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Design and Validation of a Model for Developing Creative Thinking Skills in Educational Managers

Ali. Ghahremani[1], Hamid. Shafizadeh[2*], Nader. Soleimani[2]

[1] PhD student, Department of Educational Management, Faculty of Humanities, Garmsar Branch, Islamic Azad University, Garmsar, Iran
[2] Associate Professor, Department of Educational Management, Faculty of Humanities, Garmsar Branch, Islamic Azad University, Garmsar, Iran

*** Corresponding author email address**: hamidshafidadeh1@yahoo.com

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A B S T R A C T

Objective: Recognizing the factors that influence creativity and enhancing creative skills is essential to facilitate the enhancement of creativity in environments such as schools. Therefore, the current research aims to examine the role of individual and social variables in predicting students' creative progress.

Methods and Materials: This applied research was conducted with a mixed-method approach and an exploratory design. The qualitative sample consisted of 25 professors from the educational management departments of universities in Mashhad, selected through purposive sampling and considering the saturation rule. The quantitative sample included all school managers working in middle and high schools in the sacred city of Mashhad, with a sample size of 172 individuals, calculated based on Cochran's formula. In the qualitative section, semi-structured interviews were used, while in the quantitative section, a researcher-developed questionnaire was employed.

Findings: The qualitative results identified two main categories: intra-personal skills and inter-personal skills, along with six subcategories: technical skills, problem-solving skills, ethical skills, emotional competencies, cognitive competencies, and social competencies derived from the interviews. Structural equation modeling results indicated that creative self-efficacy and intrinsic motivation are significant predictors of creative advancement. Wisdom did not significantly predict creativity, while general self-efficacy indirectly predicted creativity through its impact on creative self-efficacy. The university environment also had a significant role in predicting students' creative advancement.

Conclusion: Based on the findings of the current research, considering social factors alongside individual factors provides a clearer and more comprehensive understanding of students' creativity.

Keywords: *Development model, creative thinking, problem-solving, emotional competencies, cognitive competencies*

1. Introduction

In the last century and the era of technology and rapid information advancement, a strong emphasis and attention to education issues in each country seem essential. This is because the education system is the most apparent manifestation of human resource investment in the renewal, advancement, and development of countries, playing a fundamental role economically, socially, and culturally (Guo et al., 2022; Puente-Díaz & Cavazos-Arroyo, 2022). Creativity and innovation are not only the secret to organizational survival in times of crisis and danger but also lead to the vitality, rejuvenation, and increased morale of employees (Sun et al., 2020; Xu et al., 2021). The necessity for all institutions and government organizations to align with the vision document, which is based on the development of knowledge and wisdom, positions creativity and innovation as the engines of knowledge advancement (Allen et al., 2019). The increasing progress of human society in various dimensions depends on the creation of new and creative ideas by the workforce, through which the organization rapidly progresses and achieves its goals. Today, human resources are considered the most fundamental factor in comprehensive growth and development in organizations, and the intellectual ability and creativity of the employees towards the organization's goals are among their most important characteristics (Marhamati 2013). The primary purpose of education is to train individuals capable of performing new tasks; that is, to educate creative and innovative individuals. Education is very effective in developing and strengthening creative and critical thinking, and it is the educator who must nurture this talent in students with their creative methods and initiatives. Creative thinking refers to a type of thinking that leads to new perspectives, emerging approaches, fresh outlooks, and new ways of understanding and perceiving objects and situations (Acar et al., 2021; Allen et al., 2019).

Critical thinking almost means thoughtful and logical thinking focused on decision-making for performing a task. Critical thinking is not merely criticism; rather, it is an insightful view that helps the manager effectively and organizedly engage in issues and think about them (Parsakia, 2023). One of the effects of teaching creative and critical thinking skills is the enhancement of psychological well-being in individuals. All organizations need new ideas and fresh theories to survive and grow. New thoughts and theories inject fresh blood into the body of the organization, saving it from extinction and oblivion (Parsakia, 2023). Creative thinking aids in problem-solving and appropriate decision-making. This skill enables individuals to find solutions beyond their direct experiences and, even when there is no problem or specific decision to make, to adapt and flexibly respond to everyday life. Combining decision-making power and problem-solving skills leads to creative thinking. The power of creative and inventive thinking enables individuals to discover various choices on their own, thereby escaping life's impasses. Despair and depression in some psychiatric patients stem from a cognitive system defect, which leads to encountering deadlocks and finding ways out of them, as these patients lose their creative thinking (Salavatian & Mansouri 2017; Shabani 2017). Some psychologists, including Guilford, have studied intelligent individuals and concluded that those with higher intelligence exhibit divergent thinking. Divergent thinking means thinking in various ways about a topic and presenting multiple and different responses to a question, resulting from breaking thought patterns and viewing phenomena from another perspective (Jahanian & Haddadei 2015; Kosari 2015; Salakhatdinova & Palei, 2015). Despite the global emphasis on creative learning as an essential part of children's education programs, and the growing enthusiasm for creativity and its education, in our society, despite having talented individuals, creative abilities do not flourish as they should. The main reason for this is the unclear position of creativity and the lack of growth and methods of nurturing it (Mardanshahi 2019). Given the benefits of creativity at individual and societal levels, recognizing the factors influencing creativity and enhancing creative skills is crucial to facilitating the strengthening of creativity in environments such as schools (Abdollahi et al., 2022; Parsakia, 2023). What is the main issue in the current article regarding the validation of a model for developing creative thinking skills in educational managers? The present research aims to examine the role of individual and social variables in predicting students' creative advancement.

2. Methods and Materials

2.1. Study Design and Participants

The current study was conducted with an applied objective and a mixed-method exploratory design. The qualitative sample consisted of 25 professors from the educational management departments at universities in the city of Mashhad, selected through purposive sampling with saturation considered. The quantitative sample included all school managers working in middle and high schools in the

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sacred city of Mashhad, with a sample size of 172 individuals out of a population of 482, calculated based on Cochran's formula.

2.2. Measures

Data collection tools in the qualitative part involved semi-structured interviews, while in the quantitative part, a researcher-developed questionnaire was used.

2.3. Data analysis

To validate the questionnaire, content and construct validity were applied. Content validity was confirmed by university experts, and for construct validity, both convergent and divergent validity criteria were utilized. The values of the square root of the average variance extracted showed the highest values, indicating the presence of divergent validity among the study variables. The reliability and composite reliability of the questionnaire for all variables showed values above 0.70. For the analysis of qualitative data, a grounded theory approach was used, and for the analysis in the descriptive statistics section, the Kolmogorov-Smirnov test was utilized to check the normality of the data distribution. The significance of the relationships between variables was tested using the t-test, and sample adequacy and correlation were tested using the KMO and Bartlett's test. Additionally, model design was conducted using structural equation modeling, and data analysis was performed using SPSS21 and AMOS software.

3. Findings and Results

In the qualitative section, data were analyzed based on content analysis. Initially, key points from each semi-structured interview were marked by listening to recorded interviews and reviewing interview notes. These key points were then extracted and labeled with professional terminology. Subsequently, the labeled terms from each interview were organized into a table based on their relevance and grouped into dimensions and components. The coding stages in grounded theory were as follows: open coding, axial coding, and selective coding.

Initial Coding: At this stage, each key point in the interviews was labeled.

Secondary Coding and Categorization: In the next step, due to the large number of initial codes, they were converted into secondary codes (initial codes were grouped into similar categories. Several secondary codes then formed a single conceptual code). After determining the categories, the stage of constructing the main classes of the theory was performed.

Axial Coding: Axial coding is the second stage of analysis in grounded theory development. The aim here is to establish relationships between the generated categories (from the open coding stage). This is done based on the paradigm model, assisting the theorist to easily perform the theoretical process. The essence of the relational process in axial coding focuses on expanding one of the categories.

Table 1

Axial Coding Based on the Integrative Model

Concepts	Subcategories	Main Categories
Education in finding social and individual problems	Teaching problem-solving techniques	Education in world knowledge, planning, and problem-solving
Education in solving social and individual problems		
Education in decision-making skills	Teaching planning and decision-making techniques	
Education in risk selection		
Education in planning		
Education in developing and strengthening the mind	Teaching cognitive competencies	
Education in examining the nature of phenomena		
Education in examining human identity		
Education in understanding human and the world of creation		
Education in flexibility in thinking and relationships		
Education in etiquette in communication	Teaching communication and ethical skills	Education in communication, critical, and responsibility skills
Education in the etiquette of speaking		

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Education in teamwork and group work	
Education in establishing communication	
Education in self-regulation or self-organization	Teaching responsibility and emotional skills
Education in self-awareness	
Education in forecasting	
Education in responsibility skills	
Education in adaptability and change	

Based on the findings, all factors involved in validating and developing this fundamental thinking skill were identified; it is necessary to test the model for validation. This requires designing a quantitative tool to systematically categorize all research categories. Also, the complex influence of a set of variables on each other, both unilaterally and bilaterally, directly and indirectly, and the complexities present in measuring latent constructs need to be discovered. Based on this, through a quantitative method, we can make qualitative research categories methodologically more precise and pragmatically more realistic. Developing and exploring a measurement tool for testing the validation model helps us to examine the theoretical model, which consists of various and numerous factors, both as a whole and in parts. Now that the theoretical model has been developed, we need to see if the overall model is validated, as well as which components of the designed theoretical model are supported by the data collected with the measurement tool, and which require change, modification, and elimination.

By using such a tool, we can evaluate the quality of variable measurement and the acceptability of direct and indirect effects, as well as the defined interactions between variables. To achieve our goal, we must prepare a tool that can measure three types of variables: latent variables, observed variables, and error variables (which are a type of latent variable).

Table 2

Latent and Observed Variables

Row	Latent Variables	Observed Variables
1	Foundations	Questions 1-14 of the questionnaire
2	Objective	Questions 15-56 of the questionnaire
3	Content	Questions 57-76 of the questionnaire
4	Method	Questions 77-84 of the questionnaire
	Evaluation	Questions 85-88 of the questionnaire

The data analysis was performed using AMOS software version 23. AMOS is considered one of the most successful software specifically designed for structural equation modeling. Structural equation modeling, covariance structure analysis, causal modeling, and moment structure analysis are all terms related to a specific approach to statistical analysis involving latent variables and are often derived from these terms.

Findings indicate that the KMO index is 0.725, and the calculated Chi-square value for Bartlett's test (13310.104) is statistically significant ($P<0.001$). This means that the assumption of the unity of the correlation matrix was rejected, and the data are sufficient for conducting factor analysis and the sample size is adequate.

The result of the first-order confirmatory factor analysis is presented in Figure 1. As shown, all target scales are highly correlated with the scores of the target factor. Conversely, items h3, h8, h9, h10, h12, h14, h15, h34, h40, h42 in the target component were removed from the analysis due to low and non-significant factor loadings.

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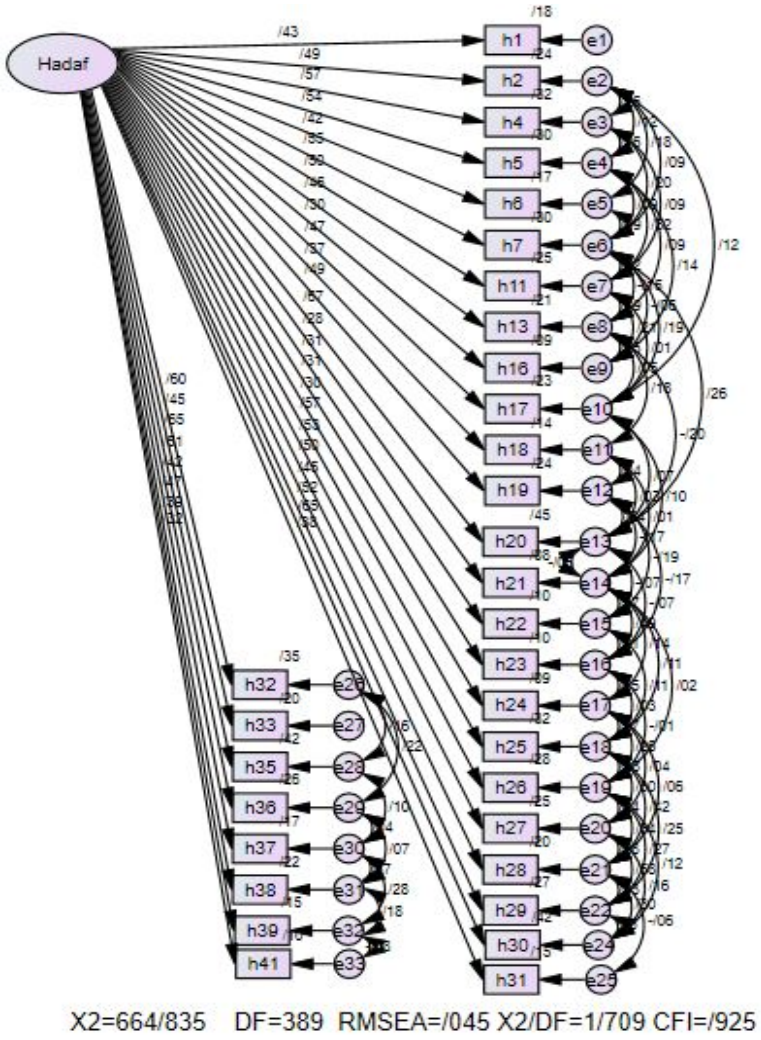
Figure 1

Structural Model for "Objective" Factor



Hadaf= Objective

Based on the output from AMOS, the calculated CMIN/DF value is 1.709. Additionally, the RMSEA value is 0.045. The Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Bentler-Bonett Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Incremental Fit Index (IFI), and Relative Fit Index (RFI) in the current model are all above 0.90. Therefore, the data of this research fit the factor structure of this scale appropriately.

The result of the first-order confirmatory factor analysis for the content factor is presented in Figure 2. As this figure shows, all content scales have a high correlation with content scores.

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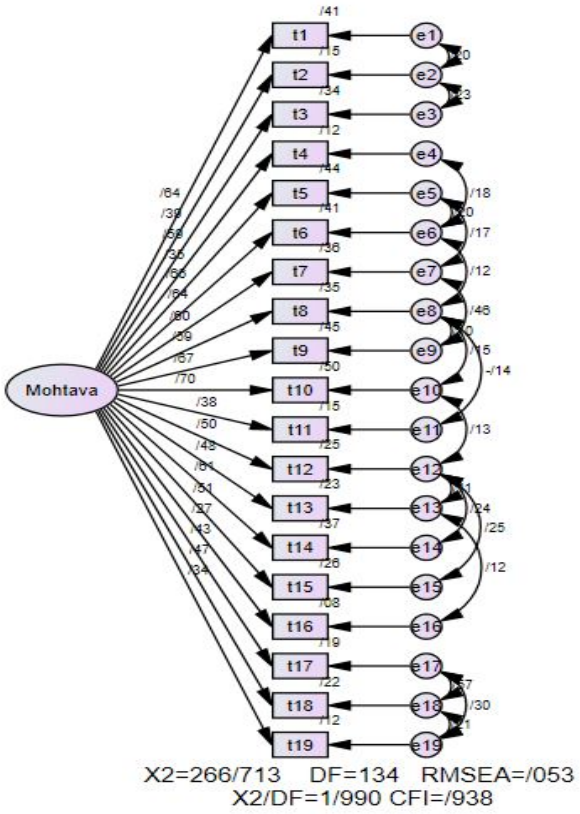
Figure 2

Structural Model for "Content" Factor

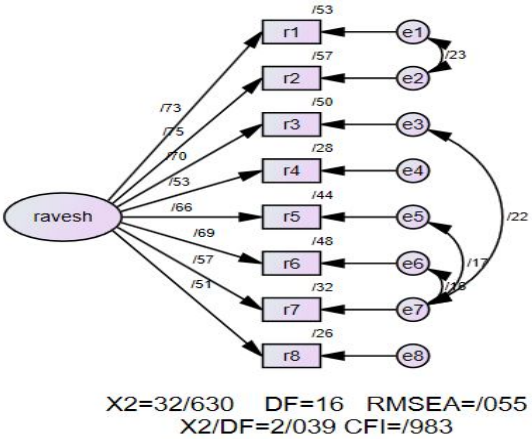


Mohtava= Content

According to the AMOS output, the calculated CMIN/DF value is 1.990. Additionally, the RMSEA value is 0.053. The Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Bentler-Bonett Normed Fit Index (NNFI), Tucker-Lewis Index (TLI), Incremental Fit Index (IFI), and Relative Fit Index (RFI) in the current model are all above 0.90. Therefore, the data of this study are suitably fit with the factor structure of this scale.

Figure 3

Structural Model for "Method" Factor



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Ravesh= Method

Table 3

Significance of Factor Loadings for Method

Variable	Symbols	Scales	Factor Loading	Explained Variance
Method	R1	Question 76	0.730	0.533
	R2	Question 77	0.755	0.570
	R3	Question 78	0.704	0.495
	R4	Question 79	0.530	0.281
	R5	Question 80	0.663	0.440
	R6	Question 81	0.694	0.482
	R7	Question 82	0.570	0.324
	R8	Question 83	0.507	0.257

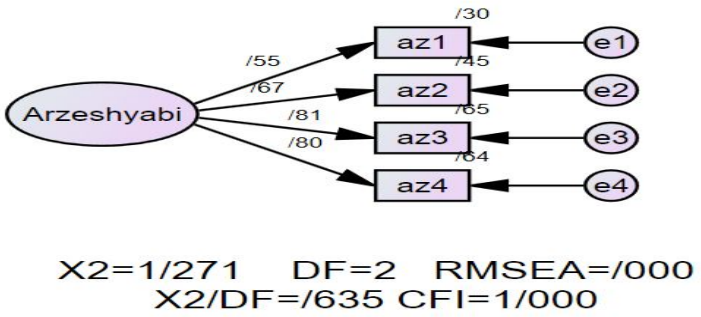
The result of the first-order confirmatory factor analysis for the method factor is presented in Figure 3. As this figure shows, all items have a high correlation with method scores.

According to the AMOS output, the calculated CMIN/DF value is 2.039. Also, the RMSEA value is 0.055. The Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Bentler-Bonett Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Incremental Fit Index (IFI), and Relative Fit Index (RFI) in the current model are all above 0.90. Therefore, the data of this study are suitably fit with the factor structure of this scale.

The result of the first-order confirmatory factor analysis for the evaluation factor is presented in Figure 4. As this figure shows, all items have a high correlation with evaluation scores.

Figure 4

Structural Model for "Evaluation" Factor



Ravesh= Evaluation

Table 4

Significance of Factor Loadings for Evaluation

Variable	Symbols	Scales	Factor Loading	Explained Variance
Evaluation	AZ1	Question 84	0.545	0.298
	AZ2	Question 85	0.668	0.446
	AZ3	Question 86	0.806	0.650
	AZ4	Question 87	0.802	0.644

According to the AMOS output, the calculated CMIN/DF value is 0.635. Additionally, the RMSEA value is 0.000. The Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Bentler-Bonett Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Incremental Fit Index (IFI), and Relative Fit Index (RFI) in the current model are all above 0.90.

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4. Discussion and Conclusion

The educational system, as the sole formal institution for nurturing creative, innovative, and inventive individuals, plays a principal and fundamental role. Among the factors and elements of education, especially in schools, managers serve as the helmsmen of the grand ship of education and have a distinctly prominent role in providing the foundation and context for this important endeavor. Managers must create conditions by providing technology and physical facilities, establishing and creating enthusiasm, fostering friendly and reciprocal interactions with teachers and students, creating a warm and open atmosphere, influencing the development of a strong culture, establishing an appropriate and flexible organizational structure, and choosing the most suitable management style aligned with the knowledge level and expectations of the teachers. Additionally, motivating teachers through various methods, enhancing their own skills, and having a complete understanding of creativity concepts are crucial for facilitating the environment for growth, nurturing, and even teaching creativity and innovation among teachers and students. Consequently, the present study aimed to examine the role of individual and social variables in predicting students' creative advancement.

The qualitative results identified two main categories: intra-personal skills, inter-personal skills, and six subcategories: technical skills, problem-solving skills, ethical skills, emotional competencies, cognitive competencies, and social competencies. The results from the quantitative section of this research indicate that all items, the foundations of objective, content, method, and evaluation, are highly correlated with method scores. Various researchers (Friedel & Rudd, 2006; Jamali et al., 2019; Kashani-Vahid et al., 2017; Mirsamadi, 2022; Puente-Díaz & Cavazos-Arroyo, 2022; Salakhatdinova & Palei, 2015; Sun et al., 2020; Tajarod et al., 2014; Ülger, 2016), have examined the role of different individual factors in fostering strategic and creative thinking. They have identified the most important individual factors influencing creative and strategic thinking as personality traits, cognitive style, divergent thinking ability, job-related knowledge, skills, and motivation, and the results of this research are consistent with their findings.

5. Limitations & Suggestions

The limitations of this study include potential biases inherent in the qualitative interviews, which may influence the objectivity of the data collected. The generalizability of the findings might be limited due to the specific cultural and organizational context of the educational institutions involved. Additionally, the reliance on self-reported data from respondents could introduce response biases. Future studies could benefit from incorporating more diverse educational settings and using a broader range of data collection methods to enhance the robustness and applicability of the findings.

Given the results obtained from this study, it is recommended that applied research be conducted aimed at achieving mechanisms for implementing performance evaluation systems and validation systems for managers, and developing creative thinking skills in educational managers. Furthermore, research concerning the processes of recruitment and deployment of individuals in the educational system should be carried out. The development of training packages (in the form of training modules) to develop creative thinking skills should be included as part of the needs of managers and experts in ongoing training programs and future research.

Acknowledgments

We would like to express our appreciation and gratitude to all those who cooperated in carrying out this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethics Considerations

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

Transparency of Data

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

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Authors' Contributions

All authors contributed equally.

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