

A Review of Teacher Self-Efficacy, Pedagogical Content Knowledge (PCK) and Out-of-Field Teaching: Focussing on Nigerian Teachers

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To cite this article:

Aina Jacob Kola, Olanipekun Shola Sunday. A Review of Teacher Self-Efficacy, Pedagogical Content Knowledge (PCK) and Out-of-Field Teaching: Focussing on Nigerian Teachers. *International Journal of Elementary Education*. Vol. 4, No. 3, 2015, pp. 80-85.

doi: 10.11648/j.ijeedu.20150403.15

Abstract: Teachers are crucial to the success of any educational system and the success of any nation in general. In fact, it is not an overstatement to say the teacher is the most important educational resource in school. The world is not static but dynamic. Therefore, systems in a dynamic world are changing every day. Based on this conjecture this paper reviewed three educational constructs as related to teacher development in a changing world. These are teacher self-efficacy, pedagogical content knowledge (PCK) and out-of-field teaching. The paper observed that these constructs are paramount to the success of any teacher because studies indicate their influence on students' academic performance. The conclusion of the paper was that these constructs are yet to be taken seriously by the stakeholders in the Nigerian educational system. The paper suggested some recommendations for improving teachers' self-efficacy, PCK and reduction in out-of-field teaching in Nigeria.

Keywords: Self-Efficacy, PCK, Out-of-Field Teaching, Academic Achievement

1. Introduction

Teachers are crucial to the success of any educational system and the success of any nation in general. In fact, it is not an overstatement to say the teacher is the most important educational resource in school. The world is not static but dynamic. Therefore, systems in a dynamic world are changing every day. Based on this conjecture this paper reviewed three educational constructs as related to teacher development in a changing world. These are teacher self-efficacy, pedagogical content knowledge (PCK) and out-of-field teaching. The paper observed that these constructs are paramount to the success of any teacher because studies indicate their influence on students' academic performance. The conclusion of the paper was that these constructs are yet to be taken seriously by the stakeholders in the Nigerian educational system. The paper suggested some recommendations for improving teachers' self-efficacy, PCK and reduction in out-of-field teaching in Nigeria.

The most important educational resource is the teacher [10]. [1]; [40] were of the opinion that a teacher can significantly influence students' achievement. [32] said

teachers have an important role to play to adequately prepare the students to be able to play their roles in the society to achieve the national set objectives. The quality of any educational system depends to a great extent on the quality of teachers in terms of qualifications, experience, competency and the level of dedication to their primary functions [33].

The success of any teaching and learning process that influence students' academic performance depend on how effective and efficient the teachers are [42]. Teachers are the facilitators who are to impact on students the concepts expected to be learnt [34]. Teachers are the most important factor in the effectiveness of schools and the quality of a child's education [2]. This paper will review these constructs in the details and the possible relationship with students' academic performance.

2. Teacher Self-Efficacy

Teacher self-efficacy is the beliefs a teacher has about his perceived capability in undertaking certain teaching tasks. It is the beliefs a teacher has about his or her ability to accomplish a particular teaching task [29]. Self-efficacy is

the set of beliefs a person holds regarding his or her capabilities to produce desired outcomes and influence events that affect his or her life [4].

Teachers' self-efficacy is the set of beliefs a teacher holds regarding his or her abilities and competencies to teach and influence student behaviour and achievement regardless of outside influences or obstacle [47]. Many of the teachers we have in science classes today are such with low self-efficacy, and that is why we have many topics in science that were taught not to the students are about writing the final examination.

[37] said teachers with a high level of teacher self-efficacy have been shown to be more resilient in their teaching and likely to persist in a difficult time to help all students reach their academic potential. The authors believed that a teacher with strong beliefs in his or her efficacy would be resilient, able to solve problems and, most importantly, learn from their experience.

[29] believed that self-efficacy affects the teachers' level of efforts and persistence when learning difficult tasks. Teachers who do not trust their efficacy will try to avoid dealing with academic problems and instead turn their effort inward to relieve their emotional distress [5]. Teachers with high efficacy persisted with low-achieving students and used better teaching strategies that allow such students to learn more efficiently [45].

The lower level of achievement often recorded in some science subjects today could be traced to low teachers' self-efficacy as opined by [48]. The author said that teachers' self-efficacy had proved to be related powerfully to meaningful educational outcomes such as students' achievement. [15] emphatically said low teachers' self-efficacy leads to low academic achievement.

Every teacher must have that belief in himself or herself that he or she has the capability to teach the subject or else he or she should not be a teacher. [21] observed that teachers' beliefs about themselves and their capabilities can be influential in the quality of their performance. It is not an overstatement to say that cannot separate poor academic performance often recorded among Physics students in Nigeria secondary schools from teachers' low self-efficacy. Teachers' self-efficacy has consistently associated with students' academic achievement [23]. Teachers' self-efficacy differs significantly according to their qualifications [3]. Teachers' self-efficacy is central to effective teaching [47].

There is no way a teacher with low self-efficacy can be effective in the classroom and that is why looking at the the relationship between teacher self-efficacy and teacher effectiveness is critical. The question is "Is there any relationship between teacher self-efficacy and teacher effectiveness"?

3. Relationship Between Teacher Self-Efficacy and Effectiveness

Studies have shown that teacher efficacy is an important

variation in teachers' effectiveness that is related consistently to teacher behaviors and student outcomes [11]. The assumption by some people that teacher who has low self-efficacy cannot be effective is supported by [39]. The author argued that high efficacy teachers are more apt to produce better student outcomes because they are more persistent in helping students who have problems.

Studies revealed that teachers who have a high level of self-efficacy regarding their ability to teach can produce superior student achievement across a range of academic disciplines [11]. [5] believed that teachers who have high self-efficacy will spend more time on student learning, support students in their goals and reinforce intrinsic motivation. [8] posited that there is a positive correlation between self-efficacy and teacher effectiveness. Teacher self-efficacy account for individual differences in teacher effectiveness [11].

Many teachers who have low self-efficacy depend on reading from textbooks when teaching students. No effective teacher will be reading a textbook for his or her students while teaching. In support of this point, [13] said efficacious, high teachers are found to be using inquiry and student-centered teaching strategies, they are not using teacher-directed strategies like lecture method and reading from the text. When come across a teacher who comes to teach from the textbook in a class, that the teacher is not sure of his or her ability and, therefore, may score very low on efficacy scale.

[51] opined that teacher self-efficacy is a reliable predictor of the improvement of the personality characteristics of teachers. According to [11], teacher self-efficacy is a strong self-regulatory characteristic that enables teachers to use their potentials to enhance students learning. Self-efficacy is informed by the teachers' understanding of what effective teaching is [38]. Teachers' self-efficacy is an important motivational construct that shapes teacher effectiveness in the classroom [37].

After the consideration of the teacher self-efficacy, it is imperative to consider what a teacher is teaching and how he or she teaches it. The subject content and how the teacher transfers this content knowledge to students is crucial in education.

4. Pedagogical Content Knowledge (PCK)

PCK according to [19] first was introduced as the dimension of subject matter knowledge for teaching by Shulman. [46] considered PCK as a special amalgamation of content and pedagogy that is especially the province of teachers, their own special form of professional understanding. PCK is a characteristic of teacher knowledge of how to teach the subject matter [28]. In a related term, [36] viewed PCK as a professional knowledge for teachers. PCK embodied a unique form of teacher professional knowledge [28]. PCK is specifically for professional teachers because it

guides the teachers' actions when dealing with subject matter in the classroom [50]. It is a particular body of knowledge of teacher required to perform successfully teaching within complex and varied context [35].

PCK is the knowledge that teachers develop over time, and through experience, about how to teach a particular content in particular ways to lead to enhanced student understanding [27]. PCK is not a single entity that is the same for all teachers of a given subject area. However, a particular expertise with individual idiosyncrasies and significant differences that influenced by (at least) the teaching context, content, and experience [27].

PCK stands out as different and distinct from knowledge of pedagogy, or knowledge of content alone. Pedagogical content knowledge is a form of practical knowledge that is used by teachers to guide their actions in highly contextualized classroom settings [27].

PCK according to [31] can combine knowledge of a particular discipline along with teaching of that discipline. The author further stressed the need for the teacher to be able to blend content knowledge with the pedagogical. [42] underscored the importance of PCK to teaching and learning as a construct to help our thinking about what teachers continue to learn as they study their teaching practice.

In a different perspective, [20] called PCK an amalgamation or transformation, but not integration of subject matter, pedagogical and context knowledge. The context knowledge here is referring to the school and students, according to the authors. According to [49], PCK is a construct that surrounded by the knowledge of the subject matter, general pedagogical knowledge, and contextual knowledge. PCK is considered by [12] to be a knowledge of teaching that is domain specific; it is making what teachers know about their subject matter known to students.

[35] identified five components of PCK as knowledge of students' thinking about science, science curriculum, science-specific instructional strategies, assessment of students' science learning and orientations of teaching science. [6] viewed these components imperative because they work together to help teachers represent specific subject matter in ways that make it comprehensible to students.

[9] viewed PCK as the knowledge base required for teaching that are subject matter knowledge and pedagogical knowledge. It consists of knowledge of the curriculum, the knowledge of learning difficulties of students and the knowledge of instructional strategies and activities [9].

PCK is important in teacher education as [49] said PCK is a knowledge base for teaching. The author further said PCK is not just the knowledge of the subject matter but include the understanding of learning difficulties, and student conceptions. No matter how brilliant a teacher may be, the moment he or she could not interpret the subject-matter knowledge to facilitate student learning he or she has not achieved anything. Therefore, PCK is referred to as teachers' interpretations and transformation of knowledge of subject matter to facilitate student learning [49]. PCK is a heuristic for teacher knowledge that can be useful in changing the

complexities of what teachers know about teaching and how it changes over broad spans of time [42].

Assessment is vital to teaching and learning, based on this fact [19] observed that PCK is an important resource for teachers engaging in formative assessment. However [9] found that the teachers under training lacked the necessary pedagogical knowledge to teach relevant science topic to students.

PCK is not only important in the classroom but helps teachers to do better professionally. Teachers' content knowledge or pedagogical knowledge alone does not contribute to their professional development [31] unless the two merged. From this submissions, it is very clear that PCK is essential for all teachers. Students' success depends on what the teachers know about a subject and how he or she can impart to the students what he or she knows.

Experience and research show that school administrator transfers teachers from one class to another because he or she has a good PCK. If a teacher has a right PCK in maths does not mean, he or she should be made a physics teacher when he or she was not trained to teach physics. The next construct we shall discuss is called out-of-field teaching.

5. Out-of-Field Teacher

These are teachers assigned to teach subjects for which they have not got adequate training and qualification [25]. [16] defines out-of-field teachers as teacher teaching out of their field of qualification, this field might be a specific subject or year level. There is a problem of out-of-field teaching in Nigeria, especially in physics because of lack of qualified physics teachers.

Holders of NCE are trained to teach in primary or at worst in junior secondary school, but today most of the teachers we have been teaching physics in rural senior secondary school are majorly NCE teachers. Out of-field teaching is a problem of poorly prepared teachers [26]. Interestingly, out-of-field teaching is not a Nigeria problem alone; it happens even in developed countries like U.S, Australia and even in South Africa. Hobbs, Silva and Loveys in [18] noted that 16% and 30% of science teachers in Australia and South Africa respectively, were unsuitably qualified. The author said those not qualified was 31.4% of physics teachers in the United Kingdom. In any given year, out-of-field teaching may be more than half of all secondary schools in U.S [24].

In Nigeria, it is a common practice to see a qualified teacher teaching a subject he/she was never trained for, at that point such teacher becomes unqualified. [16] supports this by referring to the concept of out-of-field teaching that, qualified teachers become unqualified by assigning them to teach subjects or year groups for which they lacked suitable qualifications. Darby-Hobbs in [18] opinion were that out-of-field teachers are still in the process of developing, and they are less suited to teach the subjects not qualified to teach.

Out-of-field teaching has been suggested to be indicative of a teacher's inadequate subject-matter knowledge, and inadequate subject-matter knowledge has been found by

some to be a critical factor lowering the standard of quality teaching [14]. Out-of-field teaching is a problem for our educational system, and most of the problem caused by this phenomenon are great that we may not be able to quantify. The most significant consequences of out-of-field teaching are probably those not easily quantified [24]. There are many consequences of out-of-field teaching as highlighted by [24]. Some of these consequences as pointed out by the author are:

- Decrease in preparation time for teaching;
- Decrease in time for teaching; and
- Decrease in teacher morale and commitment

The assignment of teachers to teach fields in which they have no training could change the allocation of their preparation time across all of their courses. They may decrease the time supposed to use for other courses in a way to prepare for the one(s) for which they have no background. Out-of-field teacher whose concentrate efforts on subject content that is new to him has less time to focus on understanding students' needs and interests [41]. Out-of-field teachers have low self-esteem, they feel they do not meet the requirements or expectations [17]. Pillay, Goddard and Wills in [22] posited that it is possible for out-of-field teaching to compromise 'teaching competence' and disrupt a teacher's identity, self-efficacy, and well-being.

[30] made it clear that out-of-field teaching is a factor that contributes to stress for teachers. Webster and Mark succinctly pointed out in [30] that the problem of out-of-field teaching will not allow us to know the reality of a shortage of teachers.

[22] observed that a lack of teachers in science has led to an increase in the number of teachers teaching outside their subject areas. The author said this had influence on the quality of educational outcomes and the teacher well-being. Out-of-field teachers are often not confident to take risks in unfamiliar subjects or year levels because they feel exposed in unfamiliar subject territories [18].

These teachers may not have the knowledge of the subject matter as well as the skill to teach this subject because they are not qualified. [22] understanding was that out-of-field teacher lacked knowledge and pedagogical skills. [17] contended that out-of-field teachers are insecure because of lack of pedagogical knowledge and are not qualified in a subject or year level he or she was assigned.

The negative effect of out-of-field teaching is on the teacher themselves as [17] examined that out-of-field teaching influences teachers' development opportunities. These authors argued further that anything restricting professional development of teachers is also restricting educational development.

6. Conclusion

Teacher self-efficacy and PCK are so important that once a teacher is not adequate in PCK such a teacher will surely have low self-efficacy. A teacher that is very sound in subject content and can impart well to the students through proper strategies of teaching will have the confidence to teach any

concept in the curriculum. Out-of-field teaching is not good for our educational system because it affects both students and teachers professional development.

Each teacher should teach subject(s) he or she was trained for and also maintain the same class level. In Nigeria, where a holder of the Nigerian Certificate in Education (NCE) teaches senior secondary school is not the best. Engineers are in classroom teaching mathematics and physics in Nigeria. It is one of the reasons the government failed to realize there is a shortage of teachers. Engineers are not trained to teach in primary and secondary schools.

The following recommendations are therefore paramount based on this review: There should be a reforms in pre-service teacher education program in all our teacher training institutions. This reform should aim at strengthening both content and pedagogical knowledge of pre-service teachers.

Teachers in service should always avail themselves of every opportunity to attend the seminar, conference and workshop to develop themselves. School libraries should be equipped with journals for the benefit of developing teachers' knowledge of new ideas in the teaching profession.

The government should organize seminars, conferences and workshop on teacher self-efficacy from time to time. Many of the teachers do not know what teacher self-efficacy is, therefore such teachers may not see the need for attending its seminar, conference, and workshop. However, by the time they have attended seminars, conferences and workshop on self-efficacy, they will never remain the same in their classes.

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