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Research Article

Technological Pedagogical Content Knowledge (TPACK) of Teachers and Their Formative Assessment Practices in Social Studies Lessons

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Abstract: The purpose of the study was to examine technological pedagogical content knowledge of teachers and their formative assessment practices in Social Studies lessons in the Junior High Schools in the Komenda Edina Eguafo Abirem (K.E.E.A) Municipality of Ghana. With a mixed method approach, the study adopted a descriptive survey research design. The population for the study included all Social Studies teachers at the public junior high schools in the in the Komenda Edina Eguafo Abirem Municipality. Purposive sampling technique was used to select all the seventy-four (74) public Junior High Schools and the Social Studies teachers for the study. The purposive sampling technique was used to sample the respondents because they constitute expert knowledge in the subject area and having the same characteristics. The two main instruments used to gather data for the study were questionnaire and observation. Data was analysed using descriptive and inferential statistics. The study indicated that the assessment practices of teachers during Social Studies lessons were on the average. There was disparity between theory and practice as far as the dictates of the profile dimensions are concerned. Teachers mostly assess the cognitive aspect of the child with little attention to the affective domain. The study also concluded that there was a significant positive relationship between TPACK of teachers and their formative assessment practices at 0.05 level of significance. It is recommended that Ministry of Education, National Teaching Council, Ghana Education Service should organize professional development workshop for teachers on their formative classroom assessment practices in Social Studies lessons. It is also recommended that, in order to ensure effective formative assessment practices, Ghana Education Service should collaborate with Colleges of Education and Universities training teachers to develop appropriate TPACK for teachers to improve on their formative assessment practices in the classroom.

Keywords: Technological, Pedagogical, Content, Knowledge, Social Studies, Formative Assessment

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1. Introduction

Assessment is the process of gathering information about a student in order to make decisions about his or her education. This denotes that teachers obtain information about knowledge gains, behavioural changes and other aspects of the development of learners. Assessment is used for different purposes within different levels of the educational system. For example, external assessment in most cases serves as accountability measures and, as a result, they induce teachers to devote significant amounts of instructional time

to preparing students to excel in these examinations even when those examinations do not match the curricula [1,2]. Assessment can be explained as the competitiveness of the Ghanaian educational system where high-level testing plays an essential role in the students' future advancement and places schools in ranks, ranging between most successful and less successful [2, 3]. This implies that the more a teacher conceives assessment as improving teaching and learning, the more the teacher believed that assessment ensures students, teachers and schools are accountable. Effective teachers use a repertoire of teaching models and assessment strategies depending upon their situations and the goals and objectives they wish to attain [4, 5]. Instruction would be viewed as incomplete if it is not assessed [5, 6]. The authors posit that, assessment plays an integral role in teaching and learning of Social Studies. This implies that assessment is a dynamic process and should be based on the objectives which have been clearly selected from the content taught [6, 7]. In teaching and learning of Social Studies, assessment plays an integral role. The use of effective and varied assessments increases potential and cognitive skills in students [6, 7].

However, the primary aim of assessment is to foster learning of worthwhile academic content for all students. Education reformers agree that assessment and instruction are two sides of a coin and that an invisible thread connects assessment, curriculum and teaching in the service of learning [8]. Unfortunately, when we think of assessment, we think of the traditional tests [9]. Knowledge for teaching Social Studies is considered to be "the foundational knowledge of Social Studies education (Citizenship education) needed to perform the recurrent tasks of teaching Social Studies to students" [10]. Knowledge for teaching Social Studies is made of different domains of content knowledge and pedagogical content knowledge. Studies have shown that the knowledge for teaching Social Studies is a predictor of student achievement in the subject [10, 11]. This implies that pedagogical content knowledge of teachers is a very important part of knowledge for teaching Social Studies at any level of academic ladder.

However, Social Studies concepts in the classroom affects learners' ability to apply what they learn to real-life situations and hence affects student's performance in expository questions. Thus, the very impact of the subject is felt in the teaching and learning process [11, 13]. This requires effective formative assessor who has the necessary depth of content knowledge of the subject s/he is teaching. Evaluation in the classroom motivates students-teachers' relationship in formative assessment because both of them use concrete and descriptive feedbacks during teaching and learning to get on board in lesson delivery [6]. This suggests that formative assessment is used to provide information on the likely performance of students; to describe strength or weakness and feedback given to students, telling them which items they got correct or wrong and enhances the efficacy of instructional strategies of Social Studies teachers [14, 15].

In a formative classroom it is the prime responsibility of the teacher to share "criteria for success" with learners by providing feedback as both worked towards the attainment of the objective of the lesson. Teachers' swift responses to questions made learners involved in lesson activities resulting in the successful achievement of learning goals. Effective feedback is the one that closed the gap between the intended and actual outcome of a lesson. This shows that usage of constructive feedback devoid of teacher centered approach will lead to the success of Social Studies lessons. The intent here is that Social Studies teachers should have knowledge and conceptualisation of formative assessment and feedback in regards to criteria and closing the gap [16].

Effective closing of a gap in a formative classroom requires teachers using more authentic forms of profile dimension assessment techniques such as scoring rubrics, concept mapping, scaffolding portfolio and peer and self-assessment techniques during lesson delivery to infuse in their Social Studies curricula to lay a strong foundation for the knowledge base for teaching and assessing the learners learning outcomes [13, 17-19]. This infers that the successful implementation of formative assessment requires a resourceful

teacher full of technological and pedagogical content knowledge and critical thinker in helping learners to deal with problem solving, inquiry and discovery issues in Social Studies in other to right wrong in the society [20]. This study therefore sought to fill this literature gap by investigating the technological pedagogical content knowledge of the Social Studies teacher and his/her formative assessment practices in the classroom of basic schools in Komenda Edina Eguafo Abirem (K.E.E.A) Municipality in the central region of Ghana. The study was guided by two research questions and two Hypotheses (1) What assessment methods do Social Studies teachers at the Junior High School level use to assess their students? (2) Which of the domains of educational objectives do Social Studies teachers' questions emphasise in their assessment? H_0^1: There is no significant relationship between the technological pedagogical content knowledge of the teachers and their formative assessment practices. H_0^2: There is no statistically significant difference between the technological pedagogical and content of the teachers and their formative assessment practices.

2. Materials and Methods

With a mixed method approach, the study adopted a descriptive survey research design. The population for the study included all Social Studies teachers at the public Junior High Schools in the in the Komenda Edina Eguafo Abirem municipality. The study surveyed all the seventy-four (74) public Junior High Schools and the Social Studies teachers. Most statisticians agree that in descriptive survey the minimum sample size to get any kind of meaningful result is 100. If your population is less than 100 then you really need to survey all of them [21]. Purposive sampling technique was used to select all the seventy-four (74) public Junior High Schools and the Social Studies teachers for the study. The purposive sampling technique was used to sample the respondents because they constitute expert knowledge in the subject area and having the same characteristics. The two main instruments used to gather data for the study were questionnaire and observation, they were found to be valid and reliable. A questionnaire consists of TPACK of teachers and their assessment methods. The study adapted parts of questionnaire developed and used to measure teachers' knowledge of teaching and technology [22]. Questionnaire was used because the respondents can read and answer. It also affords the researchers to elicit the opinions of a wide range of respondents. Lessons of teachers were also observed to elicit the domain of objectives that teachers' assessment tasks emphasise. Teachers test items and students exercise books were also observed to identify the type of questions teachers ask during Social Studies lessons. The observation also afforded the researchers the opportunity to confirm the assessment methods of the teachers. Observation provides the researchers to see at first hand the formative assessment practices of the teacher.

The analysis of the data collected was guided by the research questions and hypothesis. The questionnaire was looked through to ensure completeness. The Likert scale questions were coded from 1 to 5 for strongly disagree through to strongly agree for all positive statements. Negative statements were coded in the reverse order. Results were presented using frequency counts and percentages. The means and standard deviations were also calculated to describe the direction of response. The TPACK of teachers was scored and the assessment method was also scored. These two variables were correlated to describe the type and degree of relationship between teachers TPACK and assessment practices. Their mean scores were also compared to determine whether there was any statistically significant difference between them. Research questions one to five was presented using descriptive statistics including frequency counts, percentages, means and standard deviations. The hypotheses were tested using Pearson product moment correlation and the t-test. The alpha level that was used for the analysis was 0.05.

3. Results and Discussion

3.1. Assessment Methods Junior High School Social Studies Teachers Use to Assess Their Students

Assessment is an important component of the teaching and learning process. It is through assessment that a teacher can tell whether what was taught was learnt or not. It also informs the student extent to which he/she is closer to the learning goals. The research question - *What assessment methods do social studies teachers at the Junior High School level use to assess their students?* sought to find out the assessment methods that social studies teachers deploy in the classroom that enhances effective teaching and learning. Data from the responses of the teachers to the questionnaire provided relevant information that indicated the assessment methods of the Social Studies teachers. This section of the questionnaire contained fifteen items that were generally written in positive form with the responses on a five-point Likert scale measure with Strongly Disagree (SD) taking "1", Disagree (D) takes code 2; Undecided(U) taking 3; Agree (A) takes code 4 and Strongly Agree (SA) taking code 5. The individual items relating to the research question were analysed using frequencies, percentages and means. The mean of means was used to analyse the assessment method of the teachers. A mean score range of between 1.0 and 1.50 is indicative of strongly disagree, 1.51 to 2.50 is indicative of disagree, 2.51 to 3.5 is indecision, 3.51 to 4.50 is agree and from 4.51 to 5.0 is indicative of strongly agree. Table 1 presents the assessment methods adopted by Social Studies teachers at the Junior High School level.

Table 1. Assessment Methods of Teachers

Statement	SD (%)	D (%)	U (%)	A (%)	SA (%)	Me	SD
I assess my students to enhance the development of their conceptual understanding/problem solving		2 (2.7)	9 (12.2)	53 (71.6)	10 (13.5)	3.96	0.61
I assess students holistically	2 (2.7)	15 (20.3)	22 (29.7)	26 (35.1)	9 (12.2)	3.34	1.02
I use multiple assessment techniques to assess my students		5 (6.8)	20 (27.0)	40 (54.0)	9 (12.2)	3.72	.77
Most of my questions are recall of facts	31 (41.9)	17 (23.0)	6 (8.1)	13 (17.6)	7 (9.5)	2.30	1.41
I evenly distribute questions in class	3 (4.1)	4 (5.4)	4 (5.4)	43 (58.1)	20 (27.0)	3.99	.96
I assess the students as individuals rather than in group	3 (4.1)	4 (5.4)	10 (13.5)	35 (47.3)	22 (29.7)	3.93	1.01
The tasks that I give to students help them to determine cause and affect relationships.	1 (1.4)	7 (9.5)	30 (40.5)	27 (36.5)	9 (12.2)	3.49	.87
I give prompt feedback to students		4 (5.4)	6 (8.1)	36 (48.4)	28 (37.8)	4.19	.81
My Social Studies questions stress on learners' ability to show awareness and sensitivity to issues.		1 (1.4)	13 (17.6)	49 (66.2)	11 (14.9)	3.95	.62
I assess students on a wide range of social issues that are current and relevant.		1 (1.4)	7 (9.5)	56 (75.7)	10 (13.5)	4.01	.54
My Social Studies questions place emphasis on learners' ability to be involved in an issue or activity.			2(2.7)	62 (83.8)	10 (13.5)	4.11	.39
My Social Studies questions place emphasis on learners' conviction in certain goals, ideas or beliefs.		4 (5.4)	24 (32.4)	40 (54.1)	6 (8.1)	3.65	.71
My assessment task requires students to use technology to solve	24 (32.4)	31 (41.9)	9 (12.2)	9 (12.2)	1 (1.4)	2.08	1.03

I ask students to use technology to present their solutions to social problems	25 (33.8)	34 (45.9)	8 (10.8)	7 (9.5)	1.96	.91

(Group Mean =3.48; Group SD =0.78)

Results from Table 1 reveal that 53(71.6%) of the teachers reported that they assess their students so as to enhance their conceptual understanding and problem-solving skills. Two of the teachers representing 2.7% however disagreed to this assertion. A mean score of 3.96 shows that, on the average the assessment of the teachers enhances the problem-solving skills of the students and as well develop their conceptual understanding. A standard deviation of 0.61 suggests most of the responses of the teachers were similar. Again, 43(58.1%) and 20(27.0%) of the teachers agreed and strongly asserted that they evenly distributed their questions in class. This recorded a mean score 3.99 with a standard deviation of 0.96 suggesting that, on the average, the teachers agreed that they evenly distribute their questions in class. Items that recorded similar results included using multiple techniques to assess (M= 3.72, SD= 0.77); assessing students as individuals rather than as a group (M= 3.93, SD= 1.01); using questions that stress awareness and sensitivity of issues (M= 3.95, SD= 0.62); assessing students on a wide range of relevant current social issues (M= 4.01, SD= 0.54); using questions that put emphasis on learners' ability to be involved in an issue (M= 4.11, SD= 0.54) and emphasizing on learners conviction in certain goals, ideas and beliefs (M= 3.65, SD= 0.71). In contrast, 25 (33.8%) and 34 (45.9%) strongly disagreed and disagreed to the assertion that they ask their students to use technology to present their answer respectively. Seven of the teachers representing 9.5% of them however agreed to the assertion. A mean score of 1.96 recorded against this item indicates that, on the average, the teachers do not ask their students to use technology to present their answers. Table 1 further reveals a mean score of 2.30 against the assertion that the teachers mostly use questions that demand recall. This suggests that, on the average the teachers disagreed to this assertion. Invariably, it means they blend higher order thinking skills with the lower order thinking skills either evenly or skewed in favour of the higher order thinking skills. Teachers were also undecided on some of the items. For instance, a mean score of 3.34 recorded against the assertion that teachers assess their students holistically implies that, teachers were undecided as to whether their formative assessment practices covered all the developmental domains of the student or not. Whiles others agreed that their formative assessment practices were holistic (35, 47.3%), others disagreed (17, 23.0%) and yet still others were indifferent (22, 29.7%). A group mean of 3.48 is an indication that the formative assessment practices of the teachers can be rated as within average. This posit that formative assessment is used to provide information on the likely performance of students; to describe strength or weakness and feedback given to students, telling them which items they got correct or wrong and enhances the efficacy of instructional strategies of Social Studies teachers [14, 15]. This implies that teachers should continually practice formative assessment effectively in the classroom to improve teaching and learning activities.

3.2. Domains of Educational Objectives Do Social Studies Teachers Emphasise in Their Assessment

The profile dimensions of the Social Studies syllabus provide a powerful guideline as to what aspects of the student's development should be assessed. The research question - *Which of the domains of educational objectives do social studies teachers emphasise in their assessment?* sought to examine the relative emphasis that Social Studies teachers place on the educational objectives they assess in the classroom. To find answers to this question, lessons and test items of teachers were observed and tallied against the level. Results were presented using frequency counts and percentages. Table 2 presents a summary of how teachers emphasise the various domains of the student's development.

From Table 2, a total of 837 questions asked by the teachers were reviewed. Out of this number, 533 questions representing 63.68% were related to recall of facts, concepts and ideas. Also, 18.28% of the questions observed were understanding inclined with 3.70% requiring the students to analyse. According to the profile dimensions as contained in the social studies syllabus, knowledge and understanding are regarded as the lower level of knowledge in the cognitive domain. This suggests that, knowledge and understanding questions together make 81.96% of the questions that the Social Studies teachers asked their students. This implies that in every ten questions, approximately eight questions require the student to employ lower order thinking skills. This means that, the relative emphasis that teachers place on the knowledge and understanding as far above the dictate of the profile dimensions of 25% as contained in the JHS syllabus Social Studies. Again, the first six levels of the educational objectives as contained in Table 2 measure the cognitive domain of the student. From Table 2, these six levels together constitute 85.66% of the total number of questions Social Studies teachers asked. This is also in contrast to the stipulated 50% for the cognitive domain. A similar study lamented that the general practice of assessment in Social Studies in Ghana is in the cognitive domain [22]. Again, Table 2 shows that 96 of the questions representing 11.47% of the total number of questions reviewed were at the receiving level with 23(2.75%) at the responding level. Less than one percent of the questions were at the valuing level. The teachers never assessed the students' ability to organise their values. This means that, at the affective domain of the students' development, most the skills that were assessed were at the lower level. Also, the affective level which comprise receiving, responding, valuing and organisation of values were given minimal attention during assessment [23]. They together made 14.34% of the questions. This contravenes the demands of the profile dimensions which suggest that 50% of the teacher's assessment tasks should measure attitudes and values which relate to the affective domain. In effect, social studies teachers emphasise the lower level of educational objectives in their assessment. A study on domain of educational objectives social studies teachers' questions emphasise in senior high schools in Ghana tandem the findings of that, when a total of two hundred and ninety-nine (299) questions were collected from the five teachers revealed that teachers set questions that enhance the development of students' conceptual understanding or problem-solving skills, were attributed to the cognitive domain with a greater percentage measuring the lower levels of knowledge [24]. This points to a disparity between theory and practice. Most of the questions assessed the cognitive aspect of the child with little attention on the affective aspect of the child. The danger is whether Social Studies are able to develop the right attitudes and values in students which are required to be responsible citizens. This postulates that, assessment plays an integral role in teaching and learning of Social Studies [6, 7]. The implication is that assessment is a dynamic process and should be based on the objectives selected from the content taught to bridge the gap between theory and practice.

Table 2. Teachers' assessment of educational objectives

Profile dimension	Level	Freq	Percentage
Knowledge and understanding	Knowledge	533	63.68
	Understanding	153	18.28
Use of knowledge	Application		
	Analysis	31	3.70
	Synthesis		
	Evaluation		
Attitudes and values	Receiving	96	11.47
	Responding	23	2.75

	Valuing	1	0.12
	Organising of values		
Total		837	100

Hypothesis 1: There is no statistically significant relationship between the technological pedagogical and content of the teachers and their formative assessment practices.

This sought to describe the relationship between the TPACK of teachers and their formative assessment practices. A correlation was done between the TPACK of Social Studies teachers and their formative assessment practices. Table 3 presents a summary of the correlation.

Table 3. Correlation between TPACK and formative e assessment practices

	TPACK	Formative Assessment Practice	N
TPACK	-	r= 0.647	74
		Sig = 0.000	
Formative Assessment practice	r= 0.647	-	74
	Sig =0.000		

Significance level = 0.05

From Table 3, 74 teachers were involved in the study. Results from Table 3 reveal a correlation co-efficient of 0.647. This means that, there exist a direct relationship between the TPACK of Social Studies teachers and their formative assessment practices. This implies that, as the Technological pedagogical and content knowledge of the teachers increase, their formative assessment practice also increases. In the same vein, as the TPACK of the teachers decreases, their formative assessment practices also decrease. In effect, any improvement in the TPACK of teachers will result in improvement in formative assessment practices. Table 3 further reveals a sig. value of 0.000. This means that, the relationship between TPACK of teachers and their formative assessment practices was statistically significant since the sig. value of 0.000 is less than the alpha level of 0.05. As a result, the null hypothesis that there is no statistically significant relationship between the technological pedagogical and content of the teachers and their formative assessment practices is rejected. The implication is that, for improved technological pedagogical and content knowledge and formative assessment practices of the teacher should be given adequate attention to the development of his/her knowledge for successful implementation of Social Studies lessons.

Hypothesis 2: There is no statistically significant difference between the technological pedagogical and content of the teachers and their formative assessment practices.

This hypothesis investigated the extent to which the formative assessment practices of Social Studies teachers differ from their TPACK. The dependent sample t-test was used to compare the means of the formative assessment practices of teachers and their TPACK at 5% level of significance. Table 4 presents a summary of the t-test.

Table 4. T-test of teachers TPACK and formative assessment practices

Item	Mean	Mean Diff	No.	df	T	sig
TPACK	3.3108	.1651	74	73	-1.98	0.051
Assessment	3.4759					

From Table 4, a total of 74 teachers participated in the study. Their mean score for TPACK was 3.3108 with their formative assessment practices having a mean score of 3.4759. This represents a mean difference of 0.1651 in favour of formative assessment practices. This suggests that, the teachers' formative assessment practices were rated higher than their TPACK in Social Studies. However, this difference was not statistically significant since the sig value of 0.051 is greater than the alpha level of 0.05. Consequently, the null hypothesis that there is no statistically significant difference between the technological pedagogical and content of the teachers and their formative assessment practices is retained at 0.05 level of significance (t=-1.980, df= 73). This means that, there is no enough evidence to reject the null hypothesis. Therefore, the difference that existed might have arisen as a result of a sampling error. Teachers had adequate knowledge in content and pedagogy but were not conversant with their TPACK. Teachers formative assessment practices were rated average. There was a significant relationship between TPACK and formative assessment practice. There was no significant difference between TPACK and assessment.

4. Conclusions and Recommendations

The study indicated that the assessment practices of teachers during Social Studies lessons was on the average. There was disparity between theory and practice as far as the dictates of the profile dimensions are concerned. Teachers mostly assess the cognitive aspect of the child with little attention to the affective domain. Most of task demanded lower order thinking skills. This results in producing students with superficial knowledge and which may also have implications on the attitude of the students towards social issues. The study also concluded that there was a significant positive relationship between TPACK of teachers and their formative assessment practices at 0.05 level of significance. It is recommended that Ministry of Education, National Teaching Council, Ghana Education Service should organise professional development workshop for teachers on their formative classroom assessment practices in Social Studies lessons, this will improve their assessment practices as teachers. Teachers should ensure that they assess the students on all their domains and levels of learning. The profile dimensions should serve as a guide in their assessment. To implement this, headteachers must ensure that the test items of teachers cover the appropriate domains and levels of learning. It is also recommended that, in order to ensure effective formative assessment practices, Ghana Education Service should collaborate with Colleges of Education and Universities training teachers to develop appropriate TPACK for teachers to improve on their formative assessment practices.

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