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Research and innovation in teaching and learning are prime topics for the *Journal of Instructional Technology and Distance Learning* (ISSN 1550-6908). The Journal was initiated in January 2004 to facilitate communication and collaboration among researchers, innovators, practitioners, and administrators of education and training involving innovative technologies and/or distance learning.

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IJITDL is committed to publish significant writings of high academic stature for worldwide distribution to stakeholders in distance learning and technology.

In its first twelve years, the Journal logged over twelve million page views and more than two million downloads of Acrobat files of monthly journals and eBooks.

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Table of Contents – March 2018

<u>Editorial: Academic journals – an alternative business model</u>	1
Donald G. Perrin	
<u>Practice-based teacher education in hybrid, blended, and online environments</u>	
Julia Parra, Xeturah Woodley, Leanna Lucero	
<u>The effect of using the blended learning strategy on the academic achievement of computer course among ninth grade students in Jordan</u>	17
Mamon AL-Zboun, SaifAL-DeenAL Ghamma, Malik AL-Zboun, Bunder AbdulRahman AlReshidi	
<u>Using online learning materials to develop Taiwanese college students' English reading proficiency</u>	33
Dylan Sung and Chen-Yu Yeh	
<u>Low tech, high reward: using google docs to help students decipher and pattern teacher feedback on writing assignments</u>	43
Kelly Morris Roberts, Macy Allen, Kristen Certo Outen	
<u>Designing data dashboards using goal-free evaluation principles</u>	53
Jonathan S. Spackman and Sam McKnight	
<u>A culture of innovation</u>	61
Luis Camillo Almeida	

Editorial

Academic journals – an alternative business model

Donald G. Perrin

2017 was a year of disruption in the academic publishing world, signaling a need for change. The focus of attacks against publishers were restricted access and high price for services. The traditional pattern of surrendering copyright in return for publication came into question, particularly for government funded research that was already paid for by the taxpayer. Expecting free review and editorial services from academics was building resentment. Shortcomings of the peer review process itself were coming evident. Pirate websites became rampart in an effort to provide researchers access to published works. Research organizations were setting up open source websites. Open source references became more frequent. University libraries were bonding together to get better deals from publishers. And fake websites were scamming researchers with deals promising rapid publication. Sharing articles and passwords on social networks, pirate sites and open-access sites combined with, lawsuits, boycotts and mass resignations of scholars who advised publishers, threatened to revolutionize the academic publishing industry.

Powerful publishers were hard to dislodge from their highly profitable role. They controlled resources, contracts and huge libraries of research publications. They were successful in taking down illegal sites. From a researcher's point of view, this removed access to millions of publications. Universities and research institutions cancelled their subscriptions and tried to negotiate affordable and open access, with contracts to access publisher's entire collections at an affordable price, and contracts based on actual use.

Legal suits resulted in government funded research becoming open access. Publishers offered open access to researchers and organizations willing to pay editorial and publication cost, typically about \$5,000 per article. (A move that made it less profitable for scammers.) But the fact remains that millions of researchers, faculty and students did not have access to the body of knowledge necessary for their research. Publishers retained their position as gatekeepers for research information and hindered the growth of knowledge.

Legal methods to access paywalled articles for free were devised. However, options within some publisher's contracts that allow researchers to self-archive their research were frequently ignored. These ...

... typically allow authors to post accepted manuscripts, which are peer-reviewed but not yet copy edited or typeset, on institutional repositories, subject repositories, and personal websites, usually after an embargo period that lasts around six to 12 months. ...

In 2016, the International Association of STM Publishers launched "[How Can I Share It](#)," a website that provides information about publishers' self-archiving policies that includes a tool for researchers to enter their papers' digital object identifiers (DOI) and automatically see a list of places where specific versions can be posted.

Driven by the high cost of textbooks, some publishers added media, tests, and some free or Open Educational Resources (OERs) as part of their offerings. As an alternative to restrictive copyrights, The Creative Commons offered a variety of options for sharing or licensing materials. Groups such as the Khan Academy attracted funding from foundations and philanthropists to make their works universally available on the web – for free.

Many scientists and researchers believe that scientific literature is a major part of the World's heritage and should be put under the auspices of UNESCO.

Diana Kwon. **A Growing Open Access Toolbox**

<https://www.the-scientist.com/?articles.view/articleNo/51048/title/A-Growing-Open-Access-Toolbox/>

Gretchen Vogel, [Kai Kupferschmidt](#). **A bold open-access push in Germany could change the future of academic publishing**

<http://www.sciencemag.org/news/2017/08/bold-open-access-push-germany-could-change-future-academic-publishing>

David Wiley. **The Real Goal of Open Educational Resources**

<https://halfanhour.blogspot.com/2017/11/the-real-goal-of-open-educational.html>

[Return to Table of Contents](#)

Editor's Note: Practice-based teacher education applied John Dewey's concept of "learning by doing". This research is a "must read" for teachers who believe that technology can make a very substantial contribution to student motivation, participation and learning. It provides precise and detailed instructions to show how to obtain web resources, how different media can be used, and the instructional design processes involved.

Practice-based teacher education in hybrid, blended, and online environments

Julia Parra, Xeturah Woodley, Leanna Lucero
USA

Abstract

Responses to critiques of traditional teacher education programs (TEP) not meeting both the theoretical and practical needs of preservice teachers entering the classroom has led to a shift from traditional models of TEP to practice-based TEP. Using an autoethnographic approach, we explore how technology can be used to provide preservice and in-service teachers with practice-based opportunities to prepare. Two themes emerged: (1) increased capacity related to the dual role of student as learner and teacher and (2) use of TPACK framework for learning design supporting transferability of grade-level and content. Additional findings include different technology used in practice-based learning.

Keywords: Practice-based teacher education; game-based learning; multimedia; collaborative autoethnography; learning design with technology

"Education is a social process; education is growth; education is not a preparation for life but is life itself." John Dewey

Introduction

Traditional curriculum in teacher education focuses on the theory of teacher practice rather than the actual practice of teaching. For the last few decades, there has been a movement in academia to shift the focus from theory to practice-based learning. Practice-based Teacher Education (PBTE) programs integrate teaching practices as a central part of the teacher education curriculum (Zeichner, 2012). Zeichner (2012) argues, "As the work on the identification of core teaching practices continues, it will be very difficult to achieve such a consensus given the multiplicity of models now in use that detail the particular elements of effective teaching practices" (p. 281). Thus, teacher education programs struggle to find a synthesis of theory and practice in the day-to-day curriculum.

As PBTE programs continue to develop in higher education, the inclusion of technology becomes paramount in preparing preservice teacher education students with the skills they will need to be successful in 21st-century classrooms. Online and blended teacher education courses afford educators opportunities to utilize emerging technologies and virtual tools to bridge the gap between theory and practice. However, one university or professional development course alone is insufficient to prepare most preservice teachers for using technology in their classrooms (Zipke, 2017). Thus, providing preservice teacher educators with rehearsal and experience before entering their k-12 classrooms. As teachers are exposed to new technologies, and strategies for using those technologies in their teaching, they are more likely to introduce those technologies to their students (First Author, 2010). It is through the active integration of learning technologies that PBTE programs can provide new opportunities for preservice teachers to practice skills they will need to be day one ready for entering pre-K through 12 classrooms.

The purpose of this article is to evaluate and understand ways that technology can be used to provide preservice and in-service teachers with practice-based learning opportunities in hybrid, blended, and online classroom environments. As we share our teaching experiences, we do so grounded in our theoretical foundations in culturally responsive pedagogy and social justice education. Through the use of auto-ethnographic research methods, we provide a glimpse at the way we use games, multimedia, and social media in our blended and online course environments to offer practice-based activities for preservice and in-service teachers.

Background literature

Historically, many teacher education classrooms have focussed on providing preservice teachers with pedagogical foundations for the work they will do as classroom teachers. “In teacher education, the desire to use as much of the available knowledge as possible has led to a conception of teacher education as a system in which experts, preferably working within universities, teach this knowledge to prospective teachers” (Korthagen & Kessels. 1999, p.4). Theory dominates in this type of learning environment, which provides preservice teachers with few opportunities to engage in and rehearse core instructional practices (Feldman & Kent, 2006; Ghousseini, 2015; Windschitl, Thompson, Braaten, & Stroupe, 2012) they will daily perform in their pre-K through 12 classrooms.

Korthagen, Loughran, & Russell (2006) presented three main complaints about theory-centered teacher education programs. First, theory-centered programs lack relevance because they do not provide opportunities for preservice teachers to practice the skills teachers need when they go to work in the schools. Secondly, Korthagen et al., argue that teachers face "reality shock" when what they find, once they enter the classroom, doesn't match the theory they were taught in their degree programs. This realization leads many in-service teachers to attitude changes and an exodus from the teaching profession. Finally, they found that new models conflicted with traditional models of educating classroom teachers. It is the failure to resolve this conflict that leads to many programs rejecting innovative options to transform the curriculum to meet better the needs of those enrolled in teacher education programs.

Darling-Hammond & Sykes (1999) emphasized the importance of meeting both the theoretical and practical needs of teacher education candidates to have them be effective teachers once they enter the workforce. This requires creating learning environments that integrate both theory-centered and practice-based programs. In this environment, teacher educators will play a new role that Korthagen & Sykes (1999) stated, “the realistic approach to teacher education requires a special and often unconventional role on the part of teacher educators” (p.13). As teacher education programs begin to address these issues, there was a shift in focus from theory-centered to practice-based teacher education.

Practice-based Teacher Education

Ball & Cohen (1999) explain that practice-based approaches to teacher education focus on “...a terrain of action and analysis that is defined first by identifying the central activities of teaching practice and, second, by selecting or creating materials that usefully depict that work” (p.13). This type of training is centered on learning about, delving into, and analyzing core-practices (Forzani, 2014; McDonald, Kazemi, & Kavanagh, 2013) of the teaching profession. Although practice-based teacher education has its critics (Zeichner, 2012) the training of teacher candidates has shifted to a more realistic approach that intends to integrate theory with practice seamlessly.

Darling-Hammond (2006) accentuated three critical components for effective and practice-based teacher education programs. First, there should be integration between courses taught in teacher preparation courses and between coursework and field-based experiences in authentic school settings. This requires consistency across the teacher education program and tightly connected

experiences for teacher candidates. Secondly, there should be ample opportunities for teacher candidates to engage in supervised field-based experiences that are integrated with coursework and pedagogies that connect theory and praxis. These experiences should take place in authentic classroom settings with expert teachers who can model culturally responsive practices that meet the needs of diverse students. Finally, establishing relationships between teacher preparation programs and Pre-K through 12th-grade schools, and teachers, who successfully serve diverse learners is essential for creating effective practice-based teacher education programs. Darling-Hammond (2006) explains that this third component is the most challenging component but the most critical piece because establishing these partnerships is crucial for creating schools environments that are conducive to learning for all students and teachers.

McDonald, Kazemi, & Kavanagh (2013) provide a framework and lesson cycle for reimagining the pedagogy of teacher education. This cycle provides teacher candidates with opportunities to learn about practices through instruction, carry out these practices in safe environments with other candidates, conduct these practices in classrooms with real children, and then analyze their implementation of these practices (McDonald et al., 2013). As teacher education programs shift to prepare preservice teachers in a practice-based program, a focus on core-practices, such as technology integration, is essential to prepare teachers for the digital generation (Kivunja, 2013).

Theoretical framework

The research in this study was grounded in a Technological Pedagogical and Content and Knowledge (TPACK) framework. This framework informed the study's design as well as the data analysis. Effective and purposeful technology integration across all content areas is an essential skill for teacher candidates to learn to meet the needs of 21st-century learners and classrooms. Candidates should have the opportunity to learn about, observe, and enact the practical use of technology in teaching. Koehler & Mishra (2009) introduce TPACK (technological, pedagogical, and content knowledge) framework for thinking about and understanding the complexities of the "connections, interactions, affordances, and constraints between and among content, pedagogy, and technology" (p. 1025). They assert that individuals learn to use technology by design, and this broad understanding leads to the effective integration of technology into teaching. That is, learning is by doing and reflecting.

Kivunja (2013) emphasizes that teacher preparation programs ought to utilize digital pedagogy within their training of preservice teachers to help them appreciate the integration of technology, pedagogy, and content knowledge (TPACK) as well as meet the needs of students who are Digital Natives. Kivunja (2013) explains that "we can define a digital pedagogy in the words of Howell (2012) as 'the study of how to teach using digital technologies'" and further explains that digital pedagogy is "embedment into the art of teaching, computer-driven digital technologies, which enrich learning, teaching, assessment and the whole curriculum" (p. 131). As teacher educators in practice-based teacher preparation programs, we sought to create meaningful practice-based learning activities that modeled TPACK and provided opportunities to for preservice and in-service teachers to practice and prepare themselves for effective instruction in 21st-century classrooms.

Methods

For this study, qualitative research methods were used. Collaborative autoethnography (Hernandez, Ngunjiri, & Chang, 2015; Vasinda, Ryter, Hathcock, & Wang, 2017) was used to answer the research question, "In what ways do we utilize technology in our online, blended, and hybrid environments to support practice-based learning with teacher candidates and in-service teachers?" "Auto-ethnography is a style of autobiographical writing, and qualitative research that explores an individual's unique life experiences in relationship to social and cultural institutions" (Custer, 2014, p. 1) Collaborative auto-ethnography allows multiple researchers the opportunity to

reflect on autobiographical ethnographies collectively. Thus, collective data analysis afforded the opportunity for both personal and group reflections on instructional practices and technology use in online and blended environments.

Chang (2006) encourages auto-ethnographers to "develop their techniques of data collection to meet their research goals" (p. 7). In this study, data were identified from document analysis, course activity and assignment evaluation, examination of auto-ethnographic writings and collaborative reflection sessions. Two key themes surfaced and are presented: (1) the increased capacity related to the dual role of students as learner and teacher/future teacher and (2) the use of a TPACK framework for learning design supporting transferability of grade level and content. During our collaborative reflections sessions, we identified activities and practices that were most representative of practice-based learning with technology opportunities for students in our hybrid, blended, and online courses. Details about those themes and identified opportunities are presented in the findings section that follows.

Themes

Two key themes from this study surfaced: (1) the increased capacity related to the dual role of student as learner and teacher/future teacher and (2) the use of a TPACK framework for learning design supporting transferability of grade level and content.

The first theme throughout the findings includes the concept that practice-based learning with technology promotes increased capacity related to the dual role of students: (1) role of student as active, collaborative, empowered learner with increased capacity for using new technologies in their own personal and professional lives, and (2) role of student as current or future teacher/educator with increased capacity for using new technologies, activities, and practices with their own students in their online, blended, or hybrid classrooms.

The second theme from the findings is that the use of a TPACK framework for learning design supports transferability - students' ability to transfer knowledge across grade levels and content areas. In one of the courses from this study, students experienced the Superhero Introduction, Podcasting project, and Gameplay to Teach Use of Games. They each wrote a chapter about their experiences, and a class book was published (First Author, 2017). In the book, one student, a fourth-grade teacher, modified and used the Superhero Introduction and Podcasting Project with her students (Vigil, 2017). Vigil noted student engagement with the Superhero Introduction, "The student[s] reaction to creating their superheroes was amazing! They loved it." (p. 7). She also reflected on the weakness she saw such as "impersonal" replies to each others' artifacts and noted a change to address this by (a) walking the "students through more examples of what appropriate comments would be" and (b) making "sure that they clearly understand the expectations for engagement" (p.7). For the podcasting project, Vigil's students created podcasts for a book they had read as a class. Again, she noted high student engagement. Vigil further noted challenges with the technology and process and how they decided to not worry about "every little mistake" which positively changed "the outcome of the project" (p. 9). Vigil's overall theme for her experiences includes alignment with this theme of learning design grade level and content transferability - "all lessons could be adapted to fit the needs of different students in different grade levels. There are also ways that you could adapt the lessons for students with disabilities and English Language Learners."

Findings

The findings from this auto-ethnographic study include three types of technology being used in practice-based learning with technology opportunities for students in our hybrid, blended, and online courses: (1) games for teaching use of games in education and teaching course content; (2) multimedia for learning through reflection, podcasting, and digital character creation; and (3) social media to teach collaboration and the development of personal learning networks. Per

TPACK framework, the following descriptions of technologies, strategies, and activities include pedagogical background and purpose, learning outcomes, and learning design. Of note, the students in the following descriptions include teachers at various stages of learning and teaching: (a) as learners, students were in undergraduate, master's, and doctoral programs, and (b) as teachers, students included-preservice teachers and in-service teachers, teachers on hiatus, and students from various disciplines wanting to learn about educational technologies and design for teaching and learning.

Games in practice-based learning with technology

Using games provided experiences that students might not have otherwise had, especially graduate students who were most likely older and often have not participated in game culture. Further, from a practice-based learning perspective, using gameplay prompted (a) strategies to use gameplay in their classes immediately, and (b) the consideration, relevance, and transfer of further game-related concepts in their teaching.

Gameplay to teach the use of games. Monument Valley is a simple, beautiful mobile game app that first came out in 2014. With stunning Escheresque graphics, this architectural puzzle game is noted for its “aesthetic experience” (Thomaz & Cardoso Filho, 2016, p. 344) includes beautiful themes related to a princess traversing through “little worlds” filled with “sacred geometry” (Starr, 2014, para. 10). Monument Valley is sometimes free, but at the time of the class activity discussed below, it was \$3.99. Students did not purchase required books for this class; instead, they invested in this game and resources relevant to their circumstances.

Pokemon Go is also a mobile game app that was released in 2016. Pokemon Go, a location-based, augmented reality game, became a global phenomenon. Pokemon Go is free, but it contains in-app purchases. It was noted for both (a) potential in educational opportunity, social and physical activity and (b) risks related to physical and cybersecurity issues (Godwin-Jones, 2016; Gong, Hassink, & Maus, 2017; Serino, Cordrey, McLaughlin, & Milanaik, 2016).

Monument Valley and Pokemon Go were included in graduate-level learning design and technologies courses. The students in these classes included pre-service and in-service teachers, teachers on hiatus, and students from various disciplines wanting to learn about educational technologies and design for teaching and learning. Learning outcomes were that students: (1) play the game/s, (2) collaboratively and individually make the connections between gameplay and education, and (3) reflect on their gameplay and research activities. Learning design included blended activities as follows:

1. During class time students:
 - a. Downloaded and individually played the game.
 - b. Individually reflected on the game experience and posted their reflections to a learning management system online discussion forum.
 - c. Collaboratively brainstormed, discussed, and posted to same discussion their answers to questions about related design elements/characteristics that made the game popular/award winning/phenomenon along with initial ideas for using games in education.
2. For homework, students personalized the use of games for teaching and learning and:
 - a. Continued gameplay as desired.
 - b. Conducted follow-up Internet research including queries related to the game itself, and the terms “education,” “teaching,” and “learning” with the terms “games,” “game design,” “game-based learning,” “gamification,” and “gameful learning design.”

- c. Answered the question: what can you do with games, game design, gamification, and gameful learning in your classes?

Gameplay to teach math. Minecraft is a video game that came out in 2009, and though not specifically designed for education it has gained increasing global popularity to teach many different subjects (Nebel, Schneider, & Rey, 2016). Various updates have been released, including a version of that was designed for classroom use - Minecraft Education located at MinecraftEdu.com. The education version includes free lessons and activities for teachers. Both Minecraft and MinecraftEdu have a “three-dimensional Lego-like environment in which the user can build and interact with a virtual world” (Bos, Wilder, Cook, & O'Donnell, 2014, p. 56). Players can build their virtual world alone, and they also have the option to interact with other players to build a creative space together or simply explore the world the other player has created. Mørch & Thomassen (2016) note that “[s]imilar to building with blocks, the open-ended quality of a sandbox environment such a Minecraft allows the students great freedom while exploring the game, which makes it suitable for scenario-based learning and role-playing activities” (p.63). The most current version of Minecraft is \$26.95, and MinecraftEdu can be used for free for anyone with a school email address. At the time of the class activity discussed below, students, also teacher candidates, played MinecraftEdu because it was created with the classroom in mind and there was no cost to students.

MinecraftEdu was included in an elementary mathematics methods course for preservice teachers where both undergraduate and graduate students were enrolled. This course is taken one semester before student teaching. The preservice teachers in this class were required to fulfill over 100 hours of practicum experience with K-5th-grade students during the semester. Learning outcomes were that students: (1) play the game, (2) create lessons that meet state standards and integrate MinecraftEdu, and (3) reflect on the experiences related to lesson design and teaching of math with MinecraftEdu gameplay. Learning design included blended activities wherein students:

1. Spent time in class exploring the website MinecraftEdu.com and playing the game;
2. Brainstormed the design of a Math lesson tied to CCSS and shared their ideas on an online discussion forum.
3. Designed a lesson for elementary students that included the integration of MinecraftEdu and was tied to Mathematics CCSS (Common Core State Standards).
4. Taught the lesson to other students (preservice teachers) in the course.
5. Collaboratively brainstormed extensions to the lesson.
6. Reflected in the process of designing and teaching a lesson using MinecraftEdu.

Multimedia for practice-based learning with technology

Multimedia-based activities provided the opportunity for students to experience and practice the technical skills they needed as teachers/future teachers and provided scaffolding for the use of such projects in their classrooms.

Multimedia-based reflections. Reflection during and after learning experiences can “lead to new understandings and appreciations” (Boud, Keogh, & Walker, 1985, p. 19) and is widely used in education and professional development (Moon, 2013). However, “as Duley (1981, p611) points out: the skill of experiential learning in which people tend to be most deficient is reflection” (as cited in (Boud, Keogh, & Walker, 2013). Teachers who reflect strengthen their learning and practice (Day, 1999; Hatton & Smith, 1995; Loughran, 2002; Schon, 1984) and from a practice-based perspective, they also gain the skills for using reflection in their classrooms. The use of multimedia to enhance the reflection process provides learners the opportunity to (a) learn basic

technology skills, and (b) use “multiple sensory modalities” thereby increasing motivation and information retention (Neo & Neo, 2001, p. 21).

A multimedia-based reflection activity was included in a graduate-level learning design and technologies courses, sometimes entirely online and sometimes delivered in hybrid or blended format (class with online supplemental resources and activities). The technology used included online discussion forum as a venue to share reflections created using multimedia presentation tools. Multimedia presentation tools used included PowerPoint, Prezi, Screencast-O-Matic, and YouTube, and the activity required the use of recorded student voice, to increase online social presence (Newberry, 2001). The students in these classes included preservice and in-service teachers, teachers on hiatus, and students from various disciplines wanting to learn about educational technologies and design for teaching and learning. Learning outcomes were that students: (1) reflect on course learning, (2) create a multimedia-based reflection, and (3) reflect and summarize new learning from classmates. Learning design included online activities as follows:

1. Students were provided a prompt to reflect on course learning such as - reflect on your learning in this course of emerging technologies, pedagogies, and emerging models of learning design and technologies.
2. Based on the prompt, students created a multimedia-based reflection and shared it to an online discussion forum.
3. Students viewed a minimum of three of their classmates multimedia reflections and were prompted to reflect on what new information or ideas they took away from each.
4. Students summarized new learning with a 1-2 page (double-spaced) paper posted to the online course as an assignment.

Podcasting to learn content. The original purpose and popularity of podcasts can be traced to the early 2000s as “a mechanism to create and distribute personal radio shows on the Internet” (Edirisingha & Edirisingha, 2008, p.29). Podcasting is a term for both the technology and the activity that includes the creation and sharing of an “audio event, song, speech, or mix of sounds and then posting that digital sound object to a Website or blog in a data structure called an RSS 2.0 envelope (or feed)” (Mang, 2005, p. 1). The receiver side of podcasting is similarly complex, where “users can subscribe to a web page containing RSS 2.0 tagged audio files on designated web pages and automatically download these files directly into an audio management program on their personal computer” and then when the user synchronizes “their portable audio device with their personal computer, the podcasts are automatically transferred to that device to be listened to at the time and location most convenient for the user” (p.1). This concept of podcasts has expanded and includes enhanced podcasts where editing is involved, and further multimedia is added, and video podcasts also referred to as vodcasts (Fernandez, Sallan, & Simo, 2015). Along with audiobooks, podcasts have gained popularity due to anytime, anywhere, increasingly mobile access (Fernandez, Simo, & Sallan, 2009). The complex technical process for creating podcasts meant that for a long time, the focus for educational uses of podcasting focused on providing students access to educational content such as existing podcasts provided by experts, recorded lectures and informative information, and live class recordings (Fernandez, Sallan, & Simo, 2015; Frydenberg, 2006). Newer technologies have made it easier to move beyond content access to content creation with student-generated podcasts. Through the creation process of podcasting, students are “motivated by the opportunity to express themselves for a genuine audience” (Forbes, 2015, p. 199). Further, they gain content comprehension; have multiple opportunities for formative reflection; and both literally and figuratively project their voices; alongside the development of skills for the use of the real-world technologies (Forbes, 2015).

The following Podcasting Project was included in graduate-level learning design and technologies courses. The students in these classes included pre-service and in-service teachers, teachers on hiatus, and students from various disciplines wanting to learn about educational technologies and design for teaching and learning. The main podcasting tool used was Soundcloud, and the podcasts can be accessed at <https://soundcloud.com/user-636479320>. SoundCloud has free and Pro plans, see the site for pricing. The instructor of these courses uses mostly free learning tools but occasionally finds enough educational value in a tool to purchase the subscription. Of note, currently, the instructor is subscribed to the previously noted multimedia tool Screencast-O-Matic, and SoundCloud. The instructor purchased a Pro Unlimited SoundCloud plan for student and faculty use. Of note, this Podcasting Project has been completed as both an individual project and a collaborative group project. Learning outcomes were that students: (1) listen to and deconstruct podcasts, (2) create, peer review, and revise podcast transcripts, and (3) create and publish podcasts. Learning design included blended activities as follows:

1. In previous course activities, students were learning about the course content, in this case, the content was - *critical digital literacy*.
2. Students were provided a list of recommended podcasts to choose from and the options to contribute their own recommended podcasts.
3. Students listened to one podcast related to the class topic and one of personal interest and posted their listening experience to an online discussion forum.
4. Students deconstructed the podcasts to identify what makes a good podcast or a bad podcast. They created and shared their lists of “Do’s and Don’ts in Podcasting” lists with each other in an online discussion forum.
5. Students developed a transcript for a podcast focused on class content, in this case, the topic of *critical digital literacy*, and posted transcripts to an online discussion forum.
6. Students reviewed each other's transcripts and revised transcripts.
7. Students created their podcasts and posted them on social media.

Digital character creation tools to describe self and identity. Cartoons and comics are resources that can be used to provide engaging venues for access to educational content (Smith & Duncan, 2017). Student creation of cartoons and comics progresses this use of media for student empowerment and purposeful engagement of student's voice. Further, the focus on self and identity in cartoon and comic creation denotes the use of avatars. Avatars are digital representations of self (digital characters) and when used to explore identity, allow for learners to explore the “the space of liminality” the “interface between the user and the avatar” (Triberti, Durosini, Aschieri, Villani, & Riva, 2017, p.501), and “strategically select and critically consider some aspects of their personality and self (e.g., personal values) to be possibly reproduced in the avatar” (Triberti et al., 2017, p. 501). During digital character creation with a focus on avatars, learners may have the opportunity to draw upon their individual life experiences, including culturally-based funds of knowledge (Poole, 2017); and in the educational context, juxtapose with learning of content (Lazarinis, Mazaraki, Verykios, & Panagiotakopoulos, 2015; Shurkin, 2015; Smith & Duncan, 2017), and if needed, learning of technology skills.

The following digital character creation activities were included in graduate-level learning design and technologies courses, sometimes entirely online and sometimes delivered in hybrid or blended format. Avatar and static cartoon creation tools used included Heroized, Bitmoji, Hero Machine, and Marvel Create Your Own Superhero. Comic strip and animation tools used included Powtoon, Moovly, Storybird, Pixton, PowToon, ToonDoo, and Biteable. The students in these classes included preservice and in-service teachers, teachers on hiatus, and students from various

disciplines wanting to learn about educational technologies and design for teaching and learning. Learning outcomes were that students: (1) reflect on self and identity, and (2) explore and use technology to share and discuss identity reflections.

Learning design included online activities as follows:

1. Students were provided a prompt to reflect on self and identity.
 - a. In one course, this was a Superhero Introduction activity with the prompt to keep in mind who they are as educators, and answer the question, *"If you were a Superhero, who would you be?"* Included with this prompt was a reminder to consider cultural identity.
 - b. In another course, this was an Instructional Designer activity, and the prompt was content related. The content was advanced instructional design, the students were reading a book about instructional design, and the activity prompt was, *"Envision yourself as an instructional designer and show who you are, what you do, and what you need to know."*
2. Students were provided a list of tools to explore and choose one to address the prompt. As part of these explorations, students were reminded to consider a tool that could be used in their classrooms.
 - a. For the Superhero Introduction, the digital character creation focus was a single image, and over time, the following tools were chosen by students - Heroized, Bitmoji, Hero Machine, and Marvel Create Your Own Superhero.
 - b. For the Instructional Designer activity, the digital character creation focus was a comic strip or animation, and over time, the following tools were chosen by students - Powtoon, Moovly, Storybird, Pixton, PowToon, ToonDoo, and Biteable.
3. Students posted their digital character creations to online discussion forums and replied to each other.

Conclusion

Online environments provide inherent opportunities for immediate immersion with technology. "Such technologies offer important affordances to teacher educators seeking to provide candidates with course-based experiences that emphasize the development of practice-based skills and knowledge" (Herbst et al., 2016). As practice-based teacher education continues to expand and grow in teacher education programs, it becomes increasingly important that teacher education faculty model "appropriate uses of technology...[and that students]...must be provided with the learning opportunities that build learning communities, use a learner-centered approach, and model appropriate uses of technology" (First Author, 2010, p. 265). In this article, we provide insight into our collective understandings about practice-based learning while providing teacher educators with ways they can use technology to prepare preservice teachers to be day-one-ready for using technology in their classrooms. These ideas support the building of communities of practice that encourage practice-based learning with technologies in hybrid, blended and online courses.

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"Education is a social process; education is growth; education is not a preparation for life but is life itself." John Dewey

[Return to Table of Contents](#)

Editor's Note: Blending learning is a "best of both worlds" strategy combining e learning with traditional face-to-face instruction. This research confirms a significant advantage for blended learning over the traditional method of instruction.

The effect of using the blended learning strategy on academic achievement of computer course among ninth grade students in Jordan

**Mamon AL-Zboun, SaifAL-DeenAL Ghamma,
Malik AL-Zboun, Bunder AbdulRahman AIReshidi**

Abstract

The study aimed at investigating the effect of using the blended learning strategy on academic achievement of Computer Course among the ninth-grade students in Jordan. The sample of the study consisted of two sections that were purposely chosen. The first section was the experimental group with (27) students, while the second formed the control group with (29) students. A 30-question academic achievement test was prepared to measure the effects of the use of the blended learning strategy on the academic achievement of the sample members. The validity and reliability of the study instrument were verified.

To answer the study questions, the arithmetical means, the standard deviations as well as the ANCOVA analysis of the study sample were calculated. The results showed that there was a statistically significant difference between the two means of academic achievement scores due to the variable of teaching method and in favor of the experimental group taught using the blended learning strategy. The study recommended using the blended learning strategy that was applied to Computer Course students for the ninth grade, using the teaching method based on the blended learning strategy by the teachers continuously, which may contribute to increase student's academic achievement and design learning programs based on the blended learning.

Keywords: strategy, blended learning, academic achievement, computer course.

Introduction

This century is witnessing rapid developments and changes and a revolution in the knowledge and communication methods, especially the development in using computer in various sectors of science, including the educational sector, which has become a necessity of our lives, and an integral part of the life of modern society. In fact, this aspiring view for computer use in education emerged due to several prominent advantages, namely: the ability to store and retrieve large data, the enormous speed in the data processing, and the ability to have an arranged and systematic data presentation, and then provide feedback.

In light of the re-examination and development of teaching and learning methods in developed countries, the Arab countries in general, and Jordan in particular, there have been many new technological developments in the recent period. Their aim is to make the learner more effective and the main axis of the educational and learning process. Computer applications have significantly expanded, and the use of computer in education is increasing day after day because of its great impact on improving the educational process, such as shortening time and effort and helping the teacher and learner provide an attractive learning environment (Abu Zeid, 2011).

In modern electronic developments, the concept of e-learning, which is centered on multimedia technology, has emerged to provide the learner's educational content in an effective and representative manner, offering diverse ways of presenting information through the use of multimedia technology, software and the Internet to improve the quality of learning by facilitating

access to resources and services. From this perspective, aspirations have begun to integrate the implementation of the usual learning and teaching strategies that are common in schools with the computerized education and e-learning which is called the blended learning that comes by employing both methods in learning and teaching. As a fact, this has to be done for many reasons, most notably that this era is witnessing a scientific revolution and technological explosion and knowledge that has led to the accumulation of discoveries, theories and technological applications in a way we have not seen before in the life of mankind. Besides, this change carries with it several changes in all aspects of life, so it was necessary to respond to these variables through the use of knowledge and technology to keep pace with the nature of the era and respond to the transformations that include different areas of life (AL-Qarara, Hujja, 2011).

In the light of this accelerated technological progress, educational institutions find themselves facing the important issue of how to provide today's learners with a scientific culture that enables them to pursue the ongoing increasing in the scientific knowledge and to understand and cope with their contemporary world and its problems. Many reform movements emphasized on the necessity of development of learning and teaching strategies and employ the blended learning methods that make the learner more active, interactive and increase his motivation towards learning, thus improving the learning and raising the level of academic achievement among learners. More importantly, the learner becomes the focus of the teaching and learning process, due to the fact that more modern and more accurate teaching methods are strongly applied through the use of the computer with its multiple media in delivering information to the learner with the main motivation to save time and effort, and this is what we call the blended learning (AL-Mousa and Al-Mubarak, 2005).

E-learning is considered the latest revolution in teaching methods and techniques that harnesses the latest technologies and programs in the learning process, starting from the use of electronic presentation tools to give lessons in the traditional classroom, as well as the use of multimedia in classroom education, self-learning, and ending with the construction of smart schools and virtual classrooms that allow students to attend and interact with lectures and seminars held in other countries through Internet and interactive television technologies (AL-Shashbul and Olyan, 2014). Due to the thought that traditional education and e-learning have advantages and disadvantages, and in addition to the fact that the existing educational system cannot be stopped and ignored, as well as the Electronic technology that cannot be abandoned or ignored, the idea of integrating traditional education with e-learning has emerged to show a new and effective type of education known as blended learning.

Thus, many studies have sought to directly integrate effective teaching methods in the context of e-learning, such as the most notable study of Papanik and Boubouka (2011), which emphasized the possibility of integrating active learning, collaborative learning and the scientific education with the computer, based on e-learning's context and environment. This study stressed the importance of involving learners in collaborative projects and activities that employ thinking, planning, evaluation, integration and interaction, which help in saving time, efforts and costs to attain the best possible results in the learner's academic achievement.

Ghanem's study (2009) also highlighted the effectiveness of the e-learning and mixed learning-based multimedia course in increasing the cognitive achievement related to the skills of developing the credited media programs of the students of the Education Technology at the Faculty of Specific Education. Azab's study (2009) stressed on the effectiveness of the blended learning course in developing the skills of geographic research and the trend towards information technology among the students of the experimental group. Abu Musa's study (2009) indicated that the use of the blended learning strategy in teaching has had a great impact on increasing students' academic achievement and in forming positive trends and attitudes towards the blended learning strategy.

Moreover, blended learning can include several learning tools such as instant virtual collaborative learning software, online courses, self-learning courses, electronic performance systems, and management of learning systems. The blended learning also integrates multiple activity-based events that contain the teaching in the traditional classrooms where the teacher meets the students face to face (Al-Faki, 2011). Also, Al-Kilani (2011) noted that the integration of e-learning into traditional education needs to establish the required good structure and organization as a guide to plan and develop the blended learning, combining the principles of classroom teaching, classroom ethics, content design and technology and information resources management and assessment.

Salem said (2004) that there are more than a few reasons that led to the use of blended learning. Both traditional and electronic learning have pros and cons, the existing traditional educational system cannot be stopped or ignored and this electronic technology cannot be stopped or ignored also. Then, the idea of the integrated approach or course, based on the integration between traditional and electronic learning of all kinds and forms, appeared to be known as “Blended Learning”. Despite millions spent on e-learning, it fails to meet all educational needs. Though some educational topics and areas are suitable for presentation through e-learning, there are still many topics and areas that educators and teachers failed to present through e-learning and need to be blended to meet the needs and patterns of different students.

As a fact, blended learning focuses on improving the accomplishment of learning objectives by applying appropriate learning technologies that fit in with learning styles to convey the right skills to the right person at the right time. Blended learning includes several principles as mentioned by Abdul Hamid (2010):

1. Focusing on the learning goal rather than the presentation method.
2. Everyone acquires different knowledge in the learning experience.
3. Many personal learning styles need support to reach a wide audience of learners.
4. In many cases, the most effective learning strategy is only created by the first-degree necessity and need at the appropriate and right time.

Therefore, the design of teaching and learning situations based on blended learning models depends on learning and teaching theories that can achieve the desired learning objectives to attain effective learning. Blended learning is considered to be one of the most significant and modern methods. It has many advantages that lead to more effective learning, achieving learning goals, promoting positive participation by the learner and significantly reducing the cost of education. When compared to other e-learning patterns, it enriches human knowledge and raises the quality of the learning and teaching process. Blended learning also provides the required flexibility to learners by offering many options that focus on learning in interactive and interesting ways instead of traditional learning, and therefore leads to higher academic achievement (Jaber, 2007).

As a fact, the phenomenon of weak academic achievement is widespread in many academic and educational institutions in many Arab and foreign countries. It is considered one of the most central problems faced by those who are responsible for the educational process, from teachers, mentors, administrators, educational officials to parents. With the rapid growth of this phenomenon, educational leaders in many civilized countries are concerned with developing adequate strategies to solve this problem (Al-Astal, 2010).

Academic achievement is considered to be closely related to learning and study. The student's progress in learning is often determined by measuring the level of his academic achievement, expressed by scores the student obtains after studying a certain amount and doing an achievement test that measures his learning. This score is an indicator for parents to monitor their children's academic progress, and this may result in an urgent need to follow up the academic achievement through the teacher and his or her active role in the life of the learner at all levels. The significance

of learning achievement and its benefits are reflected in the students' personality, and are seen in his high academic development, as the teacher works on preparing the student for his social life in the future (Al Hassan, 2011).

Based on the aforementioned thoughts concerning the concept of blended learning leads to a study of the achievement and skills resulting from the use of this strategy. Accordingly, the problem of this study is to examine the effects of using the blended learning strategy on the academic achievement in a Computer Course among the ninth-grade students in Jordan.

Problem and questions of the study

This study is based on consideration of the rapid advancement of educational technology and its impact on the teaching process, along with the fact that technology is indispensable for attaining comprehensive development. The modernization of education should stem from the idea of developing teaching methods, approaches, strategies and use of technology in education. The intended result is an effective and required means in developing these techniques, methods and strategies to increase the students' comprehension of the curriculum. Consequently, it is necessary to prepare learners with the skills and experience to enable them to deal with data and challenges of the age and raise awareness concerning technological innovations to enhance their potential in the educational field.

Most importantly, accomplishing the aforementioned thoughts requires knowledge of the most significant features of e-learning technology and its various programs, as this technology is considered one of the modern applications of information technology, which requires the identification of the possibility of its use in educational institutions to achieve trends regarding the preparation of individual capable to deal with the changes of this era. Furthermore, technology has broadened the concept of learning that is no longer limited to a specific age or place and specific resources and instruments. This has given rise to various patterns and forms, such as e-learning, distance learning, blended learning and self-learning. The learner's individual privacy and interactive and self-responsibility are considered one the fundamental principles that form the theoretical foundation of these modern methods and techniques of learning (Al-Quds, 2014).

Concerning the aim, it is to learn in modern ways and methods that support learning in general and sciences in particular. However, previous educational literature indicates that the reality of teaching sciences reflects a decline in the efficiency of teachers, affecting and reducing their abilities to perform effectively and in a good manner inside the classroom (Mohammed, 2013). One of the main obstacles to the advancement of schools is the concentration of teachers on the use of normal teaching strategies and the failure to employ e-learning in view of the current technological development.

Hence, it was necessary to identify the impact of applied using the blended learning strategy on the students' academic achievement in the Computer Course among the ninth grade students in Jordan, as the blended learning is one of the educational methods required by the requirements of the current age. It is also considered a means to the continuous learning that accompanies these learners throughout their lives to help them rely on themselves and enable them to make decisions and take responsibility.

Therefore, this study aims to answer the following main question:

- What is the impact of using the blended learning strategy on the academic achievement in the Computer course among the ninth-grade students in Jordan?

Objectives of the study

Generally, this study aimed at identifying the impact of using the blended learning strategy to raise the level of academic achievement of ninth grade students in the computer course.

Importance of the study

The importance of this study lies in the idea that the current and future educational process is explicitly related to the technological aspects of information computer technology applications and tools. This study's importance stems from the results that will be achieved and their degree of usefulness. The importance of this study also highlights the significance of using the blended learning method in teaching computer science for the ninth-grade students in Jordan, its role in raising the level of academic achievement using this method and its future role in expanding use of this type of education in Jordan. Also, its importance is not limited to computer course, as e-learning has become an integral part of current education and is complementary, if not an alternative to traditional education.

The importance of the current study stems from the significance of the use of information and communication technology in general and e-learning with its modern applications and techniques in the educational process. The importance of using the blended learning method also lies in facilitating the learning of students through use of the blended learning method and thus increasing their academic achievement. Therefore, the importance of this study is as follows:

1. This study is consistent with the Ministry of Education's aims towards the use of information technology in the teaching and learning process in order to improve the learning strategies and avoid the traditional methods.
2. Educate teachers and students in schools and educational officials to support the blended learning method.
3. The study comes in practice to reveal the effect of the use of the blended learning method to increase the level of academic achievement among learners.

Procedural terms

For the purposes of the study, the following terms shall be defined as follows:

- **Blended Learning:** Al Gharib (2009) defines it as the use of technological innovations to integrate objectives, content, learning resources and activities, and methods of communicating information through methods of learning and e-learning to create interaction between the faculty member as a teacher and a mentor for students through innovations that include specific electronic tools. As a procedural term, it is defined by the researchers as a method of education that relies on the integration of the traditional method (discussion and dialogue, collaborative learning, active learning, direct teaching and textbook) and e-learning (multimedia presentations, the Internet, etc) in presenting the educational content to students participating in this study.
- **Academic Achievement:** Hamdan (2006) defines it as mastering a set of skills and knowledge that a student can possess after going through educational experiences in a given course or groups of courses. As a procedural term, it is defined by the researchers as what the learner has really gained from the experiences, knowledge, information and concepts about the content of the scientific course. Achievement is measured by the score obtained by the students in the computer test, which was prepared by the course teacher.
- **Computer Course:** A two-module course. The first module included the design of the web pages using the HTML language with hypertext to move to different parts of the same page or other pages, and the second module included EXCEL software of electronic tables that show students how to create and use them.

Limitations and determinants of the study

The results of this study were specified as follows:

Spatial Limits: This study was limited to the ninth-grade students at Beren Secondary School for Boys in Jordan.

Time Limits: This study was limited to the first semester of the academic year (2017/2018).

Human Limits: This study was limited to the Ninth Grade Students.

Objective Limits: This study was limited to identify the effect of using the blended learning strategy on students' achievement in computer course. The results of the study were determined by the extent of the validity of the results, and relied on the extent of validity, reliability and responses of the study members on the used measuring instruments.

Previous studies

Some previous studies have dealt with different topics and areas on the use of blended learning in education. The researchers examined a number of these studies related to the subject of the present study. The following is a presentation of those studies arranged in chronological order.

Al-Tabar (2015) conducted a study aimed at investigating the effect of using the computerized sciences curriculum in acquiring scientific concepts and skills of social communication and problem solving among second grade students in Jordan. The study sample consisted of (40) second grade students in Amman, divided into two groups; the first was experimental one taught using the computerized sciences curriculum, and the other was a control one taught using the paper sciences curriculum (textbook). In order to achieve the objectives of the study, the researcher prepared the instruments of the study, namely: testing of the acquisition of scientific concepts, the card to note the skill of social communication and the questionnaire of the problem solving skills. The results showed a statistically significant difference ($\alpha = 0.05$) between the average understanding of the scientific concepts in the experimental group and the average of their peers in the control group in favor of the experimental group. There was also a statistically significant difference ($\alpha = 0.05$) between the average of skill of social communication in the experimental group and the average of their peers in the control group in favor of the experimental group.

Al-Zboun (2015) conducted a study aimed at investigating the effect of teaching using electronic courses (MODEL) on the achievement of the students at the University of Jordan in computer skills course and in the development of their self-learning and social communication skills. The study sample consisted of two randomly selected sections; the first one was the experimental group with (30) students, and the second was the control group with (30) students. The achievement test, the self-learning skills scale, and the social communication skills scale were designed to measure the effect of teaching by using electronic courses in the academic achievement and developing self-learning skills and social communication for the sample members. The results showed a statistically significant difference between the average of academic achievement grades and the grades on the self-learning skills scale due to the variable of teaching method and for the benefit of the experimental group taught using by the (MODEL). There were also statistically significant differences among the grades on the dimensions of the third social communication skills scale: self-communication, communication with the lecturer, communication with colleagues, and on the scale as a whole due to the teaching method in favor of the experimental group taught using the (MODEL).

Al-Rimawi (2014) conducted a study aimed at investigating the effect of using of blended learning on the direct and delayed academic achievement of the sixth-grade students in the English language course. The study sample consisted of 60 students that has been distributed to control and experimental groups, where the researcher used the semi-experimental approach and prepared the academic achievement test. The results of the study showed that there were statistically significant differences between the two averages of the direct achievement in favor of the experimental group.

There were also statistically significant differences in the delayed achievement in favor of the experimental group, and the blended education had a clear effect on student's academic achievement and in the development of their critical thinking skills.

Al-Sabbagh (2014) conducted a study aimed at perceiving the effect of the blended learning strategy in developing the skills of designing the algorithms among the students of the Faculty of Education at the Islamic University, with a sample of (60) female students of computer applications course. For the purposes of this study, the researcher used the analytical descriptive method to determine the skills of designing the algorithms, and the experimental method was used to find out the effect of employing the blended learning strategy on the development of the skills of the algorithms. In order to reach the results of the study, the researcher used a cognitive test to measure the level of acquisition of scientific information. Besides, the study was applied to students of the Faculty of Education at the Islamic University in Palestine. The results of the study found that there were statistically significant differences between the averages of grades of female students in cognitive achievement in the algorithms between the control group and the experimental group in the post application.

Abu Shukair and Harab (2014) conducted a study aimed at identifying the effect of the use of blended learning in teaching the Skills of Writing English Course in the development of the attitudes of the tenth-grade students in Gaza's governorates their attitudes towards it. To achieve the research objectives, the two researchers employed the experimental approach and designed a 22-item trend scale, which was applied to a 22-random sample of tenth-grade students from Rafah Martyrs School in Gaza. The results of the study showed that there were statistically significant differences between the averages of grades of students' attitudes in pre and post application towards the use of the blended learning strategy in the Skills of Writing English Course for the benefit of application due to the effective impact of the blended learning strategy.

In their study, Pilli and Aksu (2013) aimed to investigate the effect of computer-aided learning on the acquisition and preservation of concepts in fourth grade students in Northern Cyprus. The researchers selected a sample divided into two groups: The control group included 26 students taught using the traditional lecture method, and the experimental group included 29 students taught using computerized learning software. The sample was subjected to the pre and post achievement test. After analyzing the data, the study showed that there was a statistically significant difference in average achievement between the two groups in favor of the experimental group in the operations of multiplication and division, and the results showed no significant statistically difference in the average of achievement between the two groups in operations of fractions.

Al-Sharif (2013) conducted a study aimed at identifying the degree of use of secondary school teachers in Al-Qurayyat Governorate in Saudi Arabia for the blended learning and their attitudes towards it. The study sample consisted of 166 teachers, and two instruments were designed from (24 items). The results of the study showed that the degree of use of the teachers of the secondary stage of blended learning was high in all the items of the instrument. The attitudes of secondary school teachers towards the use of blended learning were positive in all the items of the instrument except for two items that came in a middle degree. There were also statistically significant differences in the degree of use of secondary school teachers for blended learning due to the variables of experience and for the benefit of teachers with experience ranging from (5-9) years, specialization and for the benefit of teachers of humanities, the academic qualification and for the benefit of teachers whose level of education is higher than a bachelor's degree.

Al-Enezi (2013) conducted a study aimed at investigating the effect of using the blended learning strategy in the teaching of Information Technology and Computer Networks Course on the academic achievement of female students of the Technology Department at Tabuk University compared with the traditional method of teaching, as well as recognizing the change in the

attitudes of students towards blended learning after applying an experimental treatment. The sample of the study consisted of (68) female students, distributed in two groups: a control group with (34) female students and an experimental group with (34) female students, and two instruments were used such as achievement test and computerized educational program. The results of the study showed that there were statistically significant differences in the achievement of female students in Information Technology and Computer Networks Course due to the teaching method, while there were zero statistically significant differences in achievement due to the variable of level of English language. There was also a positive change in the attitudes of the female students of the experimental group towards the blended learning appeared after the experimental treatment compared with the female students of the control group, while there were no statistically significant differences in the attitudes of the students towards the blended learning due to the level of English language in the study's two groups.

Al-Thaibat (2012) conducted a study aimed at investigating the effectiveness of programmed learning based on the use of the methods of the blended learning and the traditional method. The study sample consisted of (58) students that were randomly selected from two majors, namely: Child Education and Classroom Teacher enrolled in Teaching Methods Course for the first grades. In the study, the researcher used a multiple choice achievement test consisting of (45) items. The researcher used a survey as a study instrument to measure students' attitudes toward blended learning. The results showed that there were statistically significant differences in favor of the experimental group taught using the method of blended learning at the expense of the traditional method, and there were positive attitudes towards Educational Sciences Faculty students towards blended learning.

Faraj Allah (2011) conducted a study aimed at identifying the effect of the use of blended learning in teaching the Methods Course in Mathematics on the achievement of the students of elementary stage at Al-Aqsa University and their attitudes towards it. The researcher used the semi-experimental method with a sample consisted of (100) female student distributed in two control and experimental groups. The experimental group was taught using the blended learning method, and the number of its students (50) students, while the other group is the control group taught in the traditional method, where the number of members were (50) students. As for the instruments of the study, they were an achievement test in addition to a trend measure towards blended learning. In their study, Aliasgari, Riahinia & Mojdehavar (2010) aimed to reveal the effects of computer-assisted instruction (CAI) and attitudes of students studying mathematics. The study sample consisted of twelfth grade students from two high schools in Hachterd, Iran for the academic year 2017/2018. Of the five schools selected randomly, one of the two schools was selected to be the experimental group with 23 students, and the control group consisted of (27) female students. In order to achieve the objectives of the study, the experimental method was used in this study, as the computer-assisted instruction in mathematics was studied and tested as an alternative to traditional instruction. The study was conducted over four weeks in May 2008, where the effects of the independent variable (computer-assisted instruction) were studied in one secondary school and in another secondary school in the region, while the control group was used to measure the effects of traditional instruction. One of the most significant findings of the study is that there is a positive effect of computer-assisted instruction in teaching more than traditional instruction. The study recommended to pay more attention to the selection and implementation of the teaching method too. Massey (2009) conducted a study aimed at identifying the effectiveness of web-based lessons in an adult online learning environment. The study sample consisted of adult learners enrolled in the Online Technology and Media Education Course at Colorado State University-Pueblo. The total number of participants was limited to 20 participants which are the maximum admissions allowed to the course. The researcher collected data through a mixed-method approach, where the data collection instrument was two different surveys using qualitative

and quantitative measures. One of the main findings of the study is that web-based lessons are more effective than regular lessons.

In Mahmoud's study (2008), the researcher investigated the effect of teaching using multimedia in the development of communication skills in the Arabic Language Course among second grade students in Jordan. The researcher selected a sample of 59 students divided into two groups: the control group was taught in the traditional method, while the experimental group was taught using multimedia-based lessons. The results showed that there were statistically significant differences in the development of reading and audio comprehension skills in the Arabic Language Course between the two groups in favor of the experimental group taught using multimedia.

Comment on previous studies

It is clear to the researchers through the review of previous Arab and foreign studies, the extrapolation of some of the used methods, its objectives, results and instruments and the used methodology that the current study used the semi-experimental approach, which is consistent with previous studies. It should be also known that the methodology used in these studies was almost semi-experimental or experimental, such as the study of AL-Tabar (2015), AL-Zboun (2015), AL-Sabbagh (2014) and Abu Shuqair and Harab (2014).

Besides, it is noted that most of the studies that considered the use of the blended learning method dealt with different subjects rather than the study subject used by the researchers, where they used the Computer Course, as this is what distinguishes this study from other previous studies. Its distinction also lies in the sample's size, procedures and place of study as well.

Methodology and Procedures

Population study and sample

The study population consists of (56) Computer Course students for the academic year 2017-2018. The study sample consisted of two sections that were purposely chosen. One of the two groups was the experimental group with 27 students who study the Computer Course through the method of the blended learning. The other is the control group with 29 students who study the same course through the traditional method.

Methodology of the study

The researchers followed the semi-experimental approach for being compatible with the purpose of study because the two sections were purposefully chosen.

Study instrument

This study aimed to identify the learning effects of Computer Course students' use of the blended learning strategy on student achievement. To achieve this, the researchers developed the following instrument:

Achievement test

The researchers selected the first module (HTML) from the Computer Textbook, and after analyzing the content and objectives, the percentages were set for each lesson taking into account the number of educational objectives and the number of lectures devoted to teach each subject. The objectives included the levels of knowledge area based on diploma classification as follows: Knowledge, understanding, comprehension, application, analysis, combination and evaluation. The last three levels were grouped under the item of higher mental skills. Then, the researchers prepared an achievement test to measure students' achievement in Computer Course in the study groups (control and experimental). The test questions consisted of a set of (30) multiple choice questions. The test items were derived from the specific objectives of the educational content of the first module of the

Computer Course, as the maximum mark in the test was (30) marks. The student's achievement in the Computer Course can be inferred through the total mark he takes in the achievement test in the first module.

Validity of the achievement test

To verify the validity of the test, the test was presented in its preliminary form to a committee of raters consisting of (10) faculty members of the Jordanian universities that were asked to express their opinions on the extent of suitability of the test items for the subject of the study. Some amendments were made to the test items in light of the raters' suggestions and amendments. The appropriate amendments were made in the light of their suggestions until it has been decided in the final form of application. Based on the above, this test has the meanings of validity that make it suitable for study purposes.

Reliability of the achievement test

To ensure that the test is reliable for the study after being amended in the light of the raters' opinions, it was applied on a survey sample of (20) students from outside the sample of the study. This was done before the module was learned and was re-applied after two weeks of the first application, where the value of the reliability factor based on Pearson correlation coefficient was (0.90), and this was acceptable for the purposes of study.

Study variables: the study included the following variables:

First: Independent classifying variables:

Method of teaching: It has two levels (the traditional method, the blended learning strategy)

Second: dependent variables

Academic achievement

Results and discussion:

Results related to the question and its discussion:

What is the effect of using the blended learning strategy on the academic achievement of Computer Course among the ninth grade students in Jordan?

In order to answer this question, the arithmetic means and standard deviations of the marks of the study members were calculated in the pre and post achievement test. The ANCOVA analysis was also carried out to identify the effects of using the blended learning strategy on the academic achievement of Computer Course among the ninth grade students in Jordan as shown in Tables 1 and 2.

Table 1
Arithmetic means, standard deviations, modified means and standard errors for the marks of study members in the pre and post achievement test (Total Mark) according to the variable of teaching method

Group	Pre- Test		Post –Test		Modified Means
	Arithmetic Mean	Standard Deviation	Arithmetic Mean	Standard Deviation	
Experimental Group	12.6667	2.8691	24.7083	2.42234	24.663
Control Group	11.9688	2.7295	20.6875	2.16180	20.721
Sum	12.2679	2.7993	22.4107	3.01979	22.692

Table 1 shows that the mean of scores of the students of the experimental group taught using the blended learning strategy at the total score (24.7083) is higher than the mean of scores of the students of the control group, which was taught using the traditional method at the total score (20.6875). The standard deviation of the scores of the students of the experimental group taught using the blended learning strategy at the total score (2.42234) is higher than the standard deviation of the scores of the control group students at the total score (2.16180). Thus, it has been found that there are apparent differences between the two groups in favor of the experimental group that studied the Computer Course using the blended learning strategy.

To determine whether there were statistically significant differences at the level of $\alpha = 0.05$, the ANCOVA analysis was performed as shown in Table 2.

Table2
Results of the ANCOVA analysis accompanying the test of the differences in the average of scores in the post-achievement test (total score) according to the variable of teaching method

Variance Sources	Sum of Squares	Freedom Degrees	Mean of Squares	F Value	Statistical Significance
Accompanying Variable	5.335	1	5.335	5.335	.315
Teaching Method	209.799	1	209.799	209.799	.000
Error	274.498	53	5.179	5.179	
Sum	501.554	55		5.335	

Table 2 shows that there is a statistically significant difference at the level of significance ($\alpha = 0.05$) between the means of scores of the post-achievement due to the variable of the teaching method in favor of the experimental group taught using the blended learning strategy. Therefore, zero null hypothesis is rejected (there is no statistically significant difference between the means of scores of the two groups of students, the experimental which is taught using the blended learning strategy, and the control system that is taught in the traditional method in the academic achievement of the Computer Course). This indicates the effectiveness of using the blended learning strategy in teaching Computer Course. Besides, ETA Square was calculated to determine the effect of the teaching method on students' academic achievement. It was also found that the size of the effect was huge, as ETA Square's value was 0.418; meaning that the teaching method explains 41.8% of the total variation in academic achievement and the remaining (58.2%) is unexplained due to other factors. This indicates that there is a significant effect on the academic

achievement of the Computer Course among ninth grade students due to the teaching method using the blended learning strategy.

The aforementioned result can be attributed to the multiple advantages of the e-learning system, which are expected to serve the students' learning and contribute in improving their level, such as the ability of this type of learning in helping the learner review his or her educational subject and study it more than once without feeling bored and at the time and place he wants. In general, this increases his or her motivation to learn, which increases his or her direct academic achievement, and that the learning method through the blended learning strategy is a new strategy for students, which has raised their interest and increased their motivation to learn. It should be also known that the learning through the blended learning strategy is constructed on combining the abstract theoretical knowledge with the concrete practical application, which provides the colors, animations, images and sounds. Likewise, these things may give a greater educational effect than the written words and enable the student to employ linguistic knowledge in all aspects of life, alongside enabling the student to consolidate these linguistic concepts in his or her mind, which increase the scientific and academic achievement. Similarly, the blended learning strategy provides flexibility in choice to suit the learner's needs and tendencies and uses them in a way that suits his / her skills, as all of this may have positive effects on the achievement of the learner who uses it. Similarly, it is not only a modern individual learning technique but also application of psychological principles that have been established according to scientific and logical rules. So, e-learning provides a rich learning environment with a lot of resources such as images, graphics, texts, videos, e-books, and multiple Internet portals), as well as other features and benefits in the process of acquiring learning that enhances the independence of both teacher and student when each one of them acquires the skills of research, investigation and treatment of the educational subject according to the preferred learning style to the person, where he can find the written material, audio and video on the Internet. Moreover, the blended learning provides many scientific sources that enable the teacher to obtain modern and various scientific materials that will develop the sense of the importance of the achievement through e-learning.

As a fact, the blended learning strategy is a new way for students, which has raised their interest and increased motivation to effectively learn and search, and this was confirmed by the results of previous studies. It is also confirmed by the researchers when observed it during the application, where students showed all the enthusiasm and pleasure when using e-learning in education.

Most of the results of the previous studies confirmed the connection of the learning method using the blended learning strategy between abstract theoretical knowledge and concrete practical application for providing several colors, animations, images and sounds. These things may give a greater educational effect than the written words and enable the student to employ linguistic knowledge in all aspects of life. It also helps the student to consolidate these linguistic concepts in his or her mind, which increase the scientific and academic achievement.

The increase in the achievement of students in the experimental group better than their colleagues in the control group can be attributed to several reasons such as the members of the experimental group studied in a way focusing more on the scientific content of the study material, which strengthened the scientific development of the concepts in the module and in contrast the members of the control group studied in a way focusing more on the memorization of information and facts without focusing on the scientific content of the module. This result is consistent with a number of previous studies which have indicated that teaching using the blended learning strategy has a positive effect on students' learning in general and on academic achievement in particular, such as the study of Tabar (2015), AL-Zboun (2015), Al-Rimawi's study (2014), Abu Shukair and Harab (2014) and Pilli and Aksu (2013) whose results indicated the e-course achieves a high degree of effectiveness in improving the academic results of the graduate students at the Faculty of Education.

Recommendations:

Based on the results of the study, the following recommendations can be made:

1. Generalizing the experience of using the blended learning strategy on the rest of the courses.
2. Urging the teachers to continuously use the teaching method based on the blended learning strategy, which may contribute to increase student achievement.
3. Designing and implementing learning program based on the e-learning.
4. Conducting other new studies with different designs and measurement tools from those adopted in this study.

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[Return to Table of Contents](#)

[Return to Table of Contents](#)

Editor's Note: When adopting new technologies, methods and curriculum it is advisable to compare results against the previous method of teaching. If significant positive results are achieved, then the new method should be adopted.

Using online learning materials to develop Taiwanese college students' English reading proficiency

Dylan Sung and Che-Yu Yeh
Taiwan

Abstract

In the digital information age, integrating computer technology into the teaching of English has become a popular trend. This study aimed to explore the effectiveness of utilizing multimedia online learning resources on the English reading proficiency of non-English major college students in Taiwan. The researchers also examined the participants' perspectives and attitudes toward Live ABC e-Paper. The target population was students at a selected university in northern Taiwan. Two English classes with a total of 70 students were randomly assigned into either the control group or the experimental group. The experimental group did self-learning with Live ABC e-Paper every week for one and one-half semesters, while the control group did not receive it. Quantitative methods were employed to collect and analyze data. The instruments used included pre-test and post-test of English reading comprehension, and questionnaires. Results indicated that, Live ABC indeed enhanced the English reading proficiency of the experimental group. Participants revealed that utilizing of Live ABC e-Paper helped them learn English better. In addition, the study also found that the participants held positive attitudes toward Live ABC e-Paper. The results from the quantitative analysis concluded that Live ABC e-Paper positively affects enhancing English reading proficiency. Participants of the experimental group also expressed positive attitudes and willingness to continue using Live ABC e-Paper in the future.

Keywords: English as a foreign language (EFL), online learning materials, instructional technology, distance learning, distance education, computer assisted language learning (CALL), reading proficiency, reading comprehension, English learning, higher education

Introduction

In the era of information and technology explosion, people in the world come into contact with one another more often and more easily than ever before. Second language here specifically refers to English. It is the process by which students learn it in addition to their native language. Nowadays, the Internet has become an universally important and useful English learning tool.

Generally speaking, distance education has been delivered by technologies such as video conferencing, videotape, satellite broadcast, TV broadcast, and the Internet (Cavus, 2007). Internet-enabled information and communication technologies/resources (ICTs) often have positive impacts on learning. In a recent study, Witt (2017) also pointed out that distance learning has improved tremendously in recent years as both teachers and learners are now more familiar with the use of technology. It is of importance for schools to provide similar education and training to the students.

During the process of learning English as a second language, listening, speaking, reading, and writing are seen as the fundamental skills. Binnur's (2009) study shows that using technology in EFL classrooms can improve these four skills. In today's modern society, especially in text-rich, developed countries, the ability to read well can and does make an enormous difference in one's school performance, career potential and personal success (Kearsley, 2002; Lo Bianco & Freebody, 1997). Language learners are taught to learn how to read so that they can eventually

read to learn. In other words, reading can be seen as a powerful tool that enables one to acquire knowledge and understanding. However, Sung (2011) pointed out that the technology still has limitations as to improve language learners' speaking skills. However, the technology seems very suitable for improving reading skills. Tanyeli (2009) conducted a study and found that the experimental group who were involved in online reading achieved a higher level of learning. The results show that there is a significant difference in reading comprehension scores achieved on the reading comprehension tasks before and after online English language instruction on students' reading skills.

It is easy and convenient to use the Internet as a tool for learning in the virtual learning environment. On the other hand, learning a foreign language is a challenging process and students always need motivation, both intrinsic and extrinsic, and encouragement during their learning period. Technology might be one of the factors that affects students' attitude positively in the teaching and learning process (Adiyaman, 2002). The Internet has great potential for use in the delivery of learning to a variety of people. Web-based technologies and powerful Internet connections provide a range of new possibilities for the development of educational technology. For students, the Internet is a useful, convenient medium. Investigations show that 90 percent of university students use the Internet quite often in Taiwan (Taiwan Network Information Center, 2016). Data also show that 59 percent of university students regard the Internet as a learning tool or facilitator, which includes online assessment, course syllabi, video teaching, and online learning groups.

Concerned about the effects of computer assisted language learning and the importance of second language reading comprehension, this study adopts the online learning material, Live ABC e-Paper, as a self-learning tool. It is available online in the English self-learning section of a library website of a selected university. Students and faculty can log in for totally free at anytime and anywhere through an Internet connection.

The reasons for choosing this online learning material are based on the following characteristics: convenience, non-restriction of location and time, free of charge for the participants, and an abundance of learning materials. The Live ABC e-Paper online learning materials under investigation consist of five categories: (1) daily life, (2) living environment, (3) transportation, (4) entertainment, and (5) festivals. These are divided into 50 units. This study used 35 randomly selected units from five categories as a self-learning syllabus.

Though many scholars espouse the benefits of web-based learning and the importance of reading comprehension, previous research revealed that the ability to utilize better reading strategies to comprehend the text depended on the learners' foreign language reading proficiency (Devine, 1988), prior knowledge on the subject domain (Carrell, 1988), topic interest (Schiefele & Krapp, 1996) and learning styles (Bernhardt, 1991). However, there have been few studies that investigated the contribution of these variables to reading in a hypermedia reading environment, where the information is presented in a nonlinear way through multiple types of resources such as text, graphics, sound, video and animation (Ariew & Ercetin, 2004).

Hence, this study attempts to investigate the effectiveness of utilizing Live ABC e-Paper online learning materials on the development of EFL English reading comprehension. Additionally, according to Adiyaman (2002), technology might be one of the factors that affects students' attitudes positively in the teaching and learning process. The researchers also investigated learners' perspectives with a 5-point Likert Scale questionnaire.

Methodology

The study focuses on reading comprehension and it is designed to investigate the influence of integrating Live ABC e-Paper online learning materials into English learning and teaching. The purpose of the study was to seek answers to the following questions:

1. To what extent do Live ABC e-Paper online learning materials facilitate Taiwanese non-English major college freshmen's English reading comprehension?
2. What are learners' perspectives on utilizing Live ABC e-Paper online learning materials?

Population and sample

The target population chosen for this study was the students at a selected university in northern Taiwan. Two English classes for a total of 70 students took part in this study for a period of seven months. Both classes were taught by the same instructor.

To investigate the effects of utilizing Live ABC e-Paper Online Learning materials on the development of reading comprehension and participants' perspectives, one of the classes was an Experimental Group while the other was a control group. There were 33 students in the Control Group; and 37 participants in the Experimental Group. Both groups received the same instruction from the lecture prepared by the professor. However, the Experimental Group were, for 26 weeks, assigned to follow a study schedule designed by the researchers and do self-learning activities with Live ABC e-Paper Online Learning materials after class or during their free time.

Procedure

The specific schedule of self-learning of the Live ABC e-Paper online learning materials was presented as follows. In order to make sure students in the two groups had similar English capability, all the students took an English reading comprehension test before receiving different treatment. In the first week, both the Experimental Group and the Control Group took part in a pre-test. Starting in the second week, the Experimental Group followed the schedule to engage in self-learning after class. The participants of the Experimental Group read two to four topics each week.

The content of Live ABC e-Paper online learning materials consisted of five categories and was divided into 52 topics. Topics were randomly selected from five categories to apply to the self-learning syllabus in the study.

Instrumentation

The researchers used quantitative methods to collect data in this study. The instruments employed include a pre-test and post-test of reading comprehension, and questionnaires: (1) the pre- and post-test of reading comprehension and (2) the questionnaires of students' attitudes and perspectives toward online learning materials.

Pre-test, post-test, and questionnaire

The instruments applied in the study include a pre-test, a post-test, and a perspective questionnaire. Concerned about the students' English proficiency, the researchers adopted a reading comprehension from the General English Proficiency Test intermediate level for both the pre-test and post-test. Both tests were identical in level of difficulty, format, item number, and item types, but contained different sets of questions. Quantitative data were constructed from the pre-test, post-test, and a questionnaire. Before starting the different treatments, the researchers ran an Independent Sample *t* test to compare two groups' outcomes of the pre-test to make sure both groups were similar in English performance and English reading comprehension level. Furthermore, in order to measure the potential effectiveness of the material on reading

comprehension after online learning treatment, a Paired Sample t test was used to analyze the two groups' outcomes of GEPT intermediate level reading comprehension.

Pre-test

The purpose of the pre-test is to collect reading scores of participants of both groups prior to the different treatment of the Live ABC e-Paper online learning materials. In other words, it was to record the participants' reading ability prior to taking online learning. The content of the pre-test consists of 30 multiple choice questions. Students worked in a classroom and the test lasted for 35 minutes.

Post-test

The purpose of the post-test was to collect students' reading scores after the participants utilized self learning using Live ABC e-Paper online learning materials. In other words, it is to measure the differences of participants' competency in reading after utilizing the online learning materials. Students worked in the same classroom as they did in the pre-test and the test lasted for 35 minutes as well.

Questionnaire

The purposes of the questionnaire collected three parts of data from the Experimental Group. First of all, the researchers examined the participants' perspectives and attitudes toward the Live ABC e-Papers. It was given to the students of the Experimental Group to find out their perspectives toward using the Live ABC e-Paper online learning materials. Secondly, the data of questionnaire provided participants' self-assessment of English learning performance and outcomes with Live ABC e-Papers. Participants in the Experimental Group were asked to fill out the questionnaires after the post-test in the final week of the semester. The questionnaire contained 41 items and was divided into five sections: (1) Relevance to English learning websites, (2) Live ABC e-Paper online learning website, (3) Learning outcomes of Live ABC e-Paper online learning website, (4) English learning experiences and process, (5) personal background information.

The questionnaire consisted of five parts, including 34 items and 7 open-ended questions. The 34 items adopted a five-point Likert scale ranging from 5 (strongly agree) to 1 (strongly disagree). To raise the reliability of the questionnaire, the researchers designed an item with negative statements to make sure the data from the participants was convincing. Descriptive statistics were used to document students' attitudes and perspectives towards the use of the Live ABC e-Paper online learning materials.

Data collection

The results of pre-test, post-test, and questionnaires were used for data collection in the study. The data conducted and completed from the following stages. First of all, in the beginning of the semester, the participants of both the Experimental Group and the Control Group received pre-test on reading comprehension of GEPT on intermediate level before the different treatments. After the last week of treatment, the Experimental Group and the Control Group received the reading comprehension test again but with a different set of questions. Meanwhile, the questionnaire was given to the participants at the end of the treatment to investigate students' attitudes toward online learning and perspectives of Live ABC e-Paper online learning materials as well.

Data analysis

In the beginning, the researchers ran an Independent Sample t Test to compare and contrast the two groups to make sure the two groups had similar English reading comprehension levels. Furthermore, a Paired Sample t Test was used to determine whether the differences between the mean scores of pre- and post-test were statistically significant. Meanwhile, the study also ran another Paired Sample t Test to compare the pre-test outcome and post-test outcome of the two groups separately to ensure the result would be convincing.

Quantitative analyses were employed in this study. Research question 1 was analyzed through the result of pre- and post-test and the result of questionnaire. Research question 2 was analyzed quantitatively through the questionnaire. Numerical data collected in this study were analyzed by the Statistical Program for the Social Sciences (SPSS) edition 18.0 to answer the research questions. Demographic questions, like participants' personal background information, were analyzed using descriptive statistics to analyze and described.

For Research Question 1, a Paired Sample *t* Test analysis was applied to examine whether there were significant differences between the pre-test and post-test scores of the Experimental Group and the Control Group. To answer Research Question 2, the researchers analyzed the data generated from the questionnaire with descriptive statistics.

Results

The results of the analyses from the study are contained in this section. First of all, the researchers will report the results of the pre-test and post-test between experimental group and control group. Then the findings of the questionnaire will reveal the perspectives of the participants.

In this study, the researchers chose 70 participants, 37 from the experimental group and 33 from the control group. To examine the homogeneity between the two groups, the researchers ran an Independent Sample *t* test (see Table 2) with SPSS edition 18.0 after assessing the pre-test of English reading comprehension.

Table 2
Summary of the pre-test's independent sample *t* test

Group	Number	Mean	Standard Deviation	<i>t</i>
Experimental Group	37	59.57	18.06	.33 n.s.
Control Group	33	58.30	13.97	

n. s. $p > .05$

From Table 2, the pre-test results show that the mean score of the experimental group was 59.57 and the standard deviation was 18.06. On the other hand, the mean score of the control group was 58.30 and the standard deviation was 13.97. Levene's *F* was not statistically significant ($p > .05$), the variances were not significantly different and the assumption of equal variances was not violated. In that case, the Equal variances assumed line was used, then SPSS adjusted the $t = .33$, $df = 68$, $p = .746 > .05$. Due to $p = .746 > .05$, it represented that the Experimental Group and the Control Group could be seen as homogeneous. In other words, both the Experimental and Control Group had similar English reading capabilities before the variable, "Live ABC E-paper," was added into the Experimental Group.

Table 3
Descriptive statistic reading comprehension scores of the pre-test

Group	Number	Mean	Standard Deviation
Experimental Group	37	59.57	18.06
Control Group	33	58.30	13.97

Table 4
Descriptive statistic reading comprehension scores of the post-test

Group	Number	Mean	Standard Deviation
Experimental Group	37	69.51	10.93
Control Group	33	63.03	14.63

After finishing the treatment with Live ABC e-Paper self-learning, participants of both groups took a reading comprehension post-test. In order to compare and contrast the outcomes between the two groups, the researchers ran a Paired Sample *t* test (see Table 3 & Table 4) to analyze the results of the pre- and post-test. To find out the effectiveness and extension of improvement after utilizing Live ABC e-Paper on English reading comprehension on the Experimental Group, the researchers ran a Paired Sample *t* Test to analyze the score of the two groups.

Table 5
The results of pre- and post-test of experimental group

Item	Mean	Number	S.D.	t	Sig.
Pre-test	59.57	37	18.06	-3.21	.003**
Post-test	69.51	37	10.93		

** $p < .01$

From Table 5, the results show that the mean scores of the pre- and post-test were 59.57 and 69.51 and the standard deviations of the pre- and post-test were 18.06 and 10.93. Comparing the mean scores of the Experimental Group between pre- and post-test, it could be assumed that the participants of the Experimental Group made progress on their English reading comprehension after applying the Live ABC e-Paper self-learning. On the other hand, the evidence of improvement could be generated from the statistical data. From the same table, $t = -3.206$ and $p = .003$ reached .01 level, it showed that there was a statistically significant difference in the post-test scores at the .01 level ($p = .003$, see Table 5).

Table 6
The results of pre- and post-test of control group

Item	Mean	Number	S.D.	t	Sig.
Pre-test	58.30	33	13.97	-1.96	.06 n.s.
Post-test	63.03	33	14.63		

n. s. $p > .05$

In contrast, from Table 6, the results showed that the mean scores of the pre- and post-test were 58.30 and 63.03 and the standard deviations of the pre- and post-test were 13.97 and 14.63. Even though the mean score of the Control Group between the pre- and post-test showed that the participants of Control Group also made progress on their English reading comprehension, from the statistical data, $t = -1.96$ and $p = .06 > .05$, it could be assumed that there was not a statistically significant difference between pre- and post-test scores.

These results indicate that the Experimental Group was able to complete the English reading comprehension test more accurately than the Control Group. The Experimental Group made fewer errors in reading comprehension than the Control group. Meanwhile, comparing and contrasting the results of the post-test between the two groups, it could be concluded that there was a strongly significant difference with the treatment of applying Live ABC e-Paper with self-learning. Through data analysis of the pre- and post-tests, utilizing Live ABC e-Paper really could enhance the participants' English reading capability.

Discussion

To answer Research Question 1, there are three parts of data providing evidence of the effectiveness of utilizing Live ABC e-Paper on participants' reading comprehension. First of all, as the results of the post-test reported in the previous section, there was a significant difference between the Experimental Group and the Control Group. The results showed that the post-test scores of English reading comprehension in the Experimental Group significantly increased more than those of the Control Group, revealing that Live ABC e-Paper did enhance participants' English reading comprehension capability.

On the other hand, participants in the Control Group continued to use the lecture-based English learning model and did not self-learn with Live ABC e-Paper. The results showed that the post-test scores of the Control Group showed less improvement than the Experimental Group on English reading comprehension. However, both groups had a similar English reading ability before the different treatment. It proves that Live ABC e-Paper did facilitate English reading ability for the participants of the Experimental Group after 26 weeks self-learning.

Furthermore, data from the second part of the questionnaire also showed evidence of the benefits of Live ABC e-Paper on English reading comprehension. Participants mentioned that the content of Live ABC e-Paper, including theme vocabulary, slang, phrases, and conversation could facilitate and enhance their English reading ability. It also displays evidence that Live ABC e-Paper really helped the participants of the Experimental Group to make progress on English reading comprehension.

Participants thought highly of the abundant resources that could enlarge their vocabulary size. As previously discovered by other scholars (Anderson & Freebody, 1981; Mezynski, 1983; Qian, 2002), vocabulary knowledge is very important for reading comprehension. Chall also (1987) suggested that a large vocabulary allowed for effective reading and, in turn, increased vocabulary knowledge because the reader will be able to guess the new vocabulary from context. Combining the data and literature review, it can be concluded that Live ABC e-Paper improved the size of the participants' vocabulary, slang, and phrase knowledge. At the same time, it facilitated the English reading comprehension.

Vocabulary, phrases, slang, and idioms made reading articles and paragraphs become easier than before. To sum up, from the post-test score of the two groups, Live ABC e-Paper indeed enhances English reading comprehension. The evidence of improvement in English reading comprehension can be seen in the quantitative results.

To answer Research Question 2, the data of the questionnaire must be reexamined. The researchers answered for the following aspects. From the first part of questionnaire, participants showed that positive responses and perspectives toward using websites and computer technologies to learn English. The results showed that participants mostly agreed that the website was actually a good place to learn English. On the other hand, most of the participants thought that they could acquire different knowledge compared to the textbooks. They also mentioned that using English learning websites would allow them to practice the learning content multiple times.

To sum up, participants perceived computer technologies and English learning website as a useful and convenient English learning tool. Not only did the participants obtain the English knowledge different from the textbooks, they also received more learning flexibility and greater chance to practice repeatedly.

Exactly 50% of the participants thought that Live ABC e-Paper was interesting to them, and 47.2% of the participants kept a neutral attitude towards it. However, there was one participant (2.8%) who stated that the content of Live ABC e-Paper could not arouse his/her interests.

Moreover, 47% of the participants thought that Live ABC e-Paper could trigger their learning motivations, and 50% of the participants kept a neutral attitude. However, there was one participant (2.8%) who stated that the content of Live ABC e-Paper could not induce his/her learning motivations. To sum up, most of the participants thought the content of Live ABC e-Paper could not only arouse their interests to learn English but also trigger English learning motivations.

The results indicated that 88.8% of participants thought that Live ABC e-Paper was convenient during the process of self-learning. In addition, 69.5% of participants considered the materials of Live ABC e-Paper to be balanced between difficult and simple. Concerning the characters of practicality and adaption for life, 77.8% showed that participants agreed on the practicality of Live ABC e-Paper.

Due to its convenience, balance of difficulty and simplicity and practicality, participants were satisfied with the content and learning materials of Live ABC e-Paper. However, they looked forward to seeing updates to the website and new topics they were eager to learn.

As to the students' responses to learning outcomes using Live ABC e-Paper, 80.5% of participants claimed that the content and learning materials of Live ABC e-Paper could improve their English capability. Results showed that most participants agreed that the content or materials of Live ABC could enlarge the size of their English vocabulary, phrases or slang. Participants also thought its content or materials could enhance their spelling capability. Participants also took positive attitudes toward its pronunciation function being helpful for learning English.

For improvement of reading ability, results showed that participants mentioned that the content of Live ABC e-Paper, including theme vocabulary, slang, phrases, and conversation, could facilitate and enhance their English reading ability. It also displays evidence that Live ABC e-Paper really helped participants of the Experimental Group make progress on their English reading comprehension. However, results showed that only 38.9% of participants believed that Live ABC e-Paper may enhance their English writing ability.

Participants thought Live ABC e-Paper could facilitate correct pronunciation, enlarged vocabulary, slang and idioms size, and most importantly, to enhance their English reading comprehension. However, it seems to only slightly improve their English writing ability.

The following recommendations are given for future studies. First, the length of the experimental treatment can be extended. The time for conducting this study was only for one and half semesters. Due to the limited time duration, the short-term effects could differ from long-term effects.

Second, subsequent studies should be conducted at several universities to confirm the generalizability of the results. Third, in addition to investigating participants' perspectives, future studies may focus on the impact of different English skills which are not introduced in this study. Lastly, self-learning may be one uncertain and ill-controlled variable for the participants if the researchers did not set up the schedule for self-learning. Further researchers can design a teaching schedule with Live ABC in class to prevent failure of experiments and make sure the data is more convincing and reliable.

Conclusions

This study investigated the effectiveness of utilizing Live ABC e-Paper on the development of EFL learners' English reading comprehension and examined their perspectives toward Live ABC e-Paper as well. In accordance with the results and discussion, several major conclusions are made.

Findings derived from the study led to the conclusion that the use online learning material enhances students' English learning interest and learning motivation. Due to the practicality and abundance of learning materials, participants in the experimental group increased their learning motivation. Second, the results from the post-test reveal that there are significantly positive effects from Live ABC e-Paper on participants' English reading comprehension. On the other hand, data show that the type of technology utilized for this study, namely Live ABC e-Paper, showed effectiveness in improving the overall English learning experience. In addition to improving reading comprehension, additional benefits include vocabulary expansion and pronunciation correction. Moreover, students enjoy the convenience, balance of difficulty, and user-friendliness of the technology. Students also find the practicality of the content and online learning materials attractive. They show motivation and willingness to continuously use the technology for English learning.

This study contributes to educators as it provides guidelines when teachers want to apply computer technologies and combine English learning websites to teach English. Most importantly, this study shows a useful example to choose appropriate English websites and systematical schedule for college English instructors. For English learners at the college level, this study shows the evidences that English reading proficiency can be enhanced through utilizing English learning websites and online materials. It is an effective self-learning method outside the classroom setting for English learners.

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Editor's Note: For many years, the editors of this journal did substantive editing. The final manuscript was given to a copywriter to review and correct written material to improve accuracy, readability, fitness for its purpose and to ensure that it is free of error, omission, inconsistency, and repetition. Copy editing is done before web layout and design, publication and final proofreading. My best editing would be heavily marked up with changes, suggestions, and squiggles. This paper explains how writing teachers can involve students to interpret their marked-up assignments to improve their writing. DP.

Low tech, high reward: using Google Docs to help students decipher and pattern teacher feedback on writing assignments

Kelly Morris Roberts, Macy Allen, Kristen Certo Outen

USA

Abstract

This article describes a year-long experiment with various writing classes whereby students took written comments on papers, “coded” them by creating keywords to the problems and suggestions given, and then shared them in a google doc for the class. Both teachers and students expressed appreciation and progress in deciphering what instructor comments were conveying, in noticing patterns in comments and finding errors to avoid for future papers, in communicating and identifying more clearly what needed to be retaught or improved in future writing, and in celebrating each other’s successes in writing. Students also suggested next steps that the teachers plan to implement in future writing activities.

Keywords: writing, writing instruction, google technology, technology-enhanced feedback, technology-enhanced instruction, interdisciplinary research in writing, cross-level grading, writing assessment, qualitative methods, written feedback, computer assisted pedagogy, high school writing, college level writing, middle school writing, best practice, coding.

Introduction

Here’s the riddle: what laborious and often low reward/potentially futile activity does every writing instructor on the planet spend half of her working life doing? If we are painfully honest about this almost universally-recognized experience, we would admit that it is providing extensive feedback on processed papers. We provide proofreading marks, we write paragraphs on how to create better paragraphs, and we dream up as many possible iterations of “nice sentence structure,” “I like this point,” or “can you give me another example?” And we proudly hand back our lifeblood lessons to students only to see them search for their grade, pause ever so slightly—and then return promptly to their own lives and thoughts, our sage advice not only unread and uncelebrated—but possibly unseen, as in “they-didn’t-even-glance-at-each-page”.

Tomes have been written about how to provide meaningful feedback to students and how to get those messages through to students—but in our experience very, very little works every time. So this year, we teamed up to try another suggested strategy: add tech. Since we teach in diverse socioeconomic settings, we wanted to use the most accessible tech possible. And since we are low budget, we wanted to use the lowest price tech possible, one that would do the trick but not distract us or the students from the serious task of actually acting on the writing advice once they ingested it, when doing the next hard task of improving their writing.

To that end, we engaged the universal Google Doc. If you’ve got mail, you’ve got the tech you need to do this task. The experiment was simple: for about four months, students would read all of our comments, add in their own vernacular, and “code” each and every comment, comma, circle, and question mark to figure out what we were trying to tell them. If they didn’t understand the comment, they would have to slow down and ask us. If they could not figure out what that ubiquitous “check” indicated beside a paragraph, they would have to slow down and ask us. If

they didn't know what a writing term or proofreading symbol meant, they would have to slow down and ask us, a friend, or "The Google." If they saw multiple comments on each page, they would have to slow down and take the ten minutes required to figure out a "code" they wanted to give each comment and then put it in the google doc for the class comment sheet.

You get the gist. Slow down. Slow down. Our hypothesis was that the biggest impediment to making feedback on papers meaningful and effective was that there was simply no immediate accountability—or even delayed accountability for some students who routinely received the same feedback paper after paper but who either didn't know why the grade was going down, didn't care why the grade was going down, or never even realized--or read--the pattern of suggestions in the first place. The google doc provided a way for the student to take the few minutes necessary to decipher and at least partially ingest the comments. Tracking paper after paper could help them realize patterns, and creating a class google doc where each student created his or her own pseudonym provided anonymity and the extremely helpful realization of what the class as a whole needed work on, needed to code differently, needed to clarify, needed to CELEBRATE conquering as fewer and fewer of the comments spoke to a skill on which the group had been honing. As our resident consultant and professional private tutor for writing, Kristen Outen, points out, the work of coding was not only important but necessary, both for students and for the instructor: "It is my personal belief and experience that our feedback, as teachers, requires follow-up. It is unfair to expect that students . . . stop to read our comments if we do not teach them, too, how to process the feedback. Most often teachers . . . are knee-deep into comments that, largely, end up as incomplete thoughts on a student's paper. As students move [through their education], they lose faith in the wide-variance of teacher feedback. It is important for teachers to remember that each teacher provides feedback in different ways and emphasizes different skills. Therefore, the tracking that you speak of, in some form or fashion, is absolutely necessary." We set up our google doc in five minutes, shared it with our students (about 150 participants), and launched the experiment in the spring of 2017.

How we started

The process of starting our experiment with google docs for coding written comments was fairly straightforward. After students had turned in a processed paper, we graded the paper and provided written feedback as usual. As we returned them to students, we discussed with each class the difference between higher order concerns for their writing—thesis, structure, development with robust examples, and critical thinking and reading, etc.—and lower order, sentence level concerns (wording, grammar, spelling, etc.). Depending on how independent each class was, we either brainstormed common codes for the comments (e.g., "comma use," "organization," "need more examples," citation style," etc.), or we provided a list of common codes and explained each—asking students to create their own and/or suggesting a code if they found a comment that was not conveyed on the list. We then gave students about ten to fifteen minutes to read, decipher, and "code" their comments (again depending on the needs of the class) and monitored the process by walking around the room and making sure students could read the comments and understand what we meant.

As you might imagine, we both felt it was the first time some of the students had read all of our comments at all, much less with much-improved understanding. We loved the feeling of being able to instantly see how our comments translated to the students—and we began to instantly jot down ideas for communicating better next time what we really wanted to see in the papers. Needless to say, the ten minute exercise felt better from the first paper on. As papers were added, we got better at remembering the vernacular by which students explained their writing challenges. Much more importantly, the students got much better understanding our comments (even reading our cursive writing, alas) and identifying patterns in the types of writing comments they were

receiving. We repeated the process of handing back each paper and having ten minutes in class to “code,” ask questions, and brainstorm common codes to add to the class google doc, and students got faster as the semester progressed. If they received the same comment paper one and paper two, students simply created a tally mark—a visual sign that a pattern might be emerging.

Sample Writing Comment Sheet:

	A	B	C	D	E	F	G
1	**use this sheet to categorize the comments on your papers						
2		class/semester	high order	high order	high order	high order	high order
3		Eng 320 s 17					
4	Smith	Eng 320 s 17	How to integrate quotes	topic sentence not being clear	logic thesis	better ways to make a claim	literary pre
5	Johnson	Eng 320 s 17	overlapping themes	literary present tense	other examples	MLA citation	similar topi
6	Lane	Eng 320 s 17	MLA citations	literary present tense	topic sentence vs. examples	meaning behind examples	topic sente
7	Minnie Mouse	Eng 320 s 17	Use of examples	Transitions	Nuggets of quotes	Logic	Tenses
8	Payal	Eng 320 s 17	paragraph structure	provelink examples to point	clarity	topic sentences	ambiguous
9	Nicole	Eng 320 s 17	organization	transition	logical thesis	comma use	
10	Tigger	Eng 320 s 17	be more formal	topic sentence	logic thesis	comment use	
11	Summer	Eng 320 s 17	topic sentences	nuggets of quotes	mla citations	logic with thesis	proper tand
12	Noname	Eng 320 s 17	one topic not clear	"nuggets"	need more support	need more examples	proper tent
13	Cookie	Eng 320 s 17	Present Tense	MLA format	More examples	Comment on what examples	Integrating
14	Shady	Eng 320 s 17	overlapping themes	topic sentence	other examples	be more formal	clarity
15	pizza	Eng 320 s 17	nugget quote	transition	more examples	topic sentences	broaden po
16	Steb	Eng 320 s 17	be more formal	transition words	literary present tense	transition phrases	
17	Daisy Duck	Eng 320 s 17	Nugget quote	literary present tense	topic sentence vs. examples		
18	Eleanor Rigby	Eng 320 s 17	Integrating quotes	MLA citations x1	literary present tense	Logic with thesis	
19	Cinderella	Eng 320 s 17	Transitions	Literary present tense	Connecting Paragraphs and The MLA Formatting		
20	Divergent	Eng 320 s 17	Present Tense	topic sentences	needs further examples/develop logic		
21	Sophia	Eng 320 s 17	Literary present tense	supporting examples	focus on the research question	strong points	Point of Vie
			Present Tense	MLA format	more examples	topic sentences	proper tand

At the end of the semester, we gave the students a google survey, asking them about the coding activity.

Low Tech Tools for Writing Survey

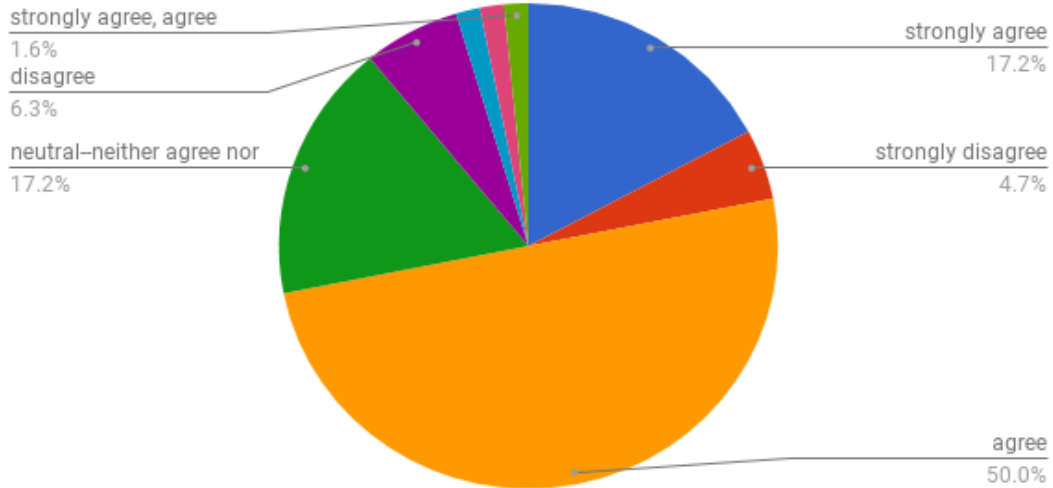
Thanks for taking this survey on how "coding" or characterizing teacher feedback on your papers can help you grow as a writer. There are ten questions. Please take your time, especially on the first three. We want to hear from you!

1. Do you think using a google doc to code the comments from your teacher helps you write better for the future? If so, why do think that? In what specific ways does this exercise help?
2. If you do NOT think using a google doc to code comments from your teacher helps you, why not? What could change in the exercise to help you write better in the future?
3. Whether you like this exercise or not, we think you probably have ideas for how to make the exercise (of looking through teacher comments, figuring out what the teacher is saying, and then "coding" it to remember for the future) better. What are your ideas to improve this activity, if you have any?
4. Please indicate your agreement with the following statement: "Taking time to read, decipher, and categorize the comments on my paper help me for the next paper"
5. Please indicate your agreement with the following statement: "It is easy (after my teacher explains the process) for me to code my teacher comments"
6. Please indicate your agreement with the following statement: "The time this activity takes in class pays off in my writing; it's a good use of time"
7. Please indicate your agreement with the following statement: "I can see at least one pattern (repeated area) in my coding that helps me know what to work on for future papers"
8. Please indicate your agreement with the following statement: "By the end of the year, I will be able to see which areas I have improved in my writing--and which areas I still need to work on--as a result of this google doc activity"
9. In case we missed some of your good thoughts on this survey, we want to ask if there is anything we should be asking but are not asking OR if you have anything to add that you haven't written in this survey already. Feel free to elaborate on any of your answers OR to tell us something totally new.

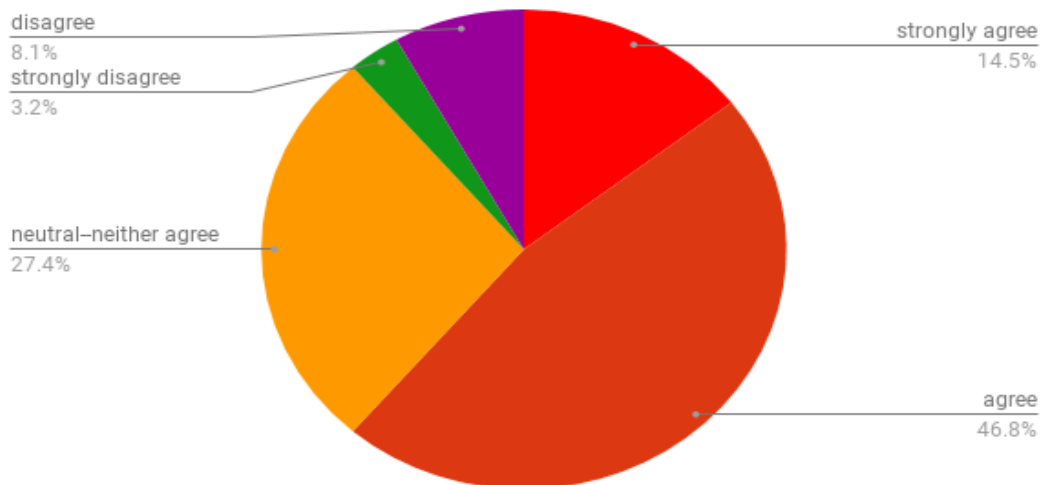
As encouraged as WE were about having better conversations about writing in our class activities as a result of trying out the google coding spreadsheet, and as sure as we were that the students had read our comments with dramatically more understanding as a result of the experiment, the proof really lay in the student surveys. We had seen incremental improvement in student essays—especially lower-level skills—but we were very interested to see if the hypothesis of the “slow down” effect was true—in other words, if adding simple tech would not only motivate students in the classroom activity but also help them identify and articulate their needs and goals in writing instruction. We thought it worked; we thought it was the best ten minute writing process activity we had created this year; did they?

The students weigh in

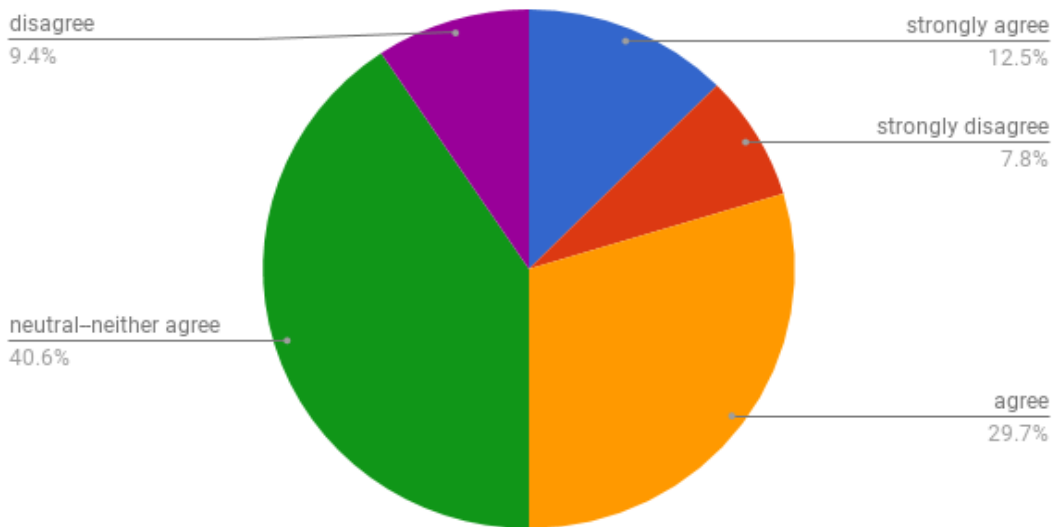
Please indicate your agreement with the following statement: "By the end of the year, I will be able to see which areas I have improved in my writing--and which areas I still need to work on--as a result of this google doc activity"



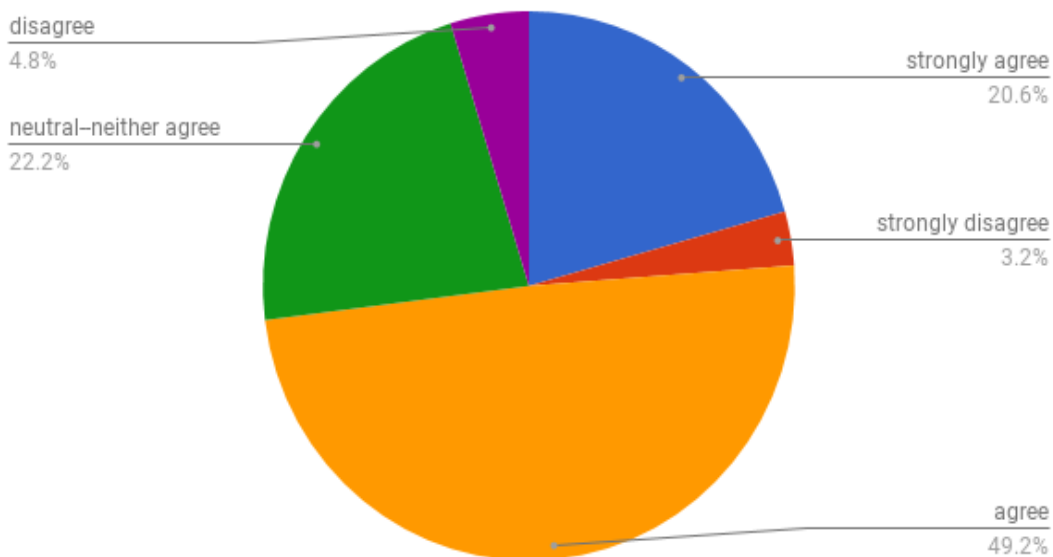
Please indicate your agreement with the following statement: "It is easy (after my teacher explains the process) for me to code my teacher comments"



Please indicate your agreement with the following statement: "The time this activity takes in class pays off in my writing; it's a good use of time"



Please indicate your agreement with the following statement: "I can see at least one pattern (repeated area) in my coding that helps me know what to work on for future papers"



The results of the survey (with 66 responses) are promising. As we can tell from Likert scale questions, the students really found value in the activity and got the point: 67% of them agreed or strongly agreed that the activity will help them improve their writing. 69% could already see a pattern forming. The comments in the other parts of the survey also indicated that the students saw the benefit for the individual, the class, and the teacher. These selected comments represent the four main benefits we had also hoped to see:

"It gives the teacher solid feedback on what the entire class excelled/messed up on and we also get the chance to ask you questions."

“It quantifies it, sort of; it’s all in one place rather than having to search around for feedback”

“Instead of getting the feedback back and forgetting about it, we are forced to remember what we do wrong so then we are likely not to repeat the same mistakes.”

“Not only does it help the student figure out what types of things they need to work on, it shows that there are other students in the class who need the same help.”

“I think the google doc does help because I know what I need to work on and focus on in the future. When I type it in, it helps me better remember what I messed up on instead of just glancing at my test score and moving on.”

We are excited to see all of the benefits represented. We did indeed use the data to figure out what to reteach, we did talk more with students about what our comments meant (and how to even actually decipher them!), we celebrated when tally marks beside certain codes helped students discern a pattern of errors, and we celebrated when the tally marks started decreasing in frequency. Although we didn’t ask this question, our sense was also that peer editing and workshopping were a bit more productive and robust as a result of the experience and the shared codes of the google doc activity.

We also looked closely, however, at the minority opinion, and students who didn’t see the activity as a good use of time had some valid points. Some students didn’t see the point of sharing the doc as a class, and we suppose it is valid that as long as the teacher sees the whole picture, little might be lost if the student coded individually without seeing the codes and patterns of others. Others pointed out that everyone jumping on the document at the same time was problematic, and we plan next semester to utilize a “station” approach where students complete the activity in shifts, ten students or so at a time. Finally, some students wanted more comments—and we realized that was a good problem to have even if we knew the pedagogy and realized that sometimes more does not equal better, even for our painstakingly and lovingly placed words of wisdom. We can work on that one separate from the google doc activity, we suppose.

We are really encouraged by the reflection we saw in student responses and in the activity itself, and we are excited that they can hope to learn not only valuable tools about writing but also about thinking and reflecting. As Kristen points out, “All writers ought to have the experience to move through the writing process in a recursive, fluid fashion - but, especially, [students] who are most self-aware, and, therefore likely, to misinterpret teacher suggestions for improvement as red-penned criticism. Additionally, the onset of this experiment includes important dialogue between the student and his teacher that can prepare the student to recognize not only his current teacher's mode of written feedback, but can equip him to understand that each of his future teachers may, too, code feedback in a unique way, still deserving of the student's attention upon receipt. The reflective element of this tracking, made possible with ease by Google docs, is rich with reflective benefits for the developing writer and learner.”

Next Steps

The students were not only overwhelmingly positive about the activity; they were also helpful in suggesting ideas for next semester—particularly when it came to adding even more tech. One comment that disturbed us seemed just misguided, that of implying that the codes would eventually replace the teacher’s personalized feedback. First and foremost, we will remind the students early and often that we are not changing how we give feedback; the point here is that we all slow down and understand more deeply what that feedback means. In the truest sense, the feedback should be more personalized and more helpful, not less that way. We likewise hope it will be even more effective, and we are seeing subtle traces of those benefits even now. A student supported the idea of adding a graphic organizer to the brainstorming session for the initial codes,

an easily implemented and solid idea. Another offered the idea of creating a website for the common codes brainstormed by each class, and we can see benefits with that one too: we can easily link to examples, resources, even videos of information for that particular writing task. Finally, one student offered this advice: “Maybe in the future, try fixing mistakes in the actual essay. This will create hands-on experience and help you remember not to make those same mistakes in the future.” We see potential for this suggestion in two different activities to try. Since many of these students have instructors in other subjects like math who offer “test corrections”—where students take graded tests back home, rework the problems, and show their work at arriving at the correct answer for a few extra points on the test—perhaps one activity might be that students who revise substantially based on the feedback could earn up to five points on the final paper grade. Since students are taught the difference between higher and lower order concerns, we will emphasize what real revision looks like and how substantial, higher-order revision is necessary to regain points. A second possible activity might involve using the class coding data to create focus groups clustered around common problems. Students who need more examples in their papers could comb through *Sing, Unburied, Sing* for more, together. Students with comma errors galore could meet with the instructor, watch a video about comma use, complete an online comma module through NoRedInk®, or review the rules in a handbook. And the same process could apply to either homogeneous or heterogeneous groups when the next paper task comes around.

The last few months have proven to us that the little things can indeed mean a lot, and that low tech can indeed produce high rewards. We are heartened by the fact that we took the tools we already had, tools with which students were very familiar, and we made them work for our writing instruction in an unobtrusive and focused and promising way. Our students seemed to embrace the task as a whole, and they offered really good suggestions about how to go forward with the exercise. They seemed to care and to take advantage of the time we gave them, and we had solid conversations about writing in the process. Low tech, high rewards paid off this time, for this task, in this way.

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[Return to Table of Contents](#)

Editor's Note: Graphic data displays facilitate rapid assessment of relationships between two variables.. If we design a display to support a specific goal or goals, we can readily assess relationships between the designated variables. If we design the display to pair data sets for any two variables, we have a flexible and powerful tool to explore all possible relationships that requires little more time to design and can be used for a large number of different analyses.

Designing data dashboards using goal-free evaluation principles

Jonathan S. Spackman and Sam McKnight
USA

Abstract

This paper explores the combination of Goal-Free Evaluation (“GFE”) principles, specifically the discovery modality, with data dashboard designs. Very little had been published regarding the combination of these two areas. Through design-based research methods, two research questions were answered: (1) What would a data dashboard employing the discovery modality look like? and (2) Would our data consumers utilize a data dashboard employing the discovery modality? This paper describes three data dashboards designed using the discovery modality:

1. DiscoverBoards present evidence, through tracking usage statistics.
2. DiscoverBoards are utilized by data consumers to the same extent as existing data dashboards.
3. DiscoverBoards are published much faster than the traditional goal-based data dashboards.

Keywords: data dashboards, goal-free evaluation, discovery, enrollment, continuing education.

Introduction

The Goal-Free Evaluation (“GFE”), a classic approach to evaluating educational and social programs, allows the evaluator a dispersed orientation and holistic perspective of the program without the evaluation being focused solely on the program’s goals. GFE is “finding out what the program is actually doing without being cued as to what it is trying to do” (Scriven, 1981, p. 68). GFEs enable a discovery modality within the evaluation that doesn’t exist when the sole purpose of the evaluation is to determine whether the program’s goals are being achieved, that is, a Goal-Based Evaluation. This discovery modality initially and intentionally scatters the evaluator’s attention across the whole of the program to look for effects, both intentional and unintentional (i.e., what the program is actually doing). Additionally, this discovery modality reduces a certain form of bias created by program administration goals. In other words, the goals set by program administration may bias the evaluator in terms of program success criteria that may not be aligned with or are representative of program success from other stakeholders’ points of view. Scriven (1991, p. 60) put it this way, “we can usually establish that the intentions of the producer [of an educational reading program] are of negligible concern to the consumer by comparison with satisfactory performance on the criterion dimensions (e.g., gains in reading scores).” Hence, the consumer cares more about their reading scores improving than the program goals being achieved. The discovery modality allows the evaluator to gather multiple success criteria that limit this kind of bias.

Although the purpose of this article is not to examine GFE’s pros and cons in depth (others have already done so; see Krathwohl (1980), Scriven (1991), Jonassen (1992), Chen & Rossi (1980), Youker, Ingraham, & Bayer (2014)); we present here a brief look at designing data dashboards

with the discovery modality of GFEs in mind. We applied these GFE concepts to our data dashboard design, our research questions in this study were:

What would a data dashboard employing the discovery modality look like?

Would our data consumers utilize a data dashboard employing the discovery modality?

Literature review

Although we conducted a thorough literature review search of education, business, psychology, family studies, and biology research related to GFEs and data dashboard design, very little had been published combining the two areas. It appeared that researchers in data dashboard design had not categorically considered the concepts laid out in GFEs as a source of design principles. We did note four studies that looked at data dashboards, which we considered at least loosely related to the discovery modality. Wu and Vakkari (2014) studied two navigation dashboards intended to help Wikipedia users more quickly find topic-related articles. Valkanova, Jorda, and Moere (2015) showed that publically displayed data visualizations of citizen data increased meaningful civic participation. Zastrow (2015) reported that non-geographic-specialists have started using geographic information systems (“GISs”) to visualize and explore geographic maps of their datasets. Aigner, Rind, and Hoffmann (2012) studied a method of data visualization intended to aid explorative analysis of large datasets, which incorporated color and spatial elements. Although these four studies begin to look at data visualization designed in a more explorative way, none reference principles of a goal-free approach of GFEs or specifically address its discovery modality. Our intention was to fill this gap with our study.

Methodology

We conducted design-based research (Brown, 1992; Collins, 1992) at a Continuing Education unit of a large private University located in the Rocky Mountains to address the question of: What would a data dashboard employing the discovery modality look like? Within this research methodology, (1) we invited data consumers as co-investigators, (2) we designed data dashboards (i.e., DiscoverBoards) across multiple datasets for different data consumers, (3) we evaluated the DiscoverBoards and addressed the objectivity of those evaluations, and (4) we iterated the design of the DiscoverBoards based on multiple evaluations. We also tracked usage of the DiscoverBoards versus other available data dashboards to answer the question: Would our data consumers utilize a data dashboard employing the discovery modality? Our co-investigators (i.e., data consumers) were the director of marketing, the director of our branch campus, and an academic product consultant. Following our “storming, forming, norming” process, we brainstormed the dataset scope and formed iterative prototypes with our co-investigators. Once the final design work was done, we normalized the use of these DiscoverBoards into the area’s practices through training and tracked usage.

Results

What would a data dashboard employing the discovery modality look like?

In attempting to answer the first research question (i.e., what would a data dashboard employing the discovery modality look like?), we developed three data dashboards following the goal-free approach with a specific focus on the discovery modality (i.e., DiscoverBoards) using Tableau software. Tableau software is primarily used for data visualization in business intelligence and analytics and was already in use across our organization. The DiscoverBoard general design consisted of a one-page view through a web browser of various bar charts displaying data (see Figure 1 with model enrollment data).

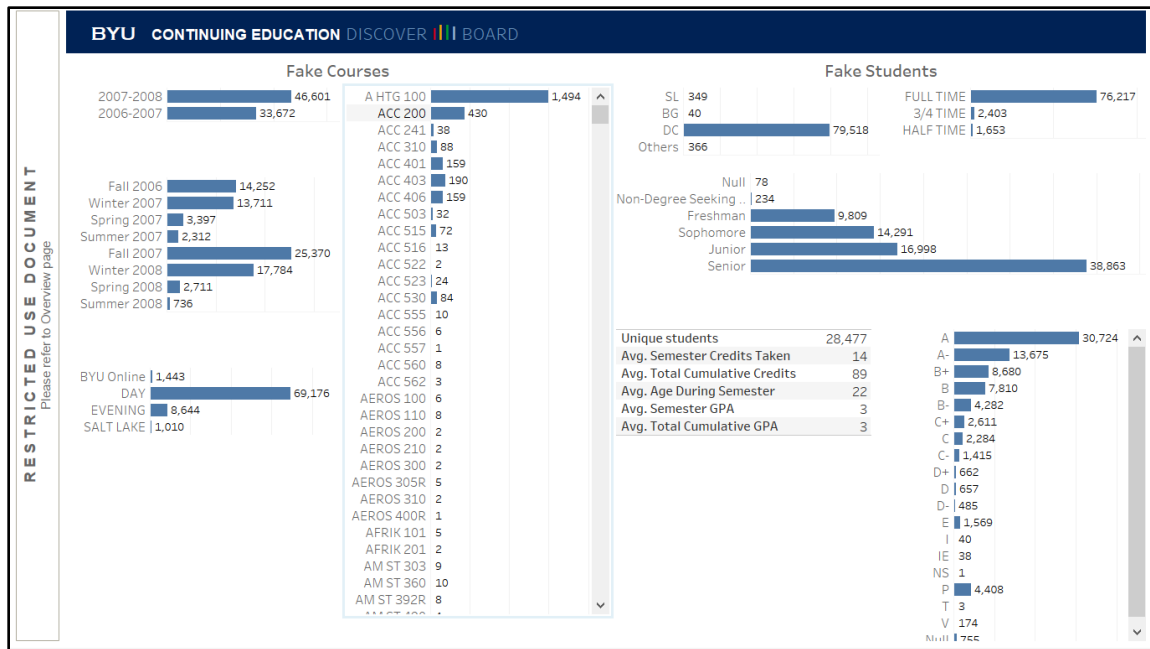


Figure 1. Example of a DiscoverBoard with model data.

When clicked on, each bar chart filtered all other bar charts. For example, if the bar for the ACC 200 course was clicked on in the course bar chart, all other bar charts and data refreshed to show only ACC 200 course enrollments. Because every bar chart could act as a filter and multiple filters could be applied, the possible data displays on the DiscoverBoard were numerous as well as the number of questions that could be answered by applying filters such as (to illustrate a few):

What was the average semester GPA for seniors during summer 2007?

Which was the highest 10 enrolling courses for freshman during 2006-2007 academic year?

Which courses had the most A grades?

Which courses were offered in the evening and what ratio of full-time, $\frac{3}{4}$ time, and $\frac{1}{2}$ time students took them?

What was the grade distribution for ACC 200 during Fall 2007?

With the co-investigators, we brainstormed and designed three DiscoverBoards: (1) Independent Study enrollments, (2) Classroom enrollments (see figure 1), and (3) Withdraw reasons. Each of these DiscoverBoards was independently designed with a different co-investigator, but followed the discovery modality principles. At least two iterations were conducted for each DiscoverBoard. Training was provided to DiscoverBoard data consumers.

Would our data consumers utilize a data dashboard employing the discovery modality?

Once our three DiscoverBoards were available for our data consumers (i.e., published to our Tableau server) and after eliminating our accessing of the dashboards related to this study, we tracked the number of times it was accessed by data consumers for their work and compared it to other similar data dashboards already in use. We choose similar data dashboards based on two criteria: (1) the dashboards had similar stated purposes and datasets, and (2) the dashboards had a similar number of data consumers (see Table 1).

Table 1
Sets of data dashboards compared based on purpose and number of data consumers

Dashboard Name	Purpose	# of Data Consumers
Set #1		
DiscoverBoard - Independent Study Enrollments	Marketing	11
Dashboard - Cumulative Enrollments	Marketing	9
Dashboard - Enrollments Per Course	Marketing	10
Dashboard - Marketing Enrollment Map	Marketing	13
Dashboard - State Report of Net Enrollments	Marketing	13
Set #2		
DiscoverBoard - Classroom Enrollments	Academic Curriculum	7
Dashboard - Course Demographics	Academic Curriculum	5
Dashboard - BYU Graduates Taking DCE Courses	Academic Curriculum	7
Set #3		
DiscoverBoard - Withdraw Reasons	Course Improvement	2
Dashboard - Registration End-State	Course Improvement	3
Dashboard - Successful Course Completion	Course Improvement	2
Dashboard - Grades	Course Improvement	2

Each set of dashboards were compared by graphing a running total of times accessed over a period of 12 weeks from June 11, 2017 to September 3, 2017 (see figures 2-4). These graphs approximated the utility of each dashboard and answered the research question: would our data consumers utilize a data dashboard employing the discovery modality?

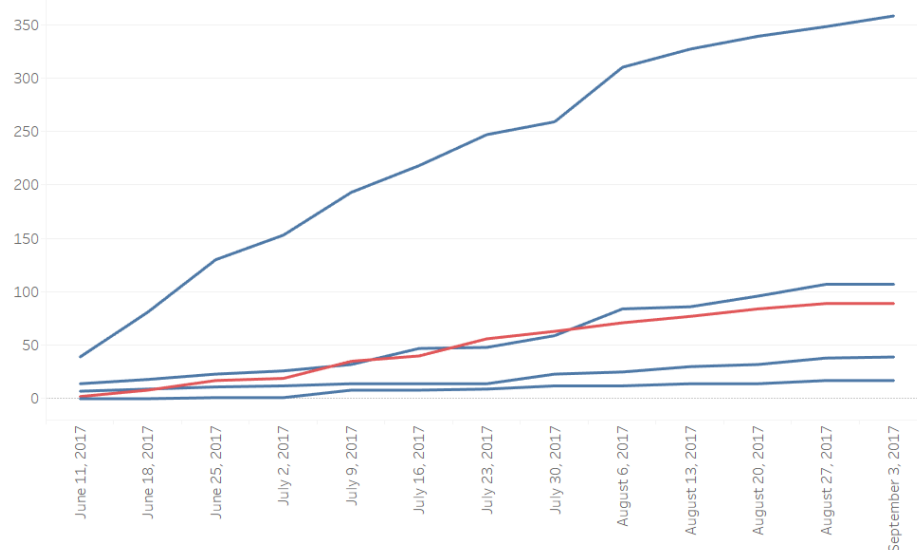


Figure 2. Frequency of access by data consumers of the DiscoverBoard - Independent Study Enrollments (red line) compared to similar data dashboards (see Table 1 - Set #1).

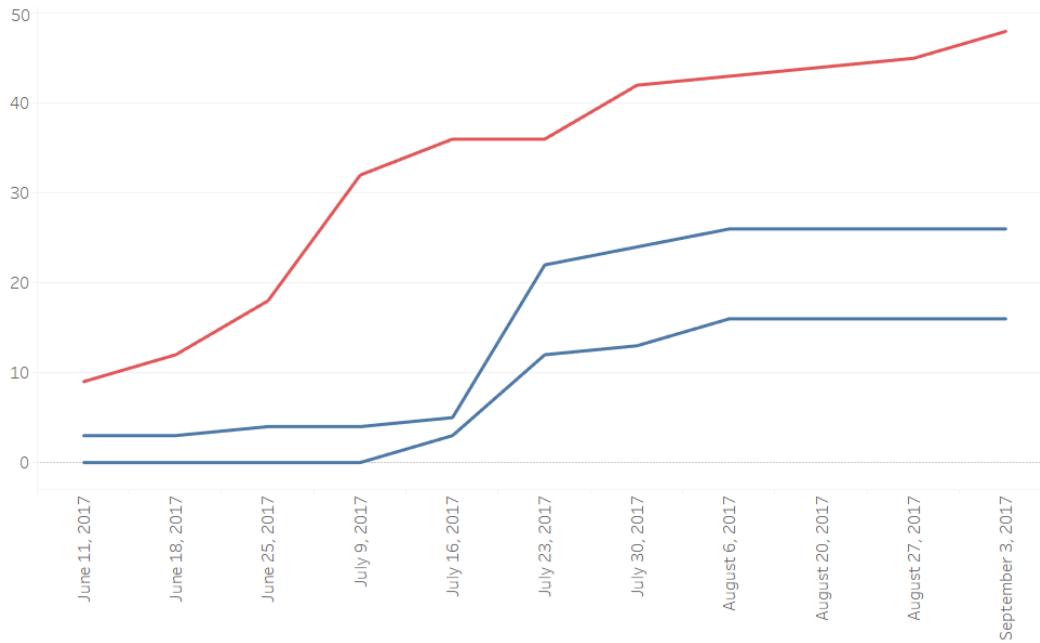


Figure 3. Graph of the frequency of access by data consumers of DiscoverBoard – Classroom Enrollments (red line) compared to similar data dashboards (for details see Table 1 – Set #2).

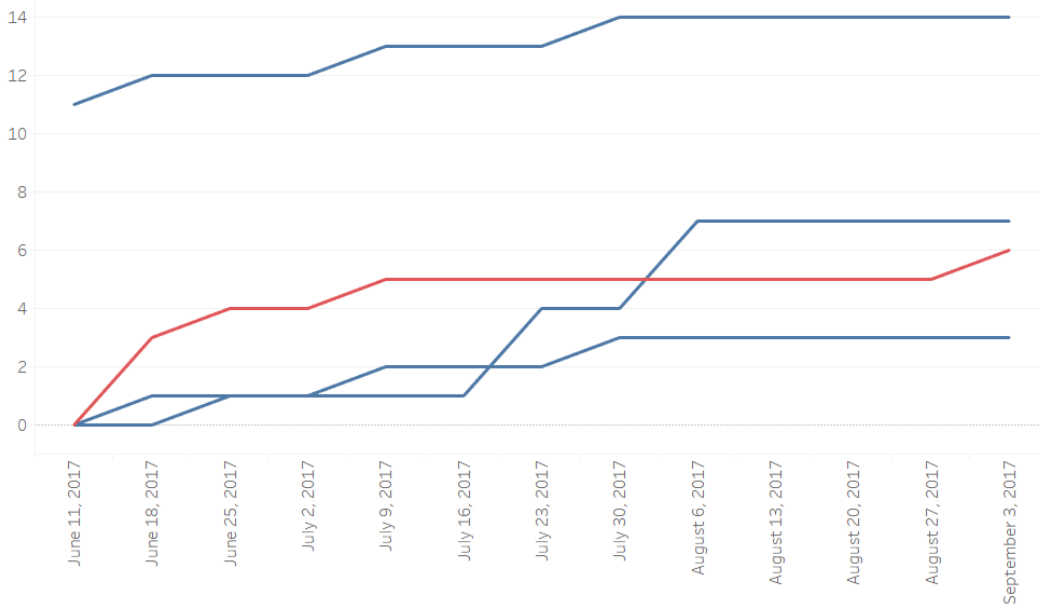


Figure 4. Graph of the frequency of access by data consumers of DiscoverBoard – Withdrawn Reasons (red line) compared to similar data dashboards (for details see Table 1 – Set #3).

Discussion

The goal-free approach that focused on the discovery modality allowed for a dispersed orientation and holistic perspective of the dataset like the goal-free evaluator's perspective of a program. We, as data dashboard designers, didn't need to know any of the questions that might be asked of the dataset in order to initially design the DiscoverBoard because of this holistic perspective. The data presented and visualized was, in essence, the data available. Thus, we considered our design goal-free. This way of designing data dashboards could be thought of as creating a window into an existing dataset without regard to any goals. For example, because one of the DiscoverBoard's dataset included the Independent Study student's geographic location, the DiscoverBoard for Independent Study Enrollments included geographic location as a filter. The decision to include geographic location had little, if anything, to do with the Independent Study program goals, but merely the fact that the data was available as part of the dataset. By virtue of such decisions, we also reduced the bias of focusing on or limiting our design based on program goals related to preconceived success criteria stated by program administration. In other words, the data dashboard wasn't bound to only display data about these preconceived indicators of success, it could also display data about unanticipated effects and relationships much like the GFE.

Somewhat unexpectedly, we found that designing dashboards without regard to program goals was much, much faster (e.g., about half the time by one designers estimate) because it required less design specifications from the data consumers and less iterations of prototypes. In essence, a DiscoverBoard's design specifications were dependent on the available dataset and a general knowledge of the program with minimal interaction with the data consumer and minimal knowledge of the program goals. This raised the second research question, would our data consumers utilize a data dashboard employing the discovery modality? Or better said, would the data consumer utilize a data dashboard when they had little to do with its design?

Based on the usage statistics of the three DiscoverBoards (as shown in figures 2-4), we posited that data consumers utilized the DiscoverBoards at about the same rate they utilized other existing data dashboards. In other words, data consumers adopted the goal-free data dashboards into their everyday work to the same extent they had already adopted data dashboards designed with specific goals in mind.

Although we concluded from our study that data dashboards could indeed be designed following a goal-free approach and that data consumers would utilize them, we identified some limitations of our study. The limitations of this study included a small sample of three DiscoverBoards at a Continuing Education unit of one University, a relatively small number of data dashboards with which to make comparisons, and the homogeneity of the data dashboard purposes and datasets. Our conclusions should be taken with the understanding that three DiscoverBoards at one University may not be representative of all goal-free data dashboards. Our conclusions were also based only on datasets of enrollments or student end-states. DiscoverBoards designed for other kinds of datasets such as Human Resources, Finance, web traffic, etc. may have different results. Further research is needed to bolster the sample size, to address specific uniqueness across different kinds of datasets, and to look into the utility of specific design elements (e.g., bar graph, line graph, whisker plots, maps, tables, etc.).

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[Return to Table of Contents](#)

[Return to Table of Contents](#)

Editor's Note: Simulating a real world environment is an excellent idea for a capstone course. After years of study, it also provides closure and preparation for the world of work. This is an excellent example.

A Culture of Innovation

Luis Camillo Almeida

USA

Abstract

By using a combination of user-design, problem-based learning and computer based instructional technologies, ten students from a Historically Black College and University (HBCU) in Mississippi built a successful campaign with very little resources leading to event awareness by alternative channels. Students fostered a culture of innovation and success by trying out new media and by using elements of user-design (Banathy, 1991) and constructivism (Fosnot, 1996) in a problem-based learning (Hmelo & Eversen, 2010). The results were stellar.

Keywords: User-design, technology, PBL, pedagogy, higher education, action research, emergent technologies, innovation, constructivism, GroupMe

Introduction

We are in the midst of the new age of information, yet research on user-design is still very limited to date. Most of the studies conducted in this area have been focused on the seminal works of a few scholars leading to investigations relating to corporate change (Pastore, Carr-Chellman & Lohman, 2011), systemic change (Carr-Chellman & Almeida, 2006), learning and systems (Cuyar, Carr & Breman, 1998), and educational change (Banathy, 1991). However, combining user-design and problem-based learning (Hmelo & Eversen, 2000) in the context of an advertising campaign course using innovative tools of learning has been no-existent to date. The purpose of this action research study is to present a logical argument for discussion by educators to consider implementing user-design (Banathy, 1991) as a model of learning for both face-to-face and courses on-line. This paper will explain in detail how the combination of user-design, problem-based learning (PBL), infographics and a text-based technology community tool were helpful in designing and developing a full advertising campaign with the goal of increasing event attendance and selling memberships for a non-profit in the south of the United States.

Description of the course and students

This study took place in Mass Communication 473 titled, "Advertising Campaigns," the capstone course of the Integrated Marketing Communications (IMC) track in the department of Mass Communication of a school in central Mississippi. MC 473 has been a mandatory course in the IMC program for a decade where students traditionally apply all the knowledge and skill-sets they acquired in their previous IMC courses in order to complete their degree with distinction. Historically, the course was lecture based and used test-based assessments to quantify student progress. The former provided little room for the applicability of advertising campaign concepts gained from previous courses, which is typically the case in institutions of higher learning offering such courses in national universities. In this study, the instructor decided to keep the objectives intact and follow the recommendations from the syllabus of record to empower students to create artifacts linked to their area of expertise within the IMC curriculum, along with the theoretical concepts and principles learned in the course. The former provided students with hands-on problem-solving opportunities before graduation, as well as the ability to design, develop and execute a professional level, portfolio quality advertising plan with a client.

MC 473 was a small, senior level course where students had to create a large number of media artifacts, including infographics, promotional videos, digital advertising elements as well as traditional deliverables including press releases, newspaper articles, and word-of-mouth advertising. The course was taught with innovative, real world applications based on constructivist theory (Fosnot, 1996) and core principles of Mass Communication. By using a combination of infographics and a collaborative smartphone texting driven community, students built a successful campaign with very little resources leading to event awareness in alternative channels.

Students fostered a culture of innovation and success by “trying out” new media and using elements of user-design (Banathy, 1991), and constructivism (Fosnot, 1996) in a problem-based learning (Hmelo & Eversen, 2000) class format. There were four course objectives that served as a guide in the course. These objectives were: students are to utilize all the knowledge and skills acquired in previous advertising and communications courses; Students are to engage in practical hands-on problem-solving opportunities; Students are to design, develop and execute a professional level, portfolio-quality advertising plan with a client.

Although the course was offered face-to-face, we spent a considerable amount of time conversing using groupMe, a text-based technology tool designed to assist groups with communicating at a distance. We used this tool in order to manage the flow of communication between students and the groups themselves.

Ten students registered for the course. Most of the students who took MC 473 were graduating seniors possessing an average GPA of 3.0, mostly females of African-American descent. The majority of students in the course were senior Integrated Marketing Communication majors. A few held junior status majoring in public relations and one majored in Digital Media.

The method explained

In order to truly apply the concepts and principles of user-design (Banathy, 1991) along with PBL (Hmelo & Eversen, 2000), I decided to use the theory of constructivism (Fosnot, 1996) in order to guide class activity and complete a challenging class assignment using a student-centered pedagogy. Due to the nature of user-design (Carr-Chellman, 2007), students were given the power to design and develop the whole campaign and solve a problem (Hmelo & Eversen, 2000) by the end of the course with minimum supervision. Learning was active where students had the opportunity to construct both the process of their own learning (Almeida, 2008) and the actual project at hand which was to create a full advertising campaign for a non-profit organization. Because of the nature of the method, students actively constructed their own subjective representations of reality (Ertmer & Newby, 1993) and linked the course assignment with prior knowledge, advancing educational gains and transfer of knowledge through constructivism (Piaget, 2013). All students worked in their zone of proximal development (Vygotsky, 1980) and were scaffolded with technology (Vygotsky, 1986), receiving support from the instructor which possessed the required knowledge base to assist students at the correct time (Ellis & Worthington, 1994).

How did the course differ from previous ones?

MC 473 was different from previous iterations of the course because I had integrated elements of constructivist theory (Fosnot, 1996), problem-based learning (Hmelo & Everson, 2000), user-design (Banathy, 1991), along with modern texting-based computer technology in one single course, leading to the completion of an actual campaign for a client. I literally asked students to build course content based on what they already knew (Fosnot, 1996) and we decided, as a group, to use GroupMe, among many other technologies, to empower students to constantly communicate and complete the final class project with distinction.

Since MC 473 was a practical course with an actual client, course assessments were based on course objectives along with the goals set by the client. I conducted semester observations and periodically collected artifacts as a means to determine the success of the course. The combination of constructivism (Fosnot, 1996) along with PBL (Hmelo & Everson, 2000), user-design (Banathy, 1991), and several technologies proved to be a powerful pedagogical combination which resulted in significant gains. In order to complete the class project, students were divided by expertise, organized in different groups, with a leader for each group, so students could self-regulate and manage to complete each assignment. The instructor served as a facilitator in the process of creation. I divided the course into six groups. These groups were the: deliverables, social media, event planning, marketers, and logistics teams.

Results

Table 1
2015 Campaign Result Numbers

ATTENDANCE	# OF MEMBERSHIPS SOLD
670	5

There has been a number of quantifiable results that emerged from this action research study. First, the combination of user-design, PBL, along with infographics and text-based technologies resulted in significant increases in event attendance and memberships sold. In fact, the event attendance numbers, when compared with the event numbers from the previous year, increased by a rate of 229.5%, going from 600 paid attendees to 1377. The number of memberships sold increased by a factor of 13.8 times, going from 5 memberships sold to 69. Please refer to the tables below.

Table 2
2016 Campaign Result Numbers

ATTENDANCE	# OF MEMBERSHIPS SOLD
1377	69

In addition to the former, students in MC 473 were able to strategize and reach thousands of potential attendees in their social media campaign which we believe led to an exponential increase in event attendance against the former year. The fact that students were able to produce a social media campaign that reached so many people is evidence that when students are given the opportunity to make decisions with the guidance of an experienced classroom facilitator, students tend to make sound decisions as a team and achieve quantifiable results. Clearly, the pedagogical elements utilized in this course when used in conjunction with senior African-American undergraduate students majoring in Mass Communication works very well in the production of advertising campaigns for non-profits. Please refer to the table and illustration below.

Table 3
Campaign Reach

PLATFORM	NUMBERS
Facebook	16,000
Twitter	8,000
Instagram	1,300
LinkedIn	2,000
Snapchat	300

Conclusions

The combination of problem-based learning (Hmelo & Eversen, 2000), user-design (Banathy, 1991), infographics and text-based technologies works very well when tailored to African-American undergraduate students especially when they have the authority to design their own systems of human learning (Carr-Chellman, 1996). Texting technologies proved to be both an important and necessary component in this study which allowed the team to keep the flow of communication open leading to excellence in project completion. Constructivism seems to be the appropriate learning theory when educating students of color in the Mississippi region.

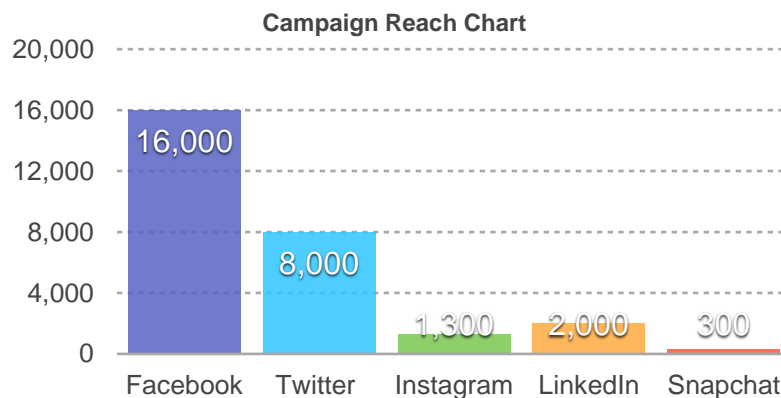


Figure 1. Campaign Reach Chart.

Limitations/Recommendations

Although the results of this study have been overwhelmingly positive, there are reasons to believe that its results may be inconclusive. The MC 473 campaign only contained 10 students and the artifacts were produced in the context of a non-profit organization. Perhaps, a larger number of participants and/or the setting in which the campaign was designed for a for profit organization may have influenced the results of the advertising campaign.

All the students who participated in this study were of African-American descent. Perhaps by conducting this same study with students of other ethnicities would have resulted in different conclusions. The vast majority of the students who took MC 473 were graduating seniors. More research is required in the area of user-design (Banathy, 1991) when combined with problem-based learning (Hmelo & Eversen, 2000) and various emerging technologies. Perhaps, conducting a phenomenological research study asking Latino students what it is like to be a member of an

empowering Integrated Marketing Communication classroom team could be a good study to be conducted. Research involving other minority groups could also provide important insights regarding the application of advertising campaigns in higher education courses.

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About the Author



Dr. Luis Camillo Almeida is Associate Professor of Communication Arts at Lee University, where he teaches a wide variety of courses. Dr. Almeida has served as a critic of technology in a number of national outlets including CBS-Chattanooga, ABC-Jackson, TEDxPhoenixville, Voice of America (VOA), Cleveland daily Banner, and The Vindicator. Internationally, Dr. Almeida has been featured in the highly prestigious O Globo Newspaper, Radio CBN, Investmentos e Noticias (Brazil), and Voice of America (Nigeria). He contributed to the Prattler Handbook of Latino Education in the U.S., and was acclaimed by the Pittsburgh Tribune Review as "Newsmaker" for his work with technology. The Digital Citizenship Summit broadcasted Dr. Almeida's interview on the ethics of technology to thousands of viewers at twitter headquarters. He has presented 70 times in academic conferences and published articles in three continents relating to media and education. He lives in Cleveland, Tennessee with his wife Amanda and daughter Sophia.

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[Return to Table of Contents](#)