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Validity Self-Regulated Learning Assessment on Student's Mathematics Learning: Realibility Study

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a b s t r a c t

Self-Regulated Learning is a student's skill in regulating themselves during the learning process, including learning initiatives, goal setting, monitoring progress, and evaluating learning outcomes. The chosen learning strategy must be able to measure the extent of their mastery of the learning material and be able to make students aware of the importance of using learning strategies. This study aims to test the validity and reliability of the student self-regulated learning measurement assessment using SPSS software. The assessment was tested on 34 high school students. Based on the results of the validity test using the Pearson Product Moment technique, from 29 statements, all statements were declared valid. The decision taken was that no statements were made, because all statements were valid and represented all indicators of the self-regulated learning questionnaire. In addition, the Cronbach's Alpha value was obtained at 0.892. Therefore, the self-regulated learning questionnaire submitted was said to be reliable.

K e y w o r d s :
JASP; Learning Outcomes; Statistics; TAM; PGSD; Technology Perception

INTRODUCTION

Education plays an important role in enhancing students' abilities and skills, as it is considered a key investment in developing human resources (Winda & Hendro, 2022). Education can be regarded as a fundamental pillar in establishing a strong foundation for building a better future (Ramayanti et al., 2023). Learning outcomes essentially reflect the achievements that students attain after participating in learning activities. There are two factors that influence students' learning outcomes: internal and external factors. One of the internal factors that significantly affects student learning outcomes is Self-Regulated Learning (SRL) (Ramayanti et al., 2023).

SRL refers to students' ability to regulate themselves during the learning process, including initiating learning, setting goals, monitoring progress, and evaluating learning outcomes. SRL involves learning activities carried out by students independently, without assistance from others, aiming to achieve deep understanding and the ability to apply knowledge in everyday life (Ramayanti et al., 2023). It refers to students' capacity to enhance their engagement and autonomy during learning, encompassing aspects of metacognition, motivation, and behaviour (Winda & Hendro, 2022; Mulyani et al., 2023). Based on the above perspectives, it can be concluded that self-regulated learning is a learning process influenced by individual behaviour, aimed at achieving results in accordance with the strategies implemented.

SRL is influenced by three main factors: person (individual), behaviour, and environment (Gestiardi & Maryani, 2020). Mulyani et al. (2023) highlight the main characteristics of self-regulated learning, which include: a) analyzing mathematical learning needs, formulating goals, and designing learning programs; b) selecting and applying learning strategies; and c) monitoring and evaluating whether the strategies have been correctly implemented, examining both processes and outcomes, and reflecting to obtain feedback. According to Zimmerman (as cited in Rosito, 2018), students with high self-regulated learning will attempt various learning strategies to optimize their outcomes. The chosen strategies must be capable of measuring the extent of their mastery of the learning materials and fostering students' awareness of the importance of using effective learning strategies (Sadeghy & Mansouri, as cited in Rosito, 2018).

Given the importance of SRL in supporting students' mathematics learning outcomes, teachers need to help enhance students' SRL. To objectively measure students' SRL, a proper SRL instrument is required. This study focuses on content validation, construct validity, and reliability. The results show that the items used are reliable and can be used to measure students' SRL.

LITERATURE REVIEW

Self-Regulated Learning (SRL) is recognized as a crucial competency for achieving academic success independently. Existing research has demonstrated that students with higher academic performance generally exhibit stronger SRL abilities

compared to their lower-achieving peers, although both groups may fall within similar categorical levels of SRL (Yulianti et al., 2016). These findings suggest that variations in the application of learning strategies significantly influence academic outcomes. Furthermore, highlighted the role of SRL, along with intrinsic motivation and metacognitive awareness, in fostering students' critical thinking skills, particularly within active learning contexts (Apriyanto et al., 2025).

In the era of digital education, SRL plays an increasingly prominent role. Students engaged in online learning environments tend to develop greater competence in managing their time, regulating emotions, and reflecting on their learning processes—key dimensions of SRL (Situngkir, 2024). A large proportion of students demonstrated a high level of SRL during remote learning. These findings underscore SRL as a central mechanism enabling students to maintain learning effectiveness in the absence of direct teacher supervision (Herlina, 2021).

Moreover, SRL is associated with the development of student character and national identity values. SRL is in the position as a core element of learning design aligned with the demands of 21st-century education and the Society 5.0 framework as a cyclical instructional model incorporating planning, monitoring, evaluation, and reflection (Kirana, 2022). SRL also plays a significant role in enhancing student well-being. Students with higher SRL abilities, especially when supported by a positive school climate, report greater levels of academic well-being. These results emphasize that SRL contributes not only to cognitive development but also to emotional resilience, equipping students to manage academic stress and challenges more effectively. Consequently, fostering SRL within a supportive educational environment can promote more balanced academic and emotional development (Syifa et al., 2024).

Meta-analytical and literature review studies have further affirmed the relevance of SRL in educational contexts. Variables such as self-efficacy, motivation, and goal-setting are closely linked to academic achievement, especially in mathematics education (Herlina et al., 2021). In parallel, emphasized that SRL supports 21st-century learning skills by enhancing learners' cognitive reflection and emotional self-regulation, particularly in remote learning settings. Collectively, these studies suggest that SRL functions as a foundational component for nurturing independent learning, positive learner identity, and academic persistence. It is therefore imperative for educators to incorporate SRL strategies into both online and face-to-face learning environments (Mahayanti et al., 2023).

METHODS

This study employs a quantitative survey method. It aims to examine the validity and reliability of a Self-Regulated Learning (SRL) measurement instrument using SPSS software. The sample consists of 34 vocational high school (SMK) students from grades X, XI, and XII, selected to represent a range of academic abilities, so that the results provide a representative overview of SRL in mathematics learning.

Data were collected using a non-test instrument in the form of a Likert-scale questionnaire. The assessment developed is a questionnaire specifically designed to measure students' SRL levels in mathematics learning. The questionnaire includes several indicators that assess how students determine effective learning strategies, their ability to regulate emotions during learning, and their capacity to self-manage throughout the learning process.

Participants in this study were given a questionnaire consisting of 29 statements. The questionnaire was adapted based on the SRL dimensions proposed by Hidayati & Listyani (2010) and Mumpuni et al. (2023), namely self-strategy, self-emotional, and self-management, with the following indicators in Table 1.

Table 1
Dimention and Indicator of Self-Regulated Learning Questionnaire

Dimention	Indicator
Self Strategy	Strategies in learning
	Behave on your own initiative
	Independent
	Behave disciplined
Self Emotional	Feelings in learning
	Have a sense of responsibility
Self Management	Exercise self-control
	Have self-confidence

The Likert-scale questionnaire was constructed with four response options: SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree. While completing the questionnaire, students were supervised by the researcher to ensure honest responses and to avoid misunderstandings when answering statements according to their beliefs.

Instrument validation in this study was carried out in two stages, as proposed by Sugiyono (2013): content validation and construct validation. Content validation used Aiken's V method, involving two experts in the fields of language and mathematics to evaluate the items in the instrument based on their relevance and alignment with the theory of SRL in mathematics learning. Construct validity was tested using the Pearson Product Moment technique, and the valid items were then tested for reliability using Cronbach's Alpha.

The content validity of the instrument in this study was determined based on expert judgment. Expert agreement was used to establish content validity because a test or non-test instrument is considered accurate if experts believe that the instrument measures the intended construct. The Aiken's V index can be used to quantify this expert agreement (Pandawa et al., 2021). Content validity refers to the degree of alignment between the questionnaire items and the specified indicators. The analysis of the content validity of the diagnostic assessment instrument was conducted using the Aiken's V formula.

$$V = \frac{\sum S}{[n(C-1)]}$$

Where:
S = R – Lo
V = Aiken's Index
S = The score given by the rater (evaluator) is subtracted by the lowest score
R = The score given by the validator
Lo = The lowest evaluation score (1)
C = The highest evaluation score (5)
n = The number of validators

The level of validity of the test items is then determined on the Aiken's V value category as explained by Suhardi (2022) which is listed in Table 2.

Table 2
Aiken's V Formula Score Range Categories

Score Range	**Category**
0,80 – 1,00	Very High
0,60 – 0,799	High
0,50 – 0,599	Moderate
< 0,50	Low

Validating assessment instrument using ssessment criteria for instrument items by the validator is important to assess the quality and suitability of the test items, as in Table 3.

Table 3
Criteria for Assessment of Instrument Items by Validator

Value	**Description**
1	Not Valid
2	Less Valid
3	Quite Valid
4	Valid

Cronbach's Alpha used in the evaluation of measurement instruments. The category of Cronbach's Alpha is an important tool to assess the level of instrument reliability. Table 4.

RESULT AND DISCUSSION

Validity Test

The SPSS validity calculation results for the questionnaire were tested on 34 students from the SMKS Musik Perguruan "Cikini". After the trial was conducted and the data were obtained in the form of questionnaire scores, the data were recorded in an Excel format. These data were then used to test validity and reliability using SPSS. The validity test, conducted using the Pearson Product Moment technique, showed that items with a significance value less than 0.05 were declared valid.

Correlations

		SRL1	SRL2	SRL3	SRL4	SRL5	SRL6	SRL7	SRL8	SRL9	SRL10
Total	Pearson Correlation	.431*	.387*	.395*	.350*	.403*	.369*	.601**	.637**	.505**	.610**
	Sig. (2-tailed)	.011	.024	.021	.043	.018	.032	<.001	<.001	.002	<.001
	N	34	34	34	34	34	34	34	34	34	34

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

SRL11	SRL12	SRL13	SRL14	SRL15	SRL16	SRL17	SRL18	SRL19	SRL20	SRL21	SRL22
.581**	.460**	.689**	.575**	.628**	.355*	.385*	.463**	.380*	.403*	.720**	.426*
<.001	.006	<.001	<.001	<.001	.039	.024	.006	.027	.018	<.001	.012
34	34	34	34	34	34	34	34	34	34	34	34

SRL23	SRL24	SRL25	SRL26	SRL27	SRL28	SRL29	Total
.386*	.377*	.604**	.787**	.469**	.432*	.557**	1
.024	.028	<.001	<.001	.005	.011	<.001	
34	34	34	34	34	34	34	34

Figure 1
Validity calculation results

Based on the results of the validity test using the Pearson Product Moment technique, all 29 statements were found to be valid. Therefore, no items were revised or removed, as all statements were valid and adequately represented all the indicators of the self-regulated learning questionnaire.

Reliability Test

After the instrument has been validated, the next step is to conduct a reliability test. Reliability testing can be used to determine the consistency of a measuring instrument, specifically whether it produces consistent results when the measurement is repeated. A measuring instrument is considered reliable if it yields the same results even when the measurement is conducted multiple times. After the validity test is conducted, reliability testing is carried out using the Cronbach's Alpha technique. A research instrument is considered reliable if the Cronbach's Alpha value is > 0.6.

Case Processing Summary

		N	%
Cases	Valid	34	100.0
	Excluded[a]	0	.0
	Total	34	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.892	29

Figure 2
Reliability calculation results

Based on the results of the reliability test for the self-regulated learning questionnaire using SPSS software, the Cronbach's Alpha value obtained was 0,892 indicating that the instrument is in the category "good reliability". Therefore, the self-regulated learning questionnaire is considered reliable.

CONCLUSION AND IMPLICATION

Conclusion

Based on the analysis using the Pearson Product Moment and Cronbach's Alpha on the mathematics Self-Regulated Learning questionnaire through SPSS software, the validity test results using the Pearson Product Moment technique showed that all 29 statements were declared valid. The decision made was that no items needed to be revised or removed, as all statements were valid and represented all indicators of the self-regulated learning questionnaire.

The reliability value of the questionnaire was 0.892, indicating that the instrument has excellent consistency/reliability and is capable of producing accurate data. This instrument is ready to be used to measure students' Self-Regulated Learning, providing educators with insights to design more effective learning strategies that can enhance students' learning motivation. Further research is recommended to modify the instrument and apply it to different sample groups and in other educational contexts.

Implication

The findings of this study imply that the validity and reliability Self-Regulated Learning (SRL) questionnaire can serve as a practical and effective tool for educators and researchers to assess students' self-regulation in mathematics learning. With accurate measurement of SRL, teachers can design more targeted instructional strategies to foster students' autonomy, motivation, and learning effectiveness. Furthermore, this instrument can contribute to the development of educational interventions that aim to enhance students' lifelong learning skills. Future applications of the instrument across different subjects and educational levels may broaden its usability and strengthen the generalizability of the results.

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