Blackboard LMS during the partial or total lockdown of the COVID-19 pandemic. It was confirmed prior to the study that all the participants used the Blackboard for different learning activities. During and after the COVID-19 lockdown, PSAU university adopted a Blackboard course template for the courses, which includes modules for course content, communication, assessment, and feedback; accordingly, it is presupposed that the participants are fully aware of the strategies and skills in question.

After obtaining the necessary consent from the administration of the colleges and the participants, they were briefly informed of the purpose of the survey. They were also coached about the meanings of questionnaire constructs, i.e. cognitive, organisational, and evaluation skills.

3.2 Structural Model and Hypotheses

To set the structural model of the study, the researcher reviewed the previous literature on SRL and set the conceptual framework that learning in an online environment provides an opportunity for students to foster their SRL (Dang & Robertson, 2010). As it was hypothesised that this capability could create a good opportunity for high academic achievement, the structural model adopted a classification of the skills incorporated in different SRL models. After reviewing previous studies (e.g. Zimmerman, 1989; Winne, 1995; Sardareh et al., 2012; Effeney et al., 2013; Goetz et al., 2013;; Mehmet, 2016; Al-Hawamleh et al., 2022; Gafaro, 2022; Karaca & Bektas, 2022), the researcher grouped the necessary skills that formulate SRL over LMS into three constructs: cognitive and monitoring, organisational, and self-evaluation skills. Each of these constructs is hypothesised to contribute to raising academic achievement and thus reveal the impact of SRL on academic achievement. Finally, the structural model of the present study and its hypotheses are displayed in Figure 2 below:

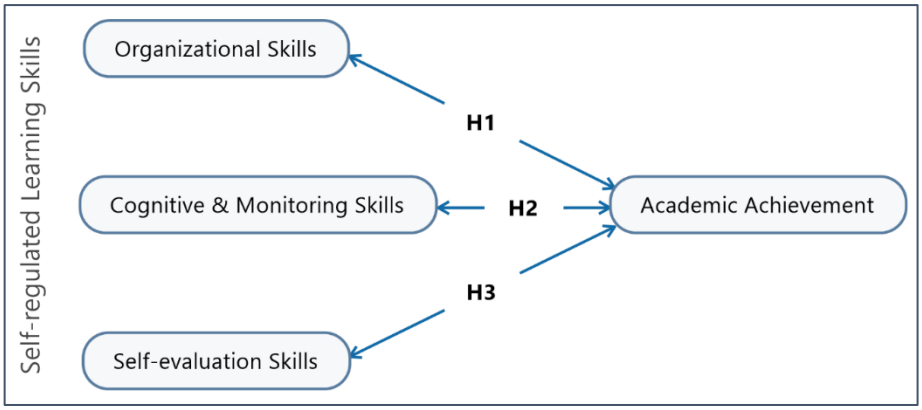

Figure 2. The Structural Model of the Study

3.3 Research Instrument

To test the study hypotheses, the researcher composed a 3-construct questionnaire incorporating 27 items (9 items for each skill category). The items were intended to measure students' practice of such skills on the Blackboard LMS. Each item

requires the respondents to describe their use of a specific skill related to a feature of the Blackboard LMS. The questions were built in a method that pertains to the Blackboard template applied in the university. For each type of strategy, respondents were asked how often they apply it by using the corresponding Blackboard feature. The answers were designed in a five-point Likert scale ranging from *Always* to *Never*. The questionnaire also collected data regarding students' GPAs as an indicator of their academic achievement. To validate the questionnaire, it was published through Google Forms to six referees who specialise in education, curriculum design, and teaching methods (three full, one associate and two assistant professors). The referees suggested a few amendments to the wording and structure of the items. The final version was administered to a sample of 30 students who were not included in the study sample. The results of this study were tested for internal consistency using SPSS. The Cronbach's Alpha for the survey was $\alpha = .84$, which suggested good reliability of the questionnaire and hence it was administered to the research sample. The survey was administered manually to guarantee more accurate responses, hard copies of the questionnaire were distributed in parts of regular classes, and the generated data were entered manually in the data analysis software. See the appendix for a copy of the study questionnaire.

3.4 Data Analysis

The obtained data were analysed using SPSS through three stages. First, the R squared (R^2) value was computed to realise the proportion of the variance for the dependent variable (GPA) which is explained by the independent variables (the three skill categories). Second, the significance value of the overall model in explaining the students' GPAs was computed. Finally, the coefficient of each of the independent variables on the participants' GPAs was calculated to test the research hypothesis and account for the primary research query. All were computed through linear regression analysis.

4. Results

The data analysis generated the following results.

Table 4. Model Summary

R	R square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.635[a]	.404	.393	.508	2.11

[a.] Predictors Organizational, Cognitive, Evaluation Skills

In general, the results show that the model could explain 40.4 % of the variation in the dependent variable, i.e. student GPA. This result indicates the model's ability to generate trustworthy findings regarding the predicting variables of the GPA. With regard to the usefulness of the model in explaining students' GPA, the ANOVA results are presented in Table 5 below.

Table 5. ANOVA of the Model

Model		Sum of Squares	*df*	Mean Square	*F*	Sig.
1	Regression	2.8.19	3	9.39	36.33	.000
	Residual	41.64	161	.259		
	Total	69.84	164			

The findings demonstrated that the overall model is significantly useful in explaining students' GPAs, F (3, 161) = 36.33, p< .05.

To account for the research hypotheses, the coefficient of each of the independent variables on the participants' GPA was computed. Table 6 below displays the results of this stage.

Table 6. The Significance of the Effect of the Independent Variables

Model		Unstandardised coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	constant	1.86	.293		6.37	.000
	Org.	.141	.060	.161	2.35	.020
	Cog.	.525	.060	.575	8.81	.000
	Eval.	.167	.052	.207	3.19	.002

The results show that all the suggested variables significantly affect the dependent variable, i.e. GPA. Organisational skills have a significant effect on GPA, t(161)= 2.35, p< .05. Cognitive skills have a significant effect on GPA, t(161)= 8.81, p< .05, and evaluation skills have also a significant effect on GPA, t(161)= 3.19, p< .05. These results indicate that cognitive skills are the most correlated to SRL, followed by Evaluation skills and organisational skills respectively.

5. Discussion

Overall, the results are as expected and in line with the previous hypotheses and theoretical work on SRL. The model of the study was found to be capable of predicting the students' academic achievement to 40%, which is a reasonable percentage. This result can be justified mainly by the components of the questionnaire, which are directly related to SRL, which is, in turn, found to be relevant to academic achievement. Furthermore, the subsequent analysis of the variance of the results means (ANOVA) supported the usefulness of the adopted model in explaining the students' GPAs. This suggests that the results of testing the study hypotheses can be safely assumed.

The correlation of the three independent variables in the model (i.e. the organisational, cognitive, and self-evaluation skills) with students' GPA was significant. Moreover, the magnitude with which each of the three independent variables impacts the dependent variable (i.e. students' GPA) is also substantial. Remarkably, the results suggest that with one unit increase in organisational skills, the student's GPA increases by .14, which is a significant effect. They also suggest that with one unit increase in cognitive skills, the student's GPA increases by .53, which is found to be a substantial change. Regarding the evaluation skills, it was found that with one unit increase here, the students' GPA increases by .17, which is also a significant change. These results validate the research hypotheses, and effectively demonstrate that the three factors are impactful in improving achievement. The most effective aspect of autonomous learning skills in the approach is cognitive skills, followed by evaluation skills, and then organisational skills.

These results are consistent with the previous studies. They are in line with Zimmerman and Pons (1990), who found that gifted students apply SRL more

effectively and that this application is correlated to more verbal and mathematical efficacy. They also support the results of Sardareh, Saad, and Boroomand (2012)'s study, which found a strong correlation between students' SRL and academic achievement, and that of Aladl and Polpol (2020), which demonstrated that applying selected SRL techniques improves academic self-efficacy. The results also match previous findings on the effect of the learning method used by LMS on applying SRL techniques. As Dabbagh and Kitsantas claimed, LMSs provide an appropriate environment to use different SRL techniques, affecting students' academic achievement (Mehmet, 2016).

As for the detailed strategies applied, the results also coincide with the previous literature. They are in line with the study by Qi (2021), which established that using cognitive strategies is highly correlated to control strategy and higher output, i.e. better reading literacy. However, the relatively low value of the contribution of other types of strategies is not supported similarly. Since most previous literature claimed equal or similar contributions of different SRL techniques in academic performance, this finding can be contradictory and needs further validation. Primarily, it can be justified by the nature of the student's major, i.e. Islamic Studies, which may entail more cognitive strategies related to memorisation and elaboration compared to organisation or evaluation techniques. More research on the probable effect of discipline on the types of SRL employed can prove or eliminate this justification.

The results also support the previous findings on the impact of LMS, i.e. Blackboard, on students' academic achievement. All the strategies applied were conducted using features that were available through the system. The results are compatible with those of Onodipe et al. (2020), which found a positive impact of LMS on SRL. They also coincide with the findings of Avcı and Ergün (2022) and Steiner et al. (2013), which revealed that LMSs can play an essential role in student academic performance and engagement by helping students use SRL strategies, including cognitive, metacognitive, organisational and evaluation strategies.

Such results can be interpreted by arguing that students have learned in an interactive electronic environment that enables them to be active learners. Subsequently, they obtain meaningful learning through their integration in activities, dialogues, discussions, projects and searching for information, rather than being passive recipients of the information. They also suggest that the Blackboard LMS contains tools and capabilities that help provide continuing education for students and create an environment in which a set of tools and learning resources are combined effectively. These capabilities help provide the required flexibility in learning and at the appropriate time and place for learners. Examples of these tools are forums where students are required to participate in a discussion about specific topics. As they get feedback from their teachers and peers, students are likely to set their goals, manage their time, and organise their participation to achieve satisfying results. Other tools, such as *My Grades,* are believed to provide students with ongoing feedback to monitor their progress, evaluate their work, and adapt their future performance. Students can also organise their learning tasks with tools such as *To-Do, My Tasks, Alerts, Needs Attention* and *What's Due.*

Another argument for interpreting the results is that employing SRL skills through the Blackboard LMS entails the consideration of individual differences among students. Learners' progress in their education is highly correlated to their abilities, capabilities and learning speed, i.e. their SRL. Therefore, distinguished learners utilise the capabilities of the Blackboard system in the educational process, which is reflected positively in their academic achievement. Also, it is understood that Blackboard LMS helped provide students with feedback through the self-evaluation tools that it provides. Therefore, it allows them to monitor and strengthen their progress through the courses, causing them to develop their learning process, and impacting their academic achievement.

The implication of this study for teaching Islamic Studies courses, and other related disciplines, can be summarised by promoting cognitive strategies that foster academic achievements. Moreover, as the organisational and evaluation strategies were found to be applied to a lesser extent, it is implied that more training is required to enable students to utilise the full potential afforded by Blackboard LMS. Accordingly, the researcher suggests continuous training on how to use the Blackboard and its features. These training sessions will be of more value if they adopt an SRL approach that targets learners' adoption of different strategies.

The findings of this study contribute to the existing literature that supports employing SRL strategies for better academic performance. They also support the positive impact of LMS tools on fostering such strategies when employed appropriately. As far as the research gap is concerned, the findings raised a significant point regarding the supremacy of cognitive strategies over the other types in determining students' high academic achievement in Islamic Studies courses. The nature of the discipline is a possible justification for this finding, as more memorisation and comprehension of concepts are required. Further research is necessary to investigate the impact of SRL on various disciplines.

Two limitations of the present study may prevent generalising its results. First, the study sample is limited to students in Islamic Studies departments, which may affect its outcomes since students' GPAs in this major are relatively high. Second, the study is conducted on a descriptive and cross-sectional basis. A longitudinal experimental study may present more credible results by comparing students who have not performed SRL or have achieved it only in a face-to-face environment. To account for such limitations, the researcher suggests that future researchers may consider experimental longitudinal approaches and incorporate a diverse sample. These studies can address research topics such as the correlation between SRL on Blackboard and different academic disciplines. Another interesting study would be to design an e-course through Blackboard based on SRL and measure its impact on raising academic achievement.

6. Conclusion

The shift toward a learner-centred approach to learning entails learners being more active and capable of adopting various strategies to get the maximum benefit from the learning content and organise their learning behaviours. Accordingly, many SRL models have been introduced containing different strategies and phases. Previous literature has addressed measuring students'

perceptions of SRL in classic learning environments and has attempted to describe and explain its techniques and stages. Nevertheless, relatively few studies have considered its incorporation in LMSs and its correlation with students' achievement. To this end, the present study has attempted to fill such a gap by adopting a questionnaire based on the previous modelling of SRL to survey students on their use of the SRL strategies. Furthermore, the correlation between students' adoption of such techniques and academic achievement was computed.

The study's findings revealed that the assessment model could predict a considerable part of the dependent variable, i.e. students' GPA. Such a finding supports the steadfast claim that SRL is directly related to student achievement and that students with high self-regulating strategies perform better than their counterparts, which is reflected in their learning outcomes. It was also found that cognitive strategies are the most influential factor for students' achievement. The nature of the student's major, i.e. Islamic Studies, can be adopted as a probable justification for this finding; accordingly, further research questions about the effect of the discipline in SRL implementation can be raised. It is possible that while some subjects require memorisation, elaboration and rote learning techniques, other disciplines may not be fully internalised with such cognitive processes. After all, investigating students' application of metacognitive, personal management, and flexibility strategies can provide meaningful insights into the effect of SRL on both types of disciplines.

These results indicate that the Blackboard has considerable potential to foster SRL. It is evident that the incorporated tools can, directly and indirectly, promote SRL strategies. Accordingly, it is recommended that teachers adopt it to a greater extent and train students to use it more effectively. Moreover, as there is variation in the interpretation of each type of strategy for academic achievement, teachers must evaluate their course design and adapt it in conjunction with their students' needs. Different tools and techniques are suitable for different students and disciplines. Nevertheless, the Blackboard has been proven to provide the proper tool for most of the required tasks. It is hoped that this research will provide a motive for applying such capabilities to enable students to use their SRL strategies successfully and thus improve their academic achievement. It is assumed that implementing such suggestions can foster students' autonomy and increase their attainment. Since the use of LMSs such as Blackboard has become the norm in today's world, harnessing their potential to achieve SRL is considered an added value to online learning.

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Appendix. The questionnaire

Please write your latest GPA in this format [0.00]					
Please read each element thoroughly, think of it carefully, and then select the option that best describes what you do to learn your courses in Blackboard.					
Organisational Skills					
Item	**Always**	**Usually**	**Occasionally**	**Rarely**	**Never**
1- I define my learning goals by reviewing the *Course Guide* posted on Blackboard.					
2- I follow up the learning process at times and places that suit me using Blackboard.					
3- I organise my time and priorities using the *Course Calendar and Retention Center* on Blackboard.					
4- I plan the learning process using *Announcement* and *What is New* tools on Blackboard.					
5- I review the past lessons and see subsequent lessons through the *Course Contents* and *To-Do* tools on Blackboard.					
6- I organise and arrange the topics to be studied using the *Tasks*and *Alerts*tools on Blackboard.					
7- I use the *E-mail* and *DiscussionForums* tools to communicate and discuss with my colleagues and faculty members.					
8- I organise my study of the selected topics by reviewing the lesson objectives, the content, and the assessment.					
9- I organise the content I want to study by downloading, saving and editing the files.					

Cognitive and Observation skills					
Item	**Always**	**Usually**	**Occasionally**	**Rarely**	**Never**
1. I memorise relevant information and concepts by viewing content on Blackboard.					
2. My comprehension of the subjects of the courses I studied through Blackboard is increased by using Blackboard tools.					
3. I link ideas and information between different Islamic studies courses using Blackboard learning tools.					
4. I summarise and paraphrase the course topics posted on Blackboard					
5. I analyse, observe and select the correct information through learning tools on Blackboard (e.g., *Content*and *Discussion Forums*)					
6. I participate in asynchronous activities on Blackboard such as Forums, Quizzes, and Assignments.					
7. I look for more information related to the topics of the courses posted via Blackboard.					
8. I check the notification panel on Blackboard regularly.					
9. I am always aware of the due dates, assignments and tasks					
Self-assessment skills					
Item	**Always**	**Usually**	**Occasionally**	**Rarely**	**Never**
1. Blackboard allows me to choose the appropriate assessment tools.					
2. I monitor my progress and development in courses via the *My Grades*tool on Blackboard.					
3. I monitor my mistakes and identify them through the assessment grades tools and on Blackboard.					
4. I use the feedback from Blackboard to guide me					

towards the desired performance.					
5. I adjust my learning methods in light of the self-evaluation results provided by Blackboard.					
6. I evaluate myself through the homework and activities tools on Blackboard.					
7. I can determine my weakness and strengths in the light of the self-evaluation results on Blackboard.					
8. I self-evaluate my learning via Blackboard before I get the correct information from the course instructor.					
9. I can measure the extent to which I have achieved my learning goals using Blackboard's monitoring and evaluation tools.					