

iPAD LEARNING ECOSYSTEM: Developing Challenge-Based Learning using Design Thinking

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ABSTRACT

In order to maximize college English language students' learning, product development, 21st Century skills and engagement with real world meaningful challenges, a course was designed to integrate Challenge Based Learning (CBL) and iPad mobile learning technology.

This article describes the course design, which was grounded in design thinking, and provides an overview of the pilot implementation of the course. The course achieved its goals to a great extent in that learners felt that they were beginning to help build a better college community by sharing stories of their learning experience and their insights about the essential question they chose with other students and with other teachers. The course also helped the students discover the use of English as they found ways to reach out to the broader college community and held meaningful conversations with teachers, librarians, managers, and staff from different departments and other students. The course transformed the teacher/researcher into an observer of learning and a guide, thus flipping the classroom and allowing the learners to take responsibility and steer their own learning experiences.

Further development is needed in the areas of CBL assessment rubric development in English Language Teaching (ELT) and the analysis of student generated content through iPad applications.

Keywords: Mobile learning, English language learning, challenge based learning, design thinking.

INTRODUCTION

This paper outlines the structure of a Foundations English Language (FEL) course that integrates the use of Challenge Based Learning (CBL) and iPad mobile learning technology.

The intent of this implementation is to maximize students' language learning, learning product development affordance, 21st Century skills (Mishra, Koehler, & Henriksen, 2011) and most importantly student engagement with real world meaningful challenges that will make a difference in their learning community. The purpose of the paper is to propose a new mode of English Language Teaching delivery through CBL (Apple Inc., 2010). The course will help tertiary English Language educators in the United Arab Emirates (UAE) tackle several challenges in adoption of new learning environments and pedagogies (Cavanaugh, Hargis, Munns & Kamali, 2013; Hargis, Cavanaugh, Kamali & Soto, in press; Cavanaugh, Hargis & Kamail, 2013).

- The first challenge is related to the shift from a traditional teacher-centered, summative assessment driven educational culture, to the more learner-centered, collaborative, facilitative, self-regulated model and ultimately real-world nature of the practices that may derive from using the structure of CBL (Apple Inc., 2010; Johnson & Adams, 2011; O'Mahony et al., 2012).
- The second challenge is technological; specifically, integrating iPad mobile learning technology into the language classroom.
- The third challenge is related to the achievement of English Language content delivery balance.

The described challenges have stemmed from a radical paradigm-changing opportunity afforded to teachers by a federal initiative that provided iPads across all national Foundations courses in the UAE starting from the 9th of September, 2012. Immediately after the initiative was announced, in April 2012, an aggressive implementation plan began to take place. iPad implementation action teams were established all throughout the federal institutions. They were delegated the responsibility of preparing every member of the Foundations English and Mathematics Departments for the iPad launch. At the Higher Colleges of Technology (HCT) Abu Dhabi and Khalifa City Women's College (AD/KCWC), strategic conversations began to be a normal part of doing business. The dynamic and flexible development framework for this paper addresses Design Thinking (DT)(Brown & Wyatt, 2010; Ericson, Bergstrom, Larsson, & Torlind, 2009; Liedtka, 2011; Riverdale Country School & IDEO, 2011). Design Thinking provided a continual structure with the power to guide meetings, professional development workshops, conferences, sharing sessions and other faculty development practices that were to be established over the course of about three months. Design Thinking was, in some way, the guarantee to success during a moment of sudden radical change (Burdick & Willis, 2011; Liedtka, 2011; Murty, Mercedes, & Maher, 2010).

LITERATURE REVIEW

Design Thinking:

An Innovative Research Development Framework for Educators

Educators are designers of curricula, of lessons, of tasks, of assessments and much more. Unfortunately, far too often do educators consider these design processes as something other than a part of their "administrative duties".

Design Thinking for Educators (DTE) (Riverdale Country School & IDEO, 2011) provides people in the field of education with clear guidelines to transform the process of designing teaching and learning experiences.

It essentially affords educators with a direct key to open the doors of innovation that are hidden in everyday conversations and other apparently insignificant interactions that take place in the context of schools, colleges, and universities. "Design thinking (DT) is a mindset. It's about being aware of the world around you, believing that you play a role in shaping that world and taking action toward a more desirable future. It is human-centered, collaborative, experimental, and optimistic" (Riverdale Country School & IDEO, 2011 . p, 3). It is about identifying and understanding the needs of people through conversations, critique and all-out teamwork. DT creates a real space to try something new and to continue with it for the long run as a work in progress that may work if you persist and believe that these new and better things are possible and any individual can make them happen. (Riverdale Country School & IDEO, 2011. p, 3).

Authors and researchers from various disciplines like Burdick and Willis (2011) have posited DT as a procedural form of cognition, involving the following aspects:

- **Constructive thinking, problem solving, collaboration, multimodality, thinking through making, project and challenge based learning, reflecting, iterating, socializing.**
- **21st century skills, strong visual-spatial skills, inductive discovery, creative hunches based on incomplete evidence. (Burdick & Willis, 2011). Also, in "Collective Intelligence and Design Thinking" (Murty et al., 2010), the authors posit DT as a conjectural design process by which people discover "ill-defined problems that are not soluble by merely collecting and synthesizing information". These problems are then turned into challenges that are then further interpreted and conjectured, ideated, and generated through derivative framing. Finally, these are further explored and evolved into some form of Collective Intelligence (CI). Collective Intelligence is explained as a "magnifier of Design Thinking"(Murty et al., 2010) because it is based on the following parallel principles:**
- **Generating ideas, Contributing and collaborating, Conceptualizing, Lateral Thinking, Problem solving, Giving feedback, Self-organizing, Motivating, Intriguing, Encouraging, Eliciting, Responding, Orienting, Visualizing, Sharing Understandings, Analyzing and Synthesizing (Murty et al., 2010).**

Furthermore, Brown (2008) defined DT as a "methodology that imbues the full spectrum of innovation activities with a human centered design ethos" in other words design thinking is the result of a process of "hard work augmented by a creative human-centered discovery process and followed by iterative cycles of prototyping, testing and refining" (Brown, 2008).

He also offers a clear personality profile for design thinkers, describing them as "empathetic, integrative, optimists, experimentalists, and collaborators" (Brown, 2008 . p, 3). These personality traits are intricate in people of any given discipline who work with DT.

DT has also been defined (Neumaier, 2009) as the "process of working through problems while operating in the space between knowing and doing, prototyping new solutions that arise from the use of four key strengths: empathy, intuition, imagination and idealism" (Colloquium & Economics, 2009).

For the purposes of this study, the DT Process proposed in the “Design Thinking for Educators Toolkit” (Riverdale Country School & IDEO, 2011) was used. This process is composed of the following five phases and their corresponding steps:

- **Discovery: Define the Challenge, Prepare the Research, Gather inspiration.**
- **Interpretation: Tell stories, Search for meaning, Frame opportunities.**
- **Ideation: Generate ideas, Refine Ideas**
- **Experimentation: Make Prototypes**
- **Evolution: Evaluate Learnings, Build Experiences (Riverdale Country School & IDEO, 2011).**

The DT for Educators Toolkit (Riverdale Country School & IDEO, 2011) affords a rich list of 45 different methods that can be used to gather data at each step of the DT process. This study explores the use of 24 methods as the others were not applicable to the context of the research due to time constraints. The methods used in the present study as outlined by the DT for Educators Toolkit include Defining the Challenge, Build a team, Share what you know, Make a plan, Prepare for fieldwork, Learn from individuals, Learn from Groups, Learn from Experts, Learn from peers observing peers, Capture your learning: journals, photos, anecdotal recounts, Share inspiring stories, Find Themes: that emerge from observation, conversation, research, Define insights: Succinct expressions of what has been learnt, Make insights actionable, Build to think: Build a simple representation of an idea to think through a lot of details, Describe your idea, Create a prototype: a storyboard, a diagram, a table, a format, a story, an ad, a mock-up, a model, a role-play. In the present study we have prototyped a lesson plan and a course outline, Make a test plan, Define Success: Measuring the impact of a concept or idea. Setting up success criteria, Identify what is needed, Plan next steps, Document Progress, Share your story (Riverdale Country School & IDEO, 2011).

Challenge Based Learning and Problem Based Learning: Differences and Similarities

Comparisons are often drawn between these two approaches due to their focus on real-world, complex, ill-structured, authentic, cross-disciplinary, problems or challenges (Apple Inc., 2010, p. 3; O’Mahony et al., 2012, p. 185; Walker, A. and Leary, 2009, p. 12; Stewart, MacIntyre, Galea, & Steel, 2007, p.77). Similar to Problem Based Learning (PBL), CBL is a learner centered instructional and curricular approach that simulates the workplace (O’Mahony et al., 2012; Walker, A. and Leary, 2009; Stewart et al., 2007).

However, it specifically “mirrors the 21st Century workplace” (Apple Inc., 2010). Ultimately, both CBL and PBL aim at empowering learners to conduct research, integrate theory and practice, and apply knowledge and skills such as leadership, creativity, media literacy, problem solving, critical thinking, analyzing, synthesizing, collaborating, attentive questioning, flexibility, adaptability, self-directedness, and reflecting in order to take action in the context of their school, family, or local community (Apple Inc., 2010; Johnson & Adams, 2011; O’Mahony et al., 2012; Savery, 2006; Stewart et al., 2007).

The twist of CBL is related to the capacity learners have today to further share and expand these impacts with the global community via educational technology and social media. Another key difference between these two approaches is that CBL has proved to be effective in technology-rich learning environments (Johnson & Adams, 2011).

Here, the learner needs to integrate his/her knowledge of technology commonly used in daily life with the social, emotional, intellectual and time management skills required by the demands of the 21st century for work, life, and school (Apple Inc., 2010; Johnson & Adams, 2011). Challenge Based Learning has also been proved to be extremely effective in moments of change in educational institutions.

Finally, it has worked as a motivation booster and reduced the drop-out rates in educational institutions known for their high levels of both student and teacher disengagement (Johnson & Adams, 2011).

METHODOLOGY

The college Foundations English course faculty applied the stages of DT as shown in this section to redesign the courses to better align them with the strengths of the mobile learning environment.

Phase 1: Discovery

Step 1- Challenge: Defining the challenge: To develop a CBL Foundations English course in response to the federal iPad implementation initiative that may guarantee collaborative, facilitative, student-centered classroom practices, sound iPad device use, and language relevant content.

Step 2- Preparing the Research

How HCT ADWC approached the challenge: Building a Team

The iPad Committee began meetings and conversations towards the end of Semester two of the 2011-2012 academic year. Initially, iPad applications for English Language Teaching and other purposes such as file management, collaboration, learner management systems (LMS) and websites were researched, reviewed, and discussed. They were collated in an institutional sharing drive as an interactive excel document that displayed the application, a link to the application, and a brief description about the relevance of the application in the context of Maths or English.

Sharing Knowledge

As the document was developed, possible technical difficulties were discussed and further explored with the foundations English team leaders. Each member of the English iPad implementation team (4 in total) coupled with a team leader (4 in total) and they were to work together in the discussion and elaboration of classroom strategies and conceptually-based lesson plans to demonstrate to the rest of their teams. Each couple had two weeks to prepare their demonstration lessons.

Each member of the iPad implementation committee was in charge of working through any doubts and insecurities with their corresponding team leader. They were also in charge of providing technical help and/or seek technical assistance from experts if needed.

Making a Plan

Lesson demonstrations were scheduled to happen in a whole department meeting. The showcased lessons and lesson plans were chosen by the members of the iPad committee, the Foundations Chair, the Academic Dean and the team leaders themselves as showcase models of best practice in a meeting prior to the whole department sharing session.

They based their choices upon their experience in the context of teaching foundations English at the college and what they thought to be Technology, Pedagogy and Content Knowledge (TPACK) (Acaoglu, Kerelvik, & Capsperson, 2011; Albion, Jamieson-Proctor, & Finger, 2010; Bos, 2011; Burgoyne & Graham, 2009; Mishra & Koehler, 2009; Mishra et al., 2011; Shin et al., 2009; Voogt et al., 2010) sound lesson plans.

Step 3- Gather Inspiration

Learning From Individuals, Learning From Observing Peers, Learning From Experts

During the first part of the showcase session, the pre-selected authors of the model lesson plans demonstrated a class. During the second part, their specific team leaders in the process of producing similar lesson plans led the rest of the foundations English department faculty members. They were provided with a specific lesson planning prototype to follow. The purpose of all of this activity was to help them in the direction developing for their own iPad learning resources. On the other hand, it was about inspiring them through practice in the selection and production of authentic English as a Second Language (ESL) content that would maximize iPad use and somehow aim at increasing student engagement.

Preparing for Fieldwork

Finally, they were helped in the process of producing a "survival" repository of lesson plans for the first two weeks of the iPad launch with students. The lesson plans were placed in the internal repository for future use.

Capture Learning

It is important to note that at the early stages of the implementation process a DT organizational template was used to direct meetings, conversations and workshops. It served the purpose of helping the whole team see their progress, their tasks and responsibilities and to look back at what had been done already. The tools provided in the DT for Educators toolkit (Riverdale Country School & IDEO, 2011) played an essential role in the achievement of short-term institutional and departmental goals.

Phase 2: Interpretation

Step 1-Tell Stories

Sharing inspiring stories, finding themes and defining insights to make them actionable:

All of the above mentioned series of discussions, conceptual lesson planning workshops and reflective sessions led to the idea of telling stories and ideas through the first iCelebrate Teaching and Learning (www.adwc.hct.ac.ae/icelebrate, 2012). The leaders of the iPad initiative at AD/KCWC organized this event . The purpose of this event was to gather the iPad experience through "short interactive conversations with educators from the three federal universities. They shared ideas, experiences, and plans for using iPad to transform higher education" (www.adwc.hct.ac.ae/icelebrate, 2012). During this daylong event held on June 20 2012, participants reflected, brainstormed, and shared stories about their teaching and learning experience with people who had varied levels of iPad experience and expertise.

This event was a vehicle to begin framing further professional learning opportunities at college level. Plans were then set out and further roles established in order to support faculty development at the start of the following semester. An iCelebrate2 was held on 18 December and subsequent iCelebrate events are planned for 2013.

Phase 3: Ideation

Step 1- Generate ideas. Building to Think

An opportunity to formally introduce CBL to faculty at the start of the 2012-2013 academic year was identified by the leaders of the iPad implementation team, the Coordinator of the Center for Teaching and Learning (CTL) and the iFellow (research Faculty Fellow appointed by the College Director to help document the process of change). These key individuals informally reflected about two key themes: the conceptual lesson plans generated by all English foundations faculty and the overall perceived level of teacher TPACK (Mishra & Koehler, 2009; Mishra et al., 2011; Shin et al., 2009; Voogt et al., 2010) they noticed at the workshops and the iCelebrate event.

Once again, this group of people based their assumptions on their experience in the college, their knowledge about current approaches to teaching and learning such as TPACK (Mishra & Koehler, 2009; Mishra et al., 2011; Shin et al., 2009; Voogt et al., 2010) and CBL (Apple Inc., 2010).

Taking all of these considerations into account, an urgency of utilizing the non-traditional CBL approach to teaching ESL was detected. It was perceived by the team that in order to make the iPad implementation successful the existing approach (task based-lecture, summative assessment oriented) would have to be significantly modified.

Step 2- Refine ideas. Describing the Idea

For the above stated purpose, the members of the iPad implementation team, the Foundations English Chair, the level team leaders, were gathered during the first week of operations of the current academic year to discuss the first iDesign workshop. This was mainly designed as a conceptual lesson planning workshop where new and existing English Foundations faculty met to put together lesson plans that would lead the faculty in developing an engaging, multidisciplinary approach that "lets students leverage the technology they use in their daily lives to solve complex, real world problems" (Apple Inc., 2010). The structure and dynamics of the first series of iDesign workshops was established and booked for the professional development week of semester one 2012-2013: September 2-6, 2012, which was one week prior to the students' arrival.

Phase 4: Experimentation

Step 1-Make Prototypes Prototyping

The iDesign Foundations workshop involved the participation of the whole Foundations English department. Day one of the event involved modeling lessons following the pre-designed prototyping lesson format.

Practice Sessions

These model lessons were discussed during the second part of the day, where faculty practiced their lesson ideas with their level team to adapt their models and create new iPrototype Lessons. In day two, faculty reconvened by level to collaboratively share their new prototype lessons.

Making a Test Plan

The remainder of the week involved the production of lesson prototypes so that everyone had ideas and resources to work with over the first two to three weeks of the semester. The CTL provided a virtual Dropbox repository where all the lessons were to be deposited for the purpose of building an iBook out of the prototypes.

Step 2: Feedback

The CTL coordinator and the iFellow reinforced the idea that these workshops had a clear purpose: To present and practice model lessons invented with the purpose of moving towards the development of a more student-centered, collaborative, engaging and also technology rich classroom environment in the college. This was reiterated by the higher executive team as they visited the workshop on its opening day and the team leaders over the course of the workshop and further on at other instances.

Phase 5: Evolution

Step 1-Evaluate Learning Identifying what is needed

Having attempted something new (the prototyping sessions with faculty), the CTL coordinator and the iFellow began to look at the prototyped lesson plans for the purpose of editing and collating the information on an iBook for public use. As they did this, they incidentally identified gaps in the educational process. For example: inconsistencies were found in teachers' lesson planning strategies and approaches, difficulties in teachers ability to differentiate learning outcomes, objectives, challenges, learning products goals, activities, tasks and assessments were clearly visualized in the lesson planning prototypes that were both showcased and developed over the course of the workshops. They observed a clear opportunity to provide further faculty development directly in the area of CBL.

Planning Next Steps

Another hands-on workshop was provided with invited members of the iPad implementation team, the Foundations English Chair, the level team leaders, Foundations teachers, and the Associate Director to an introductory CBL session named iChallenge. The purpose of this professional development initiative was to fully familiarize foundations faculty with CBL and to detect emergent themes for future discussion. In addition, the workshop provided an opportunity to explore CBL using iPads. From the reflections, discussions, and learning products generated by the teachers at this workshop the idea of tailoring a Foundations English CBL course began to evolve. Discussions began with one of the team leaders in order to evolve the idea. Formal approval was sought from the Foundations English Chair to introduce the eight-hour CBL Course outline to two sections in Foundations level three.

Step 2- Build the Experience

The iFellow began to design the Foundations English Level three course geared upon the principles of CBL and iPad technology. The purpose of the designing course was to illustrate how an EFL /CBL learning course can be tailored and how it can help make the most of using iPad technology. On the other hand, she sought to assist the level three team leader in the task of integrating the language skills, functions, vocabulary, grammar, discourse markers, and topics outlined by in the Foundations English curriculum: the Core Language Inventory. She embedded the elements into a carefully set of three "Big Ideas and Essential Questions" (Apple Inc., 2010) that would lead the students into the development of three clear challenges per semester. Since the summative assessments that already exist at system level could not be altered, she simply added some clearly established learning products to the course to make it more meaningful:

- An e-book created on the iPad Creative Book Builder application;
- A challenge storyboard podcast; and
- A challenge storyboard iMovie and a Rapid Fire talk.

She piloted the course with her classes to informally diagnose the students' reaction to the new method. The outline of the course is provided in the table 1.

Table: 1.
Challenge-Based Foundations English Course

Course	Big Idea	Question Bank	Content	Learning Products
8 Hours Week 3-4 English	NA	NA	Skills for success Adverbs & intensifiers. Comparatives & Superlatives.	
8 Hours Week 5-6 CBL English	Cultural Identity & Citizen	EQ1: How can we help students in our class speak more English? EQ2: How can we help expatriates feel the same love for our country as we do? EQ3: What can we do to make Arabic more important in our country? EQ4: How can we help local students understand other cultures better?		CBB Chapter on cultural identity and citizenship. Solution and implementation storyboard: Reflective Podcast about lessons learned through the Challenge.
8 Hours Week 6-7 English		NA	Skills for Success Gerunds and infinitives CLI Functions.	
8 Hours Week 8-9 CBL English	Relationships and Diversity	EQ1: How can we understand our teachers better? EQ2: How can we help build better student relationships in the college? EQ3: How can we improve our family relationships? EQ4: How can we help the local community build better relationships with non-locals?		CBB Chapter on cultural identity and citizenship. Solution & implementation storyboard: iMovie
8 Hours Week 10-11 English	Health	NA	Skills for Success Simple Past Conjunctions Prepositions of location Comparative adjectives	NA
8 Hours Week 12-13 CBL English		EQ1: What can be done to guarantee that students who have newborn babies don't drop out? EQ2: What can we do to help students in the college cope better with exam stress? EQ3: What can do make our roads safer? EQ4: How can we helps students in the college engage more in regular physical activity?	NA	CBB Chapter on Health Rapid Fire Talks: iChallenge student conference

Sharing the Story

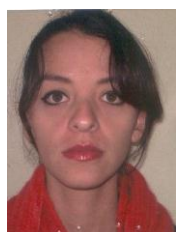
Finally, the CTL provided a follow up session of the CBL introduction solely to level three teachers in order to share the course outline with them and to familiarize them with how their current assessment structure would fit into the CBL course. Then, one faculty member made stories of CBL initiatives in the classroom. The iFellow was asked to provide the course outline and to discuss the benefits and drawbacks the approach showed in practice. The predominant assessment approach used in the Foundations program was summative and formative. Thus, the CBL approach was seen to add valuable process-based and informative assessment feedback to the learning process. The outcome of this sharing session was successful as two faculty members volunteered to participate in a pilot of the course, which will ultimately aim at providing reflective testimonials of the CBL experience at the end of semester one.

CONCLUSION

Documenting Progress

There was a relative agreement at faculty level about CBL being more beneficial for student learning than a more traditional approach. To support this transition, faculty expressed a need for further professional development in the area of CBL particularly in the field of assessment rubric development and implementation. Faculty also expressed their need to see an EFL CBL course work well in the Foundations English department as they had not experienced this approach and wanted to see it demonstrated in the unique context of their program, given the intensity of summative assessments currently structured as part of the traditional course. They also wanted to better understand how to manage the balance between providing sufficient practice for students in reading, writing, listening and speaking, with the CBL experience in order to afford the time needed in the class for developing accurate and fluent language production. Finally, the teachers expressed that the students' reaction to this new approach was an unknown as there are no formal marks involved in the CBL course outline. All of these issues require further research and development. Therefore, the conclusion is to move forward with the pilot of the course with those who choose to voluntarily participate. These people will be in charge of documenting progress of the new teaching and learning experience and hopefully provide evidence of student learning improvement (and engagement) in both English and 21st century skills at the end of the semester.

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