Professional Development for Science Teachers in Jordan According to Constructivism Theory

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Abstract

Constructivism suggests that professional development should leave aside traditional theory-based approaches and take on experimental learning technique. The theory encourages the construction of data from prior knowledge and experiences. It also states that the learners should be active in the learning process. These elements of the theory suggest that its application would fit the character of science teachers. These teachers have to face the ever-changing nature of the filed. These changes should reflect in their teaching. Fortunately, constructivist approach professional development allows the teachers to enhance their teaching skills through a reflection. The technique is also appropriate in confirming the validity of new knowledge through adapting it with prior knowledge. Reviewed literature recommends that an individual should seek functional collaboration to help in the establishment of a constructivist mentality.

Key words: Professional development, Constructivism theory, knowledge, Skills, Collaboration,

Introduction

Nowhere and nothing in the world is ever changing like science. The technologies that humans rely upon as well as predictions towards the future are all aspects of science. Constant evolution in this subject argues for a continued professional development for professionals who impart scientific knowledge – the teachers. The essence of education is to impart relevant knowledge to learners. Lack of continued development for teachers in a field that evolves regularly implies that the methods and content of science teaching becomes irrelevant. For this reason, science teachers carry the responsibility of updating their teaching skills and knowledge in response to both the changes in the subject and society. The application of constructivism theory suggests that professional development is essential in gaining additional skills that go towards the improvement of a teacher's teaching methods, as well as student performances.

The concept founds its principles on the notion that learning is an active and constructivism process. It based that the learner should take responsibility in creating knowledge. The nature of the theory aligns with the attributes of science as a subject. Making learning a continuous and constructivism process gives a science teacher the ability to update his or her knowledge and skills in line with the changes in the science field. In essence, it readies the teachers making them relevant in their respective duties of imparting science knowledge to the student. Through the application of constructivism, the professional development of teachers should focus on the construction rather than the transfer of knowledge, a concept that is beneficial in the acquisition of new and germane knowledge and skills necessary for improving their, as well as their student performances.

Conceptual Framework

The present paper strives to identify the beneficial impact of professional development in improving a teacher's method of delivery and student performances. The paper seeks the help of constructivism theory, a psychology learning theory that seeks to explain the essence of the learning process (Qarareh, 2016). According to the researcher, the theory focuses on the acquisition of knowledge through learning. To be specific, the concept uses past knowledge to find comprehension in new experiences and information. Bissou and Post (2012) assert that the theory does not focus on the transfer of knowledge. Instead, the concept calls for knowledge-building, which explains the importance of knowledge within the built-in construction. From theory, an individual creates knowledge by thinking about past experiences and knowledge.

The process of trying to find a meaning from these experiments describes the essence of the theory better. According to Bissou and Maila (2012), The theory goes against traditional forms of learning, which defends the approach taken. In these models, hold the knowledge that should be transferred to the teachers. On its part, constructivism puts the learner at the center making him or her the source of the knowledge. In short, the paper is based on the principle that professional development should come from within the learner. New knowledge and skills necessary for the professional development of a teacher should have their origin in the experiences and knowledge that an individual already possesses. The paper will use this principle to show how professional development is essential in improving the teaching and learning process.

Literature Review

Professional development is an important aspect of teachers in each field, especially science. According to Kleger and Bar-Yusuf (2010), education has several challenges, especially since the world is changing. Teachers have a major role to play in this changing world, especially with regard to the transfer of appropriate knowledge to their students. The researchers state that the changes compel teachers to change their attitudes, as well as teaching methods to meet these needs. These changes are challenges that the educational system must try to resolve.. Pitsoe and Maila (2012) describe these challenges in the form of societal needs. The researchers report that these needs change often, prompting changes in the education system. The teachers have had to alter their teaching patterns in a manner that suits the process of satisfying these needs. The importance of education in linking the youth to societal makes the changes necessary. Education must align itself to the needs of the society in the changing world, something that can be achieved through continued teacher development. The challenges brought about by the changes are intensified when the teacher teaches science and science-related subjects. According to Garbett (2011), teaching science is a complex matter. The broadness and complexity of the subject gives teachers a challenge in imparting the correct knowledge using the correct methods. Garbett (2011) contends that the presence of misconceptions about scientific elements makes the teaching much harder. Caton (2014) argues that the complexity in science leads to a situation where traditional methods of learning are void of the most important language. The researcher claims that the lack of proper knowledge discourages teachers from teaching science.

For those who gather enough courage, their delivery is always full of discomfort. These studies indicate the need for professional development and the complexity of teaching science. The fact that science does not only involved learning but also practicing intensifies its complexity. According to Southerland, et al. (2016), the process of learning science should not only involve its theoretical part but also an aspect of experiment. Science is a doing subject that allows the learners not only to obtain theoretical knowledge but also skills on how to apply the knowledge in experiential circumstances. This aspect of science differentiates its mode of teaching and learning from other subjects. According to Southerners and others (2016), learning involves basic concepts, scientific practices and comprehensive ideas. Researchers point out that learning the subject is linked to its investigative aspects. Despite the complex needs for scientific learning, the researchers point out that most science teachers lack experimental skills. The absence of the required research skills may be attributed to the traditional methods of teaching, which focus on the theory of transport rather than the blending of theory and Practice (Alkhulda, 2017).

These factors require the professional development of science teachers. Despite the complexity of science, especially considering the changes that occur in society, its importance necessitates a review of teacher training concerning professional development. In most cases, teachers rely on their existing education to impart knowledge. Teacher training takes the top-down approach explained by Pitsoe and Maila (2010). In this case, the teacher receives knowledge from someone above them. They then transfer this knowledge to their students. The researchers note that these positivist and approaches did not consider the input of the student in the learning process. Additionally, the process did not encourage the creation of new knowledge but just a transfer from one body to the next. The power of creating the knowledge was left to those at the top. In a review of the education reforms in Jordan, Alkhawaldeh (2017) notes that the country is moving away from the traditional methods of teacher training. The move takes into consideration the need to align education to societal needs, something that traditional approaches did not seem to achieve. According to Alkhawaldeh (2017), before the realization of the need to shift to conventional methods, the country relied heavily on theory-based education. Currently, a move to experiential approaches is destined to succeed in the country as the realization of its positive impact reaches the greater public. According to Rogers, et al. (2006) professional development is vital for science literacy. However, the form of gaining the development matters a lot.

The move in Jordan that Alkhawaldeh (2017) reports is geared at making sure that teacher training does not just entail the transfer of knowledge. The school-based approach tends to take into consideration the need for teachers to acquire experiential knowledge. This approach seems to appeal to the characteristics of the constructivism theory championing both activeness and constructiveness in the learning process.

Indeed, constructivism presents one of the ways towards revolutionizing science teacher training. The technique provides a unique way to enhance the ability of the teachers to cater to the needs of their students who in turn have a duty to cater to societal needs. Several researchers have commented in the appropriateness of constructivist professional development for teachers (Mukan, Fuchyla&Ihnatiuk, 2017). For instance, according to Rout and Behera (2014), the methodology is appropriate for the present challenges in teacher professional development. The researchers indicate that its suitability emanates from the fact that the concept allows the teacher to use pre-service knowledge, expand it, and make meaning of personal experiences in a way that allows the creation of new knowledge. DelleBovi (2013) supports this notion claiming that the principle allows a learner to reflect on experience and past knowledge. It provides an opportunity for a learner to reconstruct his or her place in the learning fraternity. It proffers a chance to compare existing knowledge with new knowledge. According to Kinnucan-Welsch (2007), this phenomenon is an interaction that results in the creation of knowledge. Instead of using the conventional means of PD, the theory suggests that the teacher should exploit his experiences. In place of the normal ways of transferring knowledge, teachers are encouraged to establish personal knowledge towards their professional development. In his perception, Nielsen (2012) argues that the concept champions pragmatism. The researcher states that model aims at making PD a practical rather than a theoretical element. The teachers get to grow professionally not by living their classes and attending other classes but by using their experiences in class to facilitate their learning.

An application of constructivist PD has proved its appropriateness to the teaching fraternity. In their study on teachers in Vietnam, Hang, Bulte, and Pilot (2017) found out that constructivist approach could lead to a transition from conventional ways of teaching and teacher training. However, they noted that some customized additions could improve the system applied further. On their part, Hsu and Wang (2014) report positive results in the application of constructivist PD. The researchers indicate that the approach has the ability of turning a novice into an expert. The researchers indicate that the achievement of a constructivist belief is essential in achieving these results. They also indicate that the best way to achieve a constructivist approach to PD entailed collaboration with peers. Singh, et al. (2012) continue to hail the usefulness of constructivist PD noting from their study that the teachers who used the method achieved notable professional developments in their fields of teaching. These teachers did not just grow but obtained the skills to create constructivist learning environment for their students. The benefits of the approach reach the students.

The constructivist approach aligns with the modern state of the classroom, especially concerning the use of technologies. According to Cetin (2016), the adoption of computer use in school provides an avenue for students and teachers to interact in a way that creates knowledge. The adoption of technology in schools has been long overdue considering the benefits accrued from these elements (Wilson, 2013). The autonomy that the computers give students promotes constructivist strategies. They proffer an opportunity for the students to engage actively in the formation of knowledge in a self-directed manner. These pieces of literature indicate that constructivist professional development may be beneficial to science teachers as they try to improve their teaching prowess.

Importance of Constructivist Professional Development for Science Teachers

Constructivism has two major elements that fit the fundamental purpose of science learning. First, the theory promotes constructive learning. Secondly, it champions active participation in learning (Beamer, et al., 2008). According to Southerland, et al. (2016) and Nielsen (2012), constructivism promotes pragmatism. These elements fit the nature of science teaching. The fact that it promotes the cultivation of knowledge from past knowledge and experiences giving the teacher the opportunity to reflect on the skills they possess with the view of expanding on them. Within the studies focusing on the impact of the concept on teaching quality, the majority noted several advantages. For instance, According to Singh, et al (2012), the technique allowed an improvement of teaching. The researchers note that the method gave the teachers the ability to enhance their knowledge in teaching. According to Hsu and Wang (2012), the cultivation of a constructivist mentality has a huge positive impact on teachers. The researchers note that the basic element that led to a successful adoption of the concept entailed cooperation. The presence of peer and mentor support was crucial in adopting the method, which later proved useful in improving the teachers' methods of imparting knowledge. Apart from that, the teachers extended the constructivist approach to the students letting them participate actively in the construction of knowledge.

The nature of constructivist personal development that allows comparison between past and new knowledge makes it beneficial for science teachers. According to DelleBovi (2013), the technique allows comparison. The assimilation is true to science teaching, especially in ensuring the truthfulness of certain concepts. This assimilation exposes the pragmatic nature of constructivist instruction. Relating this with the essence of experiments in science learning, the concept proves its appropriateness to the subject. According to Amolins (2015), the application of a laboratory-based PD led to desirable results. The researchers indicate that the practice allowed the teachers to create student-centered, which was vital in ensuring improved performances from the students. In short, constructivism is structured in a manner that suits science learning. First, promotes reflective though entailing use of prior knowledge to create new knowledge. Secondly, it champions engagement so that the student is in charge of the process of knowledge creation. Lastly, its experiential approach suits the aim of science of using evidence to establish facts. However, the use must consider some individual factors relating to the classroom.

Recommendations and Conclusions

Constructivist personal development is appropriate for science teachers because of its ability to use present information to create and provide proof for new knowledge. However, the application of this method needs other attributes that ensure success. In the review, collaboration was reported as the basic requirement to ensure the attainment of objectives in constructive PD. For this reason, science teachers should exploit their peers in cultivating constructivist mentality. The importance of collaboration points to the vital nature of supervisors. The supervisors are not meant as source of knowledge but rather serve the purpose of guiding the teachers towards the attainment of a constructivist mentality. Primarily, a science teacher should find peers and mentors to collaborate towards the achievement of a constructivist mentality central in achieving constructivist professional development. The concept can be applied with a huge success in Jordan education system for science teachers' professional development.

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