An Investigation into Relationship between Metacognitive Awareness and Academic Achievement of Prospective Teachers at Teacher Education Programs in Pakistan

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ABSTRACT

The purpose of this study was to investigate the association between prospective teachers' metacognitive awareness and their academic progress while enrolled in teacher education programs in Pakistan. The research was primarily descriptive. Furthermore, it was a correlational investigation. Those enrolled in teacher education programs at the bachelor's and master's degree levels provided the information for this research. A simple random selection technique was used to choose a sample of 150 potential instructors from two public sector universities. The sample included 80 B.Ed. Level prospective teachers and 70 M.Ed. Level prospective teachers. Sindhu P.G. developed and standardized a tool called the metacognitive awareness inventory, employed in this study (2011). It comprises thirty items that are rated on a 5-point scale. The cumulative grade point average (CGPA) of prospective teachers was used to assess their academic achievement. Pilot testing and expert opinion were used to guarantee that the instrument's validity and reliability were not compromised. Smart PLS 3.2.2 was used to analyze the data. The t-test in SPSS (26.0) was used for group comparison, and PLS-SEM (Partial least squares structural equation modeling) was used to measure associations. Using statistical research, it was discovered that prospective teachers are participating in B.Ed. And M.Ed. Level teacher education programs have significantly different levels of metacognitive awareness. The metacognitive awareness of prospective teachers at the M.Ed. was shown to be higher than that of prospective teachers at the B.Ed. Level. It was also shown a significant beneficial association between prospective teachers' metacognitive awareness and their academic achievement. The practical ramifications of the findings and ideas for further research are discussed in this study.

Keywords

Teachers Education, Prospective Teachers, Metacognitive awareness, academic achievement

Introduction

Metacognition, a prominent field of investigation in psychology and education, has been defined in several ways due to its broader scope. Multiple shades of this term have been explained over the last several decades. Flavell (1979) considered it a cognitive phenomenon comprising knowledge as well as cognition. Schraw and Moshman (1995) considered it a person's ability to calibrate the process of gaining knowledge. Further refinement in the definition broadens the concept of metacognition. According to Dunlosky and Thiede (1998), in addition to gaining and regulating knowledge, it includes planning and monitoring one's performance. Ormrod (2008) explained that metacognition is the awareness about our cognitive processes and how it is used to know, learn, remember, and utilize the knowledge in the future. It includes at least two interrelated mechanisms of gaining knowledge and regulating it. Abdellah (2015) described it as knowledge about our thought process. He (2015) added that metacognitive calibration refers to the activities that we employ to reduce challenges in learning. In other words, it refers to understanding and reflecting on one's thought process, learning style, and cognitive abilities to maximize the learning. When a person reaches a level where he can identify the root cause of his slow performance in a challenging situation, it is called metacognitive knowledge. The next step is eliminating hurdles, finding performance

boosters, and applying such activities for optimal performance in challenging tasks. This second ability refers to as cognitive regulations. Both of these combined is called metacognition.

The role of metacognition in education is unquestionable. It enables the students to plan for a practical learning situation, monitors their progress, and evaluate their learning. To maximize the benefits of education, students can utilize metacognitive abilities (Costa and Kallick, 2001). Several studies have indicated that the students who employ metacognition are high achievers (Coutinho, 2007; Ponnusanmy, 2002; Turan and Demirel, 2010). Efficiency in learning is associated with the application of metacognitive abilities. The students who utilize metacognition are reported to use problem solving skills at the appropriate time, thus maximizing their learning and scoring well in tests. It is found in studies that a higher level of metacognitive awareness is associated with higher academic achievement (Kocak &Bayaci, 2011; Martini and Shore, 2007; Taebee et al., 1998; Turan and Demirel, 2010). Learners with poor metacognition have poor academic performance compared with those with good metacognitive abilities (Dunning et al., 2003; Sperling et al., 2004). Metacognition is a strong predictor of academic success (Al-Jarrah, and Obeidat, 2011; Uwzurike and Ndidiamake, 2010; Young and Fry, 2008). Helping students improve their

metacognitive abilities has a positive impact on their academic performance (Rezvan et al., 2006; Saravanakumar and Mhan, 2007).

The researchers have also explored the relationship between metacognition and the teaching performance of prospective teachers. Although it is a new area of investigation, few types of research laid the foundations for prediction. Research indicates that prospective teachers with sound metacognitive awareness or those provided with training on effective metacognitive strategies during their pre-service teacher training showed good teaching skills (Crowther, 2004). Their confidence, performance, student involvement, teaching strategies were better than those with poor metacognitive awareness (Crew and Carpentre, 2005).

Rationale and Statement of the Problem

Researches reviewed above indicate a positive relationship between metacognition and academic achievement and metacognition and teaching performance. However, these were conducted in developed and European countries. Research on this issue in developing countries like Pakistan is scarce. Although a few similarities of results can be assumed, identical results cannot be guaranteed due to differences in culture, economy, and education system. Teachers being the backbone of any country's education and economy, are worth researching agents. Therefore, context-specific research is needed to get insight into the metacognitive awareness of prospective teachers who receive pre-service training in Pakistan. This study aimed to explore the metacognitive awareness of prospective teachers of teacher education programs in Pakistan and its relation to academic achievement.

Objectives of the study

1. To evaluate the level of metacognition awareness among prospective teachers at teacher education programs in Pakistan.
2. To compare the level of metacognitive awareness of prospective teachers at B.Ed and M.Ed level teacher education programs in Pakistan.
3. To find out the relationship between metacognition awareness and academic achievement of prospective teachers at teacher education programs in Pakistan.

Hypotheses of the study

H_0 There is no significant difference between metacognitive awareness of prospective teachers at B.Ed and M.Ed level teacher education programs in Pakistan.

H_{01} There is no significant relationship between the metacognition awareness and academic achievement of prospective teachers at teacher education programs in Pakistan

Methodology

This research study was descriptive. Further, it was correlational research. The groups of the elements from which information is collected and applied were called population (Siddique et al., 2021) and the selection of the individuals or

subjects from the population is called a sample, from which data were collected (Siddique et al., 2021) A sample of 150 prospective teachers such as 80 B.Ed. Level and 70 M.Ed. Level prospective teachers were taken from two public sector universities by using a simple random sampling technique. Sindhu P.G. developed and standardized a tool called the metacognitive awareness inventory, employed in this study (2011). It comprises thirty items that are rated on a 5-point scale. The cumulative grade point average (CGPA) of prospective teachers was used to assess their academic achievement. Pilot testing and expert opinion were used to guarantee that the instrument's validity and reliability were not compromised. It was determined that this tool's reliability and validity were valid using the Smart PLS program, as shown in tables 1 and 2, respectively. Smart PLS 3.2.2 was used to analyze the data. The t-test in SPSS (26.0) was used for group comparison, and PLS-SEM (Partial least squares structural equation modeling) was used to measure associations.

Data Analysis

Table 1

Construct Reliability & Validity

	Cronbach Alpha	rho-A	Composite Reliability	Average Variance Extracted
CGPA	1.000	1.000	1.000	1.000
Metacognition	0.968	0.987	0.973	0.582

When it comes to evaluating the psychometric qualities of measures and quantifying construct validation and effects, CFA is the quantitative analysis method that is most commonly utilized (Harrington, 2009). CFA is used in this work to examine each concept's convergent and discriminant validity, which is accomplished with Smart PLS 3.2.2. According to the standard dependability index, all constructions received a score of 0.70 out of a possible 100. (Hair, Risher, Sarstedt, & Ringle, 2019). Table 1 demonstrates that the Alpha values, rho A values, and composite reliability values for all variables are greater than 0.70. In this case, the AVE (average variance extracted) is greater than 0.50. All constructs have indicator loading values greater than 0.60. As a result, all of the constructs utilized in the study were highly reliable and valid, as evidenced by their excellent reliability and validity indices.

Table 2

Discriminant validity of the constructs

	Academic Achievement	Metacognitive Awareness
Metacognitive Awareness	0.772	

It was stated by Fornell and Larcker (1981) that the measurement standard has been questioned and is not regarded appropriate for measuring discriminant validity (Henseler, Ringle, & Sarstedt, 2015). The authors discovered an alternative method for measuring discriminant validity, known as the HTMT (heteroregressive-monotrait) method. Henseler et al. (2015). In this study, the researchers used the HTMT technique to test discriminant validity, compelling. Based on their research, Henseler et al. (2015) proposed a standard value of 0.90 for the HTMT.

Furthermore, they stated that an HTMT score greater than 0.90 indicates that discriminant validity is not acceptable. Table 2 has the HTMT values for each of the constructed variables. The results reveal that the value of HTMT for each construct does not exceed 0.90 for any variable. As a result, it was determined that the scales met the criteria for discriminant validity. Academic success and metacognition had high levels of discriminant validity, while metacognition had a moderate level. This suggests that both constructs in the study had distinct and discriminant identities, which means that they were both distinct and discriminant.

Table 3

Mean Scores of Prospective teachers on Metacognitive Awareness Inventory

S. N	Program	No of Teachers	SD	M
1.	B.ed	80	.39	3.33
2.	M.ed	70	.23	4.29

Table 3 shows that 80 B.Ed level prospective teachers and 70 M.Ed level prospective teachers participated in the study and responded to the Metacognition awareness inventory. The mean score of B.Ed level prospective teachers on metacognitive awareness inventory was 3.33, and the mean score of M.Ed level prospective teachers on metacognitive awareness inventory was 4.29. the mean score of both prospective teachers was above the cut, and the median score was 3. It means that both types of prospective teachers were good in their metacognitive awareness. However, the mean score of M.Ed level Prospective teachers on metacognitive awareness inventory was more significant than the mean score of B.Ed level prospective teachers.

Table 4

t-test statistics for the significance of the difference between the two groups of prospective teachers

S.N	Program	No of Teachers	SD	M	df	t	P
1.	B.ed	80	.39	3.33	148	18.09	.000
2.	M.ed	70	.23	4.29			

Table 4 indicates an on the metacognitive awareness assessment; there was a statistically significant difference between the mean scores of B.Ed. Level prospective teachers and M.Ed. Level prospective teachers (MAI). Because of the value of t, 18.09, the p-value is.000, which indicates that the result is statistically significant (which is less than the .05 alpha levels). This indicates a statistically significant difference between the means of the two groups of potential instructors on the MAI, as indicated by t-test analysis, with the value of t148= 18.09, p =.000 being statistically significant at a significance level of.05. The null hypothesis, Ho: suggests no statistically significant difference between prospective teachers in B.Ed. And M.Ed. Level teacher education programs in Pakistan were found to be incorrect.

Table 5

Structural Equation Analysis (Relationship between Metacognition Awareness & Academic Achievement)

Relationship	Estimates	M	SD	t	P
Metacognition Awareness → Academic Achievement	0.814	0.818	0.023	34.633	0.000

Table 5 indicates, In this study, we found that there is a significant positive relationship between Metacognition awareness and academic achievement of prospective teachers ($r2 = 0.814$, p 0.05), which contradicts Ho:2's conclusion that there is no significant relationship between Metacognition awareness and academic achievement. As a result, HO:2 was ruled invalid. This indicates a favorable association between prospective teachers' understanding of their metacognition and their academic accomplishment. Teachers who had a high level of metacognition awareness also demonstrated high levels of academic accomplishment.

Figure 1 *Structure Equation Model*
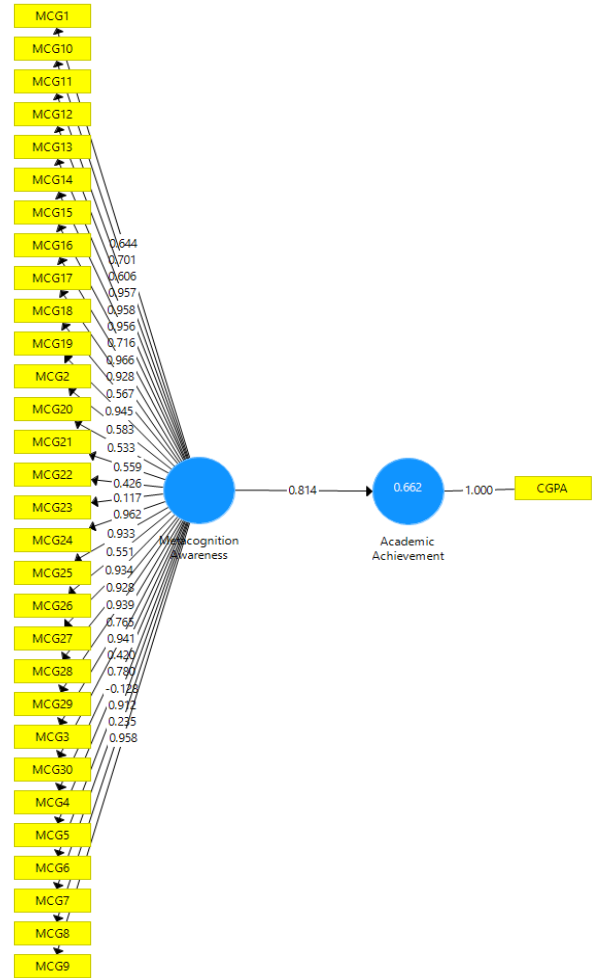
Discussion

There is a strong correlation between metacognitive awareness and academic achievement among potential teachers, according to this study. Aside from that, it compared the metacognitive awareness of potential teachers regarding their educational background. This study found a correlation between metacognitive awareness and academic achievement as measured by grade point average

for future instructors (GPA). Teachers with higher grade point averages (GPAs) were shown to be more aware of their own metacognitive processes. (MAI) validity is further confirmed by this study's findings; The findings are consistent with the results of earlier investigations. (Ndidiamaka, 2010; Young & Fry, 2008; Coutinhu, 2007). Instructors' metacognitive awareness should be explored in future research to gain a greater knowledge of the phenomena of metacognition and teachers' work performance. In future educational research, it is proposed to investigate the differences in teachers' metacognitive awareness between men and women.

Conclusion:

When it comes to higher-order thinking, metacognition is unique since it contains active control over the cognitive processes that are used in learning. Metacognitive activity includes strategies for addressing a learning task, assessing comprehension, and monitoring progress toward finishing a task. Students should be encouraged to improve their metacognitive skills because of the vital role they play in successful learning. When it comes to this, it's not just the job of teachers or schools; rather, it should be encouraged and cultivated at home, in schools, and in universities alike. In this investigation, the results are quite encouraging. Pre-service female teachers in Pakistan, according to the Metacognitive Awareness Inventory (MAI) results, are highly metacognitive. This indicates the excellent quality of education in Pakistan as measured by the MAI. This study's findings show a positive correlation between student academic achievement and the MAI. Use this assessment tool to see if pupils would benefit from direct instruction in metacognition. In large classrooms, this may be very important. This study shows that professors can also use the MAI to determine what kinds of metacognitive knowledge and regulation abilities their students claim to be using while studying in the classroom.

Consensus among teacher educators has long held that the development of both a knowledge base and skills in the delivery of instructional materials is essential. Various topics are included in the knowledge base, such as teaching philosophy, pedagogical techniques, child development, educational research and subject matter. The practice component of the curriculum, in addition to early field experience and student teaching opportunities, encourages students to put into practice the knowledge they have received through their courses and other experiences (Iqbal & Arif, 2011). Pre- and in-service training can help teachers become more effective (Basit et al., 2021). Adequate training should be provided before acquiring assistive technology. In order to increase the quality of life, the technology can perform a variety of tasks (Ashfaq & Rana, 2015). Developing empathy and interpersonal skills can help teachers become more effective. In order for a person to be content, successful, and productive in their work and professional life, they must have the personality traits that are most appropriate for their vocation, work or occupation. Many personality traits are required for a new and innovative career like teaching, such as efficacy and high-quality performance (Arif et al., 2012).

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