Using QR Codes for Blended Learning in a Micro-Factory

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Blended learning, technology

Design students leverage their mobile devices not just for personal use but also as a tool for real-world information, student life management, inspiration, and sharing of ideas. Ninety-eight percent of college students have mobile phones and ninety percent of students with smart phones use them to find information online (Ransford, 2010). Blended learning involves "combining Internet and digital media with established classroom forms that require the physical co-presence of teacher and students." (Friesen, 2012). Given the pervasiveness of mobile phones and the challenges of curtailing the use in the classroom, there are numerous opportunities for blended learning through mobile technologies, particularly those tasks of a tutorial and demonstration nature. Finally, there is also proof that students benefit from and prefer to learn from one another (Mazur, 1996). A peer instruction-based, mobile learning environment could be a promising method for undergraduate development.

A fashion design program in the United States recently acquired several industrial sewing machines of various models and ages to be used by fashion design students in a micro-factory. Instructing students on the operation and individual threading systems of the different machines is a low-level and time-consuming task. This time spent on a "tutorial" taskwork could be better used guiding students in advanced design techniques or engaging them in deeper design theory. Often, tutorials and demonstrative design studio activities are assigned to teaching assistants who need the same instruction that the undergraduate students need. Because students rely on their mobile devices so much for learning, the application of Quick Response codes can automate this repetitive practice.

Quick Response codes, or QR codes are matrix barcodes that hold large amounts of imbedded information and can be linked directly to text, video, or a URL (Bolorizadeh, Brannen, Gibbs, Mack, 2012). They have been used for tracking and convenience-oriented applications since 1994. Today, mobile-savvy college students use them for circulating information for student clubs and classes, taking polls, and managing expenses. They eliminate the need to type in long URLS or copying and pasting website links. It provides a learning environment that is user-centered and offers point-of-need information on a familiar device in a blended learning experience.

In the Fall of 2019, I trained an undergraduate teaching assistant to thread and operate a Juki single needle, model DL-8700 industrial sewing machine. The student took pictures and notes, and then created a google slide presentation that included "dos and don'ts", troubleshooting tips, diagrams, needle replacement, and threading directions. Every slide displayed images and detailed directions that were written by the student and for the exact machine in the micro-factory. They also imbedded a YouTube video demonstrating the machine operations. Once the presentation was completed, the instructor used a free online QR code generator called "QRCode Monkey" where the link for the google presentation was pasted and a unique QR code was generated. The QR code was then downloaded as a pdf and printed on 3" x 5" stickers that were secured to the corner of the sewing table of the

corresponding industrial sewing machine. Students who want to use the sewing machine can use their mobile device, scan the code using their camera, and see the step-by-step directions in the google presentation.

The most beneficial aspect of using QR codes or google slides is the ability to not just track frequency and when a document is accessed, but to know who scanned the QR code. Knowing these conversion rates is important to determine its effectiveness and potentially use in student performance evaluations as an indicator of participation or homework completion. For this micro-factory, the senior cohort was introduced to the QR codes. The data show that within the first two weeks, 56% of the students working in the space accessed the presentation via the QR code. Of the students who did not use the QR code, about half were already familiar with the machine and didn't need further instruction or didn't access it. Outside this sample, there were other individuals who used the QR codes as well. There was only a single in-person request for assistance with the machines during the semester.

While there is no actual proof that students who scan the code actually use the content, the task has been permanently offloaded to be used as frequently as it may be needed. To incentivize usage, there are ways to imbed "Easter eggs" and include information about history or trivia related to manufacturing, for example. Also, because of the similar nature of the other machines in the micro-factory, replicating this method for other machines is simply a task of cutting and pasting information and replacing a few images. Further, the codes allow students stay "on task" (Cetner, 2015) and not have to search the internet for related tutorials or videos by someone other than their instructor or teaching assistant. This way, the technology isn't a "frill" but imbedded into the learning (Tucker, 2013).

It's important to consider issues of equity. Different devices have varying abilities so students who may not have the latest iPhone or scanning capabilities will need to install an ideally, free application on their phones. The space in which the codes are accessed should be Wi-Fi enabled so data isn't needed. It should be made clear to students that the QR code is meant for their viewing, so including a "Scan me for threading directions!" prompt near the sticker is helpful and will encourage those who may be unfamiliar with the technology to use it.

This instructor intends to work with future undergraduates to develop more imbedded videos for the remaining machines and include them as part of a larger offloading effort of all demonstration instruction into a design and technology repository within the department. Compiling student feedback of the videos and continuing to monitor the usage will only affirm the validity and value of leveraging this technology and help make the micro-factory run efficiently.

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