

Understanding Teacher's Knowledge of Formative Assessment and Students' Achievements: A Structural Equation Modelling Approach

By

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Abstract

Teachers' knowledge of formative assessment and its influence on teacher's teaching and students' learning after the classroom interaction is of growing importance due to the significant increase in economics students' failure in ordinary level (O/L) General Certificate of Education (GCE) examination in Cameroon and Mezam Division in particular. It is in this backdrop that this paper attempted to describe and clarify the pedagogic effects of economics teachers' knowledge of formative assessment on economic students' achievements in Mezam Division, Cameroon. Primary data was used based on a survey of 07 government secondary general education schools in Mezam Division and 01 Higher Teacher Training College (HTTC) in Bambili, North West Region of Cameroon. From a total population of 4000 teachers and students a sample of 488 was selected. The sample consisted of 03 Regional Pedagogic Inspectors (RPIs), 08 Heads of Departments (HoDs), 33 teachers and 444 form five students of economics in the North West Region. The purposive, proportional, stratified and simple random sampling techniques were used to select the teacher training college, secondary schools, RPIs, HoDs, teachers and students of economics. The structural equation modelling (SEM) approach was employed for estimation. The pairwise correlation results showed a statistically significant correlation between teachers' knowledge of formative assessment and students' achievement. The partial least square results revealed that teachers' knowledge of formative assessment had an indirect (through teachers' knowledge of students' conception) influence on students' examination scores in economics. On the basis of these results, it is

recommended that; decision makers should encourage regular in-service training programme such as seminars and workshops for all teachers of economics in order to keep them abreast with constructive alignment theory. Indeed, the government should apportion special budgets to government schools, for helping teachers to create professional learning communities and schools to learn from each other. Learning about formative assessment and its forms should become integral elements of any new curriculum reform process.

Keywords: *Teacher's knowledge of formative assessment, students' achievements, Structural equation modelling, Cameroon*

Introduction

Formative assessment is a frequently used test in economics and other social science studies. Thus, understanding the meaning of teachers' knowledge of formative assessment is crucial to understanding more complex assessment techniques for which the teachers' knowledge of formative assessment is the basis. In every learning organization, the quality of students' academic achievement has largely been determined by the quality of the teachers' pedagogical content knowledge, especially teachers' knowledge of formative assessment. However, the quality of students' economics performances are questionable because of the quality of economics teachers' assessment practices. Problems that have been identified include the use of poorly focused questions and some teachers of economics inability to participate in the setting and marking of official examinations like the GCE (Alobwede, 2015).

Teachers' knowledge of formative assessment like the regional mock examination (Black and William, 1998) has become a worrisome phenomenon. According to the teacher's resource unit (TRU) of Bamenda and the regional inspectorates of pedagogy in collaboration with different subject teachers' association (STA), the objectives for organizing a common formative assessment like a regional mock examination in the North West Region include: to provide an opportunity for teachers who do not participate in setting and marking of official examinations to experience the setting and marking of similar examinations under near similar conditions; to provide the same opportunity to all schools, especially small and enclave schools who on their own cannot set and produce their own mock examinations (because they are often generally less endowed with human, financial and material resources to adequately prepare all their candidates for the official examination); to generally improve the quality of instruction in the schools and performance in the official examinations by encouraging effective scheme coverage, especially in examination classes; to expose candidates to examination type questions, under examination type conditions, thus giving them the requisite orientation to face the real examinations with confidence and to determine content areas in which teachers and students have difficulties and in a way give direction and proper focus to divisional and school based remedial conferences and seminars to be organized by the teachers' resource unit (TRU) and the different pedagogic inspectors in collaboration with subject teachers' association (STAs)

for final year students and their teachers (Regional Delegation for Secondary Education North West Project, 2017).

For these reasons and many more formative assessment like regional mock examinations are organised in the North West Region within the context of strict ministerial directives contained in circular letters No. 11/09/C/MINESEC/IGE/IP-SH and No. 1310/07/L/MINESEC/CAB of 25 August 2010 to the effect that no extra charges should be made on individual parents or students for the examination. In the current paper this implies that, even though regional mock is not an obligatory activity, it is pedagogically imperative for schools and teachers of economics specifically to use regional mock examination as an internal formative assessment tool in order to judge how successful teachers' instructions have been mastered and to prepare students for the external examination (GCE).

According to Ntoh (2015) all government secondary general education schools teachers and students of economics in the North West Region participate in regional mock examination. In this same context, Alobwede (2015) stated that most teachers of economics participate in sequential method of evaluation. He argued that, this frequent assessment method provides an opportunity for the teachers of economics to set economics questions. But on the contrary these teachers set sub-standard questions which fall short of the requirements at the ordinary level of the GCE examination. They set mostly multiple choice questions that make use of only the cognitive domain of Bloom's taxonomy and which in most cases are copied from textbooks. He further reiterated that most candidates come in contact with essay questions for the first time in the GCE examination hall. These candidates give brief answers of not more than a page. Hence, the immediate consequences are very poor results (Alobwede, 2015).

The above arguments underscore the significant role of teachers' knowledge of formative assessment like the regional mock examination in determining students' performance (Black and William, 1998). It is thus the intent of this paper to determine the extent to which teachers' knowledge of formative assessment influence students' achievement in economics at the ordinary level. Based on this objective it is hypothesized that, teachers' knowledge of formative assessment is relatively significance in explaining ordinary level students' achievements in economics in Mezam Division of Cameroon.

Review of Literature

Theoretically, this paper utilized Shulman's (1986) pedagogical content knowledge (PCK) theory and Biggs (1996) theory of constructive alignment. Shulman (1986) stated that, for meaningful learning to occur teachers' must possess pedagogic content knowledge which is inseparable of formative assessment. According to Shulman (1987), the purpose of doing formative assessment and evaluation is to: find out the learning progress of students, grade and rate the students for certification and for teachers to assess or evaluate

teaching by looking at the lesson and materials employed. In order to attain this purpose, Shulman (1987) defined teachers' knowledge of formative assessment as teachers' use of assessment processes that emphasized students' ability to link ideas, apply knowledge, solve problems and transfer their learning to new settings. He assumed that, meaningful learning occurs when teachers provide sensitive and constructive feedback to students and use assessment practices that encourage self-assessment and metacognition. In corroborating Shulman's view of formative assessment and meaningful learning, Biggs (1993, 1996, 1999) and Biggs and Tang (2007) refer to teachers' knowledge of formative assessment as teachers' knowledge of the linkages of intended learning outcomes, teaching and learning activities, and assessment of student learning.

Empirically, Double, McGrane and Hopfenbeck (2019) examined the effect of peer assessment on academic performance in primary, secondary and tertiary students across subjects and domains. They argued that peer assessment improved academic performance as compared to no assessment and teacher assessment. Similarly, Ozan and Kincal (2018) findings revealed that formative assessment practices significantly increased students' academic achievement and attitude toward the class and affected their self regulation skills. Van Wyk (2016) investigated how the jigsaw method as a cooperative learning approach impacts the training of economics teachers. He employed a quasi-experimental design. He used a sample of two hundred economics education teachers from South Africa. Specifically, Van Wyk (2016) findings revealed that jigsaw pedagogy enhanced students' learning of economics. This was because jigsaw learning had required each student to become an "expert" in a small part of the group assignment by mastering a specific aspect of the learning material, and then to teach other students in the group the material, which he or she had mastered. The recent findings reiterate Van Wyk (2007) findings.

Classroom assessment knowledge by teachers of economics is important in teaching as evidenced by findings of Arsaythamby and Julinamary (2015) in a study focusing on form six students' perceptions on difficulties in learning the symbols, graphs and problem solving items in their economics subject. They used a sample of 150 students from five national secondary schools in Kedah, Malaysia. Findings from the students interviewed showed that, the common mistakes that the students did during exam were being unsure of the types of questions and not being interested in certain parts. Besides that, the interview data also revealed that the level of mastery had focused on graph item, followed by symbols and problem solving. Arsaythamby and Md-Ali (2015) reaffirm these findings.

Jepketer, Kombo and Kyalo (2015) examined how teachers' capacity building strategies enhance students' performance in public secondary schools in Nandi County, Kenya. They used descriptive survey design as well as stratified and simple random sampling techniques. They used a sample of (30) public secondary schools, (30) school principals, (85) teachers and (136) students. The findings attributed poor students' performance to low students' entry

behaviour. Thus, they concluded that majority of the teachers were equipped with necessary skills, knowledge and competencies in their subject areas consequently, they articulated their teaching areas and enabled students to perform better. To ascertain the above findings Jadama (2014) findings concluded that knowledge of teachers' about a subject matter had an influence on their abilities to teach it, set questions on it and give work to students' base on it. Similarly, Trumbull and Lash (2013) and Falk (2012) descriptive findings revealed that teachers PCK were a resource in all aspects of their formative assessment practice.

Watt and Schaur (2010) investigated how economics was taught and assessed in four different types of undergraduate courses in America. They argued that cooperative learning and small group assignments were still rarely used in all kinds of courses. Multiple-choice questions were more heavily used in principles and other introductory courses. Essay questions were used more in courses where multiple choice questions were used less. The findings also revealed that written assignments were relatively rare except in upper-division field courses, where roughly a fourth of students' grades were frequently tied to term papers and/or class presentations. The use of term papers in statistics and econometrics courses had increased. Class participation had counted for a small share of student grades (usually in the 5-10% range). In an earlier study McGatha, Bush and Rakes (2009) argued that, in order to enhance growth in students' achievement levels, teachers had to engaged in the following formative assessment practices: provide quiz or task(s) that assess students learning, use other strategies that assess learning, give students answers, solutions or explanations, offer students productive hints, cues or prompts, indicate how students can improve performance, use student assessment strategies, peer assessment strategies and identify errors in facts, skills or misconceptions about concepts.

Ballard and Bates (2008) reported that one major factor that contributed to student's performance was student's attitude towards the tests, school, or study habits in general besides other factors like the student's home life or parental involvement along with the student's health on the day of the test. Ballard and Bates (2008) findings indicated that ongoing assessment was effective for measuring student learning and teacher effectiveness.

From the foregoing empirical studies the following gaps were discovered: Advocates on formative assessment have emphasized that it cannot take place outside of the teaching learning process; rather, it is integral to it (Shulman, 1987; Ballard and Bates, 2008; Jadama, 2014). Therefore, there is a need for this present study to focus on teachers' knowledge of constructive alignment since it is central to effective assessment. Most studies had focussed on analysing the effects of teachers' formative assessment knowledge on students' achievement in economics mostly in America (Falk, 2012; Watt and Schaur, 2010) and not Cameroon. This study intends to fill this gap.

Methodology and Estimation Framework

The study employed the use of the ex post facto research design. Geographically the study was conducted in Mezam Division, the North West Region of Cameroon. From a total population of 4000 teachers and students, a sample of 488 was selected (based on Krejcie and Morgan, 1970 as cited in Amin, 2015). The sample consisted of 03 Regional Pedagogic Inspectors (RPIs), 08 Heads of Departments (HoDs), 33 teachers and 444 form five students of economics in the North West Region. The purposive technique was used to select the teacher training college, RPIs, HoDs, teachers and students of economics. The stratified random sampling technique was used to select the schools. To do this, the names of all the general type of education schools (thirty five schools) in Mezam Division were divided into seven strata based on their geographical location. Consequently, names of schools were organized under the following sub divisions: Bamenda I, Bamenda II, Bamenda III, Bafut, Bali, Santa and Tubah. The simple random sampling technique was used to select the seven schools required for the study. This technique was deemed necessary because it gave each school and sub-division an equal chance of being selected. To do this, the names of all the general type of education schools (forty six schools) found in Mezam Division were written on slips of papers. Each slip was folded and put in a basket. An economics student of form five was called up to pick a folded slip after shuffling. The picked slip was unfolded and the name of the school registered. The slip was refolded and put back into the basket for another round of picking after reshuffling. The process of picking, unfolding, recording, refolding and putting back to the basket was continued until the number of schools required for the study was achieved. If any school that was previously recorded was picked in subsequent occasions, it was not taken into account; instead it was refolded for another picking. This procedure gave each subject an equal opportunity of being represented in the sample. The proportional sampling techniques was used to select students of economics. 20% of students from each school were selected regardless of subdivision size. Questionnaires to teachers and students, observation checklist to HoDs and interview guide to RPIs were the main instruments use for the collection of data.

It is hypothesized that TKFA has both a direct an indirect influence on SA in economics. To verify this hypothesis the following models were specified in a linear form:

$$SA_i = \theta_1 TPCK_i + \theta_2 TKSC_i + \theta_3 TKFA_i + \square_i \quad (1)$$

From the regression equation in equation one the partial least square equation was specified as follows: $SA_i = \theta_1 TPCK_i + \theta_2 TKSC_i + \square_i$ (2)

The empirical model for direct effect gives the direct effect of change in the endogenous variable as a result of change in the exogenous variable, while the indirect effect measure a change in the endogenous variable as a result a change in the exogenous variable moderated by other exogenous variable.

$$SA_i = \theta_0 \theta_1 TPCK_i TKSC_i + \square_i \quad (3)$$

Equation three examined the indirect effect of TPCK on SA through TKSC.

$$SA_i = \theta_0\theta_3TKFA_iTKSC_i + \square_i \quad (4)$$

Equation four examined the indirect effect of TKFA and SA through TKSC.

From the model specification the theoretical expectations of the sign of the coefficients were estimated as follows: A priori: $\theta_0 > 0, \theta_1 > 0, \theta_2 > 0$ and $\theta_3 > 0$

In equations 1, 2, 3 and 4 the PCK theory (Shulman, 1986, 1987) and Bigg's theory of constructive alignment explained that an improvement in teachers' PCK would enhance SA. Hence, an improvement in TPCK, and TKFA were expected to contribute indirectly to an improvement in SA via TKSC. Consequently, the coefficients of θ_1 , θ_2 and θ_3 were positive. Meaning a positive and direct association between TKFA and SA was expected.

Table 1: Definition of variables

Variables Description	Measurement	Authors (Date)
Teachers' knowledge of formative assessment (TKFA)	Assessment of students' classroom performance (ASPC), Assessment of students' prior performance in the lesson (ASPP) Alignment of the objective, activities, assessment and teaching methods (APCK)	Shulman (1987); Biggs (1993, 1996, 1999); Biggs and Tang (2007); McGatha, Bush and Rakes (2009)
Teachers' knowledge of students' conception (TKSC)	Pre-conceptions (PRECON), Misconceptions (MISCON), Learning difficulties (LEARN DIF), Correct conceptions (CCONCEP) and Incorrect conceptions (INCCONCEP)	Shulman, (1986, 1987); Biggs (1993, 1996, 1999) and Biggs and Tang (2007); Bukova –Güzel, (2010)
Teachers pedagogical content knowledge (TPCK)	Teachers' knowledge of content (TKC) Teachers' knowledge of pedagogy (TKTM)	Shulman (1986, 1987); Falk (2012); Jadama, (2014); Arsaythamby and Julinamary (2015); Van Wyk, (2007, 2016)
Students Assessment (SA)	Regional mock examination: multiple choice questions (SA1) and Essay questions (SA2)	Black and William, (1998); McGatha, Bush and Rakes (2009); Watt and Schaur (2010)

Source: Computed by authors

The validation of the measurement models was done by assessing the internal consistency reliability (composite reliabilities) and indicator reliability (indicator loadings). The validation of the PLS structural model was done by

evaluation of path coefficient and calculation of multiple coefficient of determination R^2 . In line with the recommended cut-off criterion suggested by Cohen (1992), R^2 values less than 13% were considered as weak effect and values greater than 40% were considered as strong effect. All ethical issues were identified and considered.

Table 2: Reliability of the Questionnaire Instruments

	TPCK	TKSC	TKFA	SA	Comment
Students' Results	0.828	0.870	0.744	0.689	Reliable
Teachers' Results	0.828	0.844	0.743	0.685	Reliable

Source: Computed by the authors using SmartPLS, 2018

Table 3: Pairwise Correlation

	SA	TKC	TKFA	TKSC
SA	1			
TKFA	0.245	0.451	1	
TKSC	0.398	0.559	0.697	1

Source: Computed by the authors using SmartPLS, 2018

The pairwise correlation matrix in table 3 shows that, there is a weak relationship between teachers' knowledge of formative assessment ($r = 0.245$) and students' achievement. This means that an improvement in teachers' knowledge of formative assessment is accompanied by a little improvement in students' achievement in economics and vice versa. This result is further explained by the loading factors for both the reflexive and formative model that are all significant at 0.05 significant levels. This implies that the structural equation models have a strong and positive significant relationship with their indicators.

Table 4: Measurement Model Loading Factor

	SA	TPCK	TKSC	TKFA
Multiple Choice Questions (SA1)	0.518			
Essay Questions (SA2)	0.940			
Teachers' Knowledge of Content (TKC)		0.739		
Teachers' Knowledge of Pedagogy (TKTM)		0.789		
Correct Conceptions (CCONCEP)			0.780	
Learning Difficulties LEARNDF			0.745	
Incorrect Conceptions (INCCONCEP)			0.711	
Preconceptions (PRECON)			0.759	
Misconceptions (MISCON)			0.787	

Assessment of students' classroom performance (ASPC)				0.471
Alignment of the objective, activities, assessment and teaching methods (APCK)				0.713
Assessment of students' prior performance in the lesson (ASPP)				0.833

Source: Computed by the authors using SmartPLS, 2018

The relationships between TPCK and SA in economics can be further explained using the coefficient of determination (R^2). An estimation of students' data and teachers' data reveal that, TPCK and TKFA explained 55% of the variation in the endogenous variable TKSC, while TPCK and TKFA explained 73% of the variation in the endogenous variable TKSC respectively.

Presentation of Results and Discussion

Table 5: Summary Statistics of Student Questionnaire Items Relating to Teachers' Knowledge of Formative Assessment

SN	Item	Strongly Agree	Agree	Disagree	Strongly Disagree	Neutral	Total
1	My teacher usually assesses students' performance based on the objectives of the lesson.	71 (16.0%)	150 (33.8%)	110 (24.8%)	77 (17.3%)	36 (8.1%)	444
2	My teacher aligns the learning objectives, activities and assessment with the teaching method	50 (11.3%)	145 (32.7%)	137 (30.9%)	73 (16.4%)	39 (8.8%)	444
3	My teacher knows the students' prior performance in the lesson.	81 (18.2%)	157 (35.4%)	109 (24.5%)	60 (13.5%)	37 (8.3%)	444
	Total	202 (15.2%)	452 (33.9%)	356 (26.7%)	210 (15.8%)	112 (8.4%)	1332

Source: Computed by the authors using SmartPLS, 2018

Table 5 indicates that the sample was dominated by respondents that agreed. Statistically, 49.1% (15.2% and 33.9%) of students agreed that their teachers had knowledge of formative assessment whereas, 42.5% disagreed (26.7% and 15.8%). 8.4% of the respondents were unable to assess their teachers' knowledge of formative assessment. 137 (30.9%) of the respondents disagreed that their teachers aligned the lesson objectives, activities and assessment with

the teaching method. However, 157 (35.4 %) and 150 (33.8%) of the students respectively agreed that their teachers knew the students' prior performance in the lesson and could assess students' performance based on the objectives of the lesson.

Table 6: Empirical Results for TKFA and SA

Hypothesized Link	Coefficient	Standard Deviation	Standard Error	T-Statistics
ASPC <- TKFA	0.237	0.060	0.060	4.031
APCK<- TKFA	0.456	0.038	0.038	11.863
ASPP <- TKFA	0.669	0.056	0.056	11.843

Source: Computed by the authors using Smart PLS, 2018

Table 6 shows that teachers' knowledge on how to assess the students' prior performance in the lesson has the highest coefficient value (0.669) whereas teachers' knowledge on how to assess students' performance in the classroom has the lowest coefficient value (0.237). The standard deviations of all the variables are less than their coefficient values. This implies that all the variables have a good performance. The t-test results indicate that teachers' knowledge on how to assess the students' classroom performance (ASPC), prior performance in the lesson (ASPP) as well as teachers' knowledge on how to align the objective, activities, assessment and teaching methods (APCK) all have a significant positive effect on students' achievement in economics paper one (SA1) and two (SA2) respectively. This is because the t- statistic values are all above 2, meaning they are significant at 5% significant level. The t-statistics results thus, reveal that teachers understood their students in the process of evaluating their work as such; teachers were required to have substantial knowledge in order to evaluate students' work. Jadama (2014) corroborates the above assertion. According to him teachers had marked students' assignments based on specific criteria of knowledge and students had learned when they receive their assignments. They were able to know where they went wrong and were able to know what they could do next time to get it correct. This implies that TPCCK and usage of assignments as a form of formative assessment influence students' achievement in economics.

The t-statistics results also point out that, an improvement in teachers' knowledge of formative assessment will results to an improvement in students' achievement in economics. Meaning that a 1% improvement in teachers' knowledge of how to assess the students' classroom performance (ASPC), prior performance in the lesson (ASPP) as well as teachers' knowledge on how to align the objective, activities, assessment and teaching methods (APCK) will results to a 0.24%, 0.67% and 0.46% improvement in students' achievement in economics respectively. These effects are statistically significant at 5% level of significance. The findings reinforced Falk, (2012), Jepketer et al. (2015) as well as, Ozan and Kincal (2018) assertion that teachers' equipped with knowledge

of content, teaching methods, students' conception and formative assessment practices enable students to perform better.

Table 7: Teachers' Knowledge of Formative Assessment

SN	Teachers' knowledge of formative assessment	Yes Responses		No Responses		Responses
		Frequency (F)	Percentage (%)	Frequency (F)	Percentage (%)	ΣF
1	The teacher prepared an assessment instrument to assess whether the objectives of the lesson have been met.	8	100	0	0	8
2	The teacher used a teaching method that was in alignment with the assessment techniques used by the teacher.	5	62.5	3	37.5	8
3	The teacher provided feedback after assignment, task(s), quiz (or test) and group work.	2	25.0	6	75.0	8

Source: Authors estimation based on data from HoDs of Economics

From the statistics in table 7, it is worth noting that, 100% of the observed teachers prepared an assessment instrument to assess whether the objectives of the lesson have been met and 62.5% used a teaching method that was in alignment with the assessment techniques used. The findings is corroborated by Biggs and Tang (2007) in their examination of the implications of Biggs' theory which states that by using appropriate learning objectives, teaching learning activities, teaching methods, teaching aids and assessment methods, the teacher can relate his teaching of content to a situation which the learner will meet in his day to day life. This implies that to enhance students' achievement teachers' must possess knowledge on how to select teaching methods that call for constructivist approach that acknowledge the need to understand concepts and relationships (Biggs and Tang, 2007). In relation to the contribution put above, Van Wyk, (2007) reported that teachers' knowledge of continuous assessment, selection of teaching methods, content, media and infrastructure were to a large extent impacting on their implementation of the national curriculum statement for economics. This implies that the effective utilization of the aforementioned factors influenced students' achievement in economics.

Classroom assessment knowledge by teachers of economics is important in teaching. The findings revealed that just 25.0% of the teachers provided feedback after assignment, task(s), quiz (or test) and group work. This finding

contradicts McGatha, Bush and Rakes (2009) prescription that to enhance students' achievement teachers must provide quiz or task(s) that assess students learning, use other strategies that assess learning, give students answers, solutions or explanations, offer students productive hints, cues or prompts, indicate how students can improve performance, use student assessment strategies, peer assessment strategies and identify errors in facts, skills or misconceptions about concepts. Moreover, the findings revealed that majority 75.0% of the teachers did not provide feedback after assignment, task(s), quiz (or test) and group work. This implies that, teachers' lack of knowledge on how to provide feedback after assignment, task(s), quiz (or test) and group work affects students' achievement negatively. This findings tally with Van Wyk (2007, 2016) findings that to very large extent, teachers were insufficiently trained in assessment practices.

Another factor that affected students' achievement in economics is teachers' knowledge of selection of formative assessment. Results obtained from an interview with regional pedagogic inspectors of economics indicated that, most RPIs used structural questions that required oral answers, essay questions that required written answers, assignment, questions that require students to calculate and interpret the results, complete tables and plot graphs. This implies that teachers' knowledge and utilization of different types of formative assessment can helped form or shape students' learning. Based on the above discussions Trumbull and Lash (2013) recommend that the most salient dimensions of formative assessment used by teachers in order to enhance students learning include: informal or formal questions, spontaneous or planned questions, immediate or delayed feedback, individual or group assessment, verbal or nonverbal assessment, oral or written assessment.

Table 8: Code-Grounding -Quotation Table on Knowledge of Formative Assessment and Students' Achievement

Questions	Code	Code Description	Grounding	Quotation
a) Is the teachers' pedagogical content knowledge amongst the factors that have accounted for your students' achievement? Yes ☐ No ☐; If yes, How? b) What types of assessment practices (or tools) do you mostly use at the end of the lesson?	Teachers' PCK and students' achievement	How teachers' PCK accounts for students' achievement	3	a) –'Yes. The teachers' mastery of the subject matter and using appropriate teaching methods to communicate this content to the learners has improved the student achievement in economics. However, most often students stay away from classes. For example once an assignment is given these students stop attending classes'. (RPIs teaching price and markets) 'Yes. The teachers' ability to identify students' prior knowledge, learning difficulties and the proper

Questions	Code	Code Description	Grounding	Quotation
c) What do you do to enhance and improve your students' achievement in economics?	Formative Assessment			use of assessment at the end of each lesson or in final examinations facilitates students' learning'. (RPI teaching international trade) b) 'I use structural questions. Students are expected to provide short answers to these questions orally. Sometimes, I give them a take home assignment '. 'I use questions that require students to calculate and interpret the results, complete tables and plot graphs '. (RPIs teaching price and markets) 'I make use of essay questions. Here students are expected to differentiate between concepts, classify factors, state and explain advantages and disadvantages, etc.(RPI teaching international trade) c) 'I attend economics seminars to upgrade my teaching, I go to class regularly, I organise revision classes and attend to students difficulties. I always complete my syllabus. All these factors contribute to students' success '. 'I encourage students to own economics textbooks. I use these books with them. I share them into mix ability groups and give them work to do. I check the work done and provide corrections'. (RPIs teaching price and markets) 'I delivery an interesting lesson with students highly engaged in the teaching learning activities'. (RPI teaching international trade)

Source: Authors Interpretation based on data from RPIs of Economics

Table 9: Bootstrapping Students' Test Results for Effects of TKFA on SA

Hypothesized Link	Coefficient	Standard Deviation	Standard Error	T-Statistics	Decision
TKFA -> TKSC	0.467	0.057	0.057	8.059	Supported

Source: Computed by the authors using SmartPLS, 2018

The students' bootstrapping result in table 9 shows that there is a positive significant effect of teachers' knowledge of formative assessment (TKFA) on students' achievement (SA). Indeed, this means that, a unit improvement of teacher knowledge of formative assessment through teachers' knowledge of students' conception (TKSC) will improve students' achievement by 46.7% ($t=8,0$). The paper hypothesis which states that, teachers' knowledge of formative assessment is relatively significance in explaining ordinary level students' achievements in economics in Mezam Division of Cameroon is retained. The bootstrapping results reiterate the fact that teachers' knowledge of ongoing assessment types like multiple choice questions, essay questions and students' entry behaviour as well as attitude toward economics are effective for determining and improving student learning and teacher effectiveness in economics. Ballard and Bates (2008), McGatha et al. (2009), Watt and Schaur (2010), Arsaythamby and Md-Ali (2015) as well as, Arsaythamby and Julinamary (2015) findings all attest to this finding.

Table 10: Bootstrapping Teachers' Test Results for Effects of TKFA on SA

Hypothesized Link	Coefficient	Standard Deviation	Standard Error	T-Statistics	Decision
TKFA -> TKSC	0.692	0.044	0.044	15.406	Supported

Source: Computed by the Researchers using SmartPLS, 2018

The teachers' bootstrapping result in table 10 indicates that there is a partial indirect relationship between teacher knowledge of students' formative assessment (TKFA) and students' achievement (SA). Actually, this means that, a unit improvement of teacher knowledge of formative assessment through teachers' knowledge of students' conception (TKSC) will improve students' achievement by 69.2%. The findings confirm the a priori expectation of the paper as well as Double, McGrane and Hopfenbeck (2019) findings.

The teachers' t-ststistic result is significant at 5% level. This means that teacher knowledge of formative assessment (TKFA) is significant in predicting students' achievement (SA) via teachers' knowledge of students' conception. The paper hypothesis which states that, teachers' knowledge of formative assessment is relatively significance in explaining ordinary level students' achievements in economics in Mezam Division of Cameroon is retained. The teachers' bootstrapping results therefore point to the fact that, teachers' knowledge of content, pedagogy, provision of actionable feedback to student

and tailoring of their teaching to meet students' learning needs will greatly enhance students' achievement in economics. The above finding hinges on Shulman's theory on PCK and Biggs theory on constructive alignment.

Conclusion and Recommendations

Teachers' knowledge of assessment of students' classroom performance, assessment of students' prior performance in the lesson and alignment of the objective, activities, assessment and teaching methods investigated in this paper had a significant direct influence on the academic achievement of students in economics. The findings revealed that teacher's pedagogical content knowledge and constructive alignment of intended learning outcomes, teaching learning activities and assessment does not only influence student achievement but; improve student achievement. The conclusions to be drawn from this paper are that teachers' knowledge of formative assessment moderated by teachers' knowledge of students' conception has a significant indirect influence on the academic achievement of students.

Thus, there is an urgent need for professional training programme to be organized at the regional and departmental levels to educate teachers on economics content, teaching methods, students' conception and formative assessment. Students should be given edifying talks on issues such as how to answer multiple choice question and essay questions and causes of poor performance in internal and external examinations especially during their classroom meetings. During parents' teachers' association meetings parents should be sensitized on the importance of allocating time for their children to do their assignments, assisting their children in doing assignments and the benefits of economics education in the lives of their children. The government should apportion special budgets to government schools, for helping teachers to create professional learning communities and schools to learn from each other. That is, lessons should be organized so that formative assessment practices are modelled and inter-school workshops should be organized where teachers can practice new skills on the setting of formative assessment questions, scoring of formative assessment and the quality of feedback after formative assessment. Therefore, learning about formative assessment and its types as well as practices should become integral elements of any new curriculum reform process.

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