

## Effect of Blended Teaching Approach on Student's Achievement in Biology

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**Key words:** Biology, blended learning, approach, students, achievement, gender, Nigeria

**Abstract:** The study investigated the effects of blended teaching approach and gender on student's achievement in Biology in Nsukka Local Government Area of Enugu State, Nigeria. The study employed a non-equivalent quasi-experimental 2×2 factorial research design. We used 85 Secondary School Two (SS-II) students from two schools for the study. We used Biology Achievement Test (BAT) to collect data. We stated three specific purposes. We posed three research questions. Moreover, three hypothesis were tested. The data were analyzed using descriptive statistics and Analysis of Covariance (ANCOVA). The results showed that there was a significant main effect for approach on students achievement in biology  $F(1,80) = 13.808$ ,  $p = 0.000$ , partial  $\eta^2 = 0.315$ ; there was significant main effect of gender on students achievement in biology  $F(1,80) = 14.570$ ,  $p = 0.000$ , partial  $\eta^2 = 0.240$ . Moreover, there was significant interaction effect of teaching approach and gender on students achievement in biology  $F(1,80) = 23.798$ ,  $p = 0.000$ , partial  $\eta^2 = 0.229$ . We recommended that teachers should strive to use BTA as an innovative instructional approach in teaching biology as this will help to concretize learning and enhance the academic achievement of students.

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## INTRODUCTION

Biology is an offshoot of a natural scientific discipline that deals with the study of living organisms, their structures, functions, development, control and interrelationships. Biology occupies a current place in the secondary school education programme because of its grandness as the scientific discipline of living. In Nigeria, the course of study planners designed secondary school

biology curricula to carry on student's probes into innate phenomena; heighten student's ideas and concerns in biology and to aid student's enthusiasm to apply scientific cognition to daily life<sup>[1]</sup>. Biology is a vital science subject and is equally fundamental to the acquisition of alternate scientific discipline courses like Medicine, Pharmacy, Nursing, Biochemistry, genetic science and Agriculture that is of enormous economic importance to the country. Based on this, there is a demand for

suitable biology instruction in schools, so that, learners will be actively interested in acquisition and exercise.

The student-centred approach includes all teaching methods that emphasise the teacher as a decision-maker and problem solver in the schoolroom but see teachers as facilitators, mentors, coaches, or consultants in the teaching and acquisition activity. In the educational sphere, the term “student-centred” or child-centred refers to teaching methods that recognize students to portion some accountability and decision making in the schoolroom. This approach has been influential in the field because of child-centeredness. O’Bannon explained that the student-centred approach is grounded in constructivism with the idea that learners are the architects of their learning. Opara<sup>[2]</sup> sorts any teaching and learning activity by which the teacher starts an ask or problem and provides help by structuring the plan for resolving such a request as student-centred in which the Blended teaching approach is a section. Based on the overhead, the target here is to enquire the effect of Blended Teaching Approach and discuss methods on student’s achievement and gender in Biology.

Blended Teaching Approach (BTA) is an instructional approach that involves intermixing of any instructional forms to accomplish an educational goal. Hege<sup>[3]</sup> states that blended teaching is the conveying of the accurate skills to the true individual at the factual period by coordinating the correct acquisition technologies with the correct acquisition fashion to accomplish the acquisition objectives. The concept of blended teaching has been around, since the 1960s. The learning is student-directed in terms of time, move, course and situation. An accomplished definition of blended learning is a combination of traditional, face-to-face (f2f) teaching with web-based on-line technologies; blended learning aims to allow for more benefits overusing one acquisition delivery medium<sup>[4]</sup>. It provides a learning experience that is engaging and that delivers successful learning outcomes. Using the computer as an educational method or vital tool started in 1977 refers to the growth of computers and digital multimedia systems<sup>[5]</sup>. All the same, studies in Saudi Arabia present a distinct position among students toward blended learning<sup>[6]</sup>. Sharma and Barrett<sup>[7]</sup>, stress that blended learning is normally applied to a lesson where all learners meet with the teacher in a f2f class in which the course includes a related self-study constituent as a compact disc read-only memory or avenue to web-based materials. Sharma and Barrett moreover state that blending technology in a f2f class adds diversity and value to the lessons. They likewise emphasise that if there is a relationship between the lesson content and technological materials included, it will make ebullience among the learners<sup>[4]</sup>. In a blended teaching

approach, teachers grant students to make use of their gadgets during f2f. Students can also use class hours to browse the cyberspace resources maximally to their needs. In a blended teaching approach, students can take advantage of the class hours to use the cyberspace resources successfully according to their want. The success of blending involves selecting the technology agreeable to the subject taught.

A blended teaching approach is an alternative approach to educational provision. It involves applying every one method, system, proficiency or media in education. Teaching is no longer just about putting pen to paper and memorizing facts. Nowadays, educators are improving learning through technology as evidenced by the quick acceptance of technology-assisted teaching methods and a blended teaching approach. They also acknowledge the blended teaching approach as hybrid teaching. It is a method of teaching which integrates technology and digital media with traditional instructor-led schoolroom activities. It gives students more airiness to tailor-made their learning experiences<sup>[8]</sup>. Graham also declared that blended teaching has definite advantages such as openness and ease in the learning environment, abound in the level of learning, multiply in permanency in learning, increase in interest in learning, good-quality interplay and low monetary value. The grandness of blended teaching has increased in current years because of its advantages. Ogunleye<sup>[9]</sup> declared that the blended teaching approach has been the best and most recent course, so far in higher education and that the number of blended courses executed in higher education will multiply. The efficiency of computers to display information visually is necessary for a biology lesson. Well-developed pictures, cubic models, animations and interactional environments concede the open idea of the learning objectives. Activities carried out during the regular lesson hours are not sufficiently able because of time constraints. With the blended teaching approach, students can accomplish their multimedia system applications which teachers do not teach them sufficiently during lessons using the traditional method of teaching only. Besides, the potency to study the course content before coming to the class enables students to identify the research subjects and accordingly to arrive at the class as planning for the lesson.

With the use of the blended teaching approach in biology, student’s literary achievement levels and their interest may improve. This is because learning in projects in classes furnished with technical tools supports students to be intellectually reactive while providing them with real-life experiences and skills. Garrison and Kanuka<sup>[10]</sup> identified definite forms of blended teaching approach as rotation model, flex model, a la carte model, Enriched Virtual model and face-to-face driver model. Even though there is a dispute in terms of the feasibility and pertinence

of implementing hybrid teaching in secondary school, a body of enquiry supports the alliance of face-to-face instruction with technology delivery models. Such an alliance provides improved learning outcomes<sup>[10]</sup>. They also declared that blended teaching can mitigate independent and collaborative acquisition experiences. Blended teaching builds both a community of enquiry and a platform for clear and interactional dialogue. They possess identified technology as performing a vital role in programme execution as they have established that its suitable use can heighten teaching and learning. There have been minor efforts in integrating ICT into the Nigerian secondary school's schoolroom. Based on the above, there is a demand to brace action to bestow technology into the schoolroom to ameliorate achievement in learning. The study aims to equate the literary achievement of biology students taught using Blended Teaching Approach (BTA) and discussion methods to find out which one is more able to enhance student's achievement.

Achievement is a critical educational variable that expresses the achievement or failure of a teaching and learning activity. Campbell<sup>[11]</sup> referred to academic achievement as the result of a teaching and learning process, the extent to which a student, teacher or institution has achieved their educational goals. Likewise, Adeyemi<sup>[12]</sup> described the academic achievement as the academic standing of a student at a moment which states that someone with intellectual grades getting from examinations or continuous assessments can measure which. In Nigeria, the level of student's academic achievement in the Senior Secondary School is determined by grades got from the Senior School Certificate Examination conducted by outside bodies WAEC and NECO, severally.

There has been a consistent awful achievement in Biology as shown by the West African Examination Council and NECO<sup>[2]</sup>. This is believable because of the use of traditional methods in teaching Biology. In a study conducted by Estelami<sup>[13]</sup>, the finding shows that there was a significant achievement among the experimental group taught using a blended teaching approach than those in the control group. Ugwu<sup>[14]</sup> conducted a study using BTA to teach Biology and the study revealed that there was a significant achievement in the experimental group than in the control group. In another study conducted by Torty<sup>[15]</sup>, the students in the first group were provided only with internet site making instruction and those in the second group with printed material. The internet site was designed and those in the third group with the printed material. The internet site is designed for face-to-face instructional support. At the end of the study, the third group covering the features of blended teaching approach was the most successful. Robinson<sup>[16]</sup>, noted that the use of methods of teaching in teaching and learning of

Biology enhances student's achievement in the subject. Based on the awful achievement of students in Biology, this study seeks to find out which of the teaching methods leads to better achievement among students. This study will also enquire which of the two methods will aid to streamline gender differences in the student's achievement in Biology.

Gender is a socio-culturally constructed notion of ascribing some characteristics and roles to sex such as male and female within the society. The concept of gender is equable to class and race. In Nigeria, gender and gender stereotyping affects every aspect of human striving. Okeke<sup>[17]</sup> ascertained that the circumstances of gender have powerfully interacted with culture to make sex-role stereotypes which cut across social, economic, political and educational development, particularly in the areas of scientific discipline and technology. Nzewi explained sex role-stereotype as the socio-cultural compartmentalization of human activities by sex in line with what the society considers as appropriate for one sex or the other.

The absolute assignment of roles and expectations to different-sex (male and female) alongside the society has given rise to such misconceptions of perceiving science as masculinity and the male domain. They possess traditionally regarded definite vocations and professions as men's (medicine, engineering and architecture, etc.) and others as women's (nursing, catering, typewriting, etc.). The society's socio-cultural acceptance of females as feeble sex together with female self-perception of themselves as feeble sex, inferior and aided by the males have imposed some socio-cultural limitations on female aspirations and achievement in sciences<sup>[18]</sup>. Fewer females choose science subjects, creating some differences in the number of males and females in science discipline in preference of the males. Chang<sup>[19]</sup> reported that albeit there is an abatement in the breach in gender differences in students; achievement in sciences, female representation in sciences is still low in comparability with their male counterparts.

Gender issues and their personal effects on student's literary achievement in a scientific discipline subject (Biology) have persisted over the years with contradicting results and abide out as a controversial issue in scientific discipline education because of variable reports from the dissimilar researchers. Kolawole<sup>[20]</sup> and Okoro<sup>[21]</sup> are of the idea that males perform better than females in science whereas some educators; Okeke<sup>[17]</sup>, Nzewi and Oludipe<sup>[22]</sup> are of the notion that both males and females accomplish equivalence in science when given proportionate chance and facilities. Nzewi declared that males are ascendant in competitive activities while females are ever shy and prefer working in a group or below their male counterparts. Given the inconclusive issues of the effects of gender on achievement and interest and some reports

that innovational teaching methods influence gender achievement in Biology, this study intends to add to the ongoing academic contention and controversy on the effects of gender on student's achievement by investigating the effects of a blended teaching approach on student's achievement in Biology.

Cognitive Theory of Multimedia Learning by Mayer<sup>[23]</sup> is a theory which rests on the conception that people learn more deeply from words and pictures than from words alone. Notwithstanding, joining words to pictures is not an ingenious way to attain multimedia system learning. The goal is to instruct media considering how the human mind works. This is the groundwork for Mayer's cognitive theory of multimedia system learning. The three major assumptions of the cognitive theory of multimedia learning include two separate channels (auditory and visual) for processing information (sometimes referred to as Dual-Coding theory); Each channel has a little (finite) capability and Learning is an efficient activity of filtering, selecting, organizing and integrating information based abreast of prior knowledge. Mayer's cognitive theory of multimedia system learning presents the view that the brain does not explain a multimedia presentation of words, pictures and auditory information mutually only; rather, the brain selects these elements and organizes them. Mayer underscores the grandness of learning (based upon the examination of content and demonstrates the successful conveying of knowledge) when extra information is incorporated with prior knowledge.

Design principles include providing tenacious oral, graphical information, directing the learner to gain relevant words and images and reducing the load for an exclusive processing channel, etc., this theory entails it. Hence, the blended learning approach is an affinity of conventional schoolroom learning and multimedia system exposure to information. Multimedia system is all about the presentation of information in original formats for example, text, audio, visual, audio-visual, animation and simulation. The cognitive theory of multimedia learning supports the use of technology in teaching and learning. To our cognition, no prior study has examined the effect of a blended teaching approach on student's achievement in biology in Nigeria. Most researchers have conducted studies to adjudge the efficiency of blended learning. Nevertheless, Alebaikan<sup>[24]</sup> noted that the researchers applied blended learning on the following courses with female lecturers: Arabic, Social studies, English, Law, Business, Accounting, Psychology, Special education and Preschool. The qualitative studies concluded that blended learning enriches the learning experience, offers Saudi females the airiness to follow their higher education and reduces the routine of the f2f schoolroom<sup>[4]</sup>. Al-Jafr<sup>[25]</sup> conducted some other studies on blended learning among

Saudi females at King Saud University in Riyadh. The study focused on using blended learning in English as a Foreign Language (EFL) schoolroom. The study aims to find out if blending the f2f class grammar instruction with on-line learning can promote the EFL university student's achievements. Al-Jafr<sup>[25]</sup> concluded that supplementing in-class grammar instruction with on-line instruction has the potential to increase student's achievement in grammar but administrative aid is needed to make the students capture the on-line lesson more seriously. Students likewise believed that they should not use the on-line course as a grade allotted lesson. They should use it for fun, not for dangerous study and acknowledgement. Ultimately, the study recommended extending blended learning to alternative language courses and colleges.

The investigators conducted it outside Africa and did not likewise study the action of gender on learning. The major purpose of this study was to determine the effect of blended teaching approach and gender on student's achievement in biology.

#### **PURPOSE OF THE STUDY**

This study investigates the effect of Blended Teaching Approach, discussion method and gender on secondary school student's achievement in Biology in the Nsukka Local Government Area. Specifically, this study will determine:

- The effect of Blended Teaching Approach and discussion method on student's achievement in Biology
- The influence of gender on student's achievement in Biology
- The fundamental interaction effects of teaching approach and gender on student's achievement in Biology

**Research questions:** We posed the undermentioned research questions to guide the study:

- What is the effect of Blended teaching approach on mean achievement scores of students in Biology?
- What is the influence of gender on the mean achievement scores of student's in Biology?
- What is the interactional effect of teaching approach and gender on the mean achievement scores of students in Biology?

#### **RESEARCH HYPOTHESIS**

We aforethought the undermentioned hypotheses to guide the study and we tested it at a 0.05 level of significance:

- $H_{01}$ : There is no significant dissimilarity in the mean achievement scores of students taught biology using a blended teaching approach and those taught using the discussion method
- $H_{02}$ : Gender is not a significant cause for the mean achievement scores of students in biology
- $H_{03}$ : The fundamental interaction effects of teaching approach and gender are not statistically significant

**Design of the study:** This study used a quasi-experimental 2×2 factorial research design. We used entire classes for the study. Fraenkel and Wallen delineated accordingly the design who noted that a quasi-experimental factorial design is a quasi-experimental design changed to admit the probe of supplementary independent variables. A treatment variable is a teaching approach at two levels: Blended Teaching (x1) and Discussion Method (x2) while the moderation variable is at two levels: Male (y1) and Female (y2). Specifically, the design is a 2×2 pretest-posttest non-equivalent control group factorial design:

E	$0_1$	$y_1$	$0_2$
C	$0_1$	$y_1$	$0_2$
E	$0_1$	$y_2$	$0_2$
C	$0_1$	$y_2$	$0_2$

Where:

$0_1$  and  $0_2$  = Pretest and posttest scores, respectively

- E = Experimental Group; C = Control Group

**Participants:** We enrolled in eighty-two Senior Secondary School students (SSS 11) in the experiment. The age range was narrow: from sixteen (40 students) to seventeen (45 students) years old. There were 38(44.7%) males and 47(55.3%) females. We divided the participants into two groups of 38(44.7%) and 44(55.3%) participants, each with no criteria of choice. We experimented with two secondary schools in Nsukka Local Government Area, Enugu State, Nigeria. We used purposive sampling techniques to select the two secondary schools from 31 public secondary schools in Nsukka. We based the selection on:

- Schools with only one stream of Senior Secondary School 11 classes
- Schools close to each other to make the supervision of the experiment easier
- Schools with blended learning facilities in terms of computers and other accessories and
- Schools are comparable in terms of well-equipped biology laboratories

## MATERIALS

The instrument for data collection was a research-made Biology Achievement Test (BAT) used for data collection. We designed the Biology Achievement Test (BAT) to assess the student's achievement in Biology. We designed this instrument to cover the content of the study which is Ecological Concepts as stated in the senior secondary school biology curriculum. Two experts in Biology Education and Measurement and Evaluation Unit, at the University of Nigeria, Nsukka, Nigeria, established face validity for the instrument. The experts scrutinized the instruments in terms of relevance, general format, suitability, structure and adequate timing. They covered the logical concept of Ecology. We changed the instructions along the line, suggesting making them clearer to the students. We established the Content validity through the agreement of experts on the table of the specifications that guided the development of BAT. The 50-item comprises Matching, filling the gap and Crossword puzzle questions. The time allowed for the test was 45 min. A marking scheme was prepared and used to score the test. The reliability of the BAT was 0.82 determined using Kuder-Richardson formulas 20 on test scores of 30 Senior Secondary School Students used for a pilot study.

Discussion Blended Teaching Approach was superior to the conventional discussion method for enhancing the achievement of the learners. The findings of this study showed that students taught Biology using BTA had higher achievement in the Biology Achievement Test (BAT) while in discussion method; only those student's that are naturally brilliant could perform high. This contrast in achievement scores of students might have been because of the instructional approach used. Blended Teaching Approach has to do with the use of an innovational method such as a computer, cellphone, a projector that uses pictures, videos and animation during teaching and learning which the discussion method could not provide.

These attributes of BTA could have helped to awaken, stimulate and motivate students to learn even harder concepts. In BTA, all the students were attentive and focused, watching and listening to the lesson whereas in the discussion method, students were too familiar with the method, lacked direction and their classmates distracted them. BTA is an innovative instructional approach which creates opportunities for commensurate involvement of the students during the teaching while discussion method is a traditional method which could not allow for room for all the students to take part because of time. The activities allowed the students to have first-hand information about the concept; it made learning concrete by providing real-life situations with pictures and videos while the discussion method made learning abstract. It

engages students through brainstorming and students could interpret the pictures and videos. The activities likewise construct learning easy and durable because students learn more about what they see and feel than what they hear while in discussion method; students easily forget what they hear. The people can also see the efficacy of blended teaching approaches from the quality and quantity of elaborations they engender. Mohandes *et al.*<sup>[6]</sup> reported that other studies among Saudi students reveal a positive attitude towards blended learning. The students that were taught with a blended teaching approach were more exposed to elaborate explanations and partly mediated teaching and learning. Using a blended teaching approach has important benefits.

The results of this study have validated the Cognitive Theory of Multimedia Learning by Mayer<sup>[23]</sup> which rests on the conception that people gain more profoundly from words and pictures than from words alone. When learners are open to multimedia instruction with the help of others, learners can facilitate learning.

The findings of this study showed that male students had higher adjusted posttest score mean than their female counterparts had. The difference in the achievement score for male and female students was statistically significant. These findings are in disagreement with the former studies by Okeke<sup>[17]</sup> and Oludipe<sup>[22]</sup> that both males and females achieve an adequate position in science when given equal chance and facilities. Male students achieved more than females in this study. The inequality could be because of the instructional approach used during the teaching activity. The research assistants used for the experiment gave all the students equal opportunity. They also actively involved themselves in the instructional process. This instructional approach allowed both the male and female students to find out facts by themselves. The male students are kinesthetic learners, so, they are active and group work-oriented while females prefer working separately. Male students were bold, candid and asked questions in the schoolroom while their female counterparts were shy. They allure male students to what they see and what they hear but female students are not. Male students have affection for ICT support and are continually attracted to any ICT exercise while female students prefer reading their notes and textbooks. Male students are time-conscious and love any activity that is not time-consuming which BTA offers but female students are not. Male students focus and do have one concern at a time but female students try to manage dissimilar activities at the same time such as copying, feeding and writing their assignments.

### CONCLUSION

The interaction effect of the instructional approach and gender was significant. Male students performed

better than female students, regardless of the teaching approach used. Male students were comfier with a blended learning approach than their female counterpart was. This may be because blended learning involves the use of technology in teaching, particularly in using a computer. The role of gender differences in using technology for learning has been expansively researched<sup>[27]</sup>. A study by Li and Kirkup<sup>[28]</sup> on gender differences in using technology for teaching and learning establishes that using technology for learning is a prevalent activity for males and that males have positive attitudes toward using technology for learning more than females do. When you provide equal access to all students, females are less probably to use computers than males because females see that using technology for learning is predominantly a male activity<sup>[29]</sup>. Gender stereotypes affect students easily because of societal influences. This might have influenced the result.

### REFERENCES

01. FME., 2009. The national curriculum for senior secondary school biology. Federal Ministry of Education, Federal Government Press, Lagos, Nigeria.
02. Opara, J.A., 2011. Inquiry method and student academic achievement in biology: Lessons and policy implications. *American-Eurasian J. Sci. Res.*, 6: 28-31.
03. Hege, B.A., 2011. The online theology classroom: Strategies for engaging a community of distance learners in a hybrid model of online education. *Teach. Theol. Religion*, 14: 13-20.
04. Eldeeb, S., 2019. An investigation into students views on blended learning at the English language Institute at King Abdulaziz University. *Special Issue: Application of global ELT practices in Saudi Arabia. Arab World English J.*, 1: 164-178.
05. Vaughan, N., 2008. Supporting deep approaches to learning through the use of wikis and weblogs. *Proceedings of the Society for Information Technology & Teacher Education International Conference, March 03, 2008, AACE, Las Vegas, Nevada, USA.*, pp: 2857-2864.
06. Mohandes, M., M. Dawoud, S. Al Amoudi and A.A. Hussain, 2006. Online development of digital logic design course. *Proceedings of the 2006 2nd International Conference on Information & Communication Technologies Vol. 1, April 24-28, 2006, IEEE, Damascus, Syria*, pp: 42-47.
07. Sharma, P. and B. Barrett, 2007. *Blended Learning Using Technology in and Beyond the Language Classroom*. Macmillan Publishers, Oxford, England, UK.,.

08. Graham, S., 2016. Teaching secondary students to write effectively (NCEE 2017-4002). National Center for Education Evaluation and Regional Assistance (NCEE), Washington, USA.
09. Ogunleye, A., 2006. Students motivational orientations and their associations with achievement in Biology. *Brunei Int. J. Sci. Math.*, 1: 52-64.
10. Garrison, D.R. and H. Kanuka, 2004. Blended learning: Uncovering its transformative potential in higher education. *Internet Higher Educ.*, 7: 95-105.
11. Campbell, L., 1997. How teachers interpret MI theory. *Educ. leadership*, 55: 14-19.
12. Adeyemi, T.O., 2011. A comparative study of students academic performance in public examinations in secondary schools in Ondo and Ekiti States, Nigeria. *Current Res. J. Econ. Theory*, 3: 36-42.
13. Estelami, H., 2012. An exploratory study of the drivers of student satisfaction and learning experience in hybrid-online and purely online marketing courses. *Marketing Educ. Rev.*, 22: 143-156.
14. Ugwu, O.R., 2017. Effect of blended teaching approach on student achievement and interest in biology. PhD Thesis, University of Nigeria, Nsukka, Nigeria.
15. Torty, G.C., 2015. Effect of BTA on secondary school students interest in English language tenses. *Int. J. Edu. Res.*, 12: 128-135.
16. Robinson, T., 2005. Teacher quality and student achievement: Policy evidence analysis. *Archives*, 8: 34-40.
17. Okeke, E.A.C., 2007. Making science education accessible to all. University of Nigeria, Nsukka, Nigeria.
18. Ojobo, J.A., 2008. Education: A catalyst for women empowerment in Nigeria. *Ethiopian J. Educ. Sci.*, 4: 93-108.
19. Chang, C.Y. and S.L. Mao, 1999. Comparison of Taiwan science students outcomes with inquiry-group versus traditional instruction. *J. Educ. Res.*, 92: 340-346.
20. Kolawole, E.B., 2007. Effects of competitive and cooperative learning strategies on academic performance of Nigerian students in mathematics. *Edu. Res. Des.*, 3: 33-37.
21. Okoro, A.U., 2011. Effects of interaction patterns on achievement and interest in biology among secondary school students in Enugu State, Nigeria. M.Ed. Thesis, Department of Science Education, University of Nigeria, Nsukka, Nigeria.
22. Oludipe, D.I., 2012. Gender difference in Nigerian junior secondary students academic achievement in basic science. *J. Edu. Social Res.*, 2: 93-99.
23. Mayer, R.E., 2009. *Multimedia Learning*. 2nd Edn., Cambridge University Press, New York, USA., Pages: 295.
24. Alebaikan, R., 2010. Perceptions of blended learning in Saudi Universities. Ph.D. Thesis, The University of Exeter, England, United Kingdom.
25. Al-Jarf, R.S., 2005. The effects of online grammar instruction on low proficiency EFL college students achievement. *Asian EFL J.*, 7: 166-190.
26. Fraenkel, J.R. and N.E. Wallen, 2003. *How to Design and Evaluate Research in Education?* 5th Edn., McGraw-Hill, New York, USA., ISBN-13: 9780072485608.
27. Kahveci, M., 2010. Students perceptions to use technology for learning: Measurement integrity of the modified fennema-sherman attitudes scales. *TOJET. Turkish Online J. Educ. Technol.*, 9: 185-201.
28. Li, N. and G. Kirkup, 2007. Gender and cultural differences in internet use: A study of China and the UK. *Comput. Edu.*, 48: 301-317.
29. Hwang, Y.S., W. Fisher and K. Vrongistinos, 2009. Calibrating a measure of gender differences in motivation for learning technology. *J. Instructional Psychol.*, 36: 259-272.