Creating a Microlearning Environment to Facilitate Retention of Information: A Three-Step Approach

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Introduction

Microlearning refers to a learning strategy designed using a series of short segments of learning content and short activities that makes a microlearning module. It is also called bite-sized learning because it utilizes small, well planned, bite-sized chunks of units or activities (Hug, 2005). It is designed to suit the limits of the human brain with respect to its attention span and avoid cognitive overload, and research shows how effective it can be on student learning (Aitchanov, Satabaldiyev, & Latuta, 2013; Liu, Wei, Gao, 2016; Wang, 2017; Zhamanov & Zhamapor, 2013). Although the concept of micro teaching existed for a long time, the term microlearning has not been used until a decade and a half ago (Hierdeis, 2007) and research that explores microlearning environments is still growing in the context of higher education.

Literature Review

According to Hug (2006), there are seven dimensions of microlearning: time, content, curriculum, form, process, meadiality, and learning type. They describe mainly the design aspect of microlearning. Although the design aspect is very important, but they lack the pedagogy and technology aspects, which are key elements to an effective microlearning design. Research conducted to investigate the opportunities of integrating technology to create microlearning environments is still at its infancy, and it focuses heavily on corporate training and adult learning. Research on higher education is very limited though. In higher education for example, a study by Liu, Z., Wei, L., Gao, X. (2016) found that 80% of college students took active part in teaching activities. They stated "it promotes multidimensional interaction and increases deep-levelled cooperation and understanding" (p.870). The researchers also found that microlearning environments inspired and improved the learning environment itself and students' interest in learning. Zhamanov & Zhamapor (2013) started to implement microlearning technique in their university course and also received positive feedback from students. Students expresses higher level of interests to learn the subject matter, and the amount of materials learned has increased compared to previous years.

Results from a study by Bruck, P. A., Motiwalla, L., & Foerster, F. (2012) with a university level course and two governmental training courses showed that learners had good satisfaction levels and high usage levels for the course materials. Similar results by Aitchanov, et. al. (2013), who examined the use of Twitter, a social media technology, in a microlearning technique for educational purposes. They collected date from college students enrolled in Advanced Programming in C++ course, and found that the majority of them enjoyed learning the course materials when it was delivered in small chunks using Twitter. However, Students suggested that they would like the number of tweets to be increased, and to implement this technique to learn other spheres. Kovachev, Cao, Klamma, & Jarke, (2011) explored bilingual vocabulary learning, and they found "promising results in enhanced flexibility in personal learning content creation and increased efficiency in filling knowledge gaps" (p. 51). Similarly, Wang (2017), investigated the effect of delivering the Engineering Mechanic Experiment content in short sequenced videos. As a result, the author reported that "the engineering mechanics experiment grade of undergraduate has

improved significantly, the service efficiency of mechanical equipment and degree of familiarity has improved sharply" (p. 130). The design of those short videos, however, resulted to limited student-student and student-instructor interaction. Interaction with the digital content in this case is the highest.

In terms of evaluations, Giurgiu (2017) assessed whether students respond better to evaluation questions when they watch small segments of content followed by a number of evaluations, or when they watch large amounts of content with fewer evaluations. Findings suggest that smaller chunks of content helped students to better retain information and better perform in end-of-course test. Students who learned through microlearning technique took 28% less time to answer their evaluations and did 20% better, took three times less to cover the course materials compared to students who did not. This suggests that trying to learn large content at once result to little interaction with content.

Although research has shown its effectiveness, there is a lack of providing clear structure and theoretical framework for microlearning. This paper intends to fill the gap in research by providing a three step process of how to create a microlearning environment that help facilitate students' retention of information.

Step 1: Break down the content

The first step in creating a microlearning environment is to break down content into smaller chunks. Microlearning is designed to suit the limits of the human brain with respect to its attention span and avoid cognitive overload, and it supports Hattie and Yates's claim (2014) that learning new material/skills within several spaced short sessions is more effective than a single longer session. This does not mean that instructors cut down their class time but to cut down their class materials into mini ones. It is important at this stage to think about what are the must-to-know information and what are the ok-to-eliminate information when students interact with content.

The following questions can help instructors when thinking about the "must to know" information for their classes:

- What do I want my students to know and understand in order to move forward?
- What are the 3 or 4 most important things I want my students to learn?
- What are the most common mistakes students do that affect their learning and their grades?
- What topics do I think that can be broken down into small pieces?

These are just some example questions to ask for choosing appropriate content to break down. Once microlearning content is determined, it is essential to think about the pedagogical model to use and the design of the microlearning environment.

Step 2: Time the Activities

Another important elements to consider is the length of the learning activities when designing and creating an effective microlearning environment. Learning in small steps happens when activities are relatively short. The total amount to complete all segment of content in a microlearning module does not take more than 15 to 20 minutes for learners to complete. Within the microlearning module, micro activities are designed that takes learner 3 to 5 minutes to complete. This can include 5-minute mini lecture, followed by 5-minute think-pair-share, etc. The purpose of this step is to revisit information multiple times through a variety of activities to reinforce and retain information and help it move to the long term memory.

Step 3: Focus on a Single Learning Goal

A Microlearning module focuses on a single learning goal students need to achieve. What makes microlearning effective is not just because an activity takes 5 minutes to complete, but also provide specific and targeted information. The purpose of this step is to ensure that learners take one step at a time to learn and meet the goal, before they move forward.

When writing down the learning goal, it is important to first think about what is the one thing that students will learn by the end of the microlearning unit? Something they'll be able to do, feel, or know as a result of interacting with

the microlearning content. For example, students will be able to compute basic statistical tests by the end of the unit. Once a learning goals for a lesson were determined, it is important to assign a single learning goa for each microlearning unit, and then think about its process to help students learn. Baumgartner (2013) discusses the theory behind microlearning and proposes a model of a competence spiral to scaffold students' learning. In the first phase called Learning I, students absorb knowledge; this knowledge is basic and has no meaning yet (relates to behaviorism), In the second phase called Learning II, students acquire knowledge. Students in this phase interact with artificial environments and make their own experiences. Learning here in active with meaningful feedback is provided by the instructor (relates to cognitivism). In the third phase called Learning III, knowledge is constructed where instructors and students work together to master the course materials (relates to constructivism). In Learning I+, students proceed to higher level with more advanced concepts. Based on the Baumgartner's model, Göschlberger (2016) proposed a social microlearning platform designed for all four phases. In Learning I, students create and share microlearning content. In Learning II, students evaluate, rate and improve the microlearning content. In Learning III, students are able to tag and collect content items. Learning I+, students interact with the microlearning content and solve low stakes quizzes, which they can take repeatedly to help them learn the materials.

The Role of Technology

Technology can play an important role in microlearning. It can be used to engage students with micro activities. The challenge with technology is that it is a fast-growing industry, sometimes it is hard for instructors to keep up, as they have teaching and non-teaching responsibilities. However, instructors often have knowledge about the content they are teaching, but not much how to integrate technology to help students learn. (Alqurashi, Gokbel, & Carbonara, 2016).

Many of the technologies used in the classroom nowadays are have mobile friendly applications. In addition, the number of students who own mobile devices continue to increase. For this reason, digital microlearning environments should use mobile friendly applications, to allow learners to complete learning activities on their devices. The integration of mobile devices to create microlearning environments was discussed by Hug (2010). He emphasized on the importance of mobile devices because many reasons: (1) content displayed on mobile devices is usually a microcontent, (2) attention span and time periods are relatively short when presented on mobile devices, (3) a screen size in a mobile device is smaller than other devices, (4) mobile devices allow the design of micro-steps in formal and informal learning environments, (5) mobile devices allow the microlearning environment to be mobile, physical and social, and (6) finally mobile devices are often associated with micro platforms.

Conclusion

The microlearning model helps to ensure that students retain information. It does help usually distracted individuals to learn in short focused micro content. Instructors must also focus on the learning experience in the big picture when implementing microlearning. The application and the construction of knowledge that occur in class after students complete their microlearning content outside of class. By including all elements of microlearning (i.e. content, pedagogy, and technology), it can increase student engagement, enhance student satisfaction, and positively impact the learning experience.

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