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Use of *Assessment of Learning* Teaching Strategy among Basic School Teachers in Ghana

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Authors' contributions

This work was carried out in collaboration among all authors. Author BAS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors OAE and ENW managed the analyses of the study. Author ENW managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Ghana's new curriculum for the basic level places much emphasis on the need for teachers to evaluate the learner's cumulative progress and achievement. This requirement makes it imperative to measure the competency of the teachers on the use of *Assessment of Learning* strategy. The study adopted a survey research approach and the features, strategies and principles under pinning *Assessment of Learning* strategy formed the basis of the construction of 12-itemlikert scale with a reliability coefficient of 0.98. A sample size of 100 was computed at 95% confidence interval and randomly selected from the population. With respect to this learning strategy, significant differences were found for teaching division and teaching experience. The findings indicated that with respect to providing processes that make it possible for students to demonstrate their competence and skill, the expertise of class teachers $(M: 3.66, SD: 0.466)$were significantly different $(t_{98} = 12.105, p < 0.05)$ from subject teachers $(M: 2.41, SD: 0.499)$. The mean difference of 1.256 shows that class teachers exhibited greater expertise in providing processes that make it possible for students to demonstrate their competence and skill than their subject teacher counterparts.

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Also, with regards to reporting students' learning based on evidence obtained from variety of contexts and applications, the expertise of class teachers $(M: 3.99, SD: 0.306)$ were significantly different $(t_{98} = 23.638, p < 0.05)$ from subject teachers $(M: 2.19, SD: 0.397)$with a mean difference of 1.710.In terms of providing range of alternative mechanisms for assessing the same outcomes, a significant difference $(t_{98} = -14.798, p < 0.05)$ was found between teachers with teaching experience of at least 4 years $(M: 4, SD: 0.00)$ and those with less experience $(M: 2.56, SD: 0.725)$.The absolute mean difference of 1.444 is an indication that the former performed better than the latter. The findings provide the basis for Ghana Education Service to organize in-service professional learning training aimed at enhancing teachers' knowledge of summative assessment with the ultimate goal of enhancing students' learning and achievement. The study recommends in-service training and continuous professional development sessions for subject teachers to build their capacity in the use of *Assessment of Learning* strategies.

Keywords: Assessment of Learning; basic school; Ghana; curriculum; evaluation; summative; education.

1. INTRODUCTION

All classroom assessments fall under summative, diagnostic, and formative. However, none in itself is a sufficient tool to maximize students' learning. In other words, they complement each other in any educational curriculum across the world. *Assessment of Learning* is a form of summative assessment [1] Ghana's new curriculum emphasizes the integration of assessment as learning, for learning and of learning into the teaching and learning processes and as an accountability strategy [2]. This calls for the need for teachers to have the requisite skills to use these assessment strategies to maximize teaching and learning. No study has so far been done to know the strengths and weaknesses of the teachers with regards to the use of each of these strategies in Ghana.

According to Deluca et al. [3], teachers have different understandings about educational assessment that leads to diverse orientations and classroom practices. They also found that there is comparatively little reliable data on teachers' current approaches to assessment in relation to existing accountability demands. They found that through research evidence, teachers' assessment literacy weaknesses could be identified to inform areas of professional development training, specifically with regard to assessment education. ANOVAs were used to determine whether or not differences existed between demographic variables (i.e. career stage, teaching division and previous assessment education) and teachers' professional learning priorities and preferences for Part Three. Significant differences were found for career stage, teaching division and assessment education. Integrating and Communicating Assessment Practices was a significantly greater priority for less experienced teachers (0–4 years) vs. teachers with 5–10 years of experience, for P/J vs. I/S teachers, and for teachers with previous assessment education vs. no previous assessment education Mertler [4] found no significant differences in teachers' approaches to assessment on teaching division. Jonson [5] found that in terms of professional learning preferences, significant differences exist based on career stage, teaching division and previous assessment education. Less experienced teachers preferred One-on-One Learning more than their experienced counterparts – a finding that is aligned with research advocating mentoring models of professional learning for early career teachers [5].

Teachers are required to demonstrate teaching skills and strategies that on regular basis confirm what students know; ascertain whether or not the curriculum outcomes have been satisfied. One of the main features of this strategy is for teachers to provide evidence of academic achievement of learners to their parents or guardians, the learners themselves and outside groups such as employers as well as other educational institutions. This kind of assessment provides results in the form of statements or symbols that depicts how well students are learning. This has the capacity to augment pivotal decisions that will affect the future of learners. To this end, it is salient for the underpinning logic and measurement of *Assessment of Learning* to be credible and defensible [6].

Methods used in this strategy should have the capacity to make way for learners to exhibit their understanding and provide enough reason to

buttress credible and defensible outputs about the quality and nature of their learning, in order for the outcome to be useful to others. This method of assessment is not exclusive to tests and examinations alone, but also other means including portfolios, project works, presentations, simulations, role play, and written, oral and visual methods [7].

The nature of *Assessment of Learning* makes it more typical of summative assessment. Its construction needs to be carefully done and of the highest quality since the academic competences of students in relation to other students results are inferred from it. Certification of the proficiency of students is required to be professionally and objectively carried out [7].

Quantifying *how much* a student learn or know can be achieved through the use of test, questionnaires, rating scales and the like. Finding out how much change has occurred on the student's acquisition, of a skill, knowledge or value, before and after a given learning experience is key. Teachers are always in the position to make judgments by assigning value or deciding on the worth of student's performance by answering the question how good, adequate or desirable is the performance of the students? [7].

Several findings from recent studies have shown that, the way students perceive certain contents of educational curriculum depend largely on the way such contexts are taught to them. Bosson-Amedenu (2017a), [8] examined the impact of virtual and concrete manipulatives on the academic achievement of senior high school students in mathematics. The results showed that the use of manipulative in the teaching of mathematics was positively related to their academic achievement. Another finding from a similar study, [9] also sought to find out the perceived difficult topics in the mathematics syllabus in Archbishop Porter Girls Senior High School in Ghana. The results showed that there were concepts that students perceived difficult; partly because of the way such topics were taught to them. In this regard, it is imperative for teachers to be evaluated on timely bases on the use of assessment strategies they adopt [9]. This will highlight the need for teachers to constantly reflect on their teaching strategies and see the need to improve upon them. A study in 2017c, by Bosson-Amedenu [10] has shown that pupils developed their misconceptions and dislike for some topics in the mathematics curriculum at the Junior High School level. This calls for the need to research into the strategies teachers use in teaching so as to help improve practice. There was another study by Bosson-Amedenu (2018), [11] which found that basic school teachers could not differentiate between examinable and non-examinable components in the mathematics curriculum. The ability of a teacher to identify examinable (WAEC syllabus) from the non-examinable components is crucial in choosing appropriate assessment strategies.

Since the outcome of the *Assessment of Learning* plays an important role in deciding the next steps in students' learning, it is imperative to measure if teachers report students' learning outcomes fairly, accurately and in a detailed manner.

2. METHOD

The study used the survey approach. The features, strategies and principles underpinning *Assessment of Learning* formed the basis of the construction of the twelve text items used in the questionnaire. The study involved a population of 132 basic school teachers from all regions of Ghana. A sample size of 100 was computed at 95% confidence interval and randomly selected from the population. The questionnaire consisted of a four-point Likert scale: Strongly agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). These options were weighted 4, 3, 2 and 1, respectively. The reliability of the items was assessed with Cronbach's Alpha. The dependent variables were the items that underpin the *Assessment of Learning* teaching strategy, while the independent variables included teaching division (class teacher or subject teacher) and years of teaching experience (at least 4 years or below 4 years). Normality assumption for the dependent variables was tested for each category of independent variable. Independent sample t tests were used to determine whether, or not, differences existed between demographic groupings such as teaching division and teaching experience. After developing these instruments, the content and face validity was done by experts in the Quality Assurance department of the Holy Child College of Education to determine the appropriateness of the instruments.Participants gave their informed consent for their responses to be used for the purpose of research. The duration for responding to the items was 2 hours. Since the respondents were guided to provide answers item by item, there were no missing data. There were 50 male and 50 female participants.The questionnaire was composed of two parts. The first part consisted of open and

closed ended questions. These questions required respondents to provide information on their sex, age, teaching division (class teacher or subject teacher), class size and years of teaching experience. The second part required the teachers to indicate their use of each feature of *Assessment of Learning* using a four-point scale. SPSS and Microsoft Excel were used for the data analysis.

2.1 Sample Size Determination

The size of sample was computed at 95% confidence interval using the following model:

$$n = \frac{N}{1 + Ne^2}$$

Where;

n= Sample size, N= population, $e = error = 0.05$

$$n = \frac{132}{1 + (132)(0.05)^2} \approx 100$$

2.2 Distribution Characteristics

Before the conduct of the analysis, assumptions that underlie the conduct of independent t-test were fulfilled. Prominent among these assumptions were normality and homogeneity of variance. Specifically, the normality assumption was checked. The visual inspection of Q-Q plots and box plots showed that the *Assessment of Learning* items were approximately normally distributed across the category of independent variables such as teaching division and teaching experience such that the skewness z- values (which were computed by dividing the skewness measure by its standard error) were within the range of ± 1.96; an indication of the data being approximately normally distributed [12].

3. RESULTS AND ANALYSIS

Hypothesis 1:

H_0: There is no statistically significant difference in basic school teaching division (Class or subject teacher) with respect to the use of *Assessment of Learning* teaching strategy in Ghana.

H_1: There is a statistically significant difference in basic school teaching division (Class or subject teacher) with respect to the use of *Assessment of Learning* teaching strategy in Ghana.

Hypothesis 2:

H_0: There is no statistically significant difference in basic school teaching experience (4 and above years or below 4 years) with respect to the use of *Assessment of Learning* teaching strategy in Ghana.

H_1: There is a statistically significant difference in basic school teaching experience (4 and above years or below 4 years) with respect to the use of *Assessment of Learning* teaching strategy in Ghana.

4. RESEARCH QUESTIONS

- How do basic school teachers' approaches to *Assessment of Learning* differ based on teaching division and teaching experience?
- What is the overall percentage performance of Ghanaian basic schoolteachers with respect to the *Assessment of Learning* strategy using the grand mean as a threshold criterion?

It can be inferred from Table 3 that the test is significant, and that the null hypothesis (H_0) is rejected. This is because considering under equal variance assumed, it is evident that a significant difference exists in the means of the class teachers and subject teachers with respect to their use of the 4th item (i.e.,reporting students' learning based on evidence obtained from variety of contexts and applications). The difference between both in their use of *Assessment of Learning* strategy with respect to reporting students' learning based on evidence obtained from variety of contexts and applications is displayed in the descriptive statistics which is presented in Table 4.

From the descriptive statistics that is shown in Table 4, it is clear that with respect to the item 4, which assesses the use of *Assessment of Learning* strategy with respect to teaching division, Class teachers had the highest mean of 3.90 with a standard deviation of .306; whereas subject teachers had a lower mean of 2.19 with a standard deviation of 0.397. The mean difference was 1.710 and these points out that Class teachers report students' learning based on evidence obtained from variety of contexts and applications than their subject teacher counterparts.

Table 1. Demographic Information about respondents

Age	Male	Female	Frequency
20-25	1	2	3
26-35	43	45	88
36-45	5	3	8
46-55	1	0	1
Level	**Frequency**		
Class Teacher	68		
Subject Teacher	32		
Class Size			
Less or equal to 40	31		
above 40	69		
Years of teaching experience			
<4 years	45		
4 years and above	55		

Table 2. Reliability statistics

Cronbach's alpha	number of items
0.978	12

The Cronbach's Alpha coefficient suggested a very high internal consistency (reliability) of the items

According to scores of Table 5, the test is significant, and null hypothesis (H_0) is rejected. When equal variance is assumed, it is evident significant difference between class and subject teachers, with respect to their use of the 7th item (i.e.providing processes that make it possible for students to demonstrate their competence and skill).

The difference between both groups in their use of *Assessment of Learning* strategy with respect to providing processes that make it possible for students to demonstrate their competence and skill is displayed in the descriptive statistics which is presented in Table 6.

Based on Table 6 analysis, Class Teachers had the highest mean respecting the 7thitem that assesses the use of *Assessment of Learning* strategy. The mean difference is 1.256, pointing out that class teachers provide more processes that make it possible for students to demonstrate their competence and skill than their subject teacher counterparts.

According to results presented in Table 7, the test is significant, and the null hypothesis (H_0) is rejected. Assuming equal variance, there is a significant difference between class and subject teachers with respect to their use of the 8th item (i.e.providing range of alternative mechanisms for assessing the same outcomes– Table 8).

From the descriptive statistics of Table 8, it is clear that with respect to the 8thitem that assesses the use of *Assessment of Learning* strategy with respect to teaching division, Class Teachers had the highest mean of 3.41with a standard deviation of .496 whereas Subject teachers had a mean of 2.28 with a standard deviation of .457. The mean difference is 1.131 and this explains that class teachers provide range of alternative mechanisms for assessing the same outcomes than their subject teacher counterparts.

It can be inferred from Table 9 (for item 4), that the test is significant, and that the null hypothesis (H0) is rejected, considering t equal variance assumed. A significant difference exists in the means of the more experienced teachers ($\geq$ 4 years) and the less experienced (<4 years).

The difference between these two groups in their use of *Assessment of Learning* strategy with respect to reporting students' learning based on evidence obtained from variety of contexts and applications is displayed in the descriptive statistics which is presented in Table 10.

More experienced teachers have the highest mean. The absolute mean difference is 1.444 indicating that more experienced teachers provide range of alternative mechanisms for assessing the same outcomes than their counterparts who have taught for less number of years.

Table 3. Independent t-test for differences in use of *Assessment of Learning* with respect to teaching division (Class Teacher or Subject Teacher)

Independent samples test										
		Levene's test for equality of variances		t-test for equality of means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference	
									Lower	Upper
Item 4	Equal variances assumed	5.236	.024	23.638	98	.000	1.710	.072	1.566	1.853
	Equal variances not assumed			21.551	49.042	.000	1.710	.079	1.550	1.869

Table 4. Descriptive statistics showing a difference in the means of teacher's responses with respect to teaching division (Class or Subject Teacher)

Group statistics					
	T divison	N	Mean	Std. deviation	Std. error mean
Item4	class teacher	68	3.90	.306	.037
	Subject teacher	32	2.19	.397	.070

Table 5. Independent t-test for differences in use of *Assessment of Learning* with respect to teaching division (Class Teacher or Subject Teacher)

Independent samples test										
		Levene's test for equality of variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference	
									Lower	Upper
Item 7	Equal variances assumed	1.382	.243	12.105	98	.000	1.256	.104	1.050	1.461
	Equal variances not assumed			11.905	58.357	.000	1.256	.105	1.044	1.467

Table 6. Descriptive statistics showing a difference in the means of teacher's responses with respect to teaching division (Class or Subject Teacher)

Group statistics					
	T divison	**N**	**Mean**	**Std. deviation**	**Std. error mean**
Item 7	class teacher	68	3.66	.477	.058
	Subject teacher	32	2.41	.499	.088

Table 7. Independent t-test for differences in use of *Assessment of Learning* with respect to teaching division (Class Teacher or Subject Teacher)

Independent samples test										
		Levene's test for equality of variances		**t-test for equality of means**						
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean difference**	**Std. error difference**	**95% confidence interval of the difference**	
									Lower	**Upper**
Item 8	Equal variances assumed	7.820	.006	10.900	98	.000	1.131	.104	.925	1.336
	Equal variances not assumed			11.229	65.575	.000	1.131	.101	.929	1.332

Table 8. Descriptive statistics showing a difference in the means of teacher's responses with respect to teaching division (Class or Subject Teacher)

Group statistics					
	T divison	**N**	**Mean**	**Std. deviation**	**Std. error mean**
Item 8	class teacher	68	3.41	.496	.060
	Subject teacher	32	2.28	.457	.081

Table 9. Independent t-test for differences in use of *Assessment of Learning* with respect to Teaching Experience (more than 4 years or 4years and below)

Independent samples test										
		Levene's test for equality of variances		t-test for equality of means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. Error difference	95% confidence interval of the difference	
									Lower	Upper
Item4	Equal variances assumed	218.969	.000	-14.798	98	.000	-1.444	.098	-1.638	-1.251
	Equal variances not assumed			-13.370	44.000	.000	-1.444	.108	-1.662	-1.227

Table 11 shows the coded responses of the respondents with their corresponding mean and mean ranks.

It is evident that the basic school teachers performed better where Means values surpassed the grand mean. Using the grand mean as a threshold reference value, out of the twelve items the teachers were being evaluated for, only 7 of the items exceeded the threshold grand mean of 82.8125, representing approximately 58% performance. The items that exceeded the threshold criterion were,(a) Students' learning are reported based on evidence obtained from variety of contexts and applications (b) student s' learning are reported accurately (c)transparent approaches are provided to interpretation (d) processes that make it possible for students to demonstrate their competence and skill are provided (e) clear descriptions of the intended learning are provided(f) students' learning are reported fairly and (g)strategies for recourse in the event of disagreement about the decisions are provided. Also, the items that fell below the threshold criterion were (h) provision of descriptions of the assessment process (i) provide range of alternative mechanisms for assessing the same outcomes (j)provide a rational for undertaking a particular *Assessment of Learning* at a given point in time (k) provide public and defensible reference points for making judgments and (l)provide transparent approaches to interpretation. Table 12 shows the weight assigned to the responses.

5. DISCUSSION

Results tend to point out a significant difference in the use of *Assessment of Learning* strategy according to teaching division, showing that class teachers performed better than their subject teacher counterparts, corroborating other studies [3]. Another major finding was the significant difference in the use of *Assessment of Learning* strategy with respect to the teacher's experience, showing that basic schoolteachers with more experience ($\geq$ 4years of teaching) used the *Assessment of Learning* strategy better than their counterparts with lesser years of experience. This finding is contrary to that of Jonson [5] who in a similar study found that experienced teachers viewed assessment from non-experienced teachers.

Table 10. Descriptive statistics showing a difference in the means of teacher's responses with respect to teaching experience (Teaching Experience)

Group statistics					
	Teaching Exp	**N**	**Mean**	**Std. deviation**	**Std. error mean**
Item 4	below 4 years	45	2.56	.725	.108
	4 years and above	55	4.00	.000	.000

Table 11. Coded response for determination of overall percentage performance of teachers with respect to the *Assessment of Learning*

Item No.	SA (4pt)	A (3pt)	D (2pt)	SD (1pt)	Mean	Mean Rank
1	204	108	24	1	84.25	6.000
2	200	141	6	0	86.75	2.000
3	104	162	26	7	74.75	12.000
4	240	99	12	1	88	1.000
5	104	198	16	0	79.5	10.000
6	192	147	4	1	86	5.000
7	200	135	10	0	86.25	4.000
8	112	189	18	0	79.75	9.000
9	100	165	40	0	76.25	11.000
10	192	150	4	0	86.5	3.000
11	156	153	16	2	81.75	8.000
12	184	135	16	1	84	7.000
			Grand Mean		82.8125	

SA means Strongly Agree; A means Agree; D means Disagree and SD means Strongly Disagree

Finally, this study quantified the overall performance of the teachers using the grand mean as a referenced criterion. The overall percentage score was 58%. This technique was in line with Bosson-Amedenu [10] who used a similar approach to identify the perceived difficult concepts in Mathematics Curriculum in Ghana.

6. CONCLUSION

The study sought to evaluate the use of *Assessment of Learning* strategy by teachers based on their teaching division and experience, and results points out significant differences between class and subject teachers in providing processes facilitating students to demonstrate their competence and skill,. As expected, class teachers with more experience tend to perform better in most of items: students demonstration of knowledge and skills, based in evidences and showimg a wider range of alternative assessment mechanisms. The There is a high percentage of the teachers that use the *Assessment of Learning* strategy, that acts as an indicator for the need of more training to improve teachers skills to use this assessment strategy to enhance teaching and learning.

7. IMPLICATION FOR FUTURE STUDY

Future research can look at the relationship between specific in-service training on assessment and its impact on teaching and learning.

8. LIMITATION OF THE STUDY

Our sample consisted of predominantly class teachers, we cannot be certain this is representative of the current teaching population.Findings were limited to 100 randomly selected basic school teachers and might differ with larger populations.

9. RECOMMENDATIONS

The findings provide a basis for Ghana Education Service to provide in-service professional learning training aimed at enhancing teachers' knowledge of formative assessment with the ultimate goal of enhancing students' learning and achievement.

CONSENT

Participants gave their informed consent for their responses to be used for the purpose of research.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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