



Effects of B-learning and F2F learning environments on students' achievement in QBASIC programming

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ABSTRACT

In higher education, teaching methods, learning style, student workload, and previous programming experience, among others are factors that greatly influence students' achievement particularly in programming courses. However, research has shown that integration of technology into classroom instruction if appropriately implemented have strong and positive impact on students achievement. This study therefore aimed at determining the effects of b-learning model and f2f method on students' achievement in QBASIC programming language in Colleges of Education in Enugu State, Nigeria. The study adopted quasi-experimental design with non-equivalent groups of intact classes. The participants for the study was 148 first year National Certificate in Education (NCE) Computer Education students made up of 53 males and 95 females drawn from the two public Colleges of Education in the State. The instruments used for data collection was QBASIC Programming Achievement Test (QBPAT) with a reliability index of .75 established using K-R 20. The test scores generated from the pre-test and post-test using QBPAT was analyzed using mean and Analysis of Covariance (ANCOVA) to test the two null hypotheses at 0.05 level of significance. Results show that b-learning model is more effective than the traditional f2f in improving students' achievement in QBASIC programming language. Furthermore, the findings revealed higher mean achievement among students taught QB programming with b-learning model compared with those taught with f2f. The researchers have been able to show that b-learning model is more effective than the f2f method in improving students' achievement in QBASIC programming in Nigeria. Further evaluation is warranted

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1. Introduction

The dropout and failure rates in introductory programming courses at the tertiary level of education are evidence to the fact that learning to program is a difficult task. The dropout and failure rate in introductory programming is as high as 30 percent (Guzdial & Soloway, 2002). This figure has obvious implication for manpower development, for instance, decisions

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about majoring in computer science and related fields are often determined by a student's success or failure in introductory programming course.

Several factors may influence a novice achievement in an introductory tertiary-level programming course. The most frequent mentioned factor is previous computer programming experience gained from secondary schools (Byrne & Lyons, 2001; Hagan & Markham, 2000; Wilson & Shrock, 2001). These studies provide converging evidence that prior programming experience has positive effect on success in an introductory programming course at the tertiary level. Similarly, other intriguing factors include teaching methods (Rasaki, 2012), positive relationship of mathematics or science background to computer programming (Byrne & Lyons, 2001; Wilson & Shrock, 2001), relationship between student learning styles and learning to program (Thomas, Woodbury, & Jarman, 2002), and students' course outcome expectations and self-efficacy (Wilson & Shrock, 2001). There is therefore a substantial literature on factors affecting achievement of students in introductory programming courses like QBASIC programming language.

Students' achievement is defined basically as the competence one has in an area of content (American Educational Research Association, American Psychological Association and National Council on Measurement in Education, 1999). Achievement is dependent upon several factors, among which are instructional techniques, learning environment, motivation for stimulating students' interest in learning and the learners (Felder, 2002). Student achievement measures whether standardized or non standardized tests can provide valuable information upon which teachers and school administrators can tailor curriculum and instruction to meet the needs of their students. Student achievement measures also enable teachers and parents gain an understanding of the areas in which students need extra attention. However, with advances in the use of educational technology in teaching and learning, there is need to assess its effects on student achievement measured through test scores.

Researches on the effectiveness of educational technology on students' outcomes have been monitored for more than 20 years (International Society for Technology Education, 2008). One convincing trend that emerged from the researches is that the integration of technology into instruction if appropriately implemented had strong and positive impact on student achievements. In recent times, several countries of the world are utilizing instructionally sound strategies, one of which is the use of b-learning in the integration of technology into classroom instruction in order to boost learning outcome.

1.1. Overview of B-Learning

New ICTs have become major sources and basis for learning in higher education (Diaz, Diniz, & Hadjileontiadis, 2014; Musbahtiti & Muhammad, 2013). ICTs can provide educators an environment to place their online course materials and for students to receive that education while interacting with other students/teachers outside the class setting. Moreover, advances in ICTs over the last decade have given rise to several concepts such as Learning Management Systems (LMS) in form of Modular Object-Oriented Dynamic Learning Environment (Moodle), m-learning, b-learning, among others while enhancing quality of interaction (QoI) in online environments (Diaz, Hadjileontiadou, Hadjileontiadis, & Diniz, 2015).

B-learning is a teaching and learning approach which combines multiple delivery media that are designed to complement each other and promote learning. Bonk and Graham (2006) defined b-learning as learning systems that combine f2f instruction with computer mediated instruction. B-learning mostly involves combining internet and digital media with established classroom forms that require the physical co-presence of the teacher and students (Friesen, 2012). It is a teaching and learning method where remote students participate in such as videoconference, web conferencing or virtual worlds (Bower, Dalgarno, Kennedy, & Mark, 2015). Furthermore, b-learning otherwise called hybrid learning is a combination of e-learning and the traditional f2f learning or instructor-led training (ILT) with coaching, assignments and projects provided as a support and reinforcement tool when necessary (Chui & Manjit, 2006). According to Garrison and Vaughan (2008), b-learning is seen as the thoughtful fusion of traditional f2f and online learning experiences. The basic principle of b-learning is that f2f oral communication and online written communication are optimally integrated such that the strengths of each are blended into a unique learning experience congruent with the context and intended educational purpose. According to Diaz and Diniz (2014), b-learning meets multiple and differentiated instructional online activities thus have the potential for accommodating students with distinct learning needs. Additionally, effective b-learning environment enable users to participate in the co-creation of knowledge through social and technological affordances, and in the process promote skills and competencies (Redecker, Ala-Mutka, Bacigalupo, Ferrari, & Punie, 2009; Diaz & Diniz, 2014).

Furthermore, b-learning models are known to be flexible and adaptable; hence, they are used by teachers to create instructional activities and assignments that give students the opportunity to work collaboratively, tapping their interest and abilities in social learning. Blended synchronous learning can provide students with greater educational access and, in many ways, offer more inclusive and equitable learning experiences to those who are geographically isolated or cannot be in classes (Cunningham, 2014; Pope, 2010; Norberg, 2012). In addition, project-based and experiential learning have also been identified to be facilitated through blended models, giving students the opportunity to conduct research online, participate in group work and then develop multimedia projects that showcase their learning processes and outcomes (Blackboard, 2009). B-learning models, according to Eduviews (2009), are extensively used at all levels of education throughout America and Europe. For example, at Albuquerque Public Schools, New Mexico, b-learning is used in teaching English as a Second Language to students. In Henrico County Schools, Virginia, b-learning is helping students fulfill physical education, mathematics, and English requirements and helping teachers meet professional development requirements.

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