

## **Teachers' pedagogical content knowledge for teaching Computer Studies in rural Zambian secondary schools of North-western Province**

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### **Abstract**

The rapid 21<sup>st</sup> century technological advancements have resulted into speedy spread of information and innovations world over and the skills in the use of computers and ICTs are at the centre of it all. The Zambian National Information and Communication Technology policy which was launched in 2007 aimed at ensuring that schools produce learners who are computer literate, innovative and attain lifelong education. To achieve this, the Zambian school curriculum was revised in 2013 and Computer Studies (CS) was introduced as a compulsory subject to be taught in all schools. At the time of this study, very few teachers had been trained to teach CS in schools. Nevertheless, CS was to be taught and examined in all secondary schools. This study was aimed at finding out the teacher pedagogical content knowledge in one of Zambia's most rural provinces, given that other studies that were conducted focused on urban areas. The study employed a concurrent embedded research design of the mixed method approach which enabled the collection of both qualitative and quantitative data simultaneously. It was established that the majority of teachers of CS had no qualifications to teach CS. Secondly, teachers employed inappropriate pedagogies and thus learners were failing to acquire the necessary knowledge and skills in CS. In view of the findings, it is recommended that the Ministry of General education (MoGE) should provide sustained support to universities and colleges of education so that these institutions prioritise Teacher Education in CS. Further, the MoGE should provide appropriate teaching and learning resources so as to support the teaching of CS in schools.

**Keywords:** Computer Studies, Pedagogical Knowledge, Content Knowledge, and Pedagogical Content knowledge.

## 1. INTRODUCTION

In today's rapidly technologically changing world, computer skills have become inevitable if one has to access and use information more effectively. Computer Studies (CS) is at a particularly dynamic stage in African education systems which are constantly incorporating new developments and innovations that are happening on a daily basis (Isaacs, 2007). The Economic Commission for Africa indicated that the ability to access and use information is no longer a luxury, but a necessity for development (Yusuf & Afolabi, 2010). Thus, if education is to be used as a means of developing 21<sup>st</sup> century communities, integrating computer technology in the curriculum is inevitable. In fact, computer technology offers vast opportunities such as cheap, accessible and instantaneous information, enormous potential for interactivity and media-rich communication (Mouza, 2002). Thus, since CS is such an important subject that should be taught in schools, then having knowledgeable and skilled teachers in the discipline is crucial and paramount to its success. Mulenga and Luangala (2015:39) had rightly pointed out that:

Teachers are one of the most critical assets of any formal education system. They play a very important role in the facilitation of the learner's acquisition of desirable knowledge, skills, values and attitudes. Teacher quality is therefore crucial and has been globally accepted to be significantly important in order for effective learning to take place in schools.

Teaching and learning are based on common phenomena of achieving the national goals of education. In this regard, the ability of the teacher to interpret, plan and implement a curriculum by following the procedures required to ensure that learning objectives are accomplished is necessary (Kimosop, 2015). Thus, teachers need to have the pedagogical content knowledge of a specific area of study, in this case CS. In addition, Gross (1971) argues that implementation of any education innovation requires capacity building of teachers in the field of specialisation in content knowledge.

When teachers have the appropriate pedagogical content knowledge in a specific subject area, they are able to effectively communicate the provisions of a curriculum to the learners. Kumar, Rose and D'Silva (2008) argue that even if there are learners who could learn on their own how to use technology to enhance their learning and skills development, with little or no input from their teachers, they are highly unlikely to improve since teachers remain the gatekeepers for students' access to educational opportunities afforded by technology. Teachers therefore cannot be replaced with technology advancement, hence the importance of teacher preparedness (Kumar, Rose & D'Silva, 2008). If teachers have not acquired the necessary pedagogical content knowledge in CS, there is a likelihood that they shall employ inappropriate teaching methods. Eventually, no effective learning will take place. It was actually for this reason that Banja and Mulenga (2019:175) noted as they analysed Zambia's first education reforms as far back as 1977 that:

The education system in Zambia had it clear through the Educational Reforms of 1977 that the TE curriculum should produce a teacher who is well prepared in the subject matter and in the methods of teaching in relation to what was relevant for schools.

### **1.1 Statement of the problem**

In 2013, MoGE in Zambia revised its curriculum and in the process introduced CS as a compulsory subject for all learners. Chaamwe (2017) in his study reported that up to 2015, no College of TE or University in Zambia had any TE programme in both computer education and ICT. Additionally, Mulenga (2016) in her study on the implementation of CS revealed that public urban primary schools in Zambia faced challenges of unskilled teachers who lacked knowledge and skills in CS. With this information from Mulenga (2016) and Chaamwe's (2017) studies one would then wonder as to who had been teaching learners CS in Zambian schools, particularly in rural provinces such as North Western Province since it was introduced. The slow response from TE institutions to provide qualified teachers in CS and the outright introduction of CS in the curriculum cannot be attributed to the lack of policy direction because Zambia's need to have computer literate learners was evident through the launch of the Zambia National ICT Policy as early as March 2007 by the then president of the republic of Zambia His Excellency Levy P. Mwanawasa who emphasised the creation of an innovative, market responsive, highly competitive, coordinated and well-regulated ICT industry in Zambia. The inclusion of CS in the Zambian education curriculum six years later was aimed at promoting a major step in equipping learners with computer skills, knowledge and values (MTC, 2007). It was for this reason that scholars in this study wanted to interrogate this problem by seeking to find out the extent to which qualified teachers were available and prepared to teach CS in Zambian rural schools of North Western province.

### **1.2 Objectives of the study**

The objectives of this study were to;

- i. find out the availability of qualified teachers for the effective implementation of the C S Curriculum in selected rural secondary schools in North Western province,
- ii. examine the appropriateness of the teaching methods used in the teaching of CS in selected secondary schools in North Western province.

## **2. LITERATURE REVIEW**

It is a well-known fact that teacher preparedness to teach a particular subject significantly affects learner's acquisition of competencies. Although many teachers may be familiar with the new and emerging trends in curriculum changes, they may not effectively implement a curriculum innovation if they are not particularly grounded in the knowledge and skills of how to teach what has been introduced (Awoniyi, 1982). In addition, Kafu (2010) observed that there is need for continuous training so that teachers are

able to cope with new challenges in the implementation of curriculum innovations. Two ways of preparing teachers, namely: pre-service and in-service education, are critical to effectively implement a curriculum such as CS.

### **2.1 Pre-Service Education of Teachers for CS**

Intensified pre-service teacher education (TE) in colleges and universities is critical. Pre-service TE is the preparation that occurs before teachers enter the teaching profession and/or take up employment in a range of different education institutions. However, Hugh (1982) argues that the implementation of curriculum changes and the continuation of the new approaches in schools depend not only on the retraining of teachers but also on knowledge, skills and attitudes fostered during initial training of teachers.

It is therefore important that teacher educators can learn the methodology of how to get in touch with the core qualities of a good teacher and how they can stimulate these qualities in student teachers. If student teachers in CS acquire computer skills, CS curriculum implementation in Zambia is likely to become a reality. Hugh (1982) further observed that pre-service education of teachers, which is supposed to facilitate curriculum implementations, is in most countries riddled with problems. However, the purpose of TE is to equip individuals with the personal and professional skills needed in schools and other learning contexts. Pre-service and in-service TE form a continuum of professional development and may take place over a number of years, in a range of different settings and with differing purposes. It is for this reason that before a new subject is introduced such as CS, Ministries of Education should first and foremost ensure the availability of qualified teachers.

### **2.2 In-Service Education of Teachers of CS**

In-service education concerns the activities directed towards remedies of perceived lack of competencies. It is an on-going process that promotes professionalism and personal growth for teachers (Daresh & Playko, 1995). In-service education is necessary and appropriate when people need special training to correct deficits in their skills. It takes place anytime, either as full time or part time, during the professional life of a teacher (Namunga & Otunga, 2012). Daresh and Playko (1995) gave useful guidelines about in-service education. They claimed that in-service education should ensure that programmes are directed towards local needs of the participants and that the participants are fully involved and encouraged to identify their needs and areas of re-training. In-service education among teachers will be more effective if such teachers have initial education in the areas of specialization that they seek upskilling.

Similarly, Jerotichl, Kurgat and Kimutai (2017) emphasised that teachers need regular in-service opportunities within the educational system to enhance their teaching methodology. Jerotichl, Kurgat and Kimutai (2017) further stressed that teachers needed to equip themselves with new forms of knowledge,

new teaching methods and strategies, purpose and scope of a new curriculum. Because teacher in-service education programmes must reach their intended audience, they should be accessibly scheduled for teachers who are curriculum implementers. In-serving of teachers is critical in CS given the fast pace at which the field is evolving. Thus initial TE many not be sufficient because computer technology is moving at a very fast pace and therefore, teachers will need constant up skilling of their knowledge, skills, values and attitudes in the discipline.

### **3. METHODOLOGY**

The study employed the concurrent embedded research design of the mixed method approach which enabled the collection of both qualitative and quantitative data simultaneously (Creswell, 2015). The study purposively targeted six rural secondary schools in North Western Province on the basis that these were among the first rural schools in the province to introduce the subject. Moreover, at the time of the study learners in the six schools had sat for national examinations for three consecutive years. In this study, 6 head teachers, one from each of the six schools were purposively sampled; 12 teachers of CS, two from each school, were randomly sampled while 51 Grade 9 learners were sampled using simple random sampling and 1, Senior Provincial Education Officer (SPEO) in charge of Technology Studies in the province took part in the study, giving a total of 70 participants. Of these 70 participants, 34 were male while 36 were female. Data was collected using a questionnaire for teachers and another questionnaire for learners. On the other hand, an interview guide for head teachers and the SPEO for Technology studies were also used. Qualitative data was analysed thematically using the constant comparative method. The Statistical Package for Social Sciences (SPSS) was used to analyse quantitative data; to generate frequencies and percentages.

### **4. PRESENTATION OF RESEARCH FINDINGS**

#### **4.1 Teachers' Qualifications in CS**

In order to teach effectively, teachers in any subject need a deep understanding of the pedagogy and knowledge of the subject matter of the particular subject. Therefore, teachers of CS were asked to indicate if they had received an appropriate TE in CS. Only 1 out of 12 teachers indicated having had received an appropriate TE in CS while 11 did not. It was therefore clear from the teachers' response that the majority of them were not prepared as teachers of CS. Lack of attaining the required TE by teachers of CS was also confirmed by the Head teachers and the SPEO during interviews as explained in the sections that follow. Head teacher 1 explained that:

*We have four teachers in the business studies department, they are the ones who are teaching learners in CS but currently the ministry gave us one teacher who is trained to*

*teach CS. We still need some more teachers because we would like to introduce CS at senior level as well.*

Also head teacher 3 indicated that;

*The school has three teachers who seem to have knowledge and skills to teach CS, one from the mathematics department and two from the business section. They were only asked to teach CS due to some knowledge and interest they exhibited in computers. If only those who are currently teaching could be in-serviced, the situation for us will be much better.*

Head teacher 6 also explained that;

*In terms of teachers, we do not have any teacher qualified to teach CS. The teachers helping in CS were selected due to the interest they had shown in computers. Otherwise what I can say is that we do not have teachers trained to teach the subject effectively. It is for this reason that we have been recording very poor pass rates in the national examination for all the years and it is the same for all the schools in the province. We introduced the subject because it is a Ministry directive.*

Similarly, head teachers 2, 4 and 5 made similar comments that were all pointing to the fact that teachers of CS were not available in their schools. When the question of qualified teachers was asked to the Senior Provincial Education Office he explained that;

*Even without qualified teachers we just had to introduce the subject in the province because it is government policy, but we are relying on some teachers especially those in business and science related subjects to teach for now. Some colleges and universities have cohorts of student teachers in training so we will soon have some. It is for this reason that learner's performance in the subject is mainly average with most of them doing well in the theoretical aspect rather than the practice.*

The SPEO the participant was trying to make the situation look hopeful but the fact was that the officer admitted that they were no qualified teachers to teach the subject. Schools seems to have been given the directive that, with or without teachers of CS, the subject had to be taught to learners. Although the study did not focus much on the performance of learners there were clear indications from both the head teachers and the education officer that learners were not learning much in the subject. Therefore, one may ask that: what is education without learning? No wonder, the 2018 World Teachers' Day Theme was so appropriate and should forever remain an education mantra that '*The Right to Education means the Right to a Qualified Teacher*'.

#### **4.2 Teaching Methods mostly used in CS**

During the curriculum implementation process, teachers are supposed to use a variety of teaching methods to enable learners acquire various skills, values and knowledge of a particular subject. However, depending on the subject content, some teaching methods may not lead a learner to achieve the set learning

outcomes. In this study, teachers were asked to indicate the teaching methods that they frequently used when teaching learners in CS. A four point Likert scale was used for each of the teaching methods as follows; 1 = Very Often, 2 = Often, 3 = Not Often, 4 = Not at All. The responses from the teachers are summarised in table 1.

**Table 1:** Teacher's responses on the teaching methods they used to teach CS

<b>Teaching Method</b>	<b>Total Positive</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>Total Negative</b>	<b>Total</b>
Educational Visit	1	0	1	1	10	11	12
Lectures	8	4	4	2	2	4	12
Practical	4	1	3	5	3	8	12
Demonstrations	7	3	4	4	1	5	12
Discussions	9	4	5	1	2	3	12
Simulations	4	1	3	3	5	8	12
Questions and Answer	9	6	3	2	1	3	12
Computer aided	2	1	1	2	8	10	12

The results in Table 1 indicate that the majority, 9 out of 12 teachers' utilised discussions and questions and answers methods when teaching CS with most of them either indicating not often or not at all on the usage of educational visits and computer aided methods. Among the respondents 8 out of 12 of the teachers indicated that they did not use practical method while 8 out of 12 indicated that they mostly utilised the lecture method.

Learners were also asked to indicate on a five point Likert scale ranging from Strongly Agree to Strongly Disagree as a way of establishing what teaching method approach teachers used in teaching them CS. The five point Likert scale was as follows; 1 = Strongly Agree, 2 = Agree, 3 = Undecided, 4 = Disagree, 5 = Strongly Disagree. The responses from learners are summarised in table 2.

**Table 2:** Learners' responses on the teaching methods frequently used by their teachers

		<b>Total Positive</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Total Negative</b>	<b>Total</b>
We visit many places to see different works that a computer can be used for, e.g. a bank	<i>f</i>	0	0	0	2	20	29	49	51
	<i>%</i>	0.0	0.0	0.0	3.9	39.2	56.9	96.1	100
During the lessons, our teacher stands in front while explaining to us	<i>f</i>	39	20	19	6	4	2	6	51
	<i>%</i>	76.4	39.2	37.3	11.8	7.8	3.9	11.8	100
Our teacher shows us how to switch on a computer, type, play games and practice	<i>f</i>	1	0	1	5	22	23	45	51
	<i>%</i>	1.9	0.0	1.9	9.8	43.1	45.1	88.2	100
Our teacher asks us to show/demonstrate to others what we have learnt	<i>f</i>	3	1	2	3	18	27	45	49
	<i>%</i>	5.9	1.9	3.9	5.9	35.2	52.9	88.2	100
We are always put in groups and asked to share idea with others	<i>f</i>	46	30	16	2	1	2	3	51
	<i>%</i>	90.2	58.8	31.3	3.9	1.9	3.9	5.9	100
Our teacher teaches us how to use games, songs, art work, from the computer	<i>f</i>	2	1	1	1	23	25	48	51
	<i>%</i>	3.9	1.9	1.9	1.9	45.1	49.0	94.1	100
During CS lessons our teacher asks us questions which we answer	<i>f</i>	35	14	21	4	3	9	12	51
	<i>%</i>	68.6	27.4	41.2	7.8	5.9	17.6	23.5	100
Sometimes we learn how to type using different computer programmes	<i>f</i>	1	0	1	4	15	30	45	10
	<i>%</i>	1.9	0.0	1.9	7.8	29.4	58.8	88.2	100

The results in Table 2 shows that majority (90.2%) of the learners indicated that teachers use group discussion method and 76.4% of the learners confirmed that lecture method was mainly used when teaching CS lessons as they either strongly agreed or agreed to the statements. These findings are almost similar to what teachers had indicated in their responses. Since group discussion and lecture methods were among the approaches teachers indicated they frequently used. Among the teaching methods not frequently used was educational visits where 96.1% of learners indicated in a total negative by either disagreeing or strongly disagreeing.

A large number (94.1%) of learners were not exposed to simulations software such as games, art work, songs as they either disagreed or strongly disagreed to the statement. Additionally, the majority (88.2%) of participants claimed that they did not have any practical, demonstrations and computer aided learning during computer lessons as it was evident from responses that they gave. Incidentally, the methods that teachers did not use are the most effective for the teaching of CS.

### 4.3 Teachers Pedagogical Knowledge for Teaching CS

Every teacher who has been through a TE programme is likely to have the pedagogical knowledge of teaching. Valtonen et al. (2017) explained that pedagogical knowledge is the generic form of teaching knowledge about the cognitive, social and developmental theories of learning and class management skills that every trained teacher should have. Thus teachers were asked to indicate on the Likert scale ranging from Excellent to Not well as a way of establishing their views on the appropriateness of the teaching methods to be used in CS. The five Likert scale was represented as follows; 1 = Excellent, 2 = Very Well, 3 = Well, 4 = Fairly Well, 5 = Not Well. Their responses are summarised in table 3.

*Table 3: Teachers' responses on the most appropriate teaching methods for CS*

	<b>Total Positive</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>Total Negative</b>	<b>Total</b>
Educational Visit	1	0	1	1	10	11	12
Lectures	8	4	4	2	2	4	12
Practical	4	1	3	5	3	8	12
Demonstrations	7	3	4	4	1	5	12
Discussions	9	4	5	1	2	3	12
Simulations	4	1	3	3	5	8	12
Questions and Answer	9	6	3	2	1	3	12
Computer Aided	2	1	1	2	8	10	12

From the results in table 3, it is clear that the majority, 11 out of 12, of teachers were of a view that the practical approach was the most appropriate method to be used in CS while the least appropriate method according to 9 out of 12 of the participants was lecture method and yet that was what they used most frequently. Educational visit was also considered an appropriate method by 9 out of 12 followed by computer aided learning where 8 out of 12 of the respondents agreed to the question.

The researchers asked teachers to explain, if there was a difference between the methods they used for teaching, as expressed in table 1, in comparison with what they knew was an appropriate method as they indicated in table 3 and why they could not use the method they thought was appropriate. Results in table 3 indicate that 8 of the teachers did not use the appropriate method because they did not have the necessary equipment and facilities while 4 taught using their preferably methods because they felt the method captured learners' attention and was good for hands on experience. These findings revealed that teachers knew the appropriate methods to use when teaching learners CS but due to lack of facilities, equipment and some knowledge in CS they ended up using inappropriate methods. The results are suggesting that teachers knew that the lecture and discussion methods were not effective methods to teach CS. These

results seem to suggest that teachers were not provided with the necessary equipment to use in order to apply appropriate teaching methods.

## 5. DISCUSSION OF THE FINDINGS

The findings above have indicated that the majority of the teachers who were teaching CS in schools had not undergone TE (TE) in CS. For teaching and learning to be successful TE is very cardinal. It is for this reason that Gross (1971) explained that a teacher needs to undergo initial TE and continue to upskill oneself throughout their career life time. It was further discovered that most teachers taught learners in CS because of their interest in the subject. During interviews with head teachers and the SPEO for Technology it was confirmed that indeed most teachers were not trained in teaching CS and that they taught out of interest for the subject. This finding is pointing to the fact that the introduction of CS was done without having prepared teachers teach the subject. Lack of trained teachers can bring about lack of knowledge and skills acquisition among learners who are learning CS (Waiharo, 2007). Similarly, Mwaniki (2007) identified low numbers of qualified teachers among the factors that had negatively affected the implementation of CS in secondary schools in Kenya. It is for this reason that poor performance of learners was cited in that study. The interpretation of this situation would be that MoGE in Zambia hurried to implement CS before teachers for the subject were prepared. Although some teachers were teaching learners based on their interest for the subject, effective teaching cannot be based on interest alone but mostly on how one has been adequately prepared to teach the subject. Furthermore, one head teacher said that teachers needed to undergo pre-service TE if they were to be prepared to teach learners in CS. These findings were in agreement with Makunja (2016) who stressed that before any implementation of the new curriculum, government should make sure that it train all teachers to equip them with skills and knowledge. The implication of these findings is that it is the responsibility of government to provide in-service TE not only when there are changes in the curriculum but it is also important because it helps teachers to develop professionally. Gross (1971) and Pelgrum and Plomp (2002) added that the success of educational innovations depends largely on the skills and knowledge of teachers.

For effective teaching and learning to take place, two things are cardinal, the content (what to teach) and the teaching methods (how to teach). Findings in this study revealed that most teachers used teaching methods that would not help learners effectively learn CS. Teachers employ a variety of teaching methods as a way of capturing learners' attention and in an effort to help them acquire the designated skills and knowledge. For a teacher to employ appropriate methods in his or her teaching, they should be trained and experienced in their area of specialisation. As mentioned in the previous section, teachers can effectively

use appropriate teaching methods when they have undergone TE to teach that particular subject. CS being a practical subject, requires teachers who have skills and knowledge on how a computer functions. These skills and knowledge can be acquired through TE. It is when teachers have the necessary skills and knowledge that they would be able to employ desirable methods in their teaching such as practical (hands-on) methods. The findings are consistent with Pelgrum and Plomp (2002) and Bakare (2014) who found that lack of practice in CS recorded poor results among learners. Learners can only gain skills through practical learning in order to get the best out of the innovations and use of CS in schools.

In this study, the researchers found that teachers were using inappropriate methods that would impede the acquisition of competencies in CS curriculum. Lectures, discussions and question and answer methods were the most frequently used teaching methods indicating that practical was used less. If learners are to acquire the necessary skills and knowledge, more learner centred approaches such as practical unlike teacher centred approaches which were being utilised in secondary schools when teaching CS should be used. These findings are in line with Makunja (2016) who found that lack of readiness to employ learner-centred approaches was a major hindrance to the achievement of learner achievement. In CS, learning should be practical oriented, engage learners in educational tours, use modern computer facilities and equipment, use simulations and computer aided learning. It was also surprising to learn that teachers were not embracing practical learning when learners were expected to sit for some practical examinations. Practical and experimental lessons enhance good understanding of concepts leading to innovation on the part of the learners while theoretical lessons will encourage rote learning and memorisation of concepts. These findings are in line with Macharia (2013) who stressed that practical lessons enhanced good learning. Mulenga and Kabombwe (2019a:127) actually explained that practical learning is more attuned to the type of curriculum that the Zambian education system adopted in 2013 when they explained that;

Competency-based learning is a system of education, often referred to as proficiency or mastery-based, in which learners advance and move ahead on their lessons based on demonstration of mastery or visibility of what they have learnt.

However, an unanticipated finding was when teachers were asked to give their views concerning appropriate methods to be used during computer lessons. Results in table 3 clearly showed that practical was the best method teachers thought would enable learners to acquire the necessary skills and knowledge in CS. Lecture, discussion and questions and answer were considered the least appropriate methods and yet they were being used. Therefore, it is clear from the responses that teachers were aware that practical method captures learners' attention and promoted positive learner achievement. Teachers explained as given in figure 1 that they could not use the appropriate methods since they lacked the needed facilities

and equipment. The extent to which they could have done so could not however be established by the researchers in this study. One explanation to this finding would be that every trained teacher would know the most appropriate method to use for a practical oriented subject such as CS since they have had formal education in teaching. However, the pedagogical content knowledge of each subject would better be known and practiced by those who have studied the subject in question. However, facilities, equipment and resources are a necessity for effective teaching and one would not expect teachers to do practical from nowhere bearing in mind that most learners in rural areas in Zambia do not have access to computers even in their homes. In supporting this finding, Olan'g (2015) argued that teachers mainly teaching in public schools were theoretically oriented and thus could not provide learners with practical knowledge since most schools lacked facilities. The observation was also made by Mwimba and Mulenga (2019:162) who mentioned that; 'although MoGE in Zambia was passionate about revising the curriculum, it did not provide adequate materials in schools and teachers' resourcefulness in providing some teaching aids was hampered by lack of raw materials in schools' that they could use to develop some of their own.

It is worthwhile noting that teaching methods are a complement of content, just as content is the complement of a curriculum. Teachers of CS tend to over use the lecture and question and answer methods, ignoring the options and opportunities that the balance of teaching methods can offer. It is essential that teachers maintain a refined sense of how to teach learners in order for them to acquire the necessary skills and knowledge which is the essence of the Zambian 2013 revised competency based curriculum. Mulenga and Kabombwe (2019b:126) explained that for the competency based curriculum to be successful, 'teachers should possess the relevant pedagogical knowledge and the learners should be willing to participate in the teaching and learning process'. It is important that teachers teaching learners in CS have a command over value clarification methods such as practical, demonstration, project methods and computer aided learning software. However, to effectively learn how to use a computer, learners should be exposed to hands on activities (practical), educational visits, and video-based tutoring among other learner centred approaches. These methods or approaches are likely to place learners on a good pace in terms of learning. A study by Aduwa-Ogiegbaen and Iyamu (2005) revealed that many developing countries, especially in African schools are still behind in the implementation, application and use of computers because of lack of specialised teachers for the subject and insufficient teaching and learning resources. We can also echo the observations made by Mtebe and Raphael (2018:276) who cited Koehler and Mishra (2005) that 'merely introducing technology into the classroom is not enough to ensure technology integration, since technology alone does not lead to change'. This is also true in the case of the introduction of CS as a compulsory subject in schools in Zambia. The need to prepare new teachers

and equip them with appropriate pedagogical content knowledge for CS and the provision of adequate and appropriate teaching and learning resources is critical to the success of CS implementation in Zambian schools. This fact has been widely confirmed by most scholars such as Zulu and Mulenga (2019:277) who mentioned that ‘the pedagogical content knowledge (PCK) helps the teacher to guide learning in ways which are appropriate as prescribed by the curriculum in order to achieve the aspirations for education of a nation’ even Shulman (1987) described PCK as a vital aspect of effective teaching. Since the introduction of CS is linked to Zambia’s economic development then the success of this subject in schools should be a priority for the Zambian government and its cooperating partners.

## **6. CONCLUSION AND RECOMMENDATIONS**

Based on the findings of this study we can confidently conclude that despite the Zambian government having a National ICT policy as far back as 2007 and a well-intended inclusion of Computer Studies (CS) as a subject in the 2013 revised curriculum, there are no qualified teachers to effectively teach the subject in rural schools of North Western province. Secondly we can as well clearly deduce and conclude that the teachers who were teaching CS did not employ the appropriate teaching methods for the subject. This in a way could help partly explain the poor performance of learners in national examination as some school administrators mentioned. Researchers in this study are therefore recommending that the Ministry of General Education (MoGE) in Zambia should through colleges and universities prioritise the preparation of teachers of Computer Studies. However, it may take some time before the education of teachers in Computer Studies start yielding fruits, thus MoGE should urgently embark on in-servicing of all teachers that are teaching Computer Studies although they do not have any formal education in the subject. The ministry and schools in North Western province should also provide teachers of CS with teaching and learning resources for the subject.

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