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APPLICATION OF THE CREATIVE PROBLEM-SOLVING MODEL TO IMPROVE PROFESSIONAL COMPETENCE IN HAIRDRESSING

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ABSTRACT

This study aims to examine the effectiveness of the Creative Problem Solving (CPS) learning model in improving professional competence in hairdressing for beauty students. This research is based on the need for vocational education to develop creative thinking skills, technical skills, and professional work attitudes in response to the demands of the beauty industry. The study used a quasi-experimental design with a non-equivalent control group involving 100 students of the Beauty Cosmetology study program at Semarang State University. Data were collected using an observation sheet, a hairdressing work assessment, and a professional work attitude questionnaire. The results showed a significant difference between the experimental class that applied CPS and the control class that used conventional methods. The experimental group achieved higher improvements in cognitive aspects, psychomotor skills, and affective aspects. Therefore, CPS proved to be an effective pedagogical approach to improve learners' readiness to face professional challenges in hairdressing.

Keywords: Creative Problem Solving, professional competence, hairdressing, vocational education.

INTRODUCTION

The 21st century is characterized by globalization, which brings rapid changes in social, economic, technological, and industrial fields. These changes require vocational education to prepare graduates with competencies relevant to the labor market. Vocational education is not only focused on mastering technical skills, but also emphasizes creative thinking, problem solving, professional communication, and adaptive work attitudes. In line with van Hooijdonk et al. (2020), which states that Vocational education has an important role in preparing human resources who have specific skills and are ready to work in accordance with certain fields of expertise.

One sector that is growing rapidly and requires skilled professionals is the beauty industry, especially in the field of hairdressing. The beauty industry demands graduates who not only master technical skills but are also able to innovate, think creatively, and have good work ethics. Kiong et al. (2022) highlighted that communication skills, professional appearance, and procedural competence are important factors to ensure sustainability in the beauty industry. Therefore, vocational education should thoroughly integrate technical expertise with creative and problem-solving skills. This is in accordance with the goal of vocational education, which is to prepare students for the job market with up-to-date professional knowledge, ranging from basic skills, problem-solving skills, to appropriate work attitudes, job skills, technical skills, and other vocational skills Ju-Hsuan et al., 2020). Professional abilities in vocational education not only include mastery of psychomotor skills, but also include cognitive aspects such as problem solving, as well as affective aspects such as work attitudes, ethics, and responsibility. Learning is carried out by linking learning materials with actual and contextual work problems related to industrial production processes (Sudira, 2020).

However, in practice, vocational education in cosmetology still tends to rely on demonstration or procedural approaches, leaving little room for creative exploration. As a result, students are less trained to think critically and independently when faced with complex work situations. To address this gap, a learning model is needed that can foster creativity, systematic problem solving, and a professional work attitude. This is in accordance with the characteristics of the CPS model developed by Osborn and Parnes, which is carried out through 4 stages, namely: (1) understanding the problem, (2) generating ideas, (3) planning actions, and (4) implementing solutions (P. Chen & Chan, 2021).

The Creative Problem Solving (CPS) model emphasizes the creative identification of problems, the creation of several alternative solutions, and the systematic implementation of the best solution. According to Missikoff et al. (2015), CPS is an open-ended exploration method that stimulates diverse ideas and perspectives, with a focus on identifying and refining promising solutions. CPS integrates divergent and convergent thinking in a cyclical and interconnected process (Kim et al., 2019).

The application of CPS to beauty education can guide students through projects based on case studies, style trends, or client needs. This is confirmed by Van Hooijdonk et al. (2023). CPS is a process of creative and critical thinking in developing something new, which requires creative effort through the process. It helps to redefine problems

and opportunities encountered, generate innovative solutions, and take action. This process not only improves technical skills but also trains students to think flexibly, innovate, and act responsibly in a professional context. Creative thinking and problem-solving skills are tools that can be used to deal with different types of unfamiliar problems that can enhance constructive and adaptive behaviors in new and demanding environments (Isaksen, 2023). In addition, CPS has the potential to foster positive attributes such as independence, teamwork, ethics, and interpersonal communication (S. Y. Chen et al., 2021). Therefore, CPS is considered an effective pedagogical alternative to strengthen professional competence among beauty students.

METHOD

This study employed a quasi-experimental design using both quantitative and qualitative approaches. This mixed method approach not only combines numerical and non-numerical data but also integrates both analyses to gain deeper insights.

The research subjects consisted of 100 students of the Cosmetology Study Program at Semarang State University who took the hair styling course. The students were divided into two groups: experimental class and control class. The experimental class was treated using the Creative Problem Solving (CPS) learning model, while the control class continued to use conventional methods in the form of lectures and demonstrations.

The instruments used in this study are as follows:

1. Written tests (pretest and posttest) consisting of 30 multiple-choice questions to measure cognitive competence, especially creative thinking and problem-solving skills, which include: (a) understanding the problem, (b) generating ideas, (c) action planning, and (d) solution implementation.

2. A professional attitude questionnaire with 20 questions to assess affective competencies, including work attitude, interest, responsibility, time management, and work ethics.

3. A performance test using a rubric with a scale of 1-4 to measure psychomotor skills in hair styling, based on indicators of proportion, balance, rhythm, emphasis, and harmony.

Instrument validity was tested using Product-Moment Correlation at the 0.05 significance level. The results showed an r-table value of 0.361, indicating that all items were valid. Reliability was assessed using Cronbach's Alpha, resulting in a coefficient of 0.950 (>0.7), which indicates excellent internal consistency.

Data analysis procedures included:

1. Prerequisite tests (normality and homogeneity tests).
2. Hypothesis testing using an independent sample t-test.
3. Calculation of N-Gain values to measure improvements in cognitive and affective competencies.
4. Descriptive percentage analysis to assess psychomotor skills, using the following interpretation criteria:

Table 1. Criteria for professional competence percentage

Interval %	Criteria
80 – 100%	Very high
60 – 79%	High
40 - 59%	Medium
20 – 39%	Low
0 - 19%	Very Low

This methodology was chosen to provide an objective picture of the effectiveness of the application of CPS in improving students' professional competence in the field of hairdressing.

RESULTS AND DISCUSSION

For ease of reading and comprehension, findings are presented first, followed by discussion. It should provide a concise and precise description of the experimental results, the interpretation, and the conclusions that can be drawn. The Findings subtitle and Discussion subtitle are presented separately. This section should occupy a minimum of 60% of the whole body of the article.

1. Pretest and Posttest Results (Cognitive Domain)

Table 2. Average pretest-posttest scores in cognitive aspects

Group	Average Pretest	Average *Posttest*	*N-Gain*	%	Criter
Experiment	11,04	26,6	0,82	82%	very high
Control	9,96	20,78	0,53	53%	medium

2. Questionnaire results of work attitude (Affective aspect)

Table 3. Average Pretest-Posttest Score of Affective Aspects

Group Pretest	Average	Average *Posttest*	*N-Gain*	%	Criter
Experiment	48,4	73,8	0,80	80%	very high
Control	37,76	56,6	0,45	45%	medium

3.   Performance Test Results (Psychomotor aspect)

Table 4. Performance of psychomotor aspects

Indicator	Experiment (%)	criteria	control (%)	criteria
Proportion	84	very high	62	high
Balance	84	very high	64	high
Rhythm	83	very high	69	high
Emphasis	84	very high	57	high
Harmony	84	very high	61	high
Average	**84,** very high		**63,** high	

The results showed that the application of the Creative Problem Solving (CPS) model provided a significant increase in student competence in three aspects, namely cognitive, affective, and psychomotor.

1.   Improvement of Cognitive Competence

The findings of this study indicate a significant increase in students' cognitive competence in the experimental group taught using the Creative Problem Solving (CPS) model. Quantitatively, the pretest average score increased from 52.4 to 89.6 on the posttest, resulting in an N-Gain of 82% (very high category). In contrast, the control group only increased from 50.8 to 68.2, with an N-Gain of 53% (medium category). These statistical results clearly show that CPS provides superior results in improving students' ability to understand, analyze, and apply knowledge in the hairdressing course compared to conventional teaching methods.

This improvement can be well understood by looking at the stages of CPS in detail. At the problem understanding stage, students are trained to identify, analyze initial conditions, and define hair styling problems more systematically, such as face shape, hair type, or client needs. This stage trains analytical skills and understanding of basic hair styling concepts. It is also stated (P. Chen & Chan, 2021). CPS is the process of intentionally encouraging the type of thinking required to effectively solve complex problems. For example, when given the case of a client with thin hair and a round face, students must articulate the main problem: how to design a hairstyle that creates volume while balancing facial proportions. As Park (2020) states, hair design is a series of processes used to create various shapes by utilizing lines and faces. It is also a method that prioritizes harmony, balance, proportion, emphasis, etc., in accordance with current fashion styles or trends. This step is aligned with Bloom's taxonomy, specifically the analyzing level, as students move beyond memorization towards decomposing real-world problems into their essential components. In line with the research of Dumas et al. (2016), cognitive abilities that underlie the design process can develop better abilities to support learners' creative problem-solving performance.

In the idea generation stage, students are asked to discuss and explore their knowledge in order to generate creative ideas and ideas that might be used as solutions to solve the problem of producing various alternative hairstyles. This process encourages students to think divergently, creatively, and critically in obtaining facts that are most relevant to the target and proposing various potential solutions. Conceptual knowledge is used as the basis for ideation, where one or more solutions to the problem are developed (Basadur et al., 2014). According to Van Hooijdonk et al. (2023)This stage is crucial in developing fluency, flexibility, and originality in students' thought processes. In vocational education, where innovation is increasingly demanded by industry, the ability to generate a range of alternatives is indispensable. For example, in contemporary salons, clients often expect not only technical expertise but also unique and personalized design solutions, which can only arise from creative ideas. This is also stated by Byeon & Koo (2020) As hair designers also need to know and apply new hair trends and techniques, perform appropriate procedures and treatments according to the customer's hair condition. Learners are expected not only to solve problems but also to express personal style while maintaining professional standards.

Based on the discussion, some suggested layer cuts, others recommended blow-dry techniques to add volume. The group discussion also generated other ideas, such as the use of light hair color on the top to give the impression of more volume. This process trains students to think divergently and creatively without fear of being wrong, according to the main principle of CPS. This is in line with the research of Kim et al. (2019) Who emphasized that CPS can facilitate divergent and convergent thinking processes in a balanced manner, encouraging the birth of new relevant ideas so that students are better prepared to face professional challenges. Thus, CPS not only improves cognitive learning outcomes quantitatively but also strengthens students' ability to identify problems and generate innovative ideas.

The action planning stage provides an opportunity for students to critically evaluate the feasibility, practicality, and aesthetic value of each proposed idea. According to Yun et al. (2022), planning actions in hairdressing needs to be based on the desire for beauty that is increasing with the changing times, and the public values created related to economy, politics, culture, art, and in line with the 4th industrial revolution, trends such as art, fashion, and beauty are changing. With changing lifestyles and trends, hair designers can suggest ways to create designs that are creative and contribute to public values. In this study, college students discussed the advantages and disadvantages of various hairstyles for thin hair, taking into account factors such as ease of maintenance, suitability to the face shape, and alignment with current fashion trends. This is in accordance with the research of Park (2018); in planning hair styling actions, one must pay attention to the face shape that a person has. Shape is a must-have competency for hairdressers as it is a basic element that is directly connected to formative factors and creativity in the hair design process. According to Yun et al. (2022), in designing hairstyling, one should consider the emotional and physical aspects of customers, complementing their weaknesses and accentuating their strengths to fulfill functionality as well as beauty. Thus, this collaborative evaluation embodies convergent thinking, where students synthesize multiple perspectives to choose the most rational solution.

Finally, at the solution implementation stage, students put the selected ideas into practice. Although this stage is usually associated with psychomotor learning, it also involves cognitive elements, especially decision making and problem anticipation. In line with Basadur et al. (2014) Stated that implementation as a completion of the creative process requires cognitive activity, at this stage, it consists of testing new solutions, evaluating the results, and making adjustments if needed to implement them successfully. While Dumas et al. (2016) Shows the cognitive abilities that underlie the design process, and can develop better abilities to support learners' creative problem-solving performance. For example, when the chosen hairstyle design does not achieve the expected results, students must quickly reassess their approach, utilize theoretical knowledge, and make adjustments in real-time.

The cognitive gains observed in this study were not limited to hair styling techniques but extended to broader problem-solving and decision-making skills. Similar results have been reported in other domains. Wolcott & McLaughlin (2020) Found that CPS enhanced Pharmacy students' ability with innovative ideas needed to address complex problems in pharmacy education. Likewise, the implementation of CPS on chemistry learning in 48 high school students in Taiwan proved to be effective in improving concept understanding of chemical techniques and products, building creative ideas, and developing a holistic view of the function of chemical knowledge. (S. Y. Chen et al., 2021). These studies, together with existing findings, suggest that CPS transcends disciplinary boundaries and develops higher-order cognitive skills essential for 21st-century professionals. This suggests that CPS can be combined with holistic problem framing and unlock the quality of problem-solving through insights to find more effective solutions. (P. Chen & Chan, 2021)**.**

In addition, CPS contributes to the development of students' metacognitive awareness of their own thinking processes. During group discussions in this study, students often verbally articulated why a particular idea may or may not work, thus engaging in self-regulation and monitoring of cognitive strategies. In the beauty industry, this metacognitive capacity is particularly important as hairdressers must constantly adapt their knowledge to the specific needs and preferences of diverse clients. It is also emphasized by Pisngot & M Cabaguing (2024) The beauty services industry requires strong professional awareness and individual competence, with levels of skills, knowledge, and attitudes correlated with job satisfaction.

Another noteworthy aspect is the integration of digital literacy into cognitive development. In some sessions, students were encouraged to explore online resources, professional hairdressing platforms, and social media trends to support their idea generation and evaluation. This practice aligns with the 21st-century skills framework, specifically information literacy and digital problem solving. By combining CPS with digital exploration, the students not only solve immediate problems but also learn how to continuously update their knowledge base in response to rapidly evolving industry trends. This is in line with the research of Byeon & Koo (2020)**Hair** designers are required to have comprehensive information processing capabilities. Thus, in creating creative ideas, learners must understand the changes and developments that occur in society so that they can find facts related to the problem and find essential information about the problem being identified.

These findings confirm that CPS not only improves measurable learning outcomes but also fosters higher-order thinking skills required in vocational education. As the beauty industry becomes increasingly competitive and innovation-driven, graduates equipped with such cognitive competencies are better equipped to succeed and adapt in local and global contexts.

2.   Strengthening Affective Competencies

The affective domain, which includes values, attitudes, and interpersonal skills, showed remarkable improvement in the experimental group using the Creative Problem Solving (CPS) learning model. The average posttest score for affective competence reached 82, with an N-Gain of 80% (very high category). In contrast, the control group only achieved an average of 61, with an N-Gain of 45% (medium category). These findings suggest that CPS is highly effective in fostering not only technical mastery but also positive attitudes and professional dispositions that are important in cosmetology.

This improvement is closely related to the stages in CPS, at the problem understanding stage - the beginning of the learning process, students are encouraged to clarify the problem by identifying the client's needs, preferences, and context. For example, when tasked to design a hairstyle for a bride from a traditional Javanese wedding, students must recognize not only the technical aspects but also the cultural values embedded in the event. This

stage encourages sensitivity, empathy, and respect for diversity, key components of the affective domain. This is in accordance with research. Park (2018)The position and shape produced by styled hair requires an understanding of the fit, balance, line, movement, softness, and strength of shape and appearance, as well as authenticity, which need to be determined for styling requirements to be met. By placing tasks in real-life cultural scenarios, learning becomes more meaningful as students are emotionally engaged and empathize with the context of the problem. CPS guides students to internalize respect for the client's identity and traditions, an attitude that is indispensable in the service industry.

At the stage of generating ideas, CPS encourages students to work together in evaluating various ideas and choosing the best idea. Students are required to discuss in groups in order to obtain the best solution. This process trains social skills such as respecting each other's opinions, accepting criticism, and being open to different ideas. In addition, this stage also forms a shared responsibility in making decisions. This finding is in line with Missikoff et al. (2015). CPS is an open exploration or search for ideas to generate many new and diverse ideas and new perspectives, and then focuses thinking by identifying ideas with interesting or exciting potential to be refined, developed, and utilized.

For example, when one group was working on a hair styling case for a client who was going to a formal event, several ideas emerged: one student suggested a classic bun, another proposed a modern styling with soft curls, while another proposed a braided bun. In the discussion, students whose initial ideas were not chosen were still encouraged to contribute to the solution. This fosters an attitude of respect, humility, and the ability to accept group decisions gracefully. In accordance with S. Y. Chen et al. (2021), who emphasized that CPS fosters intrinsic motivation, emotional involvement, and self-confidence in students. With CPS, students not only learn to style hair, but also learn *how to work with others*, an effective skill that is very relevant to the world of work, especially the beauty industry, which demands friendly service, good interpersonal communication, and the ability to understand client needs. This is also confirmed by Kiong et al. (2022) Communication skills are one of the skills that must be mastered by beauty students, which are very important in the future.

Action planning stage. During this stage, students work collaboratively to evaluate and refine the ideas generated earlier. In the case of bridal hairstyles, they weigh the practicality of maintaining hair volume for a long ceremony, the symbolic meaning of certain accessories, and client comfort. Through structured discussions, students learn how to communicate persuasively, negotiate respectfully, and resolve differences of opinion constructively. This process fosters professional responsibility. For example, one group decided to combine a traditional Javanese bun with lighter modern accessories to ease the client's movement. Students are responsible not only for the technical outcome but also for the overall client experience. This is also stated by Byeon & Koo (2020)**Hair** designers not only create hair beauty but must also understand information about the customer's desires, personality, and occupation, as well as the condition of the hair, to create a suitable hairstyle through accurate hair care procedures and methods. Thus, this activity reflects Krathwohl's affective taxonomy specifically at the "judging" and "organizing" levels, where students internalize values and prioritize those values in decision-making.

Furthermore, at the solution implementation stage, students implement the solution that has been chosen together. For example, the group finally decided to use the braided bun style. During the styling process, students are required to show discipline, patience, and cooperation. Group members divide roles-some prepare the equipment, some focus on the braid technique, and some ensure that the overall aesthetic remains in line with the concept of the formal event. This process reinforces responsibility, caring, and professionalism. This is in line with S. Y. Chen et al. (2021) research, which states that the implementation stage of CPS stimulates intrinsic motivation and emotional engagement, as students see their collaborative ideas materialize into tangible results. This sense of accomplishment strengthens confidence and commitment to high-quality service.

In the beauty industry, customer loyalty is often determined not only by technical skills but also by a makeup artist's ability to empathize, communicate, and provide an emotionally satisfying experience. Graduates who have practiced CPS are thus more likely to excel in building positive client relationships and maintaining long-term professional success. The beauty services industry requires strong professional awareness and individual competencies, with higher levels of skills, knowledge, and attitudes correlating with greater job satisfaction among beauty services workers. (Pisngot & M Cabaguing, 2024). Thus, CPS not only improves cognitive outcomes but also shapes professional attitudes and interpersonal qualities that are essential for cosmetology students to thrive in the real industrial world. Thus, CPS plays an important role in shaping students' affective competencies, especially in terms of professional attitudes, work ethics, and social sensitivity. These competencies are often the key differentiators between an average workforce and an excellent workforce in service industries such as beauty.

3.   Development of Psychomotor Competence

The psychomotor aspect, which emphasizes physical skills, coordination, and technical execution, also showed significant improvement among students who studied with the Creative Problem Solving (CPS) model. The experimental group achieved an average score of 84% in the psychomotor performance assessment, compared to 63% in the control group. This assessment was based on criteria such as proportion, balance, rhythm, emphasis, and harmony in hair styling. These findings confirm that CPS not only sharpens students' theoretical knowledge and attitudes, but also improves their technical proficiency in hairstyling practice.

In the psychomotor domain, clarifying problems often involves recognizing specific technical challenges encountered during hairdressing. For example, when faced with a client who has coarse, unruly hair, students first identify the main problem: how to create soft curls that will last without causing hair damage. This stage requires

the students to diagnose the texture, porosity, and condition of the hair before deciding on the right technique. By analyzing these technical challenges, the students strengthened their ability to align theoretical understanding with practical execution. Once the problem was clarified, the students brainstormed different variations of the technique. For example, they consider whether to use a curling iron, hot rollers, or a curling method, and discuss the use of a heat shield or setting spray. Some even suggested adjusting part sizes or experimenting with temperature levels.

This stage allows students to explore creative variations in technical application. Missikoff et al. (2015) Emphasizes that CPS provides ample exploration space for students to test, adapt, and even combine different methods. By generating multiple options, students avoid rigid reliance on a single formula, instead fostering flexibility-a hallmark of a skilled stylist. In developing solutions, students collaboratively evaluate which styling techniques are most effective given the client's hair condition and desired outcome. For example, after weighing the risk of heat damage, one group decided to use a medium-heat curling iron with smaller sections, combined with a protective serum and cold air set.

This evaluation process hones critical psychomotor decision-making. Rather than simply mimicking the teacher or instructor's demonstration, students must justify their choices based on technical feasibility and aesthetic goals. The implementation stage requires students to execute the chosen technique with precision, coordination, and artistry. For example, when performing the medium heat curling method, students must carefully control tension, angle, and duration while maintaining client safety and comfort. This process demands fine motor skills, steady eye-hand coordination, and time management. Besides precision, this stage also fosters creativity. Some students improvise by incorporating hair accessories or varying the direction of the curls to produce more dynamic results. This shows that psychomotor competence under CPS is more than just mechanical execution; it integrates artistry with technical skills. Hyeon-Kyeong & Kyu-Hwa (2006) in their research stated that the beauty of hair styling consists of form, proportion, line rhythm or balance, symmetry, and asymmetry. The shape produced by one form superimposed over another, and the effect of the associated lines, are the basis of artwork and hairdressing. During the group exercise, teamwork was also evident. While one student curls a section of hair, another applies the styling product, and another checks the overall symmetry. This collaborative implementation reflects real-world salon practices where hair styling often requires distributed roles.

This improvement was mainly related to the solution implementation stage in CPS. At this stage, students implemented the results of ideas and solutions that had previously been developed through group discussions. They not only follow the teacher's instructions, but also improvise based on the results of the previous analysis. Teachers can help learners to develop problem-solving strategies, because thinking does not just happen, but needs to be trained and practiced. All learners should be able to develop creative problem-solving skills through teaching, support, and practice. (P. Chen & Chan, 2021). For example, when the group decides to apply curl styles to clients with stiff and unruly hair, students are required to master the technique of using a curling iron, setting the temperature of the tool, and selecting hair protection products so that the results remain neat and do not damage the hair texture*. In accordance with the research of (Byeon & Koo, 2020)Hair designers not only create hair beauty but also must understand information about customers' desires, personalities, and occupations, as well as hair conditions, to create suitable hairstyles through accurate hair care procedures and methods.

This real-life situation makes students practice fine motor coordination, work speed, and accuracy. They also learn improvisation; for example, if the first curl is not symmetrical, students must immediately adjust their technique without panicking. This trial-and-error process becomes a meaningful learning tool, as students are not just copying the instructor's steps, but actually solving real problems in the field.

This implementation stage also trains aesthetic skills. Students are required to integrate the theory of proportion and balance with real results that can be appreciated visually. In his research Park (2018) Stated that the position and shape produced in hair styling require an understanding of suitability, balance, line, movement, softness, and strength of shape and appearance, as well as originality, so that styling requirements can be met. In certain cases, students even added variations, such as embedding hair accessories to make the style look more elegant. This shows that CPS encourages students not to stop at basic skills, but to develop creativity in producing unique works.

In addition, since the early stages of CPS (clarifying the problem and generating ideas), students have been involved in analyzing client needs. Therefore, when it comes to the implementation stage, they are more confident and understand the context of the work done. This process strengthens psychomotor skills as well as adaptability, important aspects in the world of work. This is also stated by Basadur et al. (2014)Implementation, as completing a creative process, involves cognitive activities that consist of testing new solutions, evaluating the results, and making adjustments if needed to implement them successfully.

This finding supports Missikoff et al. (2015) Statement, which emphasizes that CPS provides a wide exploration space in practical skills so that students can be more flexible, innovative, and not stuck to standard patterns. Thus, CPS not only enhances students' technical skills but also equips them with improvisation and innovation abilities that are much needed in the ever-evolving beauty industry. Kiong et al. (2022), stated that aspects of communication skills, beautician appearance, and procedural skills are among the most important features in ensuring that the beauty industry can survive longer.

The enhancement of psychomotor competencies through CPS has strong implications for vocational education. In the beauty industry, technical mastery is a basic expectation, but what distinguishes outstanding professionals

is their ability to improvise and innovate under various client conditions. CPS-trained students are more adaptable in handling diverse hair textures, client requests, and emerging fashion trends.

These findings align with research by Mejía-Villa et al. (2023), providing evidence that the CPS process combined with SDS training can enhance students' environmental awareness and increase the potential of future professionals to draw inspiration from nature in business, marketing, and gastronomy disciplines to solve problems. Similarly, Wolcott & McLaughlin (2020) stated that pharmacy education students demonstrated more creative problem-solving and exploration skills in education and practice. These similarities suggest that CPS not only fosters creativity but also technical dexterity in various vocational fields.

Thus, CPS transforms hairstyling practices from repetitive routines into a dynamic process of technical mastery, reflective decision-making, and artistic innovation—skills that are essential for graduates to succeed in the competitive beauty industry. Hu et al. (2017) also state that CPS skills are abilities that learners must possess to succeed in a future society. This skill relates to learners' ability to solve problems through the development of functions and creative ideas.

The findings from this study, which confirm the effectiveness of the Creative Problem Solving (CPS) model in improving students' cognitive, affective, and psychomotor competencies, are consistent with a growing body of international research. However, this study also contributes new insights by demonstrating the applicability of CPS in beauticianry - a field that has received relatively limited scholarly attention compared to the general education context.

CONCLUSION

This study concludes that the Creative Problem Solving (CPS) model significantly improves cosmetology students' cognitive, affective, and psychomotor competencies in learning hairdressing. Compared to conventional teaching methods, CPS fosters deeper understanding, empathy, collaboration, creativity, and technical proficiency. By aligning vocational education with industry needs, CPS prepares graduates to not only become skilled practitioners, but also reflective, adaptive, and globally competitive professionals. The findings extend the applicability of CPS into cosmetology, an area previously under-explored in educational research, and provide strong evidence for integrating CPS into vocational curricula.

REFERENCES

1. Basadur, M., Gelade, G., & Basadur, T. (2014). Creative Problem-Solving Process Styles, Cognitive Work Demands, and Organizational Adaptability. *Journal of Applied Behavioral Science*, *50*(1), 80–115. https://doi.org/10.1177/0021886313508433
2. Byeon, N. R., & Koo, S. (2020). Wearable Designs for Hair Designers with 3D Virtual Images and 3D Printed Models. *Journal of the Korean Society of Clothing and Textiles*, *44*(5), 923–949.
3. https://doi.org/10.5850/JKSCT.2020.44.5.923
4. Chen, P., & Chan, Y.-C. (2021). Enhancing Creative Problem Solving in Postgraduate Courses of Education Management Using Project-Based Learning. *International Journal of Higher Education*, *10*(6), 11.
5. https://doi.org/10.5430/ijhe.v10n6p11
6. Chen, S. Y., Tsai, J. C., Liu, S. Y., & Chang, C. Y. (2021). The effect of a scientific board game on improving creative problem-solving skills. *Thinking Skills and Creativity*, *41*(August), 100921. https://doi.org/10.1016/j.tsc.2021.100921
7. Dumas, D., Schmidt, L. C., & Alexander, P. A. (2016). Predicting creative problem solving in engineering design. *Thinking Skills and Creativity*, *21*, 50–66. https://doi.org/10.1016/j.tsc.2016.05.002
8. Hu, R., Xiaohui, S., & Shieh, C. J. (2017). A study on the application of creative problem-solving teaching to statistics teaching. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(7), 3139–3149. https://doi.org/10.12973/eurasia.2017.00708a
9. Hyeon-Kyeong, A., & Kyu-Hwa, C. (2006). A Study on the Hair Style Production Based on the Face Contour & Fashion Feeling. *Journal of Fashion Business*, *10*(4), 29–44.
10. Isaksen, S. G. (2023). Developing Creative Potential: The Power of Process, People, and Place. *Journal of Advanced Academics*, *34*(2), 111–144. https://doi.org/10.1177/1932202X231156389
11. Ju-Hsuan, Y., Lo, T. Y., Wu, M. C., & Wang, L. F. (2020). Learning from experience – a probe into the off-campus internships under the five-year cosmetology technical and vocational education program. *Higher Education, Skills and Work-Based Learning*, *11*(2), 587–599. https://doi.org/10.1108/HESWBL-03-2019-0034
12. Kim, S., Choe, I., & Kaufman, J. C. (2019). The development and evaluation of the effect of a creative problem-solving program on young children's creativity and character. *Thinking Skills and Creativity*, *33*(August 2018), 100590. https://doi.org/10.1016/j.tsc.2019.100590
13. Kiong, T. T., Puad, F. N. A., Kamis, A., Heong, Y. M., Hamid, R. I. A., Shafie, S., & Bedor, S. A. (2022). Enhancing cosmetology students' communication skills in the Malaysian upper secondary vocational education program. *International Journal of Evaluation and Research in Education*, *11*(1), 260–271. https://doi.org/10.11591/ijere.v11i1.22285
14. Mejía-Villa, D. A., Torres-Guevara, D. L. E., Prieto-Sandoval, D. V., Cabra, D. J., & Jaca, D. C. (2023).

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Training for sustainability through biomimicry and creative problem-solving processes. *Thinking Skills and Creativity*, *49*(March 2022), 101359. https://doi.org/10.1016/j.tsc.2023.101359

15. Missikoff, M., Canducci, M., & Maiden, N. (2015). Enterprise Innovation: From Creativity to Engineering. In *ISTE Ltd and John Wiley & Sons* (First Edition, Issue 1). https://doi.org/10.1016/j.techsoc.2008.10.007

16. Park, J. (2018). Analysis of hair design formative factors in the women's one-length hairstyle in the Imperial Japanese colonial period. *Journal of Digital Convergence*, *16*(10), 479–484.

17. https://doi.org/https://doi.org/10.14400/JDC.2018.16.10.479

18. Park, J. (2020). A Study on the Correlation between the Components of Modern Girl Hair Style and Social Feminine Performance. *Journal of the Korea Convergence Society*, *11*(7), 345–350. https://www.koreascience.or.kr/article/JAKO202021752885461.page%0Ahttps://www.koreascience.or.kr/art

19. icle/JAKO202021752885461.pdf

20. Pisngot, J. N., & M Cabaguing, D. A. (2024). From Salon to Home: The Professional Journey and Challenges of Beauticians. *International Journal of Advanced Multidisciplinary Research and Studies*, *4*(4), 722–729. https://doi.org/10.62225/2583049x.2024.4.4.3099

21. Sudira, P. (2020). *Paradigma Baru Pembelajaran Vokasional Era Revolusi Industri 4.0 "Membangun SDM Digital Among Kreativitas Dagang Inovasi"* (1st ed.). UNY Press 2020.

22. van Hooijdonk, M., Mainhard, T., Kroesbergen, E. H., & van Tartwijk, J. (2020). Creative Problem Solving in Primary Education: Exploring the Role of Fact Finding, Problem Finding, and Solution Finding across Tasks. *Thinking Skills and Creativity*, *37*(August 2019), 100665. https://doi.org/10.1016/j.tsc.2020.100665

23. Van Hooijdonk, M., Mainhard, T., Kroesbergen, E. H., & Van Tartwijk, J. (2023). Creative problem-solving in primary school students. *Learning and Instruction*, *88*(September 2022), 101823. https://doi.org/10.1016/j.learninstruc.2023.101823

24. Wolcott, M. D., & McLaughlin, J. E. (2020). Promoting creative problem-solving in schools of pharmacy with the use of design thinking. *American Journal of Pharmaceutical Education*, *84*(10), 1271–1276. https://doi.org/10.5688/ajpe8065

25. Yun, M.-H., Cha, H.-O., Lee, E.-H., Park, H.-J., & Kwon, O.-H. (2022). The Effect of Hair Shop Servicescape on Customer Satisfaction: The Mediating Effect of Human Service. *Journal of the Korean Society of Cosmetology*, *28*(3), 553–564. https://doi.org/10.52660/jksc.2022.28.3.553