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BYOD or not: A comparison of two assessment strategies for student learning

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ABSTRACT

This study investigated the effects of the BYOD (bring your own device) approach on student language learning. In the research scenario, junior high school students brought their Android-based smart phones to class in order to engage in language evaluation activities, where an application (app) called Socrative was used as a learning assessment tool. A quasi-experimental pre-test and post-test control group design was used to answer the research question. 46 eighth-grade students from two classes at a public junior high school in Taiwan participated in the four-week educational experiment. Student participants received 6 quizzes as a formative evaluation during the experiment. A learning achievement test (summative evaluation) was developed to measure the students' understanding of English vocabulary and grammar. One month after the completion of the summative evaluation, the same achievement test (delayed summative evaluation) with different item numbers was administered to assess the long-term transfer of learning in the students. A self-report questionnaire and an informal interview were used to ascertain the students' learning experiences. The formative evaluation results showed that students in the traditional instruction class outperformed those in the BYOD instruction class because several BYOD students were not familiar with the BYOD approach. Although the BYOD and the traditional instruction approaches yielded similar summative evaluation and delayed summative evaluation results, the BYOD approach demonstrated a valuable benefit on the students' long-term transfer of learning. Students in the BYOD instruction class exhibited a steady growth on learning outcomes and subsequently scored higher on the learning retention segment of the study. In addition, the BYOD teaching practice advanced the students' second language learning experiences, particularly regarding learning motivation and interest. The results of the study suggested that schools and teachers should explore creative ways to integrate traditional and BYOD approaches.

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1. Introduction

Because of the rapid growth of reliable mobile technologies, BYOD (bring your own device) has become a feasible instructional strategy for promoting students' active engagement during the learning process (Nortcliffe & Middleton, 2013). In the educational setting, the phrase "bring your own device" refers to students bringing their mobile devices into classrooms for learning purposes (Nelson, 2012). When students are asked to bring their own devices to class, their mobile devices (e.g., smart phones) must be authorized by the schools (Hockly, 2012). According to the 2015 Horizon

Report (New Media Consortium, 2015), K–12 schools worldwide have begun adopting the BYOD policy as an innovative approach to support traditional teaching practices.

Although the trend of BYOD continues to grow in popularity, the practice has created a number of behavioral and security problems on campus. First, students may use mobile devices to access inappropriate materials and websites; this, indirectly creates a classroom management issue for instructors (Mittal, 2014). Second, mobile devices that students bring into the classroom may pose a security threat to school network systems (Dickerson, 2013). Finally, because some students use more technologically advanced (or "better") mobile devices than other students, the BYOD method contributes to learning inequality in classrooms (Hockly, 2012). However, perceiving the learning potential of the BYOD approach,

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educators express a willingness to address and overcome these potential hurdles (The Journal, 2012).

This study investigated how a public junior high school attempted to transform the learning process by implementing a BYOD policy. Prior to the study, the research team and the school administration collaborated to create a pilot test designed to assess the feasibility of the technology infrastructure and instructional planning. During this three-month preparation period, the research team and school administrators discussed the logistics of the study, considering the issues of classroom management, cyber security, app (application) selection, and device hardware. A preliminary analysis indicated that soliciting support from parents was a crucial aspect of the BYOD adoption since parents are the ones that provide their children with the required devices. On the basis of data acquired during a pilot project, a formal experimental evaluation in an English course was conducted to verify the effect of the BYOD approach on student learning.

2. Literature review

2.1. Rationale for BYOD in the classroom

The rationale for implementing a BYOD policy can be explained in economic terms. Although schools lack the necessary funds required to purchase information technologies, they nevertheless aim to achieve a 1:1 computing initiative (Hockly, 2012; Nelson, 2012; Song, 2014). In other words, most K–12 schools expect to establish a “robust access ration of one computer to one student” (Bebell & O’Dwyer, 2010, p. 6) in classrooms because 1:1 computing enables each student to experience the benefits of information technologies on learning, but they lack the financial resources to implement this plan. Because the BYOD approach allows students to use their own mobile devices, it solves this economic/resource problem. However, while previous studies have shown that the 1:1 computing initiative increases student engagement and improves learning achievement in the classroom (Bebell & Kay, 2010; Looi et al., 2011), further research is required to verify the educational benefits of the BYOD approach.

2.2. Perceptions of BYOD in the classroom

According to a 2013 survey conducted by Bradford Networks (Bradford Networks, 2013), the BYOD approach had a higher acceptance rate at colleges and universities than it did at K–12 learning institutions. The survey results revealed a connection between the BYOD approach and student in-class participation and assignment completion. However, from a pedagogical perspective, several teachers perceived BYOD as a barrier in the classroom. For instance, O’ Bannon and Thomas (2014) reported that K–12 teachers expressed negative views regarding the efficacy of the BYOD approach; these teachers noted that class disruptions, cheating, and cyber bullying (caused by BYOD) impeded the learning process. O’ Bannon and Thomas (2015) also surveyed pre-service K–12 teachers: while acknowledging the same potential educational barriers cited by the K–12 teachers, the pre-service teachers expressed support for mobile phone features in school-related work. In the current study, to avoid potential classroom management problems, the BYOD approach became a short-term formative evaluation activity.

2.3. Learning outcome of BYOD integration into teaching practices

BYOD is a variant of “mobile learning” (Huang & Tsai, 2011). Previous scholarly work on mobile learning has focused on school-provided mobile devices (and not on BYOD). Only a few empirical

studies have investigated the practice of integrating BYOD into pedagogical practices (Song, 2014). One report from the Cisco Company showed that levels of learning achievement, particularly math and science scores, were significantly increased for BYOD students in one school district (The Journal, 2012). However, this report did not implement a research procedure. In Song’s (2014) study, one group of students using their own mobile devices in a science class was examined. The findings indicated that BYOD adoption strengthened students’ content knowledge and supported the student learning process in various ways. While Song reported some positive outcomes, she (like the Cisco researchers) failed to employ a formal experimental method whereby future researchers could verify the results.

2.4. BYOD as an assessment tool

In some instructional cases, the BYOD teaching model serves as a student response system (SRS) used for measuring student content knowledge or offering student practice. Traditionally, SRS is equipped with many handheld remote controllers (or clickers) that transmit the students’ answers to instructors (Caldwell, 2007). Although previous studies have confirmed the learning benefits of traditional SRS in different learning environments (Draper & Brown, 2004; Stuart, Brown, & Draper, 2004), a recent study conducted by Stowell (2015) did not find a noticeable difference between BYOD and SRS in improving student learning. Therefore, to offer students a simpler learning experience, Wang (2015) suggested that the BYOD approach could replace traditional SRS assessment tools in schools.

2.5. Moving BYOD into MALL

MALL (mobile assisted language learning) refers to using mobile devices to support language learning activities (Kukulska-Hulme & Shield, 2008). Mobile devices have proven effective in teaching vocabulary (Godwin-Jones, 2011). For example, Lu (2008) examined how students used the short message service on mobile phones to learn vocabulary, and found that students using mobile phones recognized more vocabulary words than their (paper-based reading) counterparts. Wang and Smith (2013) investigated the feasibility of developing students’ English skills through mobile phones, and reported that students preferred using mobile phones to access English reading and grammar materials. However, because MALL related studies did not focus on the concept of BYOD, more research is required to determine whether a combination of BYOD and MALL may yield different learning outcomes.

3. Significance and rationale of the study and research question

Plass and Jones (2005) proposed that integrating second-language acquisition methods and multimedia technologies would provide a useful instructional tool to facilitate student language learning, particularly for vocabulary comprehension. In Taiwan, English as a second language (ESL) is a core curriculum that students must take in junior high school. Adopting BYOD teaching practices may advance students’ second language learning experiences. In addition, the cognitive theory of multimedia learning suggests that technologies enhance knowledge transfer from short-term memory to long-term memory (Clark & Mayer, 2011). In the current study, students employed smart phones to support their language learning during the BYOD instruction. The instructional use of mobile devices may enhance students’ ability to learn English vocabulary, which will indirectly reinforce knowledge transfer in memory. According to Ferreira, Klein, Freitas, and Schlemmer

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