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Cross-Cultural Adaptation and Validation of the Self-Regulated Learning Scale for Indonesian University Students

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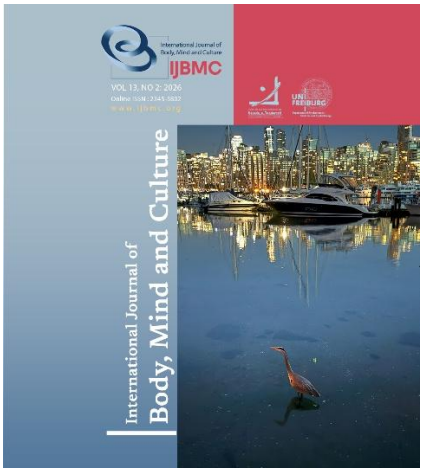

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ABSTRACT

Objective: This study aimed to cross-culturally adapt and psychometrically validate a shortened Self-Regulated Learning (SRL) scale for Indonesian university students.

Methods and Materials: Following established cross-cultural adaptation guidelines, the SRL scale underwent conceptual and cultural analysis, forward translation, synthesis, back translation, expert review, cognitive interviewing, and pretesting (n=55). In the main study, 427 undergraduate students from multiple Indonesian universities were recruited using purposive stratified sampling. Confirmatory Factor Analysis (AMOS) was used to test the factor structure. Items with standardized loadings <0.30 were removed to form a short version. Internal consistency was evaluated with Cronbach's alpha.

Findings: Item reduction yielded a 15-item instrument across five dimensions (metacognitive self-regulation, time/study environment, effort regulation, peer learning, help-seeking). CFA supported the five-factor structure with acceptable fit (GFI=0.937, CFI=0.967, TLI=0.954, RMSEA=0.069), and all retained items met recommended loading thresholds. Reliability was satisfactory to high across the dimensions (α = 0.76–0.89).

Conclusion: The Indonesian 15-item SRL scale demonstrates culturally appropriate content and robust psychometric properties, supporting its use for assessing SRL in higher education settings. Future studies should employ probability sampling and examine test–retest reliability and measurement invariance across student subgroups.

Keywords: Adaptation, Cross-cultural, Psychometric validation, Self-Regulated Learning.

Introduction

University students across the globe face increasing challenges in managing their academic lives, particularly in course scheduling and selecting courses that align with their academic goals and personal needs (Gonçalves et al., 2019). These challenges are often a result of complex scheduling systems, insufficient guidance, and the overwhelming amount of options available, leading to difficulties in making informed decisions (Wahyudin & Pujianto, 2025). In many universities, course selection is not simply a matter of choosing a subject; it is a nuanced process that involves evaluating various factors such as expected academic performance, teaching styles of lecturers, course difficulty levels, and the alignment of courses with students' long-term academic and career goals (Abrar & Rusli, 2025).

The decision-making process is influenced by individual factors, including academic performance, personal interests, and even external pressures, such as peer influence or societal expectations (Sa'adah et al., 2025; Supriyanto et al., 2021). For instance, research by Srivastava et al. (2024) shows that high-achieving students often choose easier elective courses, viewing them as a strategy to maintain high academic performance and reduce the risk of failure (Yunita & Sarajar, 2024). On the other hand, students with lower academic achievements may make suboptimal decisions, such as enrolling in courses that are too challenging for their abilities, which may contribute to stress and burnout (Deng & Li, 2024). This mismatch between students' academic abilities and the courses they select can result in serious consequences, such as a decrease in academic motivation, diminished learning outcomes, and even mental health issues such as anxiety and depression (Mahmudah et al., 2025).

The pressure of course selection is further exacerbated when students lack the necessary self-regulation skills to make informed decisions (Rahayu et al., 2025). Self-regulated learning (SRL) refers to students' ability to independently manage their learning process, which includes setting goals, monitoring their progress, and adjusting strategies based on feedback (Edwards, 2024). Research suggests that students with low levels of SRL tend to struggle with academic tasks, including time management, completing assignments on time, and adapting to the learning material (Mahoney, 2021). Such deficiencies in SRL can hinder students' ability to make strategic academic decisions, leading to increased academic stress and poor performance (Paais, 2025).

SRL is particularly important in higher education settings, where independent learning and self-motivation are crucial for academic success. Madrid-Guijarro et al. (2021) emphasize that SRL helps students navigate the complexities of university life by enabling them to plan their learning effectively, monitor their academic progress, and adjust their strategies when necessary. Students with strong SRL skills are better able to prioritize tasks, manage study loads effectively, and evaluate their strengths and weaknesses before making course selections (Octavianne et al., 2024). This ability allows them to choose courses that align with their personal learning goals and academic strengths, thereby optimizing their overall academic experience (Wiyono et al., 2019).

However, not all students possess the necessary SRL skills to navigate this process effectively. According to Wolters & Hussain (2015), Indonesian students, in particular, face significant challenges in developing self-regulation skills (Supriatna et al., 2024). While some students in Indonesia may have strong intrinsic motivation and independent learning habits, many others lack systematic support to develop these critical skills. This gap highlights the need for tools that can measure and support SRL development in the Indonesian context. Given Indonesia's unique cultural and educational landscape, there is a strong need to adapt existing SRL measurement tools to the local context (Asri et al., 2017).

In recent years, there has been growing interest in adapting and validating SRL scales across diverse cultural and linguistic contexts. Studies have been conducted in Arabic (Kurniawan & Aji, 2025), Chinese (Wells et al., 2018), and Korean (Strating et al., 2011) to ensure that SRL assessments are culturally sensitive and contextually relevant. These adaptations have demonstrated the importance of considering cultural factors, as cultural norms and educational practices deeply influence learning strategies and the way students regulate their learning. For example, in collectivistic cultures such as Indonesia, students may approach learning and academic decision-making differently than in individualistic cultures.

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Despite the growing body of research on SRL adaptations, Indonesia has seen limited efforts to comprehensively adapt SRL scales. While some localized versions of SRL tools exist, they often lack sufficient psychometric validation or fail to account for the unique cultural and structural aspects of Indonesian education. This lack of valid and reliable tools for measuring SRL in Indonesia hinders efforts to understand and improve students' self-regulation skills, which are essential for academic success and mental well-being.

Thus, there is a pressing need to adapt and validate the SRL scale for Indonesian students comprehensively. This study aims to fill that gap by cross-culturally adapting the SRL scale to ensure it is both culturally relevant and psychometrically sound. The research will involve translating the SRL scale, testing its factor structure, and assessing its reliability and validity within the Indonesian context. The findings from this study will not only contribute to the field of educational psychology but also to other fields. Still, they will also provide educators and policymakers with a valuable tool for assessing and promoting SRL in Indonesian higher education.

Furthermore, this study will provide a robust tool for academic institutions, enabling them to measure SRL more accurately, which, in turn, can inform curriculum development, teaching strategies, and interventions to improve students' learning outcomes. In a broader sense, the validated SRL scale will serve as a foundation for evidence-based educational policies and practices, contributing to the development of more effective educational strategies that address the unique needs of Indonesian students. As the educational landscape in Indonesia continues to evolve, particularly with the increasing shift towards online and hybrid learning environments, the ability to measure and support SRL will become even more critical in ensuring that students are equipped to succeed in a rapidly changing academic world.

Methods and Materials

Study Design

This study focuses on the cultural adaptation and psychometric validation of the Self-Regulated Learning (SRL) scale developed by Chen (2002). The adaptation process followed the guidelines for cross-cultural adaptation of measuring instruments recommended by Beaton et al. (2000) and the Commission (2017). In addition, the item reduction process was carried out to refine the scale, with items removed if their factor loadings were lower than 0.30. The justification for removing 16 of the original 31 items is provided through psychometric evaluation to ensure construct coverage remains sufficient.

Participants

The participants were active 5th-semester undergraduate students from various study programs at universities in Indonesia (N = 427). Participants were selected using purposive sampling, stratified by study program, to ensure diversity in the sample. This method was chosen to obtain participants who are representative of the target population. Demographic information, including gender distribution, age range, and fields of study, was collected to assess the generalizability of the findings. The inclusion criteria were that participants were active students and willing to complete the questionnaire, both online and offline.

Instruments

The instrument used in this study is the Self-Regulated Learning (SRL) Scale developed by Chen (2002), based on Pintrich's (1991) theoretical model of Motivated Strategies for Learning. The SRL model conceptualizes self-regulated learning as a cyclical process involving metacognitive, motivational, and behavioral components, enabling learners to take active control of their learning.

Chen's SRL scale originally consisted of 31 items grouped into five dimensions:

1. Metacognitive Self-Regulation – The ability to monitor, control, and assess one's thought processes during a cognitive task (e.g., "I ask myself questions to make sure I understand the material I have been studying in this class").

2. Time and Study Environment – Factors influencing the quality and effectiveness of the learning process (e.g., "I have a regular place set aside for studying").

3. Effort Regulation – The ability to manage and control effort when facing challenging tasks (e.g., "Even when course materials are dull and uninteresting, I manage to keep working until I finish").

4. Peer Learning – Interaction with peers who teach and help each other (e.g., "When studying for this course,

I often try to explain the material to a classmate or friend").

5. Help-Seeking – Seeking support or help from others when facing learning difficulties (e.g., "I ask the instructor to clarify concepts I don't understand well").

All items were rated using a 5-point Likert scale, ranging from 1 = Strongly Disagree to 5 = Strongly Agree for favorable items, and from 1 = Strongly Agree to 5 = Strongly Disagree for unfavorable items.

Data Analysis

The data were analyzed using Confirmatory Factor Analysis (CFA) to test the factor structure of the SRL scale in the Indonesian context. CFA was performed using Amos 29 software. Before CFA, an Exploratory Factor Analysis (Gonçalves et al., 2019) was conducted to explore potential structural deviations in the scale's factor structure when applied to the Indonesian cultural context. Reliability was assessed using Cronbach's alpha as well as composite reliability (CR) and average variance extracted (AVE**)** to ensure convergent validity. The test-retest reliability of the instrument was not assessed, and this limitation is acknowledged in the study.

Ethics

This study received approval from the University Ethics Committee. Informed consent was obtained from all participants before they participated in the study. The data collection process was anonymous, ensuring confidentiality and minimizing risks to participants.

Findings and Results

Item Equivalence

Item equivalence is a critical aspect of the cross-cultural adaptation of psychological measurement tools. It refers to the similarity of meaning and interpretation of items between the original and translated versions in different cultural contexts (Hambleton et al., 2004). In the context of this study, the equivalence of items from the Self-Regulated Learning scale (Chen, 2002) into Indonesian was tested through several stages:

Conceptual and Cultural Analysis

Each item on the measuring instrument was analyzed for its cultural relevance and suitability to the Indonesian higher education context. For example, certain terms or learning practices that are common in the home context may not be familiar or have the same meaning to Indonesian students.

Forward, Synthesized, and Backward Translation

Two linguists and psychologists translated the items from English to Indonesian. The results of the two initial translations were synthesized into a single agreed-upon version, taking into account differences in meaning and terminology. This version was then back-translated into English by a different translator. This process aims to identify distortions of meaning and ensure that the original meaning is preserved.

Expert Review

A panel of educational psychologists, linguists, and college lecturers assessed the extent to which the items in the Indonesian version maintained the semantic, idiomatic, conceptual, and experiential equivalence of the original version.

Cognitive Interviewing

Some university students were piloted to complete the Indonesian version while being asked to explain their interpretation of each item. This step helped to ensure that students interpreted the items as intended in the original version.

Pre-testing

The instrument was tested on a small sample of the target population: 55 participants.

Psychometric Analysis

After pretesting, Confirmatory Factor Analysis (CFA) was conducted to assess whether the emerging factor structure was consistent with the original theoretical model. If items do not load on the appropriate factor, this could indicate structural inequivalence among the items.

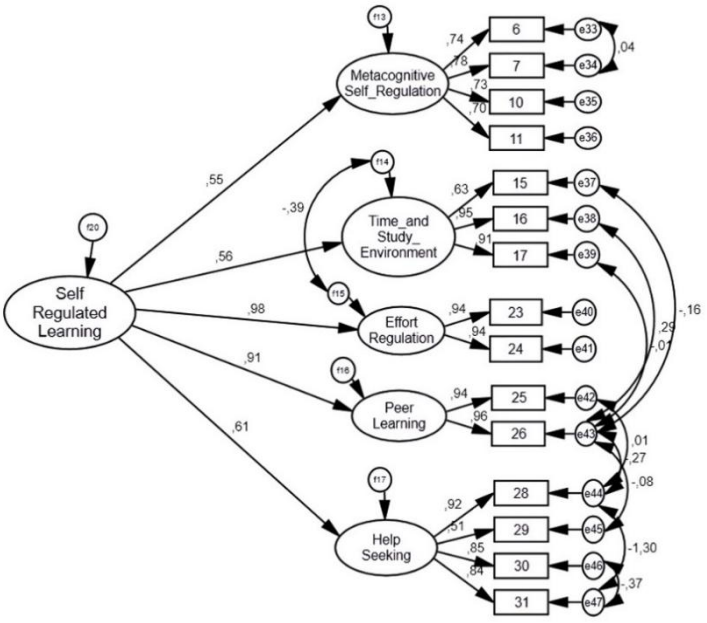
Table 1

Model Fit Indices and Evaluation Criteria

Goodness of Fit Index	Cut-off Value	Model Result	Description
X^2 – Chi Square	Expected to be small	1270.117	Marginal
Sign Probability	≥ 0.05	0.000	Marginal
CMIN/DF	≤ 2.00	1.288	Good
GFI	≥ 0.90	0.876	Marginal
AGFI	≥ 0.90	0.858	Marginal
TLI	≥ 0.95	0.953	Good
CFI	≥ 0.95	0.957	Good
RMSEA	≤ 0.08	0.028	Good

Table 1 indicate that the goodness-of-fit indices for the model reveal a mixed performance. The Chi-square (X^2) value of 1270.117 is considered marginal, indicating some potential issues with model fit. The Sign Probability, expected to be ≥ 0.05, is 0.000, suggesting poor statistical significance. However, other indices show better results: CMIN/DF (1.288), within the acceptable range of ≤ 2.00, and TLI (0.953), CFI (0.957), and RMSEA (0.028), all of which meet or exceed the desirable thresholds for good fit. The GFI (0.876) and AGFI (0.858) fall slightly below the 0.90 cut-off, indicating marginal fit. Overall, while some aspects of the model show good fit, others require attention to improve its overall quality.

The pre-testing instrument identified several items with factor loadings below 0.30, including 1, 2, 3, 4, 5, 8, 9, 12, 13, 14, 18, 19, 20, 21, 22, and 27. Hair & Sabol (2025) mentioned that standardized factor loadings below 0.30 are considered too low and are usually dropped. In addition, some conservative approaches suggest a minimum threshold of 0.25 as an exclusion criterion, especially in scale development or cross-cultural adaptation (Worthington & Whittaker, 2006). Therefore, eliminating items that did not meet this threshold yielded a clearer, more theoretically consistent factor structure and enhanced the construct validity of the Indonesian version of the Self-Regulated Learning scale. After selecting items with high factor loadings, the next step is to test the measuring instrument with a broader range of respondents. The data are then used in psychometric analysis. Multidimensional model that fits the data is presented in Figure 1.



ıt Fits the Data

Figure 1

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The measurement model on this measuring instrument is a multidimensional model with 4 items on the metacognitive self-regulation dimension, 3 items on the Time and Study Environment dimension, 2 items on the Effort Regulation dimension, 2 items on the Peer Learning dimension, and 4 items on the Help-Seeking dimension, so that the total number of items on this measuring instrument is 15. The results for fit parameters showed chi-square = 208.224, df = 2,776, p = 0.000, GFI = 0.937, CFI = 0.967, TLI = 0.954, and RMSEA = 0.069, with Cronbach's alpha coefficients of 0.740. The CFA model meets the criteria for a good fit based on the guidelines of Hair & Sabol (2025), Hu & Bentler (1999), and Kline (2023). These results indicate that the self-regulated learning construct model adapted in the Indonesian context has strong construct validity. The majority of the standardized factor loadings for the indicators are above 0.5, with most close to or above 0.7, indicating strong item contribution to the measured dimension.

The results of this study are consistent with the findings of previous research, such as the work by (Chen, 2002), and further validation by Artino Jr (2012); Bracht & Glass (1968), all of which support the idea that a multidimensional model of self-regulated learning (SRL) can effectively capture the complex self-regulation strategies used by students in higher education contexts. In this study, the majority of factor loadings exceeded 0.6, a strong indicator of each item's contribution to its respective factor (Hair & Sabol, 2025). Furthermore, none of the items had loadings below 0.3, allowing all items to be retained in the final version of the scale. This is an important finding because it enhances the construct validity of the SRL scale in measuring self-regulation among Indonesian students, making the tool highly reliable for this purpose (Ramadhani et al., 2033).

Discussion and Conclusion

Among the measured dimensions, Effort Regulation made the most significant contribution to the SRL construct. This is an important finding, particularly for Indonesian students, who often view maintaining consistent effort throughout the learning process as essential to academic success. This finding aligns with the research of Broadbent & Poon (2015), which identifies effort regulation as one of the most predictive aspects of academic achievement in educational environments. Consistent effort, therefore, plays a crucial role in students' ability to manage their academic workload, overcome obstacles, and maintain motivation, all of which are necessary for success. Studies such as those by Wolters & Hussain (2015), Theobald (2021), and Elhusseini et al. (2022) have also found that effort regulation is particularly beneficial for students with lower initial achievement, where structured effort can help improve performance, boost motivation, and enhance learning outcomes.

However, it is crucial to engage in a deeper, critical reflection regarding the performance of the Effort Regulation dimension. The high performance of this dimension compared to others raises the question of whether it is due to cultural or contextual characteristics specific to Indonesian students. Indonesian students are often culturally conditioned to value perseverance and consistent effort as key aspects of academic success (Siregar et al., 2025). This cultural inclination may contribute to the higher ratings for effort regulation, suggesting that students may place a greater emphasis on the ability to sustain effort over time. Therefore, while the findings are in line with previous research, it is important to consider the potential cultural mismatch when applying this scale to other contexts or populations (Overbeck et al., 2016).

Additionally, while Effort Regulation performed strongly, other dimensions, such as Peer Learning and Help Seeking, made significant contributions but appeared weaker (Javadi-Elmi et al., 2022; Rahayu et al., 2025). These dimensions reflect the social aspects of SRL, which may require further development among Indonesian students. This could be attributed to the more individualistic learning tendencies of many Indonesian students, who often prefer working independently or relying on structured teaching systems (Ardiansyah et al., 2025). Peer learning and help-seeking behaviors, which are essential components of SRL, might be underdeveloped in Indonesian educational contexts due to these individualistic tendencies, underscoring the importance of reconsidering how these dimensions are emphasized in future educational interventions (Simarmata & Mone, 2023).

Given the potential cultural and contextual factors influencing the performance of these dimensions, it is important to explore why certain items related to peer

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learning and help-seeking had to be eliminated (Rahayu et al., 2025). The elimination of items related to these dimensions may suggest they do not fully resonate with Indonesian students' cultural learning practices (Merett et al., 2020). This is particularly relevant because educational tools must reflect the cultural norms and expectations of the population to which they are being applied (Bracht & Glass, 1968).

Another significant implication of these findings concerns the development of collaborative-based academic interventions (Maisyaroh et al., 2023). The Peer Learning and Help Seeking dimensions suggest that there may be room for improvement in the social aspects of SRL among Indonesian students. Collaborative learning, where students engage in group work and share knowledge, can enhance critical thinking, communication, and social skills (Kline, 2023). Collaborative learning has great potential to enhance SRL effectiveness by encouraging students to exchange ideas, challenge each other's assumptions, and work together to overcome academic difficulties. It is also associated with better academic outcomes, as it allows students to engage more deeply with the material and fosters a supportive learning environment (Chakyarkandiyil & Prakasha, 2023; Deng & Li, 2024; Hu & Bentler, 1999).

However, implementing collaborative learning also poses several challenges. For instance, students may have different levels of understanding of the content, which can lead to frustration or conflicts within the group (Asri et al., 2017). Additionally, students may become overly dependent on their peers, which can hinder individual responsibility and accountability (Beaton et al., 2000; Broadbent & Poon, 2015). There may also be resistance to collaborative learning among students who are not accustomed to group-based activities or who feel uncomfortable sharing their learning with others (Beaton et al., 2000). These challenges must be taken into account when designing collaborative learning interventions, and educators should ensure that students receive adequate support and guidance to navigate the complexities of group work.

This study not only supports the validity of the factor structure of the Indonesian version of the SRL scale but also makes significant theoretical and practical contributions to understanding SRL in Indonesian university students. The findings suggest that while the scale is effective in assessing certain dimensions of SRL, further validation is needed to examine the cultural nuances of these dimensions and ensure the tool is adaptable across diverse subpopulations. The SRL scale can be widely applied across various educational settings, including assessments in educational psychology, the enhancement of students' soft skills, and the evaluation of technology-based and hybrid learning programs, which are increasingly becoming the standard in higher education.

This study successfully conducted cross-cultural adaptation and psychometric validation of the Self-Regulated Learning (SRL) scale for Indonesian students. The adaptation process was carried out gradually and methodologically, ensuring the conceptual and linguistic equivalence of each scale item. The results of the Confirmatory Factor Analysis showed that the structure of the five SRL dimensions was well supported in the Indonesian context, as demonstrated by the goodness-of-fit indices meeting the standards (CFI = 0.967; TLI = 0.954; RMSEA = 0.069). All items demonstrated statistically significant factor loadings, and the internal reliability of the subscales ranged from $\alpha = 0.76$ to 0.89. However, it is important to note that the validated scale is a shortened version of the original, which may limit its full applicability. The specific sample context focused on Indonesian students, and the reduced number of items should be considered when generalizing the findings. Given these limitations, further replication studies in different contexts and with larger or more diverse samples are necessary to fully confirm the scale's validity and reliability across various settings.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Ethical considerations in this study included the fact that participation was entirely optional.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contribute to this study.

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