



Teachers' Knowledge of Neuroplasticity: How It Augments Their Thinking

Khalil Gholami, Maryam Alikhani and Kirsi Tirri

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Teachers' knowledge of neuroplasticity: How it augments their thinking

*Khalil Gholami*¹, *Maryam Alikhani*², *Kirsi Tirri*³

1. Åbo Akademi University and University of Kurdistan, Khalil.gholami@abo.fi

2. University of Kurdistan, Alikhanimariam@gmail.com

3. University of Helsinki, Kirsi.tirri@helsinki.fi

Abstract

Educational research has shown that teachers' knowledge and beliefs are two important variables that significantly affect their pedagogical practice and decisions. Relying on the premise that knowledge is superior to beliefs in a pure epistemic dimension and rooted in the previous empirical studies, we examined the hypothesis that teachers' knowledge of neuroplasticity affects their epistemological belief system and mindset. Using a survey consisting of established scales about these variables, we collected data from a sample of 345 teachers. Results showed that teachers with a higher score in knowledge of neuroplasticity had a growth mindset and a sophisticated epistemological belief system

Keywords: Neuroplasticity, mindset, epistemological beliefs, SEM

1. Introduction

Educational research has shown that teachers' knowledge and beliefs are two important variables that significantly affect their pedagogical practice and decisions. Many teachers have acquired what Bruner (1996, p.46) calls "folk pedagogy" that reflects deeply fixed beliefs rooted in their social and personal experiences. In 2002, the Brain and Learning project of the Organization for Economic Co-operation and Development (OECD) also warned that the rapid proliferation of neuromyths among teachers and other professional is a challenging phenomenon in the educational settings (OECD., 2002). Research suggests that a significant part of neuromyths is the prevalence of misconception about brain among teachers in different countries and various educational settings (Blanchette Sarrasin et al., 2019; Carter et al., 2020). In literature, we found that teachers' mindset (Dweck (2007) and teachers' epistemological belief systems (Schommer (2004) can be two significant variables that can be affected by their knowledge of neuroplasticity. Relying on the premise that knowledge is superior to beliefs in a pure epistemic dimension and rooted in the previous empirical studies, we examined the hypothesis that teachers' knowledge of neuroplasticity affects their epistemological belief system and mindset.

2. Theoretical framework

This research relies on a conceptual model to explain the relationship between teachers' knowledge of neuroplasticity, mindset and epidemiological belief system. Neuroplasticity "refers to the capacity of neurons and neural networks to change their connections and behavior in response to experience" (Dan, 2019,p.1). "Plasticity embodies the idea that the strength of the synaptic connections between neurons is

dynamic, becoming stronger with use or weaker with inactivity...synchronous plasticity in the neural pathways producing specific behaviors results in observable learning”(Dubinsky et al., 2013,p.318). According to Dweck (2007), mindset is consist of believing that that personal characteristics, is either entirely malleable (growth mindset) and thus can be developed or entirely fixed and unchangeable (fixed mindset). Rooted in theory of personal epistemology, Schommer (2004) introduced and defined the concept of epistemological beliefs as s a system of more-or-less independent beliefs about “(a) the stability of knowledge, (b) the structure of knowledge, (c) the source of knowledge, and (d) the speed of learning.

3. Methods

The total sample of 345 teachers from Sanandaj, the capital city of the Kurdistan province of Iran, participated in the present research. We collected data using a survey consisted of four sections. In the first part, participants provided the demographic data, the second part, consisted of 18 statements about brain (Dekker et al., 2012) the third part, 6 statements from Dweck’s scale that measures mindset about intelligence and giftedness, and the fourth part, consisted of 24 statements about epistemological belief system. A structural equation modeling (SEM) was performed to examine the effect of teachers’ neuroplasticity knowledge on their mindset and epistemological belief systems.

4. Results

Rooted in the existing literature, we hypothesized that teachers with correct knowledge of neuroplasticity (independent variable) have sophisticated epistemological beliefs (dependent variable) and growth mindset (mediating variable. Results showed that teachers with a higher score in knowledge of neuroplasticity had a growth mindset and a sophisticated epistemological belief system: 63.8% of teachers with a growth mindset and 74.3% with sophisticated beliefs were found to have good knowledge of neuroplasticity. The results of SEM analysis also proved our hypothesis: the path coefficients (direct effects) from teachers’ knowledge of neuroplasticity to their mindset ($\beta = -0.70$, $P < 0.01$) and epistemological belief system ($\beta = -0.73$, $P < 0.01$) were statistically significant. Teachers’ knowledge of neuroplasticity also had also an indirect effect of -0.18 on their epistemological beliefs mediated by mindset.

5. Conclusions

The empirical model that we developed in this research is a significant contribution to existing literature on teachers’ belief, thinking and knowledge. In line with existing literature discussed, we agree that teachers’ knowledge of neuroplasticity, epistemological belief system and mindset are all important variables that have significant effects on their pedagogical practice. However, our results confirmed that they have different epistemic positions where teachers’ knowledge of neuroplasticity is superior to mindset and epistemological belief. These results have a conceptual contribution to the literature because it suggests that teachers’ knowledge of neuroplasticity is a predicting variable for mindset and epistemological beliefs. In practice, it provides us a tool for developing teachers’ growth mindset and sophisticated epistemological beliefs.

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