THE EFFECT OF CORRECTIVE FEEDBACK OF SCHOOL-BASED ASSESSMENT ON SENIOR SECONDARY SCHOOL STUDENTS' ACHIEVEMENT IN STOICHIOMETRY

Ijeoma Joy Chikezie (Ph.D)
School of Education and Ancillary Studies
National Institute for Nigerian Languages
P.M.B. 7078, Aba, Abia State, Nigeria.
joyeddy@yahoo.com +2348030975128

Abstract
School-based assessment (SBA) is an assessment, which is embedded in the teaching and learning process. Like formative assessment, SBA is used to diagnostically provide feedback to teachers and students over the course of instruction. Feedback is an essential part of teaching and learning process and lends itself to students' academic development. Hence, this study explored the effect of corrective-feedback, on Senior Secondary Two (SS2) students' achievement in stoichiometry. Quasi-experimental design of the pretest post test non-equivalent control group design was adopted. The study was guided by three null hypotheses. The population of the study consists of co-educational private schools in Aba education zone, Abia State of Nigeria while the sample comprised 80 students from two intact chemistry classes in two schools drawn using purposive sampling technique because there was no randomization . One school was assigned Experimental Group A (EGA) while the other school was assigned Control Group B (CGB). The instrument for data collection was Chemistry Achievement Test in Stoichiometry (CATS) adopted from a Diagnostic Chemistry Achievement Test (DCAT) developed based on SS2 national chemistry curriculum. The CATS comprised four-option multiple choice objective test which yielded reliability coefficient index of .76 with Kuder-Richardson formula 20 (K-R 20). The two groups were taught stoichiometry and assessed using CATS. The EGA was given corrective-feedback while CGB was given non-corrective feedback. After four weeks, the two groups were re-assessed with CATS. Research questions were answered using mean and standard deviation while the null hypotheses were tested at .05 level of significance using Analysis of Covariance (ANCOVA). Summary of the results revealed that there was a significant difference in the mean achievement scores of students given corrective feedback and those given non-corrective feedback. The study further indicated a significant difference in the mean achievement scores of male and female students. There was an evidence of no interaction between treatment and gender. Based on the findings of the study, logical recommendations were made which highlighted, among others, the imperativeness of teachers giving corrective-feedback after SBA thereby, enhancing learner empowerment.

Keywords: Corrective-feedback, School-Based Assessment (SBA), stoichiometry

Introduction
Stoichiometry is a concept in chemistry that deals with the quantitative aspect of the mass-mole number relationship, chemical formulas and reactions (Brown, LeMay & Bursten, 2013). It further involves the mole concept and the balancing of chemical equations (Zumdahl, 2002). Understanding stoichiometry is an important part of learning chemistry but students'

understanding of this concept is low with many students demonstrating surface learning only, hence, lacking confidence and ability to master chemistry (Haider & AlNaqabi, 2008 cited in Bridges, 2015). Earlier studies have shown that students in secondary schools find stoichiometric calculations difficult. This is evident in the reports of Udousoro (2011) and Opara (2014) who independently found that students persistently perform poorly in chemistry due to poor problem-solving skills in stoichiometry. West African Examination Council (WAEC) Chief Examiners report from 2010 to 2014 revealed students' weaknesses in chemical arithmetic, poor mathematical skills and inability to balance chemical equations. Attempts of researchers to develop problem-solving models and instructional strategies to foster students' success in stoichiometry showed a strong relationship between students' proficiency in mathematics and their understanding of chemical arithmetic (Badru, 2004). Krammer (2000) observed that mathematics problem-solving affects students' ability to solve problems in chemistry.

The problem of poor performance in chemistry have been attributed to students background, laboratory inadequacy, class size, environment, general students' ability, instructional strategy, mode of delivery, teachers' knowledge, creativity and resourcefulness on their subject area (Mokobia & Okoye, 2011; Bridges, 2015). The causes of under-achievement in stoichiometry are quiet enormous in these studies but one factor that seem neglected as a possible consequence is the mode of assessment of students learning and validity of assessment. Thus, this study delved into School-Based Assessment (SBA) of students' achievement in stoichiometry in senior secondary schools in Aba education zone of Abia State. Specifically, the effect of corrective feedback, a major component of SBA, on students' achievement in stoichiometry was explored.

Conceptual Framework

Assessment is a central element in overall quality of teaching and learning and is conceptualized by Izard (2005) as a process of selecting evidence from which inferences can be made about current status in learning sequences. It involves all activities that the teachers and learners undertake to gather information that can be used to diagnostically improve teaching and learning (Black & Willams 1998 cited in Mehmood, Hussian, Khalid, & Azam, 2012). However, meeting the standard of good assessment practice requires teacher observation, classroom discussion, analysis of students' work, and giving timely feedback to students. As an improvement on assessment practices, the Hong Kong Examinations and Assessment Authority (HKEAA, 2005) advocated for SBA as a proposal for reform in the education system. The education reform emphasizes a new culture of learning and teaching to be cultivated in which schools can use different modes of broad-based assessments, including observation of students' performance in classroom and participation in project works to promote learning in more flexible manner. The reform further advocated for students all-round development which gives a more comprehensive picture of individual student's learning needs, as well as, fosters the positive wash back effects of public examinations. It also helps to address the limitations of judging students on their performances in one single examination (Davison, 2007).

Defining SBA, HKEAA (2009) reported that it is an assessment which is embedded in the teaching and learning process. In addition, it is a process put in place to collect evidence of what students have achieved. Daugherty (1994) cited in Grima (2003) clarifies that this type of assessment has been recommended because of the gains in the validity which can be expected when students' performance on assessed tasks are judged in a greater range of contexts. The preference of SBA to external assessment is described by HKEAA (2009) in terms of scope,

authenticity, validity, reliability, fairness, feedback, positive wash back, professional development and teacher and students empowerment.

School based assessment has been based on model of interrelationship between assessment, teaching and learning. Assessment includes the formal planned moments when students undertake an assessment tasks and moments when students' group work are monitored and analyzed. It also incorporates self and peer assessment as well as teacher assessments from which the learner receives constructive feedback. Thus, the most important component of assessment cycle is feedback and reporting, "as unless assessment information is communicated clearly to students, it cannot be used effectively to improve learning (or teaching)" (HKEAA, 2009, p.22). Therefore, SBA needs to be continuous and integrated naturally into every stage of the teaching and learning cycle, not just at the end. Hence, appropriate feedback technique could be deployed to ensure quality assessment and students mastery of the concept of stoichiometry.

Feedback, given as a part of SBA, helps learners become aware of gaps that exist between their desired goal and their current knowledge, understanding, or skill and guides them through actions necessary to obtain the goal (Sadler, 2005). Feedback, according to Hattie (2011) is the information that aims at reducing the gap between what is now and what should or would be. Specifically, Hattie and Timperley (2007) stressed that feedback is information provided by an agent regarding aspects of a learners' performance and understanding that reduces the discrepancy between what is understood and what is aimed to be understood. The agent could be the teacher, peer, self, parents, or books. However, the present study is interested in the teacher as agent of provision of feedback. Hattie (2011) commenting on the role of feedback, submitted that feedback is powerful when it reduces the gap between where the student is and where he or she is expected to be, thereby helping the student to navigate the gap by addressing fundamental feedback questions including "where am I going, how am I going, and where to next". Admittedly, the feedback that can effectively answer the questions is one that relates performance to standards; indicates progress; is specific and descriptive; focuses on key errors and corrective procedure and is given frequently and timely.

On the importance of feedback, Shute (2008) asserted that feedback, aside giving signal to the students on the gap between a current level of performance and some desired level of performance, guides the teacher on instructional plan and subsequent activities with the students. It also helps the teacher to identify their strength and weaknesses and inform them of the efficiency of the teaching method and strategies used. Furthermore, successful feedback builds confidence in students, motivates them to improve their learning, and correct errors. From the foregoing, feedback is geared towards enhancing learning, hence, strategies that will maximize the power of feedback should be put in place. To facilitate this, elaborate feedback should be provided in manageable unit after learners have attempted a solution (Shute, 2008).

Bitchener (2008) cited in Ahmad, Saceed and Salam (2013) identified techniques of providing feedback as self, peer, teacher-student conference, electronic feedback and teacher written feedback. Of all these, teacher written feedback are strongly recommended as it lends itself to the overall development of the students. Teachers' feedback can take different forms. Basically, Ferris and Roberts (2001), in their study on error feedback in L2 writing classes, identified two forms of feedback, error feedback (in which error is either marked with codes or underlined) and no error feedback. In their study on the effect of three different feedback treatments (errors marked with codes; errors underlined; no error feedback) they found that both error feedback groups significantly outperformed the no error feedback control group.

Orluwene and Ekin (2015) conducted a quasi experimental study on the differential effects of feedback types on improvement of students' performance in school-based assessment. They found that the four experimental corrective feedback groups, Specific Positive Feedback (SPF), Specific Negative Feedback (SNF), Non-Specific Positive Feedback (NSPF), and Non-Specific Negative Feedback (NSNF) were significantly effective in improving students' performance in solving problems in chemistry while no-feedback (NF) control group had no significant effect. Also, subjects treated with specific feedback SNF and SPF types improved significantly better than those treated with NSNF and NSPF. Finally, the study revealed that gender significantly influenced the effects of the feedback intervention types on improving students' performance in solving problems in chemistry and there was interaction between feedback types and gender. Based on the findings, they concluded that the observation was based on the fact that the non-specific feedback groups lack information on how and why the already achieved level and what more has to be done to meet the standard performance. The findings collaborate with Chase and Houmanfan (2007) who reported that specific feedback is effective in enhancing learning. It is also in line with Hattie and Timperley (2007) and Pauli (2010) who in their separate works found that lack of specific information is one of the reasons for low achievement in the classroom. Moreover, NSNF interventions can lead to task avoidance among the students and they may repeat the same mistake. This observation makes SPF highly recommendable.

The present study adopted corrective feedback which explains the correct answer or leads the students to the correct answer rather than only indicating the correct or incorrect status of the student's answer. Corrective feedback is the most widely used forms of feedback and has been adjudged effective in playing pivotal role in improving students' academic performance (Chandler, 2003). Buttressing the assertion, Ferris (2006) elaborated that feedback and correction by teachers become beneficial for students when it is given at the right time. Thus, to make corrective feedback meaningful and rewarding, teachers are expected to make feedback concise, clear, error free and timely.

Bellon, Bellon and Blank (1992) argued that feedback is more strongly and consistently related to achievement than any other teaching behavior. This relationship, they added, is consistent regardless of grade, socio-economic status, race, gender or school setting and when corrective procedures are used, most students can attain the same level of achievement. However, studies have varied findings on gender differences in achievement in school. Analysis of cognitive abilities of males and females, males are found to like science and mathematics and have exceptional mathematical ability and skills than the females (Weiten, 2007). Abonyi & Nweke (2014) supporting the foregone, established significant effect of gender difference on students' achievement in mathematics and science while Okoyefi and Nzewi (2015) buttressed a no significant gender effect in science and mathematics achievement. In a similar study, Egwuom (2016) investigated the effect of meta-cognitive strategy, as a teaching method, on students' performance in stiochiometry. He found significant main effects for teaching methods, location, no significant main effect for gender and no interaction between teaching methods and gender. Since achievement is enhanced by corrective-feedback and from the review on gender difference on achievement in science and mathematics is inconclusive, it becomes pertinent to explore the effect of corrective-feedback on male and female students in stoichiometry which is mathematical aspect of chemistry.

Hypotheses

The following hypotheses were tested at an alpha level of 0.05.

1. There is no significant main effect of treatment (corrective feedback and non-corrective feedback) on students' achievement in stoichiometry.
2. There is no significant main effect of gender on students' achievement in stoichiometry.
3. There is no significant interaction effect of treatment and gender on students' achievement in stoichiometry.

Methods

Design of the Study: Quasi-experimental pre-test-post test non-equivalent group design was adopted for the study with students in the intact classes. It is an experimental study of the effect of corrective feedback of SBA of students' achievement in stoichiometry.

Participants: The population of the study comprised the entire SS2 students offering chemistry in private co-educational schools in Aba Education Zone of Abia State. The sample of the study consists of 80 students (47 males and 33 females) drawn from two school, using purposive sampling technique. Purposive sampling was considered appropriate because two intact chemistry classes were used, one from each school as randomization was not possible. The schools, sited at different locations within the education zone, were coded Experimental Group A (EGA) and Control Group B (CGB). This is to avoid interaction among the subjects.

Instrument: The instrument for data collection was Chemistry Achievement Test on Stoichiometry (CATS), a 20-item multiple choice type test adapted from a Diagnostic Chemistry Achievement Test (DCAT) in Amajuoyi (2015). Subsets of DCAT on quantitative aspect of chemistry were used. The content covered by the test were symbols, formula and chemical equations; mass-volume relationship and acid-base reactions. The Kuder-Richardson formular-20 (K-R_{20}) reliability coefficient of the instrument was 0.74. The value was adjudged suitable for use of the instrument for the study.

Procedure: Two feedback approaches were used for the study, Corrective Feedback (CF) and non-corrective Feedback (NCF). Before commencement of the experiment, subjects in EGA and CGA were taught by trained chemistry teachers (who served as research assistants) in the selected schools. They covered the topics in stoichiometry as outlined earlier in this study. The classroom work lasted for four weeks. The CATS was administered to both groups as pretest. After marking the scripts, the treatment group (EGA) was given back their scripts and thereafter, the teacher solved all the problems in CATS to enable students correct the items they failed; while the control group, CGB was given back their scripts and no correction done. After four weeks, post test was administered to the subjects in the two groups and the scores collated

Analyses: The data collected from the pretest and posttest were analysed using Statistical Package for Social Sciences version 20 (SPSS 20). The analyses comprised descriptive statistics used in answering the research questions and Analysis of Covariance (ANCOVA) for testing the hypotheses.

Results

Hypothesis 1: There is no significant main effect of treatment (corrective and non-corrective feedbacks) on students' achievement in stoichiometry..

Table 1 *Analysis of Covariance of posttest Score of students in Stoichiometry by Treatment and Gender*

Source	Type III Sum of Squares	df.	Mean Square	F	Sig.

Corrected Model	196.406[a]	3	65.469	8.109	.000
Intercept	14042.612	1	14042.612	1739.359	.000
Feedback	50.612	1	50.612	6.269	.014
Gender	83.762	1	83.762	10.375	.002
Feedback * Gender	16.248	1	16.248	2.013	.160
Error	613.582	76	8.073		
Total	16743.000	80			
Corrected Total	809.987	79			

Table 1 showed that calculated $F_{(1,76)} = (6.27)$ is greater than the critical F-ratio (3.96)) at $p < .05$ alpha level, therefore, the null hypothesis is rejected indicating that there is a significant difference in the mean achievement scores of students given corrective feedback and those given non-corrective feedback. The direction of significance was in favour of corrective feedback. This implies that those exposed to corrective feedback had a higher mean gain score of 4.50 as against those exposed to the control (non-corrective feedback with mean gain score of 0.43 as shown in Table 2.

Table 2

Mean and Standard Deviation on Students Achievement Scores in Stoichiometry

Groups	N	Pretest		Posttest		Gain mean score
		X_1	SD_1	X_2	SD_2	X
EGA	40	10.85	3.31	15.35	2.41	4.50
CGB	40	12.15	3.52	12.88	3.40	0.43

Hypothesis 2: There is no significant main effect of gender on students' achievement in stoichiometry.

Table 1 revealed that calculated $F_{(1,76)} = 10.375$ is greater than the critical F-ratio (3.96) at $p < .05$ alpha level. The null hypothesis is therefore; rejected indicating that there is a significant difference in the mean achievement scores of male and female students given corrective feedback. Table 3 shows the direction of the differences. It shows that male students showed a slight superiority in Stoichiometry than female students.

Table 3

Mean and Standard Deviation on the Effect Gender Achievement Scores in Stoichiometry

Groups	N	Pretest		Posttest		Gain mean score
		X_1	SD_1	X_2	SD_2	X
Male	47	12.49	3.52	15.08	2.38	2.60
Female	33	10.45	3.12	12.72	3.72	1.27

Hypothesis 3: There is no significant interaction effect of treatment and gender on students' achievement in stoichiometry.

Table 1 showed that there was no significant interaction of treatment (corrective feedback and non-corrective feedback) and gender (male and female). This implies that the treatment is not sensitive to gender. That is, whether there is a corrective feedback or not, male and female achievement in stoichiometry is not significantly affected.

Discussions

The purpose of the study was to investigate the effect of corrective feedback of school-based assessment on senior secondary school students' achievement in stoichiometry. The result in Table 1 indicated that a significant difference in the mean achievement scores of students given corrective feedback (CF) and those given non-corrective feedback (NCF) yielded significantly higher mean achievement score in stoichiometry while NCF had no significant effect. This finding is not surprising since corrective feedback not only provides information on areas students made mistakes but also provides opportunity for review and knowledge of correct response to the items they failed. By this, corrective feedback reduces the discrepancies between current performance and the standard performance. On the other hand, non- corrective feedback will only provide information on the items the students did not respond correctly without guidance on how to avoid such mistakes. Non-corrective feedback therefore, results to task avoidance among students and repetition of the mistake. This finding is in line with Shute (2008) who opined that feedback signals a gap between a current level of performance and some desired level of performance. Thus, corrective feedback leads to students' improved academic result especially when it is timely. The finding also collaborates with Orluwene and Ekin (2015) who found that non-specific feedback lacks information on how and why the already achieved level and what more to be done to meet the standard performance.

Results of this study also revealed a significant mean effect of gender on students' achievement in stiochiometry. It showed that male students outperformed female students significantly although the two groups were given CF. This finding may be explained based on the fact that in most cases, male students are disposed to problem solving skills which problems in stoichiometry that require. It agrees with the assertion that males are found to like science and mathematics and have exceptional mathematical ability and skills than the females (Weiten, 2007). This finding collaborates with Abonyi and Nweke (2014) who found that male students respond differentially compared to their female counterparts to items in science. Arguably, Bellon, Bellon and Blank (1992) contended that regardless of grade, socio-economic status, race, gender or school setting, when corrective procedures are used, most students can attain the same level of achievement. In contrast to the finding, Okoyefi and Nzewi (2015) in their study buttressed non-significant gender effect in science and mathematics achievement.

Finally, the study showed no significant interaction between treatment and gender. This observation implied that students' achievement in stiochiometry does not vary across feedback types and gender that is, whether there is a corrective feedback or not, male and female achievement in stoichiometry is not significantly affected. This finding is in line with Egwuom (2016) who reported a non significant interaction between teaching methods and gender on achievement in stiochiometry. However, Orluwene and Ekin (2015) work showed a significant interaction between feedback types and gender.

Conclusion

The study explored the effect of corrective and non-corrective feedbacks on the SBA of SS2 students' achievement in stoichiometry. Based on the findings, it was concluded that corrective feedback improves students' achievement in stoichiometry. It builds confidence in students, motivates them to improve their learning by not avoid tasks and repeating the mistakes.

It also helps the teacher to identify their strengths and weaknesses and inform them of the efficiency of the teaching method and strategies used.

Recommendations

Based on the findings of this study, the following recommendations were made.

1. Teachers should give clear and meaningful corrective feedback to student in teaching of stoichiometry and in fact, other topics in chemistry.
2. Schools should also encourage the teachers to provide corrective feedback consistently to the students from time to time. This will develop a supportive environment in the school.
3. Parental involvement in checking the corrective feedback given by the teacher, will help the students in reinforcement of their learning

References

Abonyi, O. S. & Nweke, I. (2014). Effect of guided scoring approach to science instruction on Senior secondary school students' achievement in algebra. *Journal of Education and Practice*, 5(14), 31 – 37. Retrieved on March 15, 2016 from http://pakacademicsearch.com/pdf-files/edu/413/31-37%20Vol%205,%20No%2014%20%282014%29.pdf

Ahmad, I., Saeed, M., & Salam, M. (2013). Effects of corrective feedback on academic achievements of students: case of government secondary schools in Pakistan. *International Journal of Science and Research*, 2(1), 36 – 40. Retrieved on March 3, 2016 from www.ijsr.net.

Amajuoyi, I. J. (2015). *Construction and validation of a diagnostic chemistry achievement test for senior secondary three students using classical test and item response theories.An* Unpublished Doctoral Thesis.University of Uyo, AkwaIbom State.

Badru, A. K. (2004). Student performance in mathematics as correlate of their performance in chemistry. *The 45th Annual Conference Proceedings of Science Teachers Association of Nigeria.*

Bellon, J., Bellon, E., & Blank, M. A. (1992). *Teaching from a research knowledge base: A development and renewal process.* New York: Macmillan Publishing Company.

Bridges, C. D. (2015). Experiences teaching stoichiometry to students in grade 10 and 11. Doctoral Studies Dissertation, Walden University. Retrieved on March 22, 2016 from http://scholarworks.waldenu.edu/dissertations.

Brown, T., LeMay, H., & Bursten, B. (2013). *Chemistry: The central science* (12th Ed.). Upper Saddle River, NJ: Prentice Hall.

Chandler, J. (2003). The efficacy of various kinds of error feedback for improvement in the accuracy and fluency of L2 student writing. *Journal of Second Language Writing*, 12, 267–296. Retrieved on March 15, 2016 from https://pdfs.semanticscholar.org/f999/cee760d25977da27e8ebb73ea6a8f732230b.pdf

Chase, J.A., & Houmanfar, R. (2009). The differential effects of elaborate feedback and basic feedback on student performance in a modified, personalized system of instruction course.
Journal of Behavioural Education, 18, 245-265.

Davison, C. (2007). Views from the chalkface: English language school-based assessment in

Hong Kong. *Language Assessment Quarterly*, 4(1), 37–68.

Egwuom, F. C. (2016). *The effect of meta-cognitive strategies on senior secondary two students' achievement in stiochoimetry.* An unpublished Masters in Education Thesis, Michael Okpara University of Agriculture, Umudike, Abia State.

Ferris, D.R. (2006). *Does error feedback help student writers? New evidence on the shorthand long-term effects of written error correction.* New York: Cambridge University Press.

Ferris, D. R., & Roberts, B. (2001). Error feedback in L2 writing classes: How explicit does it need to be? *Journal of Second Language Writing,* 10, 161–184.S.

Grima, G. (2003). School-based assessment: Implementation, issue and practice. A Paper Presented at the 21st Annual AEAA Conference, Cape Town.

Hattie, J. (2011). Feedback in schools. In R. Sutton, M.J. Hornsey, & K.M. Douglas (Eds.), *Feedback: The communication of praise, criticism, and advice*. New York: Peter Lang Publishing.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, 77(1), 8 1-112. Retrieved on March 21, 2016 from http://www.columbia.edu/~mvp19/ETF/Feedback.pdf

Hong Kong Examinations and Assessment Authority. (2005). *Assessment reform for 2007 HKCEE Chinese and English subject.* Hong Kong: HKEAA.

Hong Kong Examinations and Assessment Authority. (2009). *2012 HKDSE English language SBA teachers' handbook.* Hong Kong: HKEAA. Retrieved on March 15, 2016 from http://www.hkeaa.edu.hk/DocLibrary/SBA/HKDSE/SBAhandbook-2012-ENG-240709.pdf

Izard, J. (2005). Trial testing and item analysis on test construction. In: K. N. Ross (Ed) *Quantitative Research Methods in Educational Planning.* UNESCO International Institute for Educational Planning. Available at http://www.unesco.org/riep. Retrieved 20 December, 2012.

Krammer, P. H. (2000). Recurrent difficulties solving quantitative problems. *Journal of Chemistry Education,* 59(6), 509-512.

Mehmood, T., Hussain, T., Khalid, M., & Azam, R. (2012). Impact of formative assessment on academic achievement of secondary school students. *International Journal of Business and Social Science,* 3(17), 1 – 4.

Mokobia, M. O. & Okoye, N. S. (2011). Effect of class size on teaching and learning of chemistry in Detla State, Nigeria. *Journal of Education and Policy Review*, 3, 1 – 7. Available at www.centreinpub.org.

Okoyefi, Q. O. & Nzewi, U. M. (2015). Effect of material and non-material reinforcement on pupils' achievement in basic science. *Journal of Science Teachers Association of Nigeria,* 50(1), 40 – 47.

Opara, M. F. (2014). Improving students' performance in stoichiometry through the implementation of collaborative learning. *Journal of Education and Vocational Research,* 5(3), 85 – 93.

Orluwene, G. W. & Ekin, R. E. D. (2015). Differential effects of feedback types on the improvement of students' performance in school-based assessment. *International Journal of Development and Emerging Economics,* 3(1), 10 – 25. Retrieved on March 22, 2016 from www.eajournals.org

Pauli, C. (2010). Fostering understanding and thinking in discursive cultures of learning. A Paper presented at the meeting of EARLI SIG 10 and 21, Utrecht, the Netherlands.

Sadler, D. R. (2005). Interpretations of criteria-based assessment and grading in higher education. *Assessment and Evaluation in Higher Education,* 30(2), 175-194. Retrieved on March 15, 2016 from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.580.4858&rep=rep1&type=pdf

Shute, V.J. (2008). Focus on formative feedback. *Review of Educational Research,* 78(1), 153 – 189.

Udousoro, U. J. (2011).The Effects of gender and mathematics ability on academic performance of students in chemistry. *African Research Review: An International Multidisciplinary Journal, Ethiopia,* 5(4), 201-213. Retrieved on March 21, 2016 from https://www.ajol.info/index.php/afrrev/article/viewFile/69277/57306

Weiten, W. (2007). *Psychology: Theme and variations* (7th Ed.). Belmont: Thomson. Wardsworth.

West African Examination Council (2010 – 2014). *Chief examiners' report*. Lagos: WACE.