Teacher Education Students' Pedagogical Content Knowledge: Retooling the Professional Development Process in Kenya's Schools of Education

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Abstract

The impact of globalization has brought changes to education which requires teachers to demonstrate practical pedagogical wisdom in critical features of teaching, namely: the subject matter being taught, the classroom context, and the physical and psychological characteristics of the students, that is, Pedagogical Content Knowledge (PCK). High level of Pedagogical Content Knowledge (PCK) leads to delivery of high-quality instruction in today's highly contextualized classroom settings and has the potential of producing learners who are prepared for a competitive society. However, teachers' lack of PCK has been identified as a pervasive problem all over the world. In Kenya, it has been highly linked to the recurrence of poor performance in local and internal competitive examinations, poor attitudes in some subjects, and lack of motivation for continuous learning among school-age children along the education continuum. Even so, the voice of student teachers and that of the school practice advisors, at the center and apex of this mentorship process in the Universities, has been largely ignored in transformative teacher education discourse. Guided by literature on transformative teacher education, student teacher mentorship, and reflective pedagogy, this paper presents the perspectives of 50 Student Teachers (STs) and 10 School Practice Advisors. STs confidence in special teaching methods courses, pedagogical content competence in teaching both independently and collaboratively, key areas of concern for PCK improvement, and practical strategies for PCK mentorship were the focus. Based on a qualitative and an interpretive research paradigm, the sentiments of 50 STs who participated in the May-August, 2017 School Practice as well as the views of 10 School Practice Advisors (SPAs) from the School Education (SEDU) of Masinde Muliro University of Science and Technology were sought. Based on four domains of Pedagogical Content Knowledge (PCK) which include Subject Matter Knowledge

(SMK), Knowledge of Curriculum (KoC) and Knowledge of Learners (KoL), and Knowledge of Pedagogies (KoP), the paper provides insights for teacher educators and University Management on areas that need further improvement and strategies for developing beginning teachers' PCK practices.

Keywords: Student Teachers, Mentorship, Pedagogical Content Knowledge, School of Education.

Introduction

Teachers play important roles as transmitters, inspirers and promoters of man's eternal quest for knowledge. The professional preparation of teachers has been recognized as crucial for the qualitative improvement of education since 1960s (Kothari Commission, 1964-66). Stated by National Council for Teacher Education (1998) in Quality Concerns in Secondary Teacher Education- 'the teacher is the most important element in any educational program'. It is the teacher who is mainly responsible for implementation of the educational process at any stage. Skilful teaching requires the appropriate use and integration of specific moves and activities in particular cases and contexts, based on understanding and application of professional judgment. Teaching is a profession and teacher education, which is the process of professional preparation of teachers, (Koster Brekelmans, Korthagen & Wubbels, 2005) is undergoing transformation across the globe.

Current changes in the global educational landscape has placed unprecedented demands on teacher education programs (OECD, 2000) The quality of teacher work is now seen by an increasing number of key actors, such as, educational researchers, consumers of teacher training and policy makers as by far the most important factor determining the quality of student learning and future productive workforce (Darling-Hammond & Richardson, 2009; Borko, 2004). To this end, there has been growing interest in the scholarship of teaching (Shulman, 2002). The debate has been: What knowledge should a teacher possess and how can this knowledge be constructed and developed in a teacher education program or through experience in the field (Wilson, Cooney, & Stinson, 2005). An immediate answer: "What knowledge?" is thought to be subject-matter knowledge? Surprisingly, this is not the hallmark of this scholarship (Cochran-Smith, 2000). According to Shulman (2002), a teacher should have in-depth knowledge of what he or she is supposed to teach and a strong conceptual

understanding of a topic and its relationships with other topics. Such scholarship is displayed through a teacher's grasp of, and response to, the relationships between knowledge of content, teaching and learning in ways that attest to practice as being complex and interwoven.

The push for conceptualization of teaching scholarship is believed to emanate from a hot debate on the relationship between teacher education and teacher effectiveness (Darling-Hammond & Baratz-Snowden, 2005), and has culminated into a growing consensus on the need for transformative improvements to the teaching profession. It is partly occasioned by influx of students from culturally and linguistically diverse backgrounds, students with disabilities, technology in education, rigorous college and career-ready standards, and tougher educator evaluation systems (Borko, 2004: Furlong, 2000). These trends have continued to demand that novice (beginning) teachers enter into classrooms with newer and higher levels of expertise and instruction.

One aspect of teachers' professional knowledge that has received considerable attention over time has been associated with the purposeful linking of subject matter knowledge and teaching knowledge (Betts & Frost, 2000). This amalgam of subject matter knowledge and teaching knowledge highlight skills and expertise of subject specialist teachers is coined as Pedagogical Content Knowledge (PCK). PCK is an emerging major field of study, an acceptable academic construct and a useful framework for teachers for development and sharing content-specific wisdom of practice in meaningful ways that further enhance the development of professional knowledge and practice (Betts & Frost, 2000)

The most recent call to action on teaching scholarship ratified by NCATE in 2008, puts this into perspective. The NCATE standards specifically address teacher quality and urge commitments in preparation of teachers who: (a) acquire the necessary content, pedagogical, and professional knowledge and skills to teach both independently and collaboratively; (b) are prepared to teach a diverse community of students; (c) can integrate technology into instruction to enhance student learning and to teach to student standards set by specialized professional associations and states; (d) can explain instructional choices based on research-derived knowledge and best practice; (e) can apply effective methods of teaching students who are at different developmental stages, have difference learning styles, and come from diverse backgrounds; (f) can pursue in-depth study of the subject they plan to teach; (g) possess a

foundation of professional and pedagogical knowledge upon which to base instructive decisions; and (h) can complete diverse, well-planned, and sequenced workplace experiences in schools. Essentially, NCATE blows out these standards as a commitment to social justice demands and a strategy of assuring high quality education for all children.

The National Council for Accreditation of Teacher Education (NCATE) standards identify a whole range of elements constituting professional knowledge of teaching (Mewborn, 2000). However, Shulman identifies PCK as a distinct body of knowledge even though knowledge of content and knowledge of pedagogy contribute to it. He notes that PCK includes knowledge of learners, knowledge of educational context, and knowledge of instructional materials. Broadly, Shulman (1987) recognizes seven domains of teacher knowledge, one of which is PCK. He explains why he identified pedagogical content knowledge as a knowledge domain for teachers as follows:

> Among those categories, pedagogical content knowledge is of special interest because it identifies the distinctive bodies of knowledge for teaching. It represents the blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organized, represented and adapted to the diverse interests and abilities of learners, and presented for instruction. PCK is the category most likely to distinguish the understanding of the content specialist from that of the pedagogue. (p. 8)

Shulman's (1986, 1987) classic articles, describes categories of what a teacher needs to know. A teacher needs to know what is to be taught, that is, subject matter or content knowledge, and to teach this, the teacher needs what Shulman named pedagogical content knowledge (PCK). By this, he was referring to a specific kind of content knowledge which involves "the ways of representing and formulating the subject that make it comprehensible to others" (Shulman 1986).

Since then, PCK has been studied especially in the field of science education. Abell (2008) attempted to present some features of PCK that researchers have consistently agreed on, that is, PCK is a specific content knowledge, exists on a continuum, can be strengthened, is a discrete category of knowledge, are transformation of other types of knowledge, is dynamic rather than static and is necessary for students' success. According to Shulman (1987), a teacher also needs general pedagogical knowledge (knowledge about e.g., classroom

management), curricular knowledge, knowledge of learners and their characteristics, knowledge of educational contexts, ends, purposes and values. Using a different lens, Van Driel, Beijaard & Verloop (2001) explained how a teacher's practical knowledge is formed in a process where a mixture of formal knowledge, learned through formal courses and programs, and experiential knowledge, gained through practice, is interpreted in practice through one's beliefs and values.

Tamir (1988) comes out with a sharper distinction between general pedagogical knowledge and subject-matter-specific pedagogical knowledge. He claimed that each type of knowledge is composed of four categories-namely, student, curriculum, instruction, and evaluation- but they have different meanings in each domain. He provided examples for each category to reveal the distinction between general pedagogical knowledge and subject-matter specific pedagogical knowledge. For instance, for the student category, knowing about Piaget's developmental levels is related to general pedagogical knowledge, whereas knowing about specific common conceptions and misconceptions in a given topic is related to subject-matter specific pedagogical knowledge. Furthermore, he identified teachers' skills in diagnosing students' conceptual difficulties in a given topic and their knowledge about effective use of instructional tools as subject-matter-specific pedagogical knowledge.

Similarly, Ball & Bass (2000) identified teachers' knowledge of students' difficulties and appropriate teaching strategies to eliminate those difficulties as part of teachers' PCK. They defined PCK as follows:

> Pedagogical content knowledge is a special form of knowledge that bundles mathematical knowledge with knowledge of learners, learning, and pedagogy. These bundles offer a crucial resource for teaching mathematics, for they can help the teacher anticipate what students might have trouble learning and have ready alternative models or explanations to mediate those difficulties. (p. 88)

As it is, differences occur with respect to elements scholars include or integrate in PCK, and to specific labels or descriptions of these elements. However, a common view of PCK is that it is bound up and recognizable in a teacher's approach to teaching particular content. A teacher should act as facilitator of children's learning in a manner that the child is helped to construct his/her own knowledge. Therefore, teacher education system through its initial, in-service and

continuing professional development programs is expected to ensure adequate supply of professionally competent teachers to run the nation's schools (NCFTE, 2009) and this happens when teacher education program that is sensitive to this idea. Significant too, is an emerging agreement that PCK of trainees or beginning teachers improve or change after taking well-crafted special methods course in which trainees are intensively prepared on critical issues on this scholarship (Abell, 2008). According to Grossman (1990) content-specific methods courses as well as associated field experience supports the development of PCK and enable STs to learn about the overarching purposes for teaching specific subject-matter, strategies and techniques to teach that subject.

Pedagogical Content Knowledge Development in the Context of Field and Microteaching Experiences

Through field experiences, STs are accorded opportunities to make connections between what they have learned so far and what a real classroom environment looks like (Askell-Williams, 2004). They get chance to improve their repertoire of teaching strategies and students' misconceptions during field experiences. Therefore, methods course and field experiences are important in helping STs to develop PCK. In this view, Tamir (1988) suggests that the instructor of any special methods course should endeavor to help the development of PCK of STs by providing opportunities for microteaching.

During microteaching activities, trainees prepare a lesson plan in which they describe what they will teach and how they will teach it (Shulman, & Shulman, 2004). In attempting to find appropriate answers for those questions, STs will use their knowledge of content, knowledge of learners, knowledge of curriculum, knowledge of pedagogy and PCK. After the implementation of the lesson, STs evaluate their teaching practices and learn from their experiences. Since STs tend to rely on their own experiences while they are teaching (e.g., Ball, 1988) lots of opportunities for microteaching and critical reflections before and after these experiences can contribute to the development of PCK domains. As warned by Shulman and Shulman, (2004), poorly designed programs or rushed delivered special teaching methods courses may not ground STs in PCK. Trainees are bound to face a lot of challenges during their initial teaching practice experiences.

A lot has been published on the relationships between PCK and other knowledge domains (e.g., Kinach, 2002) in the developed world but little is documented about this unique aspect of teaching scholarship in sub-Saharan Africa. More studies are needed in order to understand the nature of PCK in training programs and how it is developed through teacher education programs or field experiences. In view of the foregoing, the area of emphasis for this study is pedagogical knowledge, skills, and dispositions acquired by STs at training points prior to school experience. This assumes that subject-matter knowledge alone is not enough for being a good teacher (Saxena, 2015) and that teachers should definitely possess knowledge of subject-matter, students, pedagogy, and curricular issues and also be able to interweave them effectively when planning for instruction as well as when teaching in the classroom.

Understanding Pedagogical Content Knowledge

Pedagogical Content Knowledge (PCK) was originally introduced by Shulman (1987) to enclose a category of teachers' professional knowledge determined to each individual teacher. It is a generic knowledge about understanding, designing, managing and implementing student learning. It includes not only what teachers know about learning, but also what they do to, make learning happen for a diverse range of students within their classrooms. Shulman points out that PCK is a form of practical pedagogical wisdom of able teachers to guide teachers' actions in highly contextualized classroom settings and enable them come out with most useful way of representing and formulating the subject that make it comprehensible to others.

For a decade, there has been a blurring of lines when trying to separate content and pedagogy because pedagogy is also the content. For instance, in describing PCK, Cochran, *et al*. (1993), renames PCK as pedagogical content knowing (PCKg) to acknowledge the dynamic nature of knowledge development and defined pedagogical content knowing as teacher's integrated understanding of four components pedagogy, subject matter content, student characteristics, and the environmental context of learning. On the other hand, Magnusson, *et al*. (1999) consider PCK as a separate domain of knowledge that is iteratively fueled by knowledge of its component parts: subject matter knowledge, pedagogical knowledge and knowledge of context. Gess Newsome and Lederman (1999) puts forth a transformative model of PCK which is considered as the transformation of subject matter, pedagogical and contextual knowledge into a unique form of knowledge that impacts teaching practice.

Over and above, the concept of PCK is integral to teaching as a profession and is often considered to be an important aspect of a teacher's lived experience. It is equated to transformation of teacher knowledge from a variety of domains of knowledge, which includes subject matter knowledge, pedagogical knowledge, and knowledge about content and including also knowledge of how particular subject matter topics, problems and issues can be organized, represented and adapted to the diverse interest and abilities of learners and then presented for instruction. As put by Shulman (1987:8) PCK is "the blending of content and pedagogy into an understanding of how particular topics, problems or issues are organized, represented, and adapted to the diverse interests and abilities of learning, and presented for instruction."

For this reason, Shulman outlines seven knowledge domains for teachers: namely, subject-matter knowledge; general pedagogical knowledge; pedagogical content knowledge; knowledge of learners and learning; curriculum knowledge; knowledge of educational contexts; and knowledge of educational philosophies, goals, and objectives. Additionally, PCK could also refer to ".... knowledge of the transformation of several types of knowledge for teaching (including subject matter knowledge), and that as such it represents a unique domain of teacher knowledge". The first component of PCK is knowledge of subject-matter which refers to knowledge of mathematical facts, concepts and the relationships among them. SMK is important as it influences teachers' instruction and students' learning (Ball & Bass, 2000). It equally includes being able to relate a particular concept with others and explain or justify the reasons behind the procedures explicitly to promote students' understanding.

Knowledge of pedagogy covers knowledge of planning and organization of a lesson and teaching strategies. Teachers who have strong pedagogical knowledge have rich repertoires of teaching activities and are able to choose tasks, examples, representations, and teaching strategies that are appropriate for their students. In addition, they know how to facilitate classroom discourse and manage time for classroom activities effectively.

Knowledge of background understanding or and knowledge, consisting of students' learning style preconceptions, common difficulties, errors and misconceptions. Teachers who possess a strong knowledge base in this domain know what concepts are difficult for students to grasp, which concepts students typically have misconceptions about, possible sources of students' errors, and how to eliminate those difficulties and misconceptions. Finally,

knowledge of curriculum includes knowledge of learning goals for different grade levels and knowledge of instructional materials. Teachers with strong knowledge in this area plan their teaching activities accordingly. They choose appropriate materials (e.g., textbooks, technology, and manipulatives) to meet the goals of the curriculum and use them effectively.

PCK is therefore a unique knowledge processed only by individuals within the profession of teaching, and a powerful academic construct that is based on the view that teaching requires much more than the simple delivery of subject content knowledge to students and, that quality student learning is not the simple recall of facts and figures. Shulman opine that teacher need strong PCK to be the best possible teachers because PCK demands of teachers a rich conceptual understanding of the particular subject content that they teach. This rich conceptual understanding, combined with expertise in developing, using and adapting teaching procedures, strategies and approaches, for use in particular classes, is purposefully linked to create the amalgam of knowledge of content and pedagogy (Loughran *et al*., 2006, p. 9). It is useful in helping teachers' understandings what teachers know, what teachers ought to know, and how they might develop it (Park, 2005).

PCK is a corner stone of a teacher's professional expertise. A teacher should know the content, pedagogy, curriculum, and the interaction between them. It enables the teacher to know how to orchestrate the learning environment to facilitate students' understanding of a particular concept and to contribute to their intellectual development. Shulman further identifies PCK as "the ways of representing and formulating the subject that make it comprehensible to others" (p. 9). He adds that PCK includes teachers' knowledge about specific topics that might be easy or difficult for students and possible conceptions or misconceptions that student might have related to the topic. Shulman (1986) described PCK as including, "the most powerful analogies, illustrations, examples, explanations, and demonstrations– in a word, the ways of representing and formulating the subject that make in comprehensible for others" (p.9).

Importantly, PCK is knowledge that teachers develop over time, and through experience, about how to teach particular content in particular ways in order to lead to enhanced student understanding. In the initial training stages, student teacher trainees are expected to be grounded in PCK before going to test their level of understanding in different aspects of

professional knowledge in their model schools. PCK is a key aspect in teacher professional development that should not be neglected during initial training and should be accessed by STs for meaningful teaching practice.

Statement of the Problem

In most countries of the world universities have become the most important source of new knowledge, generated by research, which constitutes the basis of teachers' professional knowledge used to solve problems in everyday teaching practice. Nearly all universities in Kenya are granted the mandate of preparing teachers who are able to meet the needs of learners from diverse backgrounds. Whereas a number of them have held the largest responsibility for the education of teachers for quite some time, a few have got accreditation to do the same recently. They are the providers of most initial teacher education programs, and they also play a key role in providing professional development programs for practicing teachers.

One main expectation after going through university teacher training is that one should be able to demonstrate that they possess general knowledge of subject matter, of pedagogy, of learning and learners, and of curriculum. Equally, teachers should have context specific knowledge, which includes knowing how to teach a particular concept to particular students, how to represent specific ideas, how to respond to students' questions, and what tasks to use to engage students in a new topic (Shulman, & Shulman, 2004). Furthermore, they are required to demonstrate some level of confidence in their subject areas since this affects the choice of tasks and the kinds of learning environments they create (Koster *et al*., 2005). It means that University training programs should provide several content, general pedagogy, and content-specific methods courses to support the development of professional knowledge for teaching.

Even so, the nature of this professional knowledge and the way it is acquired by practicing professionals from various institutions in Kenya, has been put to serious scrutiny by international organizations involved in educational development. Besides, the immediate glaring indicator - the inability of learners handled by the trained teachers to effectively achieve basic learning goals and concern over the recurrence of poor performance of basic school pupils in local and internal competitive examinations, there is a growing concern that many new teachers rarely begin their careers with the deep knowledge and robust skills necessary to respond to the wide diversity of learners in their classrooms. Moreover, consumers of teacher

education, aspiring teachers and educational stakeholders do not know which institutions are doing a great job and which are not. The binary and quite opaque approach of accrediting bodies, in which an institution earns a thumbs-up or -down, does not provide information that consumers can easily access or use.

What is not clear is whether a flurry of new programs at leading universities -in many cases overflowing with graduate students, adequately equip STs with theoretical understanding and professional skills to effectively engage in classroom practice. While this study considers PCK as an integral aspect in the teaching profession and perhaps the most important aspect of a teacher's lived experience and a transformation of teacher knowledge from a variety of domains of knowledge, it acknowledges that if students are to develop better attitudes and values towards all school subjects and excel academically, they have to be handled by teachers who exhibit high levels of PCK (Shulman, & Shulman, 2004). Although PCK development is continual as a result of experience in many classroom settings it is expected that initial teacher training programs should be able to imbue student teachers with PCK. This study interrogates student teacher trainees' PCK level for effective classroom practices.

Purpose of the Study

The purpose of this study was to investigate whether the special teaching methods courses taught at Masinde Muliro University of Science and Technology (MMUST) and their associated field experiences support development of PCK of STs. By extension the study examined STs' conceptual understanding of PCK and its influences in school practice.

Research Question

a. To what extent did the special teaching methods course prepare you in PCK before your teaching practice experience?

b. How did you perceive your Pedagogical Content Knowledge level during School Practice?

Methods

Case study methodology was used given the exploratory nature of the research. As noted by Merriam (1998), the "interest is in the process, rather than outcomes, in context rather than a specific variable, in discovery rather than confirmation" (p. 19). This case study research was

conducted over a seven -week period, with a cohort of STs taking education courses at MMUST. 50 Student Teachers (STs) participated in the study as well as 10 School Practice Advisors (SPAs) who assumed an expert role. STs were picked from fourth year students who have gone through Special Teaching Methods Courses as well as a one Semester school practice experience in the month of May-August, 2017. Of the student teachers, 27 were female and 23 were male.

Data sources

The study investigated the extent to which special teaching methods courses taught at Masinde Muliro University of Science and Technology (MMUST) and their associated field experiences supported development of PCK of STs. The main source of data was questionnaire for STs. This addressed three main concerns (a)The extent to which the special teaching methods course prepare STs in PCK before teaching practice experience? (b)The perceptions of STs with regards to Pedagogical Content Knowledge competence during School Practice? and (c) STs level of competence in knowledge of subject-matter, knowledge of pedagogy, knowledge of learners and knowledge of curriculum? Data obtained from interviews with SPAs were compared to the findings obtained from questionnaire and used for triangulation purposes. Interview questions sought the views of the SPAs with regards to the organization, delivery, appropriateness, and effectiveness of special teaching methods courses in enhancing PCK of Student teachers.

Procedure

A list of the current fourth year education students comprising specialization from Arts/Humanities, Early Childhood Education and Technology students was obtained from the coordinator of Curriculum Instructions Technology. Then, a random sampling procedure performed to select study participants. Ten students were picked from each cohort; thereafter questionnaires were delivered to 50 STs along with a letter which briefly explained the purpose of the research and requested their participation. All the questionnaires were complete and returned. Interviews sessions were conducted a week after questionnaire administration. This helped clarify issues that were emanating from questionnaire items.

Instrument

The main research tool, the questionnaire, was divided into three parts. Part I sought data on demographic characteristics of STs. Part II investigated their views on how well they felt prepared in specific aspects on PCK classified under four main themes: Knowledge of curriculum knowledge of learners, knowledge of subject matter and knowledge of pedagogies prior to school practice. The question, "to what extent do you feel prepared by your teaching methods course before school experience and practice?" was rated on a scale of 1-Strongly Agree, 2-Agree, 3-Undecided, 4-Disagree and 5-Strongly Disagree. This comprised of twenty -seven questions (27). Lastly, part three examined their overall feeling of competence in the four main areas of PCK important in teaching scholarship. Lastly the question: how do you perceive your knowledge level in each knowledge base identified above? This was rated along a four-point likert-type scale ranging from 1-Not Competent at all, 2-Somehow Competent, 3-Competent and 4-Very Competent. Prior to distribution, the questionnaire was piloted on a small group of STs (Agricultural Extension Students) from the school of Sugar and Agriculture and Veterinary Sciences (SAVET). They completed the questionnaire, made comments and provided feedback. Most changes suggested were incorporated.

Findings and discussion

Demographic Characteristics

Table 1.1: Gender of the students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	23	46.0	46.0	46.0
	Female	27	54.0	54.0	100.0
	Total	50	100.0	100.0	

There were 23 (46.0%) male students and 27 (54.0%) female students

Table 1.2: Age of the students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-25 Years	49	98.0	98.0	98.0
	25-30 Years	1	2.0	2.0	100.0
	Total	50	100.0	100.0	

Most of the students were of age bracket of 20-25 years. They were 49 (98.0%) and the rest who was 1 (2.0%) was within an age range of 25-30 years of age.

Table 1.3: Area of specialization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelor Education Arts	43	86.0	86.0	86.0
	Bachelor Education Sciences	7	14.0	14.0	100.0
	Total	50	100.0	100.0	

Table 1.4 revealed that 43 (86.0%) of the students were training to become art teachers while 7 (14.0%) of them were training to be science teachers.

Table 1.4: Knowledge of curriculum and subject matter

Statements on PCK	SA	%	A	%	U	%	D		SD
I had taken enough content courses to be an effective teacher	40	80	3	6	7	14	0	0	0
I had the understanding of how to teach many concepts in all the grades where my subject is taught	35	70	10	20	4	8	0	0	0
I knew what content/concepts were to be addressed in each year in all the grades in my subject area	30	60	7	14	7	14	0	0	0
I knew learning goals for different grade levels in my two subject areas	13	26	27	54	10	20	0	0	0
I understood how the concepts I was to teach in different grades were applicable in real world situation	31	62	16	32	3	6	0	0	0
I knew the rationale/ objectives and learning goals of each content / concepts in the grades	27	54	23	46	0	0	0	0	0
I knew quite a number of concepts, facts and procedures in my subject areas and how to explain them	19	38	25	50	3	6	0	0	0
I knew how concepts are related within topics in my two subjects	22	44	28	56	0	0	0	0	0
I knew how to use different instructional materials (e.g., textbook, technology, manipulative) for different topics	26	52	24	48	0	0	0	0	0
I knew learning activities appropriate for different grades in my subject areas	31	62	7	14	7	14	5	10	0
I knew how to plan teaching and learning activities for student understanding	36	72	11	22	3	6	0	0	0

According to table 1.4, a majority of the student teachers *strongly agreed* that they had taken enough content courses to be an effective teacher, these were 40 (80%) out of 50 student teachers. Three STs *agreed* that they had taken enough content while 7 (14%) were still

doubting whether they had enough content. 35 (70%) of the STs strongly agreed that they had understood how to teach many concepts in all the grades where their subject is taught, 10 (20%) agreed that they had done so but 4 (8%) of them were undecided. By then 30 (60%) of the students strongly knew what content/concepts to be addressed in each year in all the grades in their subject area, 7 (14%) knew it and a similar number were undecided. In ability to know learning goals for different grade levels in their two subject areas was strongly familiar with 13 (26%) of the student teachers. 27 (54%) of them agreed to have understood learning goals for different grade levels in their two subject areas.

Thirty-one, (62%), strongly understood how concepts they were to teach in different grades were applicable in real world situation, 16 (32%) understood and 3 (6%) were undecided. Capability to know the rationale/ objectives and learning goals of each content / concepts in the grades was strongly common with 27 (54%), just familiar with 23 (46%). 19 (38%) knew quite a number of concepts, facts and procedures in their subject areas and how to explain them, 25 (50%) knew it while 3 (6%) were undecided. 22 (44%) had the strong required ability to know how concepts are related within topics in their two subjects and those who had moderate ability were 28 (56%).

Knowing how to use different instructional materials (e.g., textbook, technology, manipulative) for different topics was strongly known by 26 (52%) and generally known by 24 (48%). The confidence of knowing learning activities appropriate for different grades in subject areas was strongly identified among 31 (62%) of the student teachers, generally common among another set of 7 (14%) of them and was not familiar with 5(10%) students. Lastly, 36 (72%) students had strongly known how to plan teaching and learning activities according to student understanding. 11 (22%) of STs knew how to do so, 3 (6%) were undecided.

Table 1.5: Students' Knowledge of Pedagogy

Statements on PCK	SA	%	A	%	U	%	D	SD
I had a sufficient repertoire of strategies and methods for teaching my two subjects	17	34	33	66	0	0	0	0

I knew how to plan a lesson and use different teaching strategies in teaching my subjects	31	62	15	30	4	8	0	0
I knew how to coordinate and organize lessons in my areas	33	66	17	34	0	0	0	0
I knew how to integrate technology in teaching my two subjects	4	8	27	54	7	14	0	0
I was already able to choose tasks, give examples and representations in teaching many concepts in my subjects	39	78	11	22	0	0	0	0
I had mastered teaching strategies appropriate for students in different grades in my two subjects	36	72	10	20	4	8	0	0
I could facilitate classroom discourse	24	48	26	52	0	0	0	0
I could manage time for classroom activities effectively	31	62	15	30	4	8	0	0

Table 1.5 shows the Students Knowledge on Pedagogy, 17 (34%) had strongly attained sufficient repertoire of strategies and methods for teaching their two subjects while 33 (66%) of them had averagely done so. Capability of knowing how to plan a lesson and use different teaching strategies in teaching the teaching subjects was strong and average among 31 (63%) and 15 (30%) students respectively, 4 (8%) students had not decided. 33 (66%) of the students had strongly known how to coordinate and organize lessons in their areas. Another set of 17 (34%) students had moderate knowledge on the same. Integrating technology in teaching was not strongly common with majority of the teachers; 4 (8%) students could strongly do so, 27 (54%) students could averagely do so while 7 (14%) of the students were silent about the same issue. There were 39 (78%) students who were already able to strongly choose tasks, give examples and representations in teaching many concepts in their subjects while 11 (22%) of the students could do so.

For mastering teaching strategies appropriate for students in different grades in the two teaching subjects, 36 (72%) and 10 (20%) of the students could strongly and moderately do so respectively. 24 (48%) and 26 (52%) of the students could strongly and averagely facilitate

classroom discourse in that order. Effective time management for classroom activities could strongly be done by 31 (62%) students and moderately by 15 (30%) of the students, 4 (8%) of the students were undecided.

Table 1.6: Statements on Knowledge of Learners

Statements on PCK	SA	%	A	%	U	%	D	SD
I know how to diagnose and eliminate students' difficulties, errors, and misconceptions in my two subject areas	20	40	23	46	7	14	0	0
I know possible difficulties or misconceptions that students might have in my subjects' areas	16	32	34	68	0	0	0	0
I knew difficulties that students have in specific concepts in each grade level	17	34	29	58	4	8	0	0
I knew possible sources of students' errors and difficulties	25	50	25	50	0	0	0	0
I knew which concepts in my subjects' students typically had misconceptions about	22	44	28	56	0	0	0	0
I knew students' common difficulties, errors, and misconceptions	29	58	21	42	0	0	0	0
I possessed a strong knowledge base on concepts which are difficult for students to grasp and how to lead them to understand	32	64	18	36	0	0	0	0

According to table 1.6, 20 (40%) students had strongly known how to diagnose and eliminate students' difficulties, errors, and misconceptions in their two subjects' areas, 23 (46%) of the students had averagely known how to so while 7 (14%) were undecided. 16 (32%) students could strongly know possible difficulties or misconceptions that students might have in their subjects' areas and 34 (68%) could moderately do it. The ability to know difficulties that students have in specific concepts in each grade level was strongly familiar with 17 (34%) student, 29 (58%) could fairly do so. 25 (50%) students and a similar number strongly and fairly knew possible sources of students' errors and difficulties respectively. Knowing which concepts in subjects that students typically had misconceptions about, could strongly and averagely be done by 22(44%) and 28 (56%) students respectively. 29 (58%) and 21 (42%) of

the student teachers strongly and moderately knew students' common difficulties, errors, and misconceptions. Lastly 32 (64%) of the student teachers could strongly possess a strong knowledge base on concepts which are difficult for students to grasp and how to lead them to understand while 18 (36%) could do so.

Table 1.7: Student Teachers Level of Competence in PCK

Statements on PCK	Not at all	%	Some how	%	competent	%	very competent	%
Knowledge of subject-matter	0	0	8	16	20	40	22	44
Knowledge of pedagogy	7	14	4	8	30	60	9	18
Knowledge of learners	0	0	4	8	25	50	21	42
Knowledge of curriculum	0	0	14	28	21	42	15	30

Table 1.7 shows level of competence of the student teachers in PCK. According to the table there were 8 (16%) students who were somehow competent, 20 (40%) of them were fairly competent while 22 (44%) were very competent. This was on knowledge of subject matter. On knowledge of pedagogy, 7 (14%) of the students were not competent at all, 4 (8%) students were somehow competent, 30 (60%) of the students were averagely competent while 9 (18%) of them were very competent. Based on learner's knowledge 4 (8%) of the student teachers were somehow competent, 25 (50%) were moderately competent and 21 (42%) were very competent. On knowledge of curriculum, 15 (30%) student teachers were very competent, 12 (42%) of them were fairly competent while 14 (28%) of them were somehow competent.

Broadly, STS views   with regards to their level of competence in knowledge of pedagogy, learners and curriculum   was fair. This led the researcher to seek the views on the School Practice advisors. SPAs were asked to comment on the organization and delivery of the special teaching methods courses taught at the SEDU MMUST prepared STs for school experience and practice in schools

This was what   School Practice Advisor IV had to say

Other than special teaching methods courses for specific subjects, we offer other teacher professional courses such as CIT 210- Instructional Methods and Strategies methods/pedagogies and CIT 360- Media Practicals. These are housed in Curriculum Instructional Technology (CIT) department. These are taught by Specialists in general Curriculum and Instructions. The two courses expose STs to a range of media and technological resources applied in teaching and learning, techniques of development, identifying them for classroom instructions. Aspects of how they are acquired, utilized, displayed, managed and stored are also covered. Quite a number of these courses are[. . .] All education students must all register for and take the two and special teaching methods courses for their two teaching subjects before proceeding for school attachment and practice. Each Special Teaching Methods Course aims at exposing students to a sufficient repertoire of strategies and activities that they would engage students in the classroom for concept understanding. Most of these courses are taught at year two because our teaching practice is scheduled for year III (Interview Summaries-School Practice Advisor IV.)

 A follow up   discussion sought SPAs views on why STs feel fairly competent in most of the PCK domains. With regards to the question|: Do you feel that the special teaching methods courses taught in the SEDU is efficient enough to ground students in PCK for use in school/classroom practice? School Practice Advisor VIII commented:

I believe the STMC design is up to standards. However, I feel that delivery is what we are not getting right. One major problem has been class sizes which limits instructor-student interactions.

. . .

Often, all education students, that is, Arts/ Humanities, Early Childhood Education, French, Technology and Agricultural Extension are instructed together. In such a scenario no chance is left for the instructor to delve deep or cover specific teaching methods. Eventually, those taking subjects such as computer, agriculture usually get a raw deal. Although, we recognize that subjects differ in the kind of methods best for addressing them, there is never enough room for in-depth analysis. Superficial

treatment of the course has been the norm. The course mostly dwells on teaching documents design. A few courses are also overloaded with irrelevant content (e.g., historical and philosophical orientations of the subjects, branches, or contents areas) These do not directly address the special methods but have been included in the courses after the call for restructuring of university programs. Amidst all the above, there is inadequate reference resources for students to do more independent research out of class.

With regards to the question 'What practical programs does the program allow to augment the special teaching methods courses?" The School Practice Advisor II reported:

The course requires every Bachelor of Education teacher trainee to undertake a mandatory three month-school practice experience at 3rd year. Besides avenues for microteaching are provided that allow student trainees to practice the learnt aspects. However, these are not always possible due to student n opportunities for student centered learning and interactive classroom sessions is limited as it would never be possible to have practical.

He clarified further on the course expectations:

Teaching methods course should be student centered but such crowded classrooms cannot allow.in this case new interesting methods such as problem-based methods are very difficult to introduce or expose to learners who may require opportunities for demonstration and practice. As such most often the special methods course is basically for learning designing of teaching and learning documents like schemes of work, lessons plan, records of work covered and discussion of a few teaching methods that cut across all disciplines with little opportunities to introduce content or subject specific methods.

Conversely School Practice Advisor II was of the opinion that Special Teaching Methods Courses offered by MMUST do not offer students appropriate grounding in PCK:

In most instances we lack subject specialists for instance in the area of environmental education or physics education while at some time the faculty staff are never trained

on pedagogies and this raises questions on how well they could be grounded in these special methods for the subjects they teach to student teachers

She identified other difficulties:

The other major challenge is lack of resource and media. Take a professional teacher course, Curriculum Instructional Technology 360, aimed at preparing students to design, acquire and manage resources in the classroom as well as integrating technology in teaching and learning. Ideally, the course is to be handled by specific specialists and delivered by use of specific technology and media. However, more often, this course is taught to all education students theoretically and this obviously leave a good number of STs having their expectations for the course not met. There is inadequate resource centers, theaters, technological tools, electronic resources and media such as videos, computers for STs to practice the skills learnt.Again, this means practical media sessions where students are to develop and use specific resources in teaching a content of their choice, has remained too theoretical where most students are put in groups and asked to design a media for use but are not necessary required to use it for instruction in a microteaching classroom

Conclusion

This paper has discussed the level of competence in PCK of STs after undergoing Special Teaching Methods Course at MMMUST with regards to knowledge of learner's pedagogy and subject matter. It also adds the voice of the SPAs on why the Special Teaching Methods Courses may not be achieving this PCK support as intended by School of Education.

Pedagogical content knowledge strongly supports a perspective of teaching as a profession and teachers as professionals. PCK is a unique knowledge domain and a cornerstone of a teacher's professional expertise PCK develops over time, and through experience, about how to teach particular content in particular ways in order to lead to enhanced student understanding but it's an important professional knowledge that should not be neglected during initial training and should be accessed by STs for meaningful teaching practice. This can be actualized through well- crafted and delivered Special Teaching Methods Course which empowers STs on four main elements in PCK that is Knowledge of Subject matter, curriculum, |learners and pedagogies. Practical delivery of STMCs is the way to go.

Constraints

The large class sizes, poorly designed special teaching methods courses, unstandardized course content, intolerable workload among course lecturers, in adequate facilities, equipment and teaching and learning resources, inadequate skilled manpower were the challenges to effective instructional management of Special Teaching Methods Course.

Possibilities and Recommendations for School of Education, MMUST

- There is need to redesign the teacher education program at MMUST so that in its initial, in-service and continuing professional development, there is guarantee that it will lead to adequate supply of professionally competent packages. Special Teaching Methods Courses need to recognize that PCK is an important component of teacher professional knowledge relevant to the teaching scholarship. The program should aim at according to opportunities for not only theoretical but more of practical experiences that guide STs toward the abilities, strategies, and ways of thinking for teaching today and tomorrow

- Special teachings methods course taught at SEDU MMUST should be redefined to give more attention to practical based research, teaching practical and microteaching sessions rather than exam based which simply requires students to reproduce knowledge. Supervision and feedback for the practical experience should be enhanced at department levels. From the very beginning of the special teaching methods' school-based assignments designed by teaching faculties should be administered compelling STs to spend more time in schools during off campus sessions.

- To improve PCK mentoring during university training sessions, there is need for real partnerships. A mentor training program can be development between SEDU, its departments and model schools where an agreement is made about what parts of the curriculum would be implemented in school and university. School mentors (cooperating teachers) could then be involved in observing STs and providing feedback to the University before the final assessment by School Practice Advisors (SPAs)This is likely to improve the quality of the teaching practicum and create a more 'realistic' and meaningful environment for varied forms of learning to take place.

- Consumers of teacher education need to be more aggressive by asking for what they need from teacher graduates from MMUST. With this knowledge they could provide feedback to SEDU on aspects that are useful in maintaining quality of teacher education programs in MMUST. This could also lead to greater synergy in partnership for teacher preparation.

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