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Influence *Self-Regulated Learning on* Creative Thinking Skills in Modern Hair Bun Styling Material: *Systematic Literature Review*

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Abstract
This study aims to analyze the contribution of Self-Regulated Learning to students' creative thinking skills in modern hair bun styling through a Systematic Literature Review approach. The urgency of this research lies in the vocational education demand for learners who are not only technically skilled but also capable of demonstrating creativity in solving aesthetic problems and producing original modern hair bun designs. This research employs a Systematic Literature Review guided by the PRISMA 2020 protocol, including identification, screening, eligibility, and synthesis of national and international indexed articles published between 2019 and 2024 related to Self-Regulated Learning and creative thinking skills. The findings indicate that Self-Regulated Learning has a consistently positive influence on creativity, particularly through metacognitive processes such as planning, strategy monitoring, and reflection. Results also highlight key supporting factors, including scaffolding, project-based learning, and digital learning environments, while barriers include limited instructional support and unsupportive learning conditions. The study concludes that integrating Self-Regulated Learning systematically into vocational aesthetic education is essential to enhance students' creativity and recommends improving scaffolding practices and implementing project-based tasks as effective strategies.

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1. INTRODUCTION

The development of the creative industry and the 21st-century workforce demands that vocational graduates not only master technical skills but also possess a high level of creative thinking. Creativity is a crucial competency in the field of cosmetology, including in the process of styling modern buns, which requires the ability to connect basic techniques, aesthetics, and design innovation. Learning in the realm of aesthetic vocations cannot rely solely on procedural exercises; it requires cognitive and metacognitive abilities that enable students to produce original, flexible, and artistically valuable work [1]. Therefore, learning strategies that encourage independent learning (*self-regulation*) are becoming increasingly relevant to building students' readiness to face complex practical situations that require creativity.

Self-regulated learning is a learning approach that emphasizes students' ability to set goals, choose strategies, monitor the learning process, and evaluate the results independently. Recent literature shows that *Self-Regulated Learning plays* a significant role in improving higher-order thinking skills, both in online learning, blended learning, and vocational practice [2]. Through the ability to manage their learning process, students are

able to develop cognitive and metacognitive strategies that form the basis for the emergence of creativity, such as the ability to analyze task requirements, design alternative approaches, critically evaluate work, and improve designs independently. A recent meta-analytic study also confirmed that strengthening *Self-Regulated correlated* with increased creativity, especially in activities that are open-ended and require exploration [3].

In the context of vocational education, the relationship between *self-regulated* creativity is increasingly relevant, considering that the practical learning process often involves authentic tasks and projects that require creative decision-making. Research in the fields of engineering, art, and fashion education shows that students with high levels of *Self-Regulated Learning* higher grades tend to be able to produce more original designs and demonstrate better self-evaluation skills [4]. On the other hand, studies at the elementary and secondary school levels show a positive relationship between *Self-Regulated Learning and* creativity in various learning situations, including distance learning, thus strengthening the understanding that *Self-Regulated Learning is* one of the important predictors of the emergence of creativity [5]. However, most of these findings do not specifically describe the dynamics of Self-Regulated *Learning in* the context of learning modern bun styling, which has different aesthetic-motor task characteristics compared to other vocational fields.

In the international arena, studies on *Self-Regulated Learning* vocational education, there is more focus on technical skills or work competencies, rather than on artistic creativity, such as hair styling. Research [1] notes that although vocational students use strategies of *Self-Regulated Learning* in work-based learning, the dimensions that contribute to creativity are still not clearly mapped. This shows that although there is evidence that *Self-Regulated Learning* influences creativity, the mechanism of this relationship in the aesthetic-vocational context remains an area that has not been explored in depth. In other words, there is a gap between general empirical findings regarding *Self-Regulated Learning and* the need for more focused studies on creativity in modern bun styling practices.

The gap is also visible from the heterogeneity of previous research designs that use various creativity indicators (*fluency, flexibility, originality, elaboration*) and model *Self-Regulated Learning differently*, so a synthesis is needed that brings together evidence, compares approaches, and maps key determinants. *Self-regulated learning is* most relevant to enhance creativity in an aesthetic context. There is no systematic *literature review that* specifically studies the influence of *Self-Regulated Learning on* the ability to think creatively about the material of modern bun styling shows the need for this research to provide a comprehensive understanding and evidence-based.

Based on these needs, this research was designed to identify and map the latest empirical evidence regarding how Self-Regulated *Learning* contributes to improving creative thinking skills in learning aesthetic skills, especially modern bun styling. This study also aims to analyze factors that strengthen or hinder the effectiveness of *Self-Regulated Learning in* supporting creativity, as well as formulate evidence-based pedagogical recommendations to integrate strategies *Self Self-Regulated Learning in* vocational learning. By conducting a systematic synthesis, this research is expected to make a significant contribution to vocational education practices, curriculum development, and the direction of future research related to self-regulation and creativity-based learning in the field of cosmetology.

2. RESEARCH METHODS

This research uses the method Systematic *Literature Review,* namely a structured approach that allows researchers to systematically trace, evaluate, and synthesize various empirical findings to obtain a comprehensive picture of the influence of Self-Regulated

Learning on creative thinking skills in learning modern bun styling and other educational contexts. The selection of the SLR method is based on the need to obtain an objective and in-depth understanding of the relationship between the two variables, while also identifying research gaps (*research gap*) and future research directions. Process review in this study follows the guidelines of Preferred *Reporting Items for Systematic Reviews and Meta-Analyses or* PRISMA 2020, so that all stages from study identification to synthesis of findings are carried out transparently, replication can be carried out, and potential bias can be minimized.

The data sources in this study were obtained through searches of several leading, credible, indexed databases, such as Google Scholar, the Sinta journal portal (minimum Sinta 3), Garuda, DOAJ, ERIC, and ScienceDirect. The use of these various databases was intended to ensure that the articles obtained were valid, up-to-date, and relevant scientific publications to the research focus. The search process was carried out by applying methodologically formulated keywords, such as "*Self-Regulated Learning* and creative thinking", "*Self-Regulated Learning* and creativity", "self-regulation learning and creative thinking", and other keyword combinations using Boolean operators.

After the identification stage, all articles underwent a selection process based on inclusion and exclusion criteria. Inclusion criteria were established to ensure the relevance and quality of the study. The articles were published within the last five years (2019–2024), were peer-reviewed journal articles, and were fully accessible (*full text*), indexed at least Sinta 3 or recorded in Google Scholar, and explicitly researched *Self-Regulated Learning and* creative thinking skills in an educational context. Articles that are not in scientific journals, do not present empirical data, do not touch on *Self-Regulated Learning* or operational inconsistencies, or failure to meet methodological standards were excluded at the exclusion stage. Each article that passed was then thoroughly evaluated at the eligibility stage, and only fully relevant articles were included in the final analysis.

The entire literature selection process followed the PRISMA 2020 framework, which encompasses four stages: identification, screening, eligibility assessment, and determination of included articles. During the identification stage, all articles appearing in the search results were collected. Duplicate articles were then removed, and their titles and abstracts were screened to ensure they aligned with the research focus. Relevant articles were thoroughly read to determine whether they met the eligibility criteria. Only articles meeting all scientific criteria were subjected to further analysis.

The analysis process in this study included data extraction, thematic synthesis, and study quality assessment. Data extraction was conducted by collecting detailed information from each article, including author names, year of publication, study objectives, research design, and instruments. *Self-regulated Learning and* creativity used, educational context, and key findings. The data were then analyzed using a thematic synthesis approach to identify important patterns related to the relationship between *Self-Regulated Learning and* creative thinking skills. This thematic analysis allows researchers to identify trends in findings across studies, the most dominant SRL dimensions, and the most researched creative thinking competencies at various levels of education.

This study has several limitations, including the use of a publication range that only covers the last five years, so there may be important theories or findings from studies before 2019 that are not covered. Furthermore, differences in measurement instruments are also present. *Self-regulated learning and* creativity between studies also generate considerable variation, so this study did not conduct a quantitative meta-analysis. However, this SLR still provides a comprehensive overview of research developments. *Self-regulated learning and* creative thinking skills, including the direction of research development that can be carried out in the context of vocational learning, such as modern hair bun styling.

3. RESEARCH RESULTS AND DISCUSSION

3.1.Research result

3.1.1 Identification and Mapping of Empirical Evidence Regarding Contributions to Self-Regulated *Learning* on Creative Thinking Ability

The results of the systematic review show that Self-Regulated *Learning* has a significant contribution to improving creative thinking skills in various educational contexts. Theoretically, the SRL mechanism is in line with the framework of social *cognitive theory of self-regulation* [6], which places the process of planning, controlling actions, and self-reflection as the main components in forming high-level cognitive performance. These self-regulation processes have been shown to support flexibility of thinking, the production of new ideas, and the ability to evaluate alternative solutions – dimensions that are inherently related to creativity.

At the empirical level, a meta-analysis by [7] showed that *Self-Regulated Learning has* a strong positive correlation with creative thinking ability. Mapping of other studies also confirms that *Self-Regulated Learning impacts* higher-order thinking skills, such as critical thinking [8], mathematical problem solving [9], and sustainable independent learning skills (Kusuma, 2020). Thus, the literature confirms that Self-Regulated Learning not only plays a role in improving general learning performance but also serves as a foundation that supports student creativity.

Recent research also indicates an increasing global trend of research on *Self-Regulated Learning in* the last five years. [10] noted that the increase was particularly evident in the areas of digital education, vocational education, and experiential learning. This trend underscores the relevance of this research in mapping empirical evidence linking *Self-Regulated Learning with* creativity, especially in aesthetic learning such as modern bun styling, which requires innovation in form, technique, and aesthetics.

3.1.2 Analysis of Factors that Strengthen and Inhibit Effectiveness of Self-Regulated *Learning* in Supporting Creativity

Literature analysis states that the effectiveness of *Self-Regulated Learning* in increasing creativity is influenced by internal and external factors. The first prominent reinforcing factor is the existence of regulated *learning scaffolding*, which, according to meta-analysis [11], has been shown to improve the ability to manage learning strategies and has a direct impact on academic performance. *Scaffolding* students to develop metacognitive strategies that are important in the creative process.

The second reinforcing factor is a technology-based learning environment, such as smart learning environments. [12] showed that digital environments that provide instant feedback and enable self-monitoring can strengthen self-regulation and creativity. In addition, project-based learning (PjBL) has consistently been found to be an effective pedagogical model for enhancing students' Self-Regulated Learning and creativity [13] due to its nature that demands exploration, creative freedom, and self-evaluation.

However, the literature also identifies several inhibiting factors. Lack of instructional feedback and the suboptimal role of teachers in facilitating self-regulation have been significant obstacles, as indicated by [14]. Social support from peers also plays an important role; without such support, the ability of *self-*

regulated vocational students is hampered [15]. Other obstacles include a lack of intrinsic motivation and a procedural learning environment, which also limits students' opportunities to develop creative ideas, especially in aesthetic learning, which requires freedom to experiment.

3.13 Formulating Evidence-Based Pedagogical Recommendations for Integration of Self-Regulated *Learning* in Vocational Learning

Based on a synthesis of empirical findings, this study formulates pedagogical recommendations that can be applied in vocational learning, including the subject of modern bun styling. First, learning instructions need to explicitly include the stages of *Self-Regulated Learning*, including independent planning, strategy monitoring, and self-reflection. This is in line with the results of the study [16], which confirmed that integration *of Self-Regulated Learning* structured learning can significantly improve academic achievement.

Second, project-based or creative product-based learning models are highly recommended because they provide ample space for aesthetic exploration and have the potential to enhance creativity. The integration of PjBL in modern bun learning allows students to develop designs, solve technical problems, and evaluate their work independently, as demonstrated by its effectiveness in enhancing Self-Regulated Learning in vocational junior high school students [13]. Third, the strategy scaffolding and the provision of formative feedback need to be strengthened, following the recommendations [11] to help vocational students develop self-control and reflective thinking. In addition, learning needs to create a supportive social environment, as peer support has been shown to have a strong influence on effectiveness. *Self-Regulated Learning* [15].

As a basis for confirming the consistency of research results, a review of previously published empirical findings is required. *Self-Regulated Learning* and creative thinking skills. This review serves to demonstrate the patterns of interrelationships between publications, methodological tendencies, and the contribution of each study to strengthening the arguments in this research. The following table presents a summary of relevant previous research and serves as an analytical basis for the discussion section.

Table 1. Relevant Research

No	Researcher (Year)	Research Focus	Key Findings	Relevance
1	Bandura (1991) [6]	Self-regulation theory	SRL was built through forethought *performance reflection*	Theoretical basis of SRL
2	Nugroho & Ardani (2023)[7]	Meta-analysis of SRL creativity	SRL has a significant influence on creativity	Main empirical basis
3	Apriyanto et al. (2025) [8]	SRL & critical thinking	SRL enhances HOTS capabilities	Supporting SRL creativity relationships
4	Ansari & Saleh (2021) [9]	SRL in mathematical HOTS	SRL strengthens problem-solving strategies	Relevant to the creative process
5	Shao et al. (2023) [11]	Scaffolding & SRL	Scaffolding improves SRL & performance	SRL reinforcing factors

No	Researcher (Year)	Research Focus	Key Findings	Relevance
6	Gambo & Shakir (2021) [12]	SRL in*smart learning*	The digital environment strengthens SRL	Relevant for modern vocations
7	Kusuma (2020) [17]	SRL online	Online increases independence	Supporting SRL in a digital context
8	Azizah (2021) [14]	SRL & learning satisfaction	The role of the teacher influences SRL	Inhibiting/strengthening factors
9	Wasono & Suciati (2024) [13]	PjBL & SRL vocational	PjBL enhances self-regulation & creativity	Very relevant for aesthetic learning
10	Judijanto (2025)[10]	SRL publication trends	Significant increase in SRL research	Strengthening the urgency of research
11	Perdana et al. (2024) [16]	SRL & achievements	SRL is a strong predictor of learning success	Basis for pedagogical recommendations
12	Khusniyah & Widyastuti (2022) [15]	Social support & SRL	Peer support improves SRL	Social factors in SRL
13	Li, T, et al., 2025 [18]	Interaction between learning strategies, SRL scaffolding & learning performance	Findings that LA-based scaffolding + effective learning strategies improved learning performance; the interaction effect was significant.	Providing an empirical basis that scaffolding (instructional support) strengthens SRL outcomes is important for instructional design.
14	Wang, X, et al., 2025 [19]	Creativity of learning strategies in SRL & its relationship with academic performance	Creativity in strategies (fluency, flexibility, originality, usefulness) and self-monitoring have been shown to improve academic performance; self-efficacy mediates this relationship.	The extension of the SRL framework shows that creativity in learning strategies is an important dimension in modern SRL.
15	Hilda Ashari, Vitalocca & Nuridayanti (2024) [20]	Implementation of internet-based SRL for students	Internet-based SRL improves students' learning independence	Relevant in the modern digital/online learning context
16	Rafika Rahmadani, Rohmah & Vovi Sinta B (2022) [21]	SRL and academic skills of MA students	SRL contributes to students' academic skills	Relevant as an indicator that SRL supports general academic ability, not just one subject
17	Fidya Rahmayani, Bahar, Pangesthi &	SRL & Self-Efficacy on Vocational Learning	There is no significant influence of SRL & self-efficacy on learning outcomes ($R^2 \approx 4.5\%$)	Shows that SRL alone is not always sufficient, considering other variables (e.g,. facilities, motivation, vocational context)

No	Researcher (Year)	Research Focus	Key Findings	Relevance
	Miranti (2025) [22]	Outcomes (Culinary)		
18	Tingting Zhang (2024) [23]	Self-regulation strategies, motivation, self-efficacy, and creativity in EFL learners	Self-regulation strategies increase motivation, self-efficacy, willingness to communicate, and language creativity.	Adding SRL dimensions to creativity and communicative skills, not just academic ones

3.2.Discussion

The findings of this study confirm that *Self-Regulated Learning has* an essential role in encouraging student creativity, including in learning aesthetic skills such as modern bun styling. Based on self-regulation theory [6], creative activities cannot be separated from students' ability to set goals, strategies, and self-evaluation. This activity is closely related to creating bun designs that require new ideas, form innovation, and aesthetic decision-making.

Literature mapping shows that the metacognitive dimension in *Self-Regulated Learning is* a dominant factor that influences creativity [7]. This dimension allows students to assess, improve, and develop ideas independently. Contribution: *Self-regulated learning. Higher-order* thinking skills are also seen in the improvement of critical thinking and problem-solving skills (Apriyanto et al., 2025; Ansari & Saleh, 2021), which are an integral part of the creative process in hairdressing.

The discussion also shows that the effectiveness of *Self-Regulated Learning is* strongly influenced by contextual factors. Findings [11] emphasize the importance of scaffolding in strengthening self-regulation strategies, while digital learning environments [12] support self-monitoring and creative exploration. In a vocational context, project-based learning [13] is effective in enhancing student creativity because it provides space for exploration of techniques, variations in form, and critical evaluation of work. However, barriers such as low instructional support [14] and minimal social support [15] can reduce the potential for SRL to generate creativity. This shows that creativity does not only depend on internal self-regulation, but also requires a conducive and supportive learning environment.

Overall, this discussion shows that *Self-Regulated Learning provides* a real contribution to increasing the creativity of vocational students, and its integration into modern bun learning can strengthen the ability of aesthetic exploration, reflective evaluation, and design innovation.

4. CONCLUSION

Integration of *Self-Regulated Learning has* been shown to play a strategic role in developing creative thinking skills in various educational contexts. Self-regulation mechanisms, including goal setting, strategic planning, monitoring the learning process, and reflection, encourage students to generate more varied ideas, conduct independent evaluations of the quality of their ideas, and demonstrate the flexibility of thinking that is at the heart of creativity. Recent studies have shown that students who have this ability *Self-Regulated Learning* with high levels tend to display stronger, more adaptive, and more consistent creative performance when faced with tasks that demand innovation.

The effectiveness of *Self-Regulated Learning,* encouraging creativity, is reinforced by several learning elements, particularly the presence of self-regulatory scaffolding, digital

learning environments that enable autonomy and self-monitoring, and project-based learning approaches that provide space for exploration and experimentation. These three elements repeatedly appear in the literature as catalysts for increased creativity. Conversely, limited instructional support, minimal reflective feedback, low social support, and overly procedural learning structures have been shown to inhibit the full activation of self-regulated learning and ultimately limit students' creative potential.

This synthetic overview emphasizes the urgency of implementing the Self-Regulated Learning systemically in vocational learning, particularly in the aesthetic realm, such as modern bun styling, which demands creative, innovative, and reflective thinking skills. Learning designs that provide opportunities for students to plan, monitor, and evaluate the creative process, combined with authentic projects and adaptive instructional support, have the potential to be an effective pedagogical framework for improving the quality of creative abilities. These findings provide a strong theoretical and empirical foundation for the development of more innovative and evidence-based vocational learning models.

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