

EXPLORING THE ONTOLOGICAL BOUNDARY OF METACOGNITIVE AWARENESS OF PRE-SERVICE EDUCATORS

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Abstract

The pre-service educator preparation period is crucial in developing the competencies necessary for effective educators who succeed in the classroom. Consequently, it becomes imperative for pre-service educators to develop their awareness of self-regulatory and metacognitive skills to become effective in the classroom. Therefore, the process of developing pre-service educators' metacognitive awareness is important if we are to produce self-directed learners with well-developed cognitive skills. However, the designing and development of Bachelor of Education programmes that enhances teaching with metacognition is a neglected area in higher education institutions. The concept of Ontology is applied in this presentation because it constitutes an explicit specification of a conceptualization of the levels of interpretation of metacognitive awareness. This presentation reports on part of a larger quantitative study on the relationship between metacognitive awareness, teaching perspectives, and sense of efficacy of pre-service educators. On the theoretical component, the presentation aims to explore a framework for analysing the level of pre-service educators' metacognitive awareness, building on the self-directed learning theory and its application in the context of pre-service educators. A sample of 683 pre-service educators completed the Metacognitive Awareness Inventory for Teachers. To present and describe data, mean scores, standard deviations, Cohen's effect size for interpretation of results, and Spearman's correlation coefficients to determine correlations between concepts using multiple regression analysis were calculated, this was done to determine the nature of the relationship between the constructs (variables) of metacognitive knowledge and the effect of specified contextual components such as gender, Language of instruction, Mode of delivery Programme enrolled for and Area of specialisation as well as Campus of the respondents in relation to metacognitive awareness. There are two levels of interpretation of the findings presented here: (i) the manifested component of metacognitive awareness, and (ii) the contextual components of gender, language of instruction, programme enrolled for, area of specialisation, mode of delivery, and campus. This study is of particular interest to tertiary institutions, who are charged with the task of developing educators who can influence student achievement in a positive way.

Keywords: *Metacognition, metacognitive awareness, pre-service educators, ontological boundary, self-directed learning.*

1. Introduction and background

Teaching is one of the careers that is considered ideal (Mundiri & Bariroh, 2019), and as such becoming an educator is "often seen as a noble profession as it strives for the country's high-quality education and establishes a foundation for the future generation" (Ingarianti et al., 2022, p. 56). To this end, pre-service educator preparation period becomes crucial in developing the competencies necessary for effective educators who succeed in the classroom. Consequently, it becomes imperative for pre-service educators to develop their awareness of self-regulatory and metacognitive skills to become effective in the classroom.

Ontological boundaries make no sense as brute items above and beyond properties and relations but make sense as subset of properties and relations (Azzouni & Azzouni, 2017). Ontology is a Greek neologism coined in early modern times, "on" is the present participle of Greek "einai", which means "to be," and "logos" derives from *legein*, "to talk about" or "to give account of" something (Hennig, 2008). According to Gruber (1993, p. 1), an *Ontology* is "an explicit specification of a conceptualization" of notions that are presumed to exist in some area of interest and the relationships that hold them together. Therefore, the concept of *Ontology* is applied because it constitutes an explicit specification of a conceptualization of the levels of interpretation of the findings presented here. According to Larsen (2006, p. 2) any boundary implies at least two levels; tangible *manifestations*, and the *conditions*

(i.e., contextual components) of this manifestation. The tangible manifestations relate to things or to a given situation, and their interconnection with natural process and forces. Meanwhile, the conditions relate to theories of why and how the manifestations occur. Thus, “a boundary is a meaning-producing difference between at least two domains” (Larsen, 2006, p. 3). In line with this understanding and the results presented later, there are two levels of interpretation of the findings presented here: (i) the manifested components (i.e., metacognitive awareness components which are metacognitive knowledge and metacognitive regulation), and (ii) the contextual components (i.e., gender, language of instruction, programme enrolled for, area of specialization, mode of delivery, and campus).

The purpose of this paper is to explore the ontological boundary of metacognitive awareness of pre-service educators with the aim of designing a framework for analysing the level of pre-service educators’ metacognitive awareness. The presentation reports on the nature of the relationship between the variables of metacognition (metacognitive knowledge and metacognitive regulation) and the effect of specified contextual components such as gender, Language of instruction, Mode of delivery Programme enrolled for and Area of specialisation as well as Campus of the respondents in relation to metacognitive awareness.

2. Conceptual-theoretical framework

2.1. Metacognitive awareness

According to Flavell (1979), knowledge of one’s cognitive processes (or metacognitive knowledge) and awareness of one’s thinking play a vital role in learning. To this end, Dunlosky and Kane (2007) indicate that metacognitive awareness supports the learning process as a necessary motivation in the learning process itself. Studies on the relationship between metacognitive awareness and student academic achievement confirm a noteworthy relationship between metacognitive awareness and student academic achievement (Erlin et al., 2020). Thus, one can conclude that metacognitive awareness plays a major role in teaching and learning.

Researchers in the field of metacognition (Jacobs & Paris, 1987; Schraw & Moshman, 1995; Efklides, 2001; Tanner, 2012; Doyle, 2013) operationalized metacognition as having two main variables: metacognitive knowledge (knowledge of cognition) and metacognitive regulation (regulation of cognition).

- *Knowledge of cognition*, meaning the extent to which the learner knows (i) how they learn and what influences their performance (*declarative knowledge*), (ii) different strategies and procedures that can be used to solve problems (*procedural knowledge*), and (iii) when and how to use these strategies (*conditional knowledge*).
- *Regulation of cognition*, which includes (i) *planning*, i.e., activating prior knowledge, setting goals, and selecting appropriate strategies, (ii) *monitoring*, i.e., checking how well the learning processes and strategies used are, and (iii) *evaluation*, i.e., checking the outcomes of one’s learning.

Metacognitive knowledge, which is an awareness of one’s thinking, “occurs consciously and deliberately when the teaching-learning content and the knowledge about the thinking process involved coincide (Jagals, 2021, p. 131) Meanwhile, metacognitive regulation, which describes the ability to manage one’s own thinking processes, (Taasooobshirazi & Farley, 2013; Adagideli et al., 2015), “involves the actions that arise from the intentional thinking of metacognitive knowledge” (Jagals, 2021, p. 132).

2.2. Self-directed learning as standard theory

The study is underpinned by Self-Directed Theory as a standard theory, which is appropriate for this study as it promotes Lifelong learning skills and encourages reflective practice (Bosch, 2019). Self-directed learning as a teaching and learning approach has been studied since the publication of a book entitled *Self-directed learning: A guide for learners and teachers* by (Knowles, 1975). Since then, this concept has gained wider interest as researchers and policy makers world-wide have advocated for empowering learners with metacognitive awareness, self-regulation, and knowledge of the learning process skills to promote lifelong learning. Knowles (1975, p. 18) defined Self-Directed Learning (SDL) as “a process in which individuals take the initiative, with or without the help of the others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes”. Therefore, SDL is “an approach to education where learners take responsibility for their own learning” (Bosch, 2019, p. 2). In line with the SDL approach to teaching and learning, pre-service educators could benefit significantly if they are taught the skills to identify their own learning needs, how to formulate learning goals, and how to choose appropriate learning strategies and even evaluating their own learning.

3. Research paradigm and approach

This study utilized the post-positivism paradigm and a qualitative research approach. The choice of this research paradigm and approach was informed by Creswell and Creswell (2017) who argue that the post-positivist assumptions apply more to quantitative research than to qualitative research.

4. Population and sample

The target population for this study was the pre-service educators registered for a Bachelor of Education degree in the Foundation Phase, Intermediate Phase, Senior Phase and the Further Education and Training Phase at one University with three campuses across the North-West and Gauteng Provinces of South Africa.

For this study, a stratified purposeful sampling scheme was used as it “increases sample representatives by dividing the study population into strata based on characteristics that are of interest to the researcher” (Howell et al., 2020, p. 2). This is a sampling scheme whereby a “sampling frame is divided into strata to obtain a relatively homogenous subgroup and a purposeful sample is selected from each stratum” Collins et al. (2006, p. 85). For example, in the case of this study, the target population was organised according to campus and programme enrolled (Foundation phase, Intermediate phase, and Senior/ Further Education training phase).

5. Data collection

Data was collected through a close-ended online questionnaire, the Metacognitive Awareness Inventory for Teachers (MAIT) by (Balcikanli, 2011). The questionnaire was typed into a google form, the researcher then identified generic modules and the link to the questionnaire was uploaded on eFundi site by an independent person.

6. Reliability

Reliability in a research study refers to “the extent to which a measuring instrument is repeatable and consistent” (Pietersen & Maree, 2019, p. 260). In this study, the researcher used standardised questionnaires (MAIT) that had already gone through rigorous reliability and validity tests in previous studies. The Cronbach’s Alpha reliabilities values for this inventory vary from 0,79 to 0,85, indicating that the inventory displays high alpha scores (Balcikanli, 2011).

7. Data analysis

The services of a statistician were employed to use the Social Packages for the Social Sciences (SPSS) in the analysis of data. Data was converted from Google sheets into Microsoft Excel. To present and describe this data, mean scores, standard deviations, Cohen’s effect size for interpretation of results, and Spearman’s correlation coefficients to determine correlations between concepts using multiple regression analysis were calculated.

8. Results and discussion

The following table outlines the manifested components and provides a summary of the inter-item correlations means, and the Cronbach values for the MAIT.

Table 1. Manifested components: summary of inter-item correlation means, and the Cronbach Alpha values for the Metacognitive Awareness for Teachers Inventory.

Variable	Perspective	Inter-item correlation means	Cronbach Alpha
Metacognitive Knowledge	Declarative knowledge	0,304	0,636
	Procedural knowledge	0,317	0,645
	Conditional knowledge	0,291	0,620
Metacognitive regulation	Planning	0,329	0,654
	Monitoring	0,319	0,651
	Evaluation	0,363	0,694

The results presented in the table above illustrate that the inter-item correlation means for metacognitive knowledge ranges between 0,291 and 0,317, whilst the inter-item correlation means for metacognitive regulation ranges between 0,319 and 0,363. Meanwhile, the overall inter-item correlation means for MAIT items ranges between 0,291 and 0,363. This suggests that the items for the metacognitive awareness inventory are well correlated and can be used for further analysis. The Cronbach Alpha reliabilities for MAIT are as follows, 0,620 – 0,645 (metacognitive knowledge) and 0,651 – 0,694 (metacognitive regulation). The overall Cronbach’s Alpha ranges between 0,620 (metacognitive knowledge-conditional and 0,694 (metacognitive regulation-evaluation), indicating Cronbach Alpha values equal to 0,70. According to Gil-Gómez et al. (2017), this implies a high level of consistency of the inventory.

Figure 1. Ontological boundaries: Manifested and contextual components.

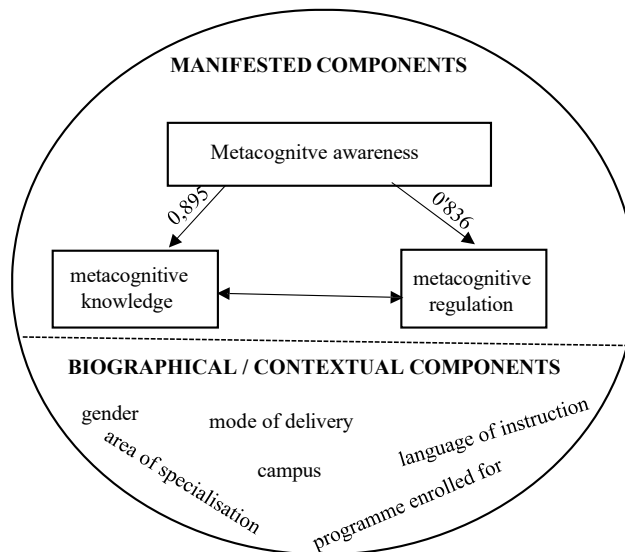


Figure 1 is a depiction of the reality as (co)-constructed by the respondents in this study. It illustrates a direct and/or indirect relationship between the manifested and contextual components. The manifested components stand in relation with one another, because one component can cause or affect the other, the relationship is therefore mediated. The mediated relationships were determined through correlations, whereas the conditions of these were measured by effect sizes.

9. Findings

There is an implicit relationship between the manifested and the contextual components as observed from the effect sizes. This suggests that contextual factors such as age, language of instruction, area of specialization, programme enrolled for, campus affiliation, and mode of delivery play a role in the pre-service educators’ metacognitive awareness.

10. Conclusion

The development of pre-service educators’ metacognitive awareness skills can contribute to the promotion of self-regulated learning. This suggests that pre-service educator programmes should be underpinned by pedagogies that enhance metacognitive awareness skills which will contribute to the promotion of self-directed learning.

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