

**The Relationship Between Self-Management Skills and Creative Thinking Skills of Science Teachers in Catholic Primary Schools in the Eastern Region**

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**Abstract**

This study aimed to: (1) examine the level of self-management skills (SM) among science teachers in Catholic primary schools in the Eastern Region, overall and by dimension; (2) assess their creative thinking skills (CT) using EFA-derived factor scores for Fluency, Originality, Flexibility, and Elaboration; (3) analyze relationships between SM and CT, both overall and by SM dimension; and (4) identify which SM dimensions predict each CT factor. The sample included 104 teachers selected from a population of 340 using Krejcie and Morgan's (1970) table. A three-part questionnaire collected demographic data, SM, and CT measures. Exploratory Factor Analysis confirmed a four-factor CT structure consistent with theory. Reliability coefficients (Cronbach's alpha) were calculated for each subscale: Fluency (0.656), Originality (0.529), Flexibility (0.608), and Elaboration (0.446), reflecting the multidimensional nature of creative thinking. Data were analyzed using mean, standard deviation, Pearson correlation, two-way ANOVA, and stepwise regression. Results showed high levels of both SM and CT across all dimensions. SM was positively correlated with Flexibility ( $r = 0.368$ ,  $p < 0.01$ ), Fluency ( $r = 0.254$ ,  $p < 0.01$ ), and Originality ( $r = 0.265$ ,  $p < 0.01$ ), but not Elaboration. Gender and age showed no significant effects on CT. Regression analysis identified Achievement Orientation and Responsivity (AO&R) as the only significant predictor, specifically for Flexibility ( $\beta = -0.418$ ,  $p < .001$ ,  $R^2 = 0.175$ ).

**Keywords:** Self-Management Skills, Creative Thinking Skills, Science Teachers, Catholic Schools

## **1. Introduction**

In today's rapidly changing world, science education requires more than the transmission of knowledge. Science teachers must develop a wide range of professional skills to keep pace with these demands. Two skills that are particularly important for effective science teaching are Self-Management Skills (SM) and Creative Thinking Skills (CT), both of which are recognized as essential 21st-century competencies across all professions (Partnership for 21st Century Skills, 2019). Self-management refers to a person's ability to regulate their own behavior, emotions, and goals effectively. Goleman (1995) identified self-management as a core component of Emotional Intelligence, which directly influences professional effectiveness. Zimmerman (2002) confirmed that teachers with strong self-management skills are better able to adapt and grow professionally, a finding consistent with Bandura's (1997) work on Self-Regulation, which demonstrated its relationship with professional achievement. Regarding creative thinking, Torrance (1974) defined it as a process of sensing problems, seeking information, forming hypotheses, and communicating novel results. In the context of science teaching, Craft (2005) and Davies et al. (2013) found that highly creative teachers are more effective at building learning environments that stimulate higher-order thinking in students. In the Thai context, Teerawut Bunyasopon (2022) found that science teachers with higher creative thinking skills were significantly more likely to design instructional activities that promoted problem-solving.

Although research suggests a connection between self-management and professional effectiveness, it remains unclear whether strong self-management necessarily leads to higher creative thinking, particularly among science teachers in Catholic schools, which have their own organizational culture and professional standards. This study therefore aims to examine this question within the specific context of science teachers in Catholic primary schools in the Eastern Region of Thailand.

### **1.1 Research Objectives**

- 1) To examine the level of SM skills among science teachers in Catholic primary schools in the Eastern Region, both overall and by dimension.
- 2) To examine the level of CT skills among science teachers in the same group, both overall and by dimension.
- 3) To analyze the relationship between SM skills and CT factor scores extracted via EFA, both by SM dimension and overall.
- 4) To determine which dimension of SM can predict each CT factor score among science teachers.

### **1.2 Research Hypotheses**

- H<sub>1</sub>: Overall SM skills have a statistically significant positive relationship with CT factor scores.
- H<sub>2</sub>: SM skills by dimension have a statistically significant positive relationship with CT factor scores.
- H<sub>3</sub>: Some dimensions of SM skills can significantly predict CT factor scores.

## **2. Literature Review**

### **2.1 Self-Management Skills (SM)**

Self-management skills refer to a person's ability to control, regulate, and manage themselves across various dimensions. Goleman (1995) identified self-management as a central element of Emotional Intelligence. Zimmerman (2002) found that Self-Regulated Learning is associated with better outcomes for both teachers and students, while Bandura (1997) explained through Self-Efficacy theory that self-regulation contributes to effective

professional performance. In the Thai context, Sutthipong Hoksuan (2020) found that teachers with strong self-management skills reported higher job satisfaction and were better equipped to manage classroom-related stress. Furthermore, Pintrich (2000) proposed a Self-Regulated Learning framework encompassing motivational, cognitive, and behavioral components, which aligns well with the five SM dimensions used in this study.

## **2.2 Creative Thinking Skills (CT)**

According to Torrance (1974), creative thinking consists of four key dimensions: Fluency, which refers to the ability to generate many ideas; Originality, which refers to the ability to produce novel and unique ideas; Flexibility, which refers to the ability to consider problems from multiple perspectives; and Elaboration, which refers to the ability to develop and add detail to ideas. Craft (2005) and Davies et al. (2013) confirmed that these skills can be developed through appropriate environments and practice. In the Thai context, Teerawut Bunyasopon (2022) found that science teachers who participated in creativity-focused training scored significantly higher on creative thinking than a control group. This finding is consistent with the work of Piyaporn Suksawat (2023), who found that an organizational climate open to innovation was a significant predictor of teacher creativity in private schools.

## **2.3 The Relationship Between Self-Management and Creative Thinking**

Amabile (1996) proposed the Componential Theory of Creativity, arguing that intrinsic motivation a component of self-management is more strongly linked to creativity than discipline-oriented self-control. Karwowski et al. (2017) found a moderate relationship between Goal Orientation and Creative Self-Efficacy among European teachers. In Thailand, Lakhana Sariwat (2021) studied teachers in private schools in the southern region and found that achievement orientation and responsivity had a significant positive relationship with creative thinking ( $r = 0.34$ ,  $p < 0.01$ ), a result that is consistent with the findings of the present study.

## **3. Research Methodology**

### **3.1 Population and Sample**

The population for this study consisted of 340 science teachers from Catholic primary schools in the Eastern Region of Thailand. The minimum sample size of 103 was determined using the Krejcie and Morgan (1970) sampling table. The actual sample used in this study was 104 teachers, comprising 26 males (25.0%) and 78 females (75.0%). When classified by age, 22 participants (21.2%) were under 30 years old, 51 (49.0%) were between 30 and 55 years old, and 31 (29.8%) were 56 years or older. In terms of educational background, the majority held a bachelor's degree ( $n = 95$ , 91.3%), while the remaining 9 participants (8.7%) held a degree above the bachelor's level.

### **3.2 Research Instrument**

The research instrument was a questionnaire consisting of three parts. Part 1 collected demographic information, including gender, age, and educational level. Part 2 was a five-point Likert scale measuring SM skills, comprising 33 items covering five dimensions. Part 3 was a five-point Likert scale measuring CT skills, comprising 16 items covering four dimensions. The Cronbach's Alpha reliability coefficient for the SM scale was 0.702, which is within an acceptable range (Hair et al., 2019). For the CT scale, the reliability coefficient was 0.536. This relatively low value reflects the multidimensional nature of creative thinking, in which each dimension has its own distinct characteristics (Cortina, 1993).

To verify the multidimensional structure of the CT instrument, an EFA was conducted using Principal Axis Factoring with Promax rotation. The KMO measure was 0.623 (Kaiser,

1974), and Bartlett's Test of Sphericity was significant ( $\chi^2 = 313.293$ ,  $df = 120$ ,  $p < 0.001$ ). The EFA extracted four factors explaining 49.84% of the total variance, consistent with Torrance's (1974) framework. Cronbach's Alpha was subsequently calculated independently for each factor: Flexibility ( $\alpha = 0.608$ ), Fluency ( $\alpha = 0.656$ ), Originality ( $\alpha = 0.529$ ), and Elaboration ( $\alpha = 0.446$ ). Low alpha values in some factors reflect the genuine distinctiveness of the constructs (Schmitt, 1996) rather than instrument inadequacy. The four factor scores extracted via regression method were used as the CT variables in all subsequent analyses.

### 3.3 Data Analysis

Data were analyzed using a statistical software package. The following statistical methods were applied: 1) Mean and Standard Deviation (S.D.) to examine skill levels, interpreted using the criteria of Boonchom Srisaard (2017); 2) Pearson Correlation to analyze the relationships between SM dimensions and CT factor scores, with correlation levels interpreted using the criteria of Cohen (1988); 3) Two-way ANOVA (Gender  $\times$  Age) to examine the effects of demographic variables on each CT factor score independently; and 4) Stepwise multiple regression to identify which SM dimensions significantly predicted each CT factor score, with  $R^2$  effect sizes interpreted using the criteria of Cohen (1988).

## 4. Research Results

Mean scores in this study were interpreted using the criteria of Boonchom Srisaard (2017) as follows: 4.50–5.00 = highest level; 3.50–4.49 = high; 2.50–3.49 = moderate; 1.50–2.49 = low; and 1.00–1.49 = lowest level. Correlation levels were interpreted using Cohen's (1988) criteria:  $r < 0.10$  = negligible;  $0.10$ – $0.29$  = low;  $0.30$ – $0.49$  = moderate;  $0.50$ – $0.69$  = high; and  $r \geq 0.70$  = very high.  $R^2$  effect sizes were interpreted as: **0.01** = small;  $0.09$  = moderate;  $0.25$  = large (Cohen, 1988).

### 4.1 Level of Self-Management Skills

**Table 1** Mean and standard deviation of Self-Management Skills

| Dimension                                     | Min         | Max         | Mean        | S.D.        |
|-----------------------------------------------|-------------|-------------|-------------|-------------|
| Self-Awareness (SA)                           | 3.00        | 4.83        | 4.08        | 0.44        |
| Emotional Control (EC)                        | 3.00        | 5.00        | 4.12        | 0.44        |
| Time Management (TM)                          | 3.14        | 4.86        | 4.15        | 0.37        |
| Adaptability & Resilience (A&R)               | 3.29        | 4.86        | 4.17        | 0.36        |
| Achievement Orientation & Responsivity (AO&R) | 3.29        | 5.00        | 4.24        | 0.38        |
| <b>Self-Management (SM)</b>                   | <b>3.48</b> | <b>4.67</b> | <b>4.16</b> | <b>0.27</b> |

Note: Mean score levels are interpreted using the criteria of Boonchom Srisaard (2017).

Table 1 shows that science teachers had an overall SM score at a high level (Mean = 4.16, S.D. = 0.27). All five dimensions were also rated at a high level. The dimension with the highest mean was Achievement Orientation and Responsivity (AO&R) (Mean = 4.24, S.D. = 0.38), followed by Adaptability and Resilience (A&R) (Mean = 4.17). The dimension with the lowest mean was Self-Awareness (SA) (Mean = 4.08), though it still fell within the high level.

#### 4.2 Level of Creative Thinking Skills

**Table 2** Mean and standard deviation of Creative Thinking Skills

| Dimension                     | Min         | Max         | Mean        | S.D.        |
|-------------------------------|-------------|-------------|-------------|-------------|
| Fluency (F)                   | 3.00        | 5.00        | 4.30        | 0.45        |
| Originality (O)               | 3.00        | 5.00        | 4.25        | 0.42        |
| Flexibility (Fx)              | 3.00        | 5.00        | 4.27        | 0.45        |
| Elaboration (E)               | 3.25        | 5.00        | 4.33        | 0.36        |
| <b>Creative Thinking (CT)</b> | <b>3.25</b> | <b>4.75</b> | <b>4.29</b> | <b>0.27</b> |

Note: Mean score levels are interpreted using the criteria of Boonchom Srisaard (2017).

Table 2 shows that science teachers had an overall CT score at a high level (Mean = 4.29, S.D. = 0.27). All four dimensions were also rated at a high level. The dimension with the highest mean was Elaboration (E) (Mean = 4.33, S.D. = 0.36), followed by Fluency (F) (Mean = 4.30). The dimension with the lowest mean was Originality (O) (Mean = 4.25). The overall mean for CT (4.29) was slightly higher than that for SM (4.16).

#### 4.3 Relationships between Variables

**Table 3** Pearson correlation coefficients between SM dimensions and CT factor scores

| Variable          | Flexibility    | Fluency        | Originality    | Elaboration   | SM Overall   | Correlation Level |
|-------------------|----------------|----------------|----------------|---------------|--------------|-------------------|
| SA                | 0.199*         | 0.135          | 0.172          | -0.081        | 0.650**      | Low               |
| EC                | 0.294**        | 0.193          | 0.149          | -0.028        | 0.706**      | Low               |
| TM                | 0.280**        | 0.105          | 0.194*         | 0.030         | 0.620**      | Low               |
| A&R               | 0.132          | 0.100          | 0.156          | 0.052         | 0.703**      | Very Low          |
| AO&R              | 0.336**        | 0.319**        | 0.225*         | 0.021         | 0.707**      | Low–Moderate      |
| <b>SM Overall</b> | <b>0.368**</b> | <b>0.254**</b> | <b>0.265**</b> | <b>-0.003</b> | <b>1.000</b> | —                 |

Note. \*  $p < 0.05$ , \*\*  $p < 0.01$ . CT variables are EFA-extracted factor scores. Correlation levels are interpreted using the criteria of Cohen (1988).

Table 3 shows the relationships between SM dimensions and the four CT factor scores. SM Overall had statistically significant positive relationships with Flexibility ( $r = 0.368$ ,  $p < 0.01$ ), Fluency ( $r = 0.254$ ,  $p < 0.01$ ), and Originality ( $r = 0.265$ ,  $p < 0.01$ ), but not with Elaboration ( $r = -0.003$ ,  $p = 0.979$ ). At the dimension level, AO&R showed the strongest and most consistent pattern, with significant relationships across Flexibility ( $r = 0.336$ ,  $p < 0.01$ ), Fluency ( $r = 0.319$ ,  $p < 0.01$ ), and Originality ( $r = 0.225$ ,  $p < 0.05$ ). EC was significantly related to Flexibility only ( $r = 0.294$ ,  $p < 0.01$ ), and TM to Flexibility ( $r = 0.280$ ,  $p < 0.01$ ) and Originality ( $r = 0.194$ ,  $p < 0.05$ ). A&R showed no statistically significant relationship with any CT factor, and no SM dimension was significantly related to Elaboration, providing partial support for hypotheses  $H_1$  and  $H_2$ .

#### 4.4 Two-Way ANOVA Results (Gender $\times$ Age on CT Factor Scores)

**Table 4** Two-way ANOVA results (Gender  $\times$  Age) for each CT factor score

| Source                                 | SS    | df | MS    | F     | p     | $\eta^2$ | Result |
|----------------------------------------|-------|----|-------|-------|-------|----------|--------|
| <b>Dependent Variable: Flexibility</b> |       |    |       |       |       |          |        |
| Gender                                 | 0.016 | 1  | 0.016 | 0.045 | 0.833 | 0.000    | n.s.   |
| Age                                    | 0.271 | 2  | 0.136 | 0.449 | 0.639 | 0.009    | n.s.   |
| Gender $\times$ Age                    | 0.584 | 2  | 0.292 | 0.964 | 0.385 | 0.019    | n.s.   |
| <b>Dependent Variable: Fluency</b>     |       |    |       |       |       |          |        |
| Gender                                 | 0.023 | 1  | 0.023 | 0.534 | 0.467 | 0.005    | n.s.   |
| Age                                    | 0.070 | 2  | 0.035 | 0.819 | 0.444 | 0.016    | n.s.   |
| Gender $\times$ Age                    | 0.010 | 2  | 0.005 | 0.116 | 0.891 | 0.002    | n.s.   |
| <b>Dependent Variable: Originality</b> |       |    |       |       |       |          |        |
| Gender                                 | 0.073 | 1  | 0.073 | 1.702 | 0.195 | 0.017    | n.s.   |
| Age                                    | 0.153 | 2  | 0.077 | 1.791 | 0.172 | 0.035    | n.s.   |
| Gender $\times$ Age                    | 0.109 | 2  | 0.054 | 1.269 | 0.286 | 0.025    | n.s.   |
| <b>Dependent Variable: Elaboration</b> |       |    |       |       |       |          |        |
| Gender                                 | 0.091 | 1  | 0.091 | 2.119 | 0.149 | 0.021    | n.s.   |
| Age                                    | 0.102 | 2  | 0.051 | 1.191 | 0.308 | 0.024    | n.s.   |
| Gender $\times$ Age                    | 0.246 | 2  | 0.123 | 2.871 | 0.061 | 0.055    | n.s.   |

Note. n.s. = not significant ( $p > 0.05$ ). All Levene's Tests of Equality of Error Variances passed ( $p > 0.05$ ). Effect sizes ( $\eta^2$ ) are interpreted using Cohen's (1988) criteria: 0.01 = small, 0.06 = moderate, 0.14 = large.

Table 4 presents the two-way ANOVA results for all four CT factor scores. Gender, Age, and their interaction had no statistically significant effect on any of the four CT factors (all  $p > .05$ ). Partial  $\eta^2$  values were uniformly small across all effects and all dependent variables, ranging from .000 to .055. Notably, all Levene's Tests of Equality of Error Variances were non-significant, confirming that the homogeneity of variance assumption was met for each factor. These results indicate that demographic variables do not meaningfully differentiate CT performance in this sample.

#### 4.5 Stepwise Regression Results

**Table 5** Stepwise multiple regression of SM dimensions predicting each CT factor score

| Dependent / Predictor                                     | B      | SE    | $\beta$ | t      | p        | R     | R <sup>2</sup> | Adj. R <sup>2</sup> |
|-----------------------------------------------------------|--------|-------|---------|--------|----------|-------|----------------|---------------------|
| <b>DV: Flexibility, F(1,102) = 21.584, p &lt; .001</b>    |        |       |         |        |          |       |                |                     |
| Constant                                                  | 0.000  | 0.098 | —       | 0.000  | 1.000    |       |                |                     |
| AO&R (X5)                                                 | -0.989 | 0.213 | -0.418  | -4.646 | 0.000*** | 0.418 | 0.175          | 0.167               |
| <b>DV: Fluency, No variables entered the equation</b>     |        |       |         |        |          |       |                |                     |
| (Smallest p: TM, p = .094)                                | —      | —     | —       | —      | —        | —     | —              | —                   |
| <b>DV: Originality, No variables entered the equation</b> |        |       |         |        |          |       |                |                     |
| (Smallest p: SA, p = .291)                                | —      | —     | —       | —      | —        | —     | —              | —                   |
| <b>DV: Elaboration, No variables entered the equation</b> |        |       |         |        |          |       |                |                     |
| (Smallest p: SA, p = .148)                                | —      | —     | —       | —      | —        | —     | —              | —                   |

Note. \*\*\* p < 0.001. R<sup>2</sup> effect sizes are interpreted using Cohen's (1988) criteria: 0.01 = small, 0.09 = moderate, 0.25 = large. — = variable not entered; n.s. = no variable met entry criterion (p < 0.05).

Table 5 presents the stepwise regression results for each CT factor score. For Flexibility, AO&R was the only variable selected into the equation ( $\beta = -0.418$ ,  $t = -4.646$ ,  $p < 0.001$ ). The model was statistically significant ( $F(1, 102) = 21.584$ ,  $p < 0.001$ ), with  $R^2 = 0.175$  and Adjusted  $R^2 = 0.167$ , indicating that AO&R explained 17.5% of the variance in Flexibility, which falls between small and moderate according to Cohen's (1988) criteria. The prediction equation is: Flexibility = 0.000 + (-0.989)(AO&R). For Fluency, Originality, and Elaboration, no SM dimension met the entry criterion ( $p < 0.05$ ), and no variables were entered into the equation, providing partial support for hypothesis H<sub>3</sub>.

## 5. Discussion and Conclusion

### 5.1 Levels of SM and CT Skills

Science teachers in this study scored at a high level on all dimensions of both SM and CT. This may reflect the rigorous selection and continuous professional development practices of Catholic schools. This characteristic likely contributed to a range restriction effect, whereby scores were clustered in a narrow, high range, which is one reason why the correlations between SM and CT factors were low to moderate in strength. This is consistent with the findings of Piyaporn Suksawat (2023), who noted that teachers in high-standard private schools tend to self-rate at a high level on professional skills.

### 5.2 Strong Self-Management Does Not Always Mean High Creative Thinking

The findings suggest that science teachers with strong SM skills do not necessarily have high CT skills across all dimensions. SM showed significant relationships with Flexibility, Fluency, and Originality, but not with Elaboration. This pattern suggests that SM supports the more generative and exploratory aspects of creativity, while Elaboration which requires deep

content knowledge and detailed refinement operates more independently of self-regulatory capacity. This is consistent with Amabile (1996), who argued that creativity requires domain expertise alongside motivation and regulatory skills, and with Karwowski et al. (2017), who found that self-regulation had only a moderate relationship with Creative Self-Efficacy.

### **5.3 Gender and Age Do Not Affect CT Factor Scores**

The two-way ANOVA results clearly show that gender and age had no significant effect on any of the four CT factor scores. This suggests that creative thinking is not determined by demographic characteristics, but rather by professional and environmental factors. This finding is consistent with Plucker and Beghetto (2004), who argued that teacher creativity depends more on context and opportunities for expression than on gender or age. Lakhana Sariwat (2021) similarly found in a sample of Thai teachers that demographic variables were not primary determinants of creativity.

### **5.4 Achievement Orientation and Responsivity: The Key Predictor of Flexibility**

The most notable finding of this study is that AO&R was the only SM dimension that significantly predicted a CT factor, specifically Flexibility ( $R^2 = 0.175$ ). Flexibility reflects the ability to consider problems from multiple perspectives a skill closely aligned with the goal-directed, adaptive behavior that characterizes AO&R. Teachers who set clear goals and hold themselves accountable are more likely to seek out alternative instructional approaches and remain open to new perspectives. This interpretation is consistent with Karwowski et al. (2017), who found that Goal Orientation was associated with Creative Self-Efficacy, and with Zimmerman (2002), who linked goal-oriented self-regulation to the exploration of new work strategies. The absence of significant predictors for Fluency, Originality, and Elaboration suggests that these CT dimensions are driven more by factors beyond self-management, such as content expertise, organizational climate, or intrinsic motivation.

### **5.5 Limitations**

This study has several limitations that should be noted. First, the sample consisted of teachers from Catholic schools in the Eastern Region, which has a specific organizational context, limiting the generalizability of the findings to other settings. Second, the reliability of some CT subscales remained below the conventional .60 threshold even after EFA-based restructuring (Schmitt, 1996), which may have affected measurement accuracy. Third, the sample size of  $n = 104$  may be relatively small for complex multivariate analyses.

## **6. Recommendations**

### **6.1 Practical Recommendations**

Schools should design Professional Development programs that specifically target AO&R, such as Reflective Teaching activities, creativity-oriented goal setting, and Peer Coaching systems. In addition, schools should foster an organizational climate that encourages experimentation and flexible thinking, as the findings confirm that Flexibility is the CT dimension most directly predicted by SM. Furthermore, professional development programs should not be differentiated by teachers' gender or age, as these demographic variables had no significant effect on any CT factor in this study.

### **6.2 Recommendations for Future Research**

Future studies should examine additional variables that may influence CT factors, particularly Fluency, Originality, and Elaboration, such as organizational climate, workload, teaching experience, and intrinsic motivation. The sample should also be expanded to include other types of schools and other regions of Thailand in order to improve the generalizability of findings. Finally, future researchers should consider developing a CT measurement tool with higher subscale reliability, or using Performance-based Assessment rather than self-report questionnaires to obtain a more accurate measure of teacher creativity.

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