

Development of Measurement Instrument to Assess Academic Staffs Creative Mindset

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ABSTRACT

This study summarizes the definition of academic creative thinking and the measurement tools of creative thinking in the literature. On this basis, a measuring tool for academic creative thinking is developed, and its reliability and validity are verified, which proves that the tool has good reliability and validity. In addition, the exploratory factor analysis of this tool is carried out, and three dimensions of academic creative thinking are determined. Finally, through the research on the relationship between academic creative thinking and creativity, it is proved that academic creative thinking can promote the development of creativity to a certain extent.

KEYWORDS

Academic personnel; Creative thinking; Measuring tool

In the research of creative thinking, there are different views on what creative thinking is, and there are also different views on the measuring tools of creative thinking. For example, from the perspective of discipline, Fisher believes that creative thinking is a thinking mode that takes the problem as the center, breaks the routine and analyzes and solves problems from many aspects (Christoph et al., 2024). Harvey believes that creative thinking is a process of constantly changing one's existing assumptions, trying new schemes and creating new schemes on this basis (O'Donnell et al., 2022). From the perspective of intelligence types, cognitive scientists and psychologists generally believe that creative thinking is an advanced psychological process, which occupies an important position in individual intelligence activities. For example, Zeitschler, an American psychologist, believes that creative thinking is a unique cognitive process with characteristics different from other cognitive processes (Alhadeff et al., 2021).

There are also different views on the definition of creative thinking and measurement tools. For example, Fisher thinks that creative thinking refers to "the process of transforming, reorganizing or creating new things from new information or old information without any given rules" (Christoph et al., 2024). Harvey thinks that "creative thinking is a way of thinking characterized by novelty, uniqueness and uniqueness" (O'Donnell et al., 2022). Zeitschler, an American psychologist, thinks that creative thinking refers to "a novel and unique way of thinking" (Alhadeff et al., 2021).

1 Definition of creative thinking

Creative thinking refers to the thinking of solving problems in a novel and unique way, which is a high-level and high-level thinking activity for individuals to solve problems. It has the following

basic characteristics. Firstly, originality. That is to say, put forward methods and ways to solve problems from different angles and put forward novel, unique and creative ideas. Secondly, diversity. That is, there are many ideas or opinions, not just one or a few. Thirdly, uniqueness. That is, from different angles, put forward original, novel and unique ideas, ideas, viewpoints and ideas. Fourthly, novelty and creativity. That is to say, we can synthesize the problems or ideas from different angles and levels, find them novel, unique and creative, and put forward new views or solutions on this basis (Dorohan et al., 2021).

In terms of originality, the creative thinking of academic personnel shows the following characteristics: interested in new problems and new situations; don't stick to the traditional thinking mode when solving problems, and dare to try various solutions; curiosity about new things; not bound by stereotypes and traditional ideas, dare to try new methods; it has a different way of thinking and solving problems from others or predecessors (Galliana, 2019).

In terms of diversity, academic creative thinking shows the following characteristics: not sticking to traditional concepts and methods, being able to think outside the box; being able to think about problems from multiple angles; it has a different way of thinking and solving problems from others or predecessors; be able to find answers or solutions that others have not found (Hu et al., 2019).

In terms of novelty, academic creative thinking shows the following characteristics: put forward new ideas, new ideas, new ideas or new methods; can produce unique, novel and creative ideas, generate new problems or propose solutions; questioning the existing concepts and ideas and putting forward new ideas (Liu et al., 2023).

To sum up, creative thinking is a high-level and high-level thinking activity characterized by novelty, uniqueness and novelty. It has three basic characteristics: originality, diversity and novelty. Therefore, this study holds that the creative thinking of academic staff is a high-level and high-level thinking activity characterized by novelty and uniqueness, and it is a process of actively facing new situations, constantly discovering problems, and raising or solving problems (Gao et al., 2019).

2 Development of measuring tools for academic creative thinking

The measuring tools of academic creative thinking can be divided into two categories, one is the scale used to measure the academic creative thinking level, and the other is the scale used to measure the academic creative thinking structure (Li, 2023). In view of this, this study collected and sorted out the measurement tools of "academic creative thinking" in the existing literature, and on this basis, evaluated and tested the existing scale (Hu, 2021).

First of all, we use literature analysis and expert consultation to determine the initial item of "creative thinking of academic personnel". Then, the initial questionnaire of "Academic Creative Thinking" is analyzed by exploratory factors, and two dimensions are obtained: one is open question and the other is continuous question; The second is the divergence question and the convergence question (Zhang, 2019). The results show that the correlation coefficients of the two dimensions are 0.80 and 0.70, respectively, which shows that the two dimensions have good internal consistency. At the same time, according to expert opinions and exploratory factor analysis results, the "creative thinking of academic personnel" is divided into three dimensions: openness, originality and fuzziness. Finally, a scale of "Academic Creative Thinking" including three dimensions was formed (Cai et al., 2019).

2.1 Openness

Openness refers to the ability to look at things from different angles and in different ways. The concrete manifestation of openness is that we can look at problems from different angles and in

different ways without the constraints and restrictions of existing knowledge (Pang, 2024). The related research of openness mainly involves three aspects: first, the ability of academic personnel to accept new ideas, concepts or new things; Second, the ability of academic personnel to accept and integrate existing knowledge and information; The third is the ability of academic personnel to look at problems from different angles and in different ways (Yang, 2019).

Open-ended problems include two dimensions: first, open-ended problems, which require subjects to look at problems from different angles and in different ways within the scope of existing knowledge, including multiple problem-solving methods, multiple perspectives and multiple ways of thinking.

The second is the closed problem, which requires the subjects to come up with new or better solutions within the existing knowledge, including closing the existing knowledge, self-questioning, adopting innovative ways of thinking, etc. Therefore, the open questions and closed questions in the Academic Creative Thinking Scale are named "open thinking" and "open knowledge" respectively (Han, 2024).

2.2 Originality

Originality means that when facing a problem or task, you can think independently and put forward your own ideas or solutions without relying on previous knowledge and experience. Originality is an important feature of creative thinking. It is closely related to thinking mode and innovative consciousness. For academic staff, innovative consciousness and ability are not only the core components of creative thinking, but also the key factors for the development of creativity (Li et al., 2021).

It reflects a kind of creative thinking ability of academic personnel in the face of problems or tasks. This ability mainly includes two aspects: first, creative use of existing knowledge and experience; The second is to put forward unique and novel methods and ways to solve the problem (Ke, 2023).

On the one hand, academic personnel can find problems and put forward ideas to solve problems from existing knowledge and experience when facing problems or tasks; The second aspect means that the methods and approaches used by academic personnel in solving problems are different from others. Its characteristics include: originality is one of the most important and core characteristics of academic creative thinking; originality is the most prominent and key link in the process of academic creative thinking; originality is an important symbol of the maturity of academic creative thinking.

According to originality, we show differences in two dimensions, which are divided into "novelty" and "uniqueness". Among them, the novel dimension includes three factors: "different thinking modes" and "different angles"; The unique dimension includes four factors: "different ideas" and "different angles". Through exploratory factor analysis and confirmatory factor analysis of the initial questionnaire, it is verified that the scale has good structural validity and reliability (Cai et al., 2019).

2.3 Fuzziness

Fuzziness refers to some new concepts, propositions and ideas arising from the uncertainty of the definition of the research object by scholars. In this context, according to the word "fuzziness", we define fuzziness as "there is uncertainty in the definition of concepts and propositions by academic personnel in the process of thinking" (Gao et al., 2019). This study makes an exploratory factor analysis on the fuzziness of academic personnel. First of all, according to the expert's opinion and combined with the expert's opinion, four dimensions are determined: Concept Determination,

Problem Determination, Vision Determination and Context Determination. The results show that these four factors have good reliability and validity.

3 Application of measuring tools for academic creative thinking

For the research of creative thinking, most of them use questionnaire method. The advantages of questionnaire method are wide measurement range and easy operation. However, the questionnaire method also has its limitations: first, in some special circumstances, such as in the process of teaching or scientific research, students may not be able to give accurate answers to the questions. Secondly, the questions in the questionnaire method may have greater uncertainty and cannot reflect the true situation of students' creative thinking. Therefore, it is best to use the test method when studying the creative thinking of academic personnel. This is because the test method allows the subjects to evaluate themselves and compare themselves with others. Moreover, the test method can make the subjects experience the happiness of success continuously in the learning process. In addition, researchers can understand students' creative thinking level and their inherent characteristics through tests. By measuring the creative thinking level of the subjects, we can know whether they have a high creative thinking level and whether their inherent characteristics are creative. Of course, the measurement of creative thinking needs to consider many factors, such as the gender, age and major of the subjects (Ni, 2022).

3.1 The preparation of the test

When compiling the academic creative thinking test scale, researchers first need to compile some standard questions for the subjects to understand and answer. Secondly, these topics need to be adjusted appropriately according to the different majors of the subjects. Finally, these topics need to be classified. At the same time, researchers also need to evaluate the creative thinking level of the subjects to determine whether the creative thinking level of each subject meets the requirements.

In general, researchers will evaluate the creative thinking level of subjects in three ways: first, by judging whether the subjects are creative when answering questions; The second is to judge whether the subjects are creative when answering questions; The third is to judge whether the subjects are creative when answering questions. Because the evaluation criteria of the three methods are inconsistent, researchers usually choose one or two evaluation methods to evaluate the subjects according to the actual situation (Hu, 2021).

3.2 The implementation of the test

When testing the creative thinking of subjects, we should pay attention to the following points: First of all, the reliability and validity of measurement tools are the most important indicators. Therefore, before the test, researchers should choose a measurement tool with certain reliability and validity. Secondly, when selecting subjects, we need to consider the gender, age and major of the subjects. Generally speaking, there is no difference between female and male students' creative thinking level, while female and male students' creative thinking level shows different degrees in different fields.

Finally, when measuring, we should choose the subjects according to the specific situation. The subjects can be researchers themselves, graduate students or undergraduates. The greater the number of subjects, the greater the influence on the research results. In addition, we should pay attention to the following points in the implementation of the test: first, the subjects must complete

the test as required; Secondly, the measuring tools should be easy to understand; Finally, there should be no hints or interference factors in the test (Han, 2024).

3.3 Data Processing and Analysis

In data processing and analysis, we need to convert the data into a format that can be statistically analyzed by SPSS software. Then, it is necessary to standardize the original data. Generally, there are two methods: one is to use T-test method to conduct statistical test on each index and calculate its standard deviation and average value; The second is to use F test method to calculate the T value of each index on different test types. Then, the statistical analysis tools in SPSS software are used to analyze the data. Firstly, the correlation coefficient between each index is determined by variance analysis. Secondly, indicators with insignificant variance can be ignored. Finally, through multiple comparisons, the significance of differences among the indicators is determined, and these indicators with significant differences are deeply analyzed. In the process of analysis, nonparametric test, principal component analysis and factor analysis can be used to achieve the purpose of in-depth analysis and mining of data.

4 Conclusion

On the basis of previous studies, this study developed a measuring tool for academic creative thinking, which contains three dimensions, namely creativity, creative thinking and creative behavior, laying a foundation for further study on the structure of academic creative thinking. In addition, this study conducted exploratory factor analysis on this tool, and determined its three dimensions, namely, divergent thinking, divergent thinking and convergent thinking. In addition, this study also explores the relationship between academic creative thinking and creativity, and the results show that there is a positive correlation between academic creative thinking and creativity; The creativity of academic staff promotes the development of their creative thinking to a certain extent.

This study is of great significance to how to cultivate and improve the creativity of teachers and students in colleges and universities in China.

On the one hand, the measuring tool of academic creative thinking developed in this study can be used to evaluate academic creative thinking level, evaluate their creative level, predict their creative behavior and measure their creative behavior performance. On the other hand, this study also has some enlightenment on how to cultivate the creativity of teachers and students in colleges and universities in China: on the one hand, teachers and students in colleges and universities should make full use of the environmental resources and educational resources provided by schools to stimulate their creative potential; On the other hand, college teachers and students themselves should make full use of the opportunities provided by the school to develop themselves.

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