SCIENCE TEACHERS' BELIEFS ABOUT TEACHING AND LEARNING IMPLEMENTING INQUIERY-BASED LEARNING – A CASE IN QATAR GOVERNMENT PRIMARY SCHOOLS

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Abstract

The current study investigates the beliefs held by science teachers' on constructivism and a traditional approach in Qatar government primary schools. More specifically, it aims to investigate the challenges that science teachers experience during inquiry-based learning implementation. A web-based survey was conducted in order to collect data from Grades 4 to 6 science teachers.

A total of 112 science teachers responded and completed the survey on a voluntary basis. The results indicate that science teachers hold a higher beliefs in constructivism than traditional approach. A T-test and ANOVA analysis have showed that there is no significant differences between the beliefs of science teachers' and their gender, level of education, and years of teaching experience. In addition, Science teachers faced challenges in lesson planning, assessment, and teacher support.

Key words: Scientific inquiry, Beliefs

Introduction

Inquiry involves an assortment of ways in which students study nature through raising questions and suggesting an explanation based on the collected data and evidence from their investigation, and this process develops student information and understanding of scientific concepts (National Research Council, 2000). Referring to the theories of learning, the methodology of inquiry has derived from constructivist theory (BADA, 2015; McLeod, 2019), which emphasizes that learning occurs when students builds new knowledge through experience using the previous knowledge (BADA, 2015; Phillips, 1995).

Method

This study embraced a quantitative approach. A web-based survey was employed for data generation. The survey consisted of three sections: Demographic Data, Teachers Beliefs, and Challenges.

Validity:

- **Section 2 (Teachers Beliefs):** a confirmatory factor analysis was conducted on the items using AMOS Program 24. According to the results reported in Figure 3.1, the factor loadings for all items were significant and exceeded the suggested cut-off level of 0.5 (Chin, Gopal, & Salisbury, 1997).
- **Section 3 (Challenges):** It has been developed by researchers at the MOEHE in Qatar, and were validated by three experts from the College of Education at Qatar University and two other MOEHE specialists.

Reliability:

Based on Cronbach's alpha coefficients, presented in Table 1, the Instrument has excellent reliability.

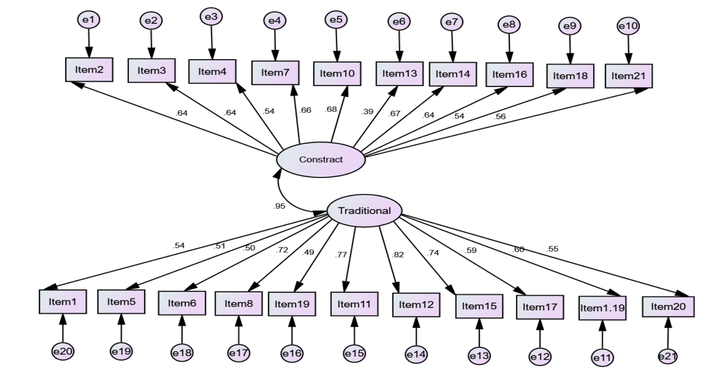

Figure 1. The results of factor analysis using AMOS program for Section 2 Items

Table 1. Cronbach's alpha reliability for the dimensions (Sample=112)

Dimensions	N of Items	Cronbach's alpha (α)
Section 2	21	0.919
Section 3	10	0.834

Results

1) **What are science teachers' beliefs regarding IBL across Qatar's government primary schools?**

Table 2 presents the t-test results, demonstrating that the teachers held higher beliefs toward a constructivist approach than toward a traditional approach, however, this difference has a small effect size.

2) **Do science teachers' beliefs about teaching and learning vary by gender, level of education, or years of teaching experience?**

- **Gender:** There are no significant differences between male and female teachers in relation to either the constructivist approach (t=0.28, df=110, p=0.78) or the traditional approach (t=-0.071, df=110, p=0.94).
- **Level of Education:** There are no significant differences are evident between the different teachers' educational levels in relation to the constructivist domain (t=-1.69, df=110, p=0.093) and the traditional domain (t=-1.79, df=110, p=0.076).
- **Teaching Experience:** Teachers with more than 11 years of experience in teaching, reported stronger beliefs in the constructivist approach (M=4.66, SD=0.79) than the traditional approach (M=4.34, SD=0.85), and the difference was significant (t=4.21, df=47, p=0.0001<0.05). However, there are no significant differences were evident between different teachers' years of experience in the constructivist domain (F (1, 111) = 1.15, p = 0.33) and the traditional domain (F (2, 111) = 0.48, p = 0.70).

3) **What challenges do science teachers encounter in their implementation of IBL?**

Eight of the 10 listed items had means higher than 3.5, suggesting that the teachers had encountered these challenges. These challenges were related to topics in the following three clusters: lesson planning; assessment; and teacher support. However, the participants reported that they did not encounter any serious challenges in time.

Table 2. T-test results of teachers' beliefs

Domain	M	Std. Error Mean	t	df	Sig. (2-tailed)
Constructivism	4.664	0.086	4.838	111	0.000
Traditional	4.386	0.090			

Discussion

- **Question 1:** This result underscores suggestions from previous studies that teachers' practices in relation to student-centred learning can affect their beliefs (Mansour, 2009; Pajares, 1992; Poulson, Avramidis, Fox, Medwell, & Wray, 2001). Previous studies in Qatar have documented the changes in teacher beliefs toward constructivism after having implemented PBL in mathematics and English classrooms (Du, Chaaban, & ALMabrd, 2019; Al Said, Du, ALKhatib, Romanowski, & Barham, 2019).

- **Question 2:**
  - **Gender:** Previous study found that female teachers held more constructivist beliefs than male teachers (Beck, Czerniak, & Lumpe, 2000).
  - **Level of Education:** McMullen's (1997) study has illustrated how a college education can influence teachers' beliefs. Moreover, he stated that teachers' beliefs were positively correlated with their educational experience and practices.
  - **Teaching Experience:** The result can be attributed to the fact that teachers' beliefs are influenced by their experience (Pajares, 1992; Hancock & Gallard, 2004; Mansour, 2008). Kagan (1992) found that an increase in teachers' experience in the classroom also informed their teaching beliefs (as cited in Mansour, 2008).

- **Question 3:**
  - **Student Learning:** DiBiase and McDonald (2015), found that science teachers were concerned that their students would not have the required skills to work effectively in an inquiry lesson.
  - **Teacher Support:** Said (2016) found that there were deficiencies in Qatari teachers' practical activities, which was thought to be indicative of a lack of competences on the part of teachers in this field; thus, teachers needed to be better trained in conducting scientific inquiry.

Conclusions

The results of this study will benefit teachers in particular, and the Ministry of Education and Higher Education in general, as it provides them with information and statistics regarding teachers' beliefs in the constructivist approach and the challenges they experience in its successful implementation. The results of this study open new horizons for research into the beliefs held by science teachers, and the ways in which these beliefs ultimately impact their practices.

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References

Al Said, R. S., Du, X., ALKhatib, H. A., Romanowski, M. H., & Barham, A. I. (2019). Math Teachers' Beliefs, Practices, and Belief Change in Implementing Problem Based Learning in Qatari Primary Governmental School. *EURASIA Journal of Mathematics, Science and Technology Education*. Retrieved from https://doi.org/10.29333/ejmste/105849

Chin, W. W., Gopal, A., & Salisbury, W. D. (1997). Advancing the Theory of Adaptive Structuration: The Development of a Scale to Measure Faithfulness of Appropriation. *Information Systems Research*, 342-367. Retrieved from http://content.ebscohost.com/ContentServer.asp?EbscoContent=dGJyMNHX8kSeprc4zOX0OLCmr1GeprFSrqy4S7CWxWXS&ContentCustomer=dGJyMPGptUiyrbNMuePfgeyx9Yvf5ucA&T=P&P=AN&S=R&D=bsu&K=252946