



**Investigating Online Self-Regulated Learning
Strategies Among Gifted High School Students in
Saudi Arabia: Do Personality Traits Play A
Role?**

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دراسة استراتيجيات التعلم المنظم ذاتيًا عبر الإنترنت بين طلاب المدارس الثانوية الموهوبين في المملكة العربية السعودية: هل تلعب سمات الشخصية دوراً؟

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المستخلص:

تُمكن عمليات التوجيه الذاتي والإيمان بالذات المتعلمين من تحويل قدراتهم العقلية، مثل الكفاءة اللفظية، إلى مهارات أداء أكاديمي. يُعتبر التعلم الذاتي المنظم عملية متكررة يستخدمها الطالب لاكتساب مهارات أكاديمية مثل تحديد الأهداف، واختيار ومراجعة الاستراتيجيات، والمراقبة الذاتية الفعالة، وذلك على النقيض من الأنشطة التي تحدث نتيجة قوى غير واعية. تهدف هذه الدراسة إلى التحقيق في دور الانفتاح، والضمير الحي، والانبساطية، والموافقة، والعصابية كعوامل تنبؤية في استخدام طلاب المدارس الثانوية الموهوبين أكاديمياً في المملكة العربية السعودية لتطبيقات الذكاء الاصطناعي في استراتيجيات التعلم الذاتي عبر الإنترنت. تم استخدام تصميم بحثي ارتبادي في هذه الدراسة، وشارك في العينة ١٩٠ طالباً موهوباً عقلياً. تم استخدام تحليل الانحدار الخطي للتحقق من العلاقة بين استراتيجيات التعلم الذاتي عبر الإنترنت وسمات الشخصية. وقد وجدت الدراسة أن استراتيجيات التعلم عبر الإنترنت ترتبط بشكل إيجابي مع الانبساطية، والموافقة، والضمير الحي، والانفتاح، وترتبط سلباً مع العصابية. وساهمت كل من المتغيرات المستقلة بشكل كبير في التنبؤ باستراتيجيات التعلم الذاتي.

الكلمات المفتاحية: استراتيجيات التعلم الذاتي عبر الإنترنت، طلاب المدارس الثانوية الموهوبين، سمات الشخصية.

المساهمة/الأصالة: تضيف الدراسة إلى الأدبيات من خلال التركيز على دور الانفتاح، والضمير الحي، والانبساطية، والموافقة، والعصابية كعوامل تنبؤية في استخدام طلاب المدارس الثانوية الموهوبين أكاديمياً في المملكة العربية السعودية لتطبيقات الذكاء الاصطناعي في استراتيجيات التعلم الذاتي عبر الإنترنت



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ABSTRACT

The processes of self-direction and self-belief allow learners to shift their mental abilities such as verbal aptitude toward an academic performance skill. SRL is viewed as a repetitive process used by the student to acquire an academic skill such as setting goals, selecting and reviewing strategies, and effective self-monitoring, in contrast to the activities that occur in students due to unconscious forces. The purpose of this study is to investigate the predictive role of openness, conscientiousness, extraversion, agreeableness, and neuroticism in using academically gifted high school students in Saudi Arabia to artificial intelligence applications in self-regulated learning strategies on line. Correlational research design was employed. A sample of 190 intellectually gifted children participated in the study. Linear regression analysis was used to investigate the relationship between online self-regulated learning strategies and personality traits. Online strategies for learning correlate positively with extraversion, agreeableness, conscientiousness, openness, and negatively with neuroticism. Each of the independent variables made significant individual contributions to the prediction of self-regulated learning strategies.

Keywords: online self-regulated learning strategies, gifted high school students, personality traits.

Contribution/Originality: The study adds to the literature by focusing on the predictive role of openness, conscientiousness, extraversion, agreeableness, and neuroticism in using academically gifted high school students in Saudi Arabia to artificial intelligence applications in self-regulated learning strategies on line.

Introduction

Self-regulated learning (SRL) is a concept that has been talked about in recent years in the field of educational psychology (Jivet et al.,2020; Karlen et al.,2021). The results depend directly on the students' ability to self-regulate behavior, and on the self-behavioral and environmental processes that fit the requirements of the educational situation, where SRL combines both cognitive factors, motivational factors, and environmental factors (Ravi,2017; Schuster et al.,2020). SRL incorporates processes during which learners engage in thoughts, emotions, and actions that support achieving personal learning goals (Zimmerman, 2013).

Zimmerman (2008) points out that the processes of self-direction and self-belief allow learners to shift their mental abilities such as verbal aptitude toward an academic performance skill. SRL is viewed as a repetitive process used by the student to acquire an academic skill such as setting goals, selecting and reviewing strategies, and effective self-monitoring, in contrast to the activities that occur in students due to unconscious forces.

Individuals with SRL skills can plan, organize, conduct, observe, and evaluate every stage of their learning process. In addition, they see themselves as sufficient, effective, and autonomous in terms of motivation and can create the most suitable environment for learning(Zimmerman,2013).

The use of AI to support SRL should have two objectives: to assess and interpret learners' SRL behaviors in online learning environments (Jin et al.,2023) and to provide support that scaffolds these complex SRL processes (Sáez-Delgado et al.,2022).

The results of Jin et al.(2023) indicated that learners perceived AI applications as useful for supporting metacognitive, cognitive, and behavioral regulation across different SRL areas, but not for regulating motivation.

Learners display their efforts at learning because they are aware of their own strengths and weaknesses. They are guided by their personal goals and task-related strategies, such as using addition arithmetic to check the accuracy of solutions to subtraction problems, and monitor their own behavior based on their goals and self-reflection to increase their effectiveness (Zimmerman,2013). This enhances self-satisfaction and motivation to continue to improve their learning methods. Because of their high motivation and adaptive learning methods, self-regulated students are likely to succeed, not

automatically, but to see their future with optimism (Zimmerman, 2002).

SRL supports students in optimizing their learning processes (Eissa,2015). Therefore has a positive impact on learning results (Dörrenbächer& Perels,2016). However, it is affected by a myriad of factors. Instructional content, learner's previous knowledge and skills, characteristics, attitudes, and motivation all play a role in the SRL process(Zimmerman,2013).

Concerning learning in online environments, Lynch and Dembo (2004) identified five self-regulatory skills that were found to be predictive of academic success in online environments: intrinsic goal orientation, self-efficacy for learning, time and study management, help seeking, and Internet self-efficacy. A myriad of factors were established as leading to better academic performance in distance education environments (Puzziferro, 2008), such as goal setting, self-efficacy, time and study environment, and effort management strategies.

Whipp and Chiarelli (2004) indicated that learners used many traditional SRL strategies in online courses. However, a number of these strategies were adapted to fit the unique requirements of an online environment. For example, important elements of the forethought phase include goal setting and planning.

There seems to be a relationship of SRL to several personality traits(Dörrenbächer& Perels,2016). Big Five traits are important for learning. Personality traits can be defined as individual differences that are stable across time and situations and that explain a person's patterns of cognitions, behavior, and emotions (Hogan& Roberts,2000). The Big Five personality traits are intended to reflect basic aspects of human personality and those that have strong effects on behavior (Costa & McCrae, 1992).

The Big Five personality traits have been found to be related to self-regulated learning (Bruso et al., 2020) and academic achievement (Babakhani, 2014). Bruso et al. (2020) found that learners high in openness, conscientiousness, extraversion, and agreeableness were more skilled self-regulators than those high in neuroticism. Dörrenbächer and Perels (2016) stated that more skilled self-regulators showed lower neuroticism and greater degrees of extroversion, conscientiousness, agreeableness, and openness to experiences.

Babakhani (2014) found that with the exception of neuroticism, personality traits and self-regulated learning strategies together were predictive of changes in academic achievement and that the self-regulated learning strategies variable was stronger than personality traits in predicting academic achievement. Furthermore, Bidjerano and Dai (2007) found an overlap between the Big Five personality factors and self-regulated learning strategies and suggested that the personality trait of openness to experience made an independent contribution to student achievement.

Bidjerano & Dai(2007)found that conscientiousness and openness to experiences were linked to metacognitive and elaborative learning strategies and to higher frequencies of using time management and effort regulation strategies. Therefore, conscientiousness and openness to experiences accompany effective learning styles that encompass SRL skills and are thus positively related to academic achievement(Bidjerano & Dai, 2007). For neuroticism, Bidjerano and Dai (2007) concluded that overall effects of being emotionally unstable on learning are negative and that it is negatively related to academic outcomes.

Extraversion could support effective learning because social behaviors such as help seeking are likely to be promoted. However, extraverted students seem to have less reflective problem-solving skills (Dörrenbächer & Perels, 2016).

little attention has been given to connections between personality traits and the use of SRL strategies. This lack of attention is supposed to be the base for this study to bridge the gap and to address an area that has to date been under-researched.

Zawacki-Richter and his colleagues (2019) highlighted the need for more research on the pedagogical and psychological considerations perceived by learners to effectively design AI applications in education. Similarly, Rosé and her colleagues (2019) emphasized the importance of providing interpretable and actionable insights into learners, rather than simply focusing on developing AI models that predict learners' data more accurately.

What may happen when AI applications are introduced in online learning remains still unclear (Molenaar,2022). Although students perceive AI applications as useful ,however, they become dissatisfied due to the feeling that relying on AI leads to reduced creativity (see Seo et al., 2021a2021b).



Purpose of the Study

The purpose of this study is to investigate the predictive role of openness, conscientiousness, extraversion, agreeableness, and neuroticism in using gifted high school students in Saudi Arabia to self-regulated learning strategies on line.

Significance of the proposed approach

Schools, as well as Universities have recognized the need to adopt a vision that aligns with modern educational trends in order to accelerate the pace of the education system and meet the requirements of the knowledge economy. The success of any educational process is measured by how quickly it responds to changes and modern developments in using digital devices and applications. Moreover, integrating the curriculum with AI and its applications has a vital, an essential role in facing the challenges of education.

Hypotheses

H1. There will be a significant relationship between personality traits and self-regulated learning strategies .

H2. There will be a predictive role of openness, conscientiousness, extraversion, agreeableness, and neuroticism on self-regulated learning strategies.

H3. Openness, conscientiousness, extraversion, agreeableness, and neuroticism will collectively contribute to self-regulated learning strategies.

Methods

Research Design

In order to investigate the interrelatedness between personality traits and the use of self-regulated learning strategies, it is intended to employ correlational research design. A correlational research design investigates relationships between variables without the researcher controlling or manipulating any of them. A correlation reflects the strength and/or direction of the relationship between two (or more) variables. The direction of a correlation can be either positive or negative. With a regression analysis, one can predict how much a change in one variable will be associated with a change in the other variable. The result is a regression equation that describes the line on a graph of your variables (see flowchart).

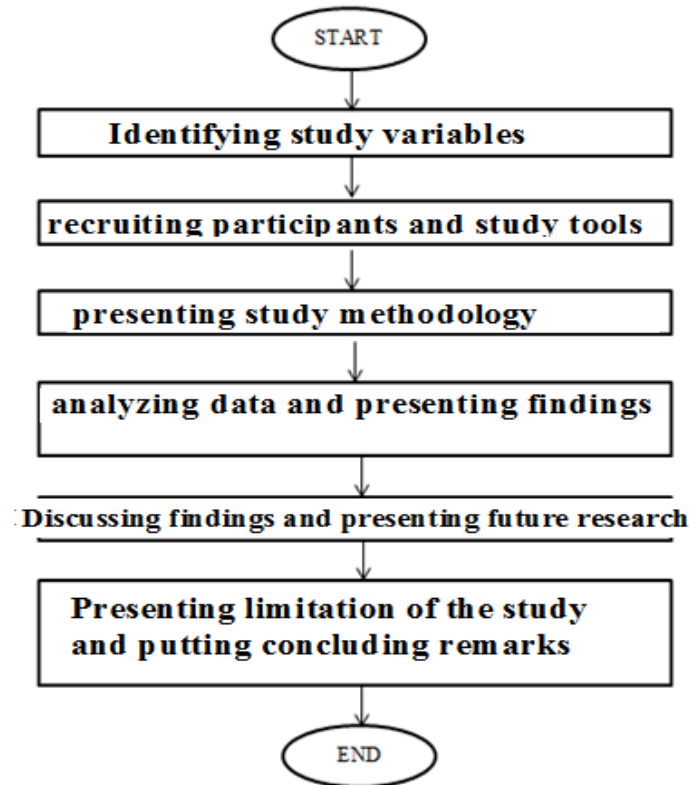


Fig. 1. A flowchart of the study steps

Setting

The present study took place at two high school for gifted students in Mecca , Saudi Arabia .

Participants

A sample of 190 academically gifted children (mean age = 16.7 years, SD = 1.44) of which 120 were females(63.15%) , and 70 were males (36.85%)participated in the study. No one of them had known learning disorders. Moreover, all of them had normal or corrected vision, and all were native Arabic speakers. Participants were recruited in high schools. The study was performed in compliance with local ethics regulations. Signed informed consent was provided by all of the participants in accordance with the Declaration of Helsinki. Before testing, the purpose of the study were explained to the participants, who then gave oral agreement for their participation. Sample size was determined by the number of available subjects. According to the school records, the inclusion criterion for the gifted students IQ strictly above 125, corresponding to the 95th percentile. The IQ criterion was



additionally verified using Raven's Standard Progressive Matrices (Raven et al., 1998).

Measures

Big Five Inventory, John & Srivastava (1999). It is a 44-item, 5-point Likert scale ranging from 1 (Disagree Strongly) to 5 (Agree Strongly) measure consisting of five personality scales: extraversion (represented by 8 items), agreeableness (represented by 9 items), conscientiousness (represented by 9 items), openness (represented by 10 items), and neuroticism (represented by 8 items). Two assistant professors in English department independently translated the 44 items of the English original BFI into Arabic. They then compared their translations, discussed discrepancies and generated a preliminary Arabic version of the BFI after reaching an agreement on discordant translations. Next, another assistant professor, blind to the original English version, checked the Arabic items through a back version procedure. The original and the back-translated versions were reviewed and a final translation was obtained after modifications based on comments by the author of the present study. In this study, coefficient alphas ranged from .79 to .86 and test-retest reliabilities ranging from .78 to .88 across scale scores.

The Online Self-Regulated Learning Questionnaire (OSLQ), Barnard, Lan, To, Paton, & Lai, (2009) is a 24-item scale with a 5-point Likert-type response format having values ranging from strongly agree (5) to strongly disagree (1). The OSLQ has revealed satisfactory psychometric properties being validated across two samples of learners in the online and blended learning environments respectively (Barnard et al., 2009). The OSLQ consists of six subscale constructs, including environment structuring, goal setting, time management, help seeking, task strategies, and self-evaluation. Two assistant professors in English department independently translated the 44 items of the English original scale into Arabic. They then compared their translations, discussed discrepancies and generated a preliminary Arabic version of the scale after reaching an agreement on discordant translations. Next, another assistant professor, blind to the original English version, checked the Arabic items through a back version procedure. The original and the back-translated versions were reviewed and a final translation was obtained after modifications based on comments by the author of the present study. In this study, the

internal consistency of scores by subscale, values for Cronbach alpha ranged from .89 to .93.

Procedure

The author visited the target school and invited students to complete the tools. She provided a description of the purpose of study. Participants were asked to indicate their willingness to participate. Those who chose to participate in the study were asked to complete the instruments . They were told that they were free to withdraw at any point of time , however, the author expressed her wish they would continue till the end of the study.

Data Confidentiality

Respondents were told that their answers would be kept confidential. They would be used for the purpose of research only. They should have been worried about their academics and school activities, as the results of this study had nothing to do with.

Data Analysis

To investigate the research questions, data from the instruments were analyzed via SPSS statistical software. Data analysis began by testing assumptions regarding normality of the data. Linear regression analysis was used to investigate the relationship between online self-regulated learning strategies and personality traits. Invalid questionnaires, including those that were incomplete or provided the same response for all items or with many missing values, were eliminated.

The complexity and overhead analysis of the proposed approach

Predictive research is chiefly concerned with forecasting (predicting) outcomes, consequences, costs, or effects. This type of research tries to extrapolate from the analysis of existing phenomena, policies, or other entities in order to predict something (Rustagi & Goel,2022).

Results

Descriptive Analysis

In order to check univariate normality for variables, Skewness and Kurtosis values for each scale were calculated. Skewness and Kurtosis values between ± 3 are recommended acceptable ranges for normality assumption. In tables 1-2. Skewness and Kurtosis values of the each measure are presented. accordingly, it can be proposed that univariate normality indicators for each scale fall between the suggested ± 3 ranges confirming the assumption of normality. Descriptive statistics of means and standard deviations for each



variable were computed. The results for descriptive statistics are presented in tables 1-2. As shown in table 1, Goal setting has mean score of 3.39, Skewness=-.342, Kurtosis=.158. Environmental structuring has mean score of 3.30, Skewness= -.458, Kurtosis=.167. Task strategies has mean score of 3.37, Skewness= .177, Kurtosis=-.894. Time management has mean score of 3.34, Skewness= .382, Kurtosis= -.678. Help seeking has mean score of 3.31, Skewness= .177, Kurtosis= -.877. Self-evaluation has mean score of 3.35, Skewness= .170, Kurtosis= -.854.

Table 1

Mean, standard deviation, range, skewness, and kurtosis of Online Strategies for Learning Questionnaire (n= 100)

Variable	Mean	SD	Range	Skewness	Kurtosis
Goal setting	3.39	1.04	3.1-3.7	-.342	.158
Environmental structuring	3.30	1.34	3.1-3.5	-.458	.167
Task strategies	3.37	1.23	3.2-3.7	.177	-.894
Time management	3.34	1.90	3.2-3.6	.382	-.678
Help seeking	3.31	1.46	3.1-3.5	.177	-.877
Self-evaluation	3.35	1.15	3.0-3.5	.170	-.854

Table 2

Mean, standard deviation, range, skewness, and kurtosis of Big Five Personality Inventory (n= 100)

Variable	Mean	SD	Range	Skewness	Kurtosis
Extraversion	25.30	1.00	24.2- 28.7	-.322	.161
Agreeableness	34.34	1.30	31.1- 36.6	-.439	.175
Conscientiousness	33.25	1.20	31.2- 36.7	.186	-.832
Neuroticism	20.29	1.10	18.2- 23.2	.377	-.665
Openness	35.31	1.11	33.1- 37.5	.180	-.833

Correlations

Table 3 shows the means, inter-correlations of goal setting, environmental structuring, task strategies, time management, help

seeking, self-evaluation, extraversion, agreeableness, conscientiousness, neuroticism, openness. Table 3 shows that online strategies for learning correlate positively with extraversion, agreeableness, conscientiousness, openness, and negatively with neuroticism.

Table 3.

Correlations of study variables

Variable	GS	ES	TS	TM	HS	SE	E	A	C	N	O
GS							.400**	.401**	.311**	-.333**	.408**
ES							.407**	.406**	.390**	-.341**	.410**
TS							.410**	.404**	.307**	-.337**	.402**
TM							.415**	.409**	.305**	-.301**	.429**
HS							.422**	.410**	.310**	-.319**	.418**
SE							.441**	.403**	.325**	-.326**	.415**
E											
A											
C											
N											
O											

Note. GS= Goal setting, ES= Environmental structuring, TS= Task strategies, TM = Time management, HS= Help seeking, SE= Self-evaluation, E=Extraversion, A=Agreeableness, C= Conscientiousness, N=Neuroticism, O= Openness, **p=.01

Prediction

Results presented in table 4 show that the independent variables (extraversion, agreeableness, conscientiousness, neuroticism, openness) when put together yielded a coefficient of multiple regression (R) of 0.646 and a multiple correlation square of 0. 639. This shows that 63.9% of the total variance in self-regulated learning strategies of those who participated in the study is accounted for by the combination of extraversion, agreeableness, conscientiousness, neuroticism, openness. Table 5 indicates that the analysis of variance of the multiple regression data produced an F-ratio value significant at 0.01 level (F(5, 184) = 102.553; P < 0.01).



Table 4.

The regression results of the Predictor Variables and the Outcome Measure.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.689a	0.646	.639	3.38171	0.085	29.4204	5	184	.000

a. Predictors: (Constant), extraversion, agreeableness, conscientiousness, neuroticism, openness
 b. Dependent Variable: self-regulated learning strategies

Table 5

Summary of Multiple Regression Analysis between the Predictor Variables and the Outcome Measure

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.	
1						
	Regression	1623.024	5	811.512	102.553	.000a
	Residual	1052.368	184	13.667		
	Total	2641.119	189			

- a. Predictors: (Constant), extraversion, agreeableness, conscientiousness, neuroticism, openness
 b. Dependent Variable: self-regulated learning strategies

As shown in table 6, each of the independent variables made significant individual contributions to the prediction of self-regulated learning strategies. The results indicated that the following beta weights which represented the relative contribution of the independent variables to the prediction were observed. E ($b = .388$, $t = 4.500$; $P < 0.01$), A ($b = .374$, $t = 5.424$, $P < 0.01$), C ($b = .372$, $t = 4.401$; $P < 0.01$), N ($b = .368$, $t = 4.112$; $P < 0.01$), and O ($b = .361$, $t = 4.021$; $P < 0.01$).

Table 6
Relative Contribution of the Independent Variables to the Prediction of self-regulated learning strategies Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	7.336	1.521		5.11	.000	6.102	9.221
E	.388	.077	.399	4.500	.000	.194	.494
A	.374	.066	.393	4.424	.000	.228	.490
C	.372	.064	.390	4.401	.000	.223	.486
N	.368	.061	.387	4.112	.000	.217	.472
O	.361	.057	.382	4.021	.000	.213	.467

Discussion

When students learn in Online environments , they may face challenges related to a decline in their motivation, particularly for those who have not developed SRL skills (Karaoglan Yilmaz & Yilmaz, 2021). Jones and Castellano (2018) suggest that SRL tutoring can help less able learners increase their motivation to engage in SRL practices.

Direct instruction gives poor results; students are too dependent on teachers, which prevent them from cultivating and developing their capacity for independent learning.

It is well documented that recognizing learners’ personality is the foundation for understanding individual differences within the learning environment (Eilam, et al., 2009; Geisler-Brenstein et al., 1996). However, a search of the literature revealed a scant few studies that focused on personality traits as predictors of the use of SRL strategies. The purpose of this study is to investigate the predictive role of openness, conscientiousness, extraversion, agreeableness, and neuroticism in using gifted high school students in Saudi Arabia to six subscales of SRL strategies: goal setting, environmental structuring, task strategy, time management, help seeking, and self-evaluation.

Results from this study indicate that online strategies for learning correlate positively with extraversion, agreeableness, conscientiousness, openness, and negatively with neuroticism. It is not surprising that that students high in openness, conscientiousness, extraversion, and agreeableness are shown to be more skilled self-



regulators as measured by strategy use scales. In the literature(e.g. Dörrenbächer & Perels ,2016; Bidjerano & Dai,2007 Şahin& Tüfekçibaşı, 2021), students in the openness category are typically considered deep and complex. They have a positive attitude toward learning challenges. These enable them to be more flexible and be able to face the challenges whenever they take place.

Those with conscientiousness trait are dependable and responsible .They are able to plan for their learning , organize it , and persist to achieve their ultimate goal (Kader, & Eissa,2015). While extroverted students are energetic. They enjoy interacting with others (Mahmoud,2015) . Therefore, they outperform their peers in classroom discussions. Those with agreeableness have the spirit of cooperativeness and compliance. Therefore, they follow guidelines and respect due dates (Çelikkaleli et al.,2022). It is clear that students in this study employ a variety of SRL strategies.

The associations between openness, conscientiousness, extraversion, agreeableness, and neuroticism and SRL strategies: goal setting, environmental structuring, task strategy, time management, help seeking, and self-evaluation are consistent with previous research (Dörrenbächer & Perels, 2016; Mirhashemi & Goodarzi, 2014). Dörrenbächer & Perels(2016) showed that more skilled self-regulators showed lower test anxiety, lower neuroticism, and higher values in extraversion, conscientiousness, agreeableness, and openness to experiences.

Online learning environments face challenges related to a decline in students' motivation, particularly for those who have not developed SRL skills (Karaoglan et al., 2018; Karaoglan Yilmaz & Yilmaz, 2021). Jones and Castellano (2018) suggest that SRL tutoring can help less able learners increase their motivation to engage in SRL practices.

Limitations

The use of self-report measures(e.g. Big Five Inventory and the OSLQ) limits the validity of the respondents particularly when asked about exhibiting actions or traits that may be construed as negative. This study was conducted on certain type of students; gifted students, and a certain geographical area ; Mekka. This limits generalizability of study findings.

Future Research

The current study sheds light on the relationship between openness, conscientiousness, extraversion, agreeableness, and neuroticism and SRL strategies: goal setting, environmental structuring, task strategy, time management, help seeking, and self-evaluation. Replicating the current study with other types of students like those of developmental disabilities, could broaden generalization of findings.

Conclusion

It is essential for instructional designers, educators, and school administrators to developing a better understanding of the relationship between common personality traits and the use of SRL strategies. Various personality traits have a powerful predictive role in frequent deployment of one or more SRL strategies . This in its turn has an essential impact on how students are taught. Therefore, personality trait can provide a basis to inform the course design, instruction, or support for gifted students. Taking into account the personality traits of gifted students could be beneficial with regard to their training for using self-regulated learning strategies. Future studies that examine more complex networks of relationships among these constructs, such as through structural equation modeling techniques, would be beneficial.

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