The Seven Traits of a Learning Environment: A Framework for Evaluating Mobile Learning Engagement

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Abstract: Mobile technology is increasingly used both in and out of school classrooms by students to remain actively engaged in learning and extend their learning. Developments in mobile technology have made it possible to access and interact with learning resources, other learners and teachers in ways not possible just a few years ago. Instructional designers and teachers struggle to maintain understandings of how changes in technology impact student interactions and learning engagement. Instead of focusing on particular tools, instructional designers and teachers should focus on the design of the learning environment to gain understanding of what students are doing while engaged in learning. The Seven-Traits of a Learning Environment framework is introduced here to help educators develop more effective and engaging instructional design for mobile learning environments. The SAMR technology integration model is discussed as a potential tool to help measure student engagement through the lens of the 7-Traits framework.

Key words: Cognitive load theory, connectivism, engagement, learning environment, mobile learning, reciprocal determinism, SAMR.

1. Introduction

Students connect to their classroom environments both in and out of class in manners that are increasingly new to the experiences of teachers and instructional designers. Students use iPads, smart phones, laptops, and other devices as a natural part of their learning experience. Typically, they don't even notice that they are using these devices until they are unable to, such as when the internet does not work, or the teacher tells them to put the device away. At these moments their behaviors, their thinking processes, and their environment alter. Learning engagement is impacted. By always being connected, students develop channels for interaction with others in and out of school, as well as new means for accessing and processing information [1]. By the very nature of these connections, learning opportunities expand.

For example, students may develop their own chat groups so that they can ask a question and get help at any time both in and out of class. These groups represent modern-day note passing, but the use of such messaging apps helps extend learning opportunities through both space and time to provide students with more opportunities to develop language and thinking in a nonthreatening atmosphere [2]. This example illustrates the need to understand how learners develop engagement strategies as environments change.

2. Theoretical Background

2.1. Connectivisim

Connectivist learning theory explains how knowledge acquisition depends on connected information sources that include people, social networks, search engines, media resources, and other digital media. Siemens wrote that connected learners regularly inquire, collaborate, share work and express themselves while developing and strengthening knowledge sources, which can be found internally in cognitive networks, and externally in connected networks [3]. The actions involved in maintaining these knowledge connections increase the complexity of these networks and enables learners to construct new and meaningful understandings. Learning in a connected environment is typically public and non-linear and assessments are based on student generated and collaborative works [4]. By utilizing common mobile communication and search tools, students can create, develop, and strengthen connections between different information sources [5]. The tools aid student thinking by providing ways to help them decrease mental effort while processing information and creating long-term knowledge. As students are practically always in possession of a mobile device, they are capable of increasing overall participation in discussions, asking and answering questions, sharing and reviewing work, or conducting and analyzing research.

2.2. Cognitive Load Theory

Cognitive load theory describes how people process working memory, or cognitive load, to develop understandings and build knowledge [6]. Working memory (intrinsic cognitive load) is affected by outside influences (extrinsic cognitive load) that can either help or hinder working memory. As intrinsic memory is processed it is related to existing knowledge or information resources, both inside and outside the brain. By making it easier for the mind to process information, mental effort can be reduced and students can more effectively process knowledge to create permanent or long-term knowledge [7]. In mobile environments knowledge is accessed through external digital networks akin to internal cognitive networks. Thus, locations such as Google, YouTube and Wikipedia become places where students go to find answers to questions, make connections, and gain additional knowledge. This enables students to increase their capacity to utilize information networks to extend the capacity of their minds to access and process information with decreasing amounts of mental effort.

Cognitive load is related to engagement. Harris states that student engagement is based on three factors: behavioral, emotional and cognitive engagement [8]. Behavioral engagement is observed by looking at how students participate in class activities. Emotional engagement is observed by learning about student attitudes and how students react when interacting with their learning environment. Cognitive engagement is observed by examining how students develop strategies to develop meaning and understanding. Because of increased interactive options, personality and learning styles are also influenced by how students connect and interact with their learning environment [9]. In a mobile learning environment these engagement characteristics can be witnessed in how students access information or make inquiries, share or exchange work, participate in activities, seek guidance from experts, and reflect on their learning [10]. When they are actively engaged in learning, they use particular mobile tools to increase intrinsic cognitive load and ease mental effort.

2.3. Reciprocal Determinism

According to Bandura, learning can be observed through the triadic relationships of behavior, psychology and situation [11]. From a practical point of view instructional designers or teachers can observe this in how the students act, behave and process information in different situations. Learning is dependent on how these factors interact; changes in one impact the other two. In mobile learning environments, learner engagement is witnessed when students use their mobile learning in different contexts to build and personalize their knowledge. They may send messages, share pictures and work, ask for help, inquire, watch videos, or even play games in different ways to help their learning. Because this context provides

students with the ability to always be connected, the contexts for learning expand [12]. Students have more choices for action, can pace their learning, can share work, get public feedback, use language with different formalities and levels of technicality, and can discuss matters with different audiences [13].

3. Learning Environments

Learning environments can be defined as the place where learning occurs. Learning environments have certain common attributes that can be examined, such as location, tools, interactions and assessments [14]. Learning environments can take many forms in both the real and virtual worlds, from the classroom to the chat-room. These features change over time and place, as does how the features relate to one another. For example, when students create instant messaging groups to share work and ask one another questions while outside the school, the breadth and depth of their interactions and assessments grow.

Kirschner suggests looking at the learning environment as a set of three sub-environments, each meeting different learner needs [15]. The task environment is composed of the activity or practice opportunities. The knowledge environment is where the student demonstrates learning and abilities. The study environment is composed of content and resources. These environmental aspects can be aligned with the behavior, psychology and situation framework of reciprocal determinism to better understand how students interact in class.

4. The Seven Traits of a Learning Environment

The traits of any learning environment relate to accessibility and actions that occur within the environment [16]. Regarding accessibility, an effective learning environment is organized to make it simple for learners to find their way around their class, and it has resources that both support and personalize the learning experience. Within a learning environment students can make exchanges, participate in activities, make social interactions, and communicate through various channels to share work, test knowledge, inquire, research, collaborate, express themselves and show understandings. Additionally, through these interactions, teachers can assess and evaluate student learning through a collection of learning artifacts. The most important trait relates to engagement itself, or how often and why students interact with the learning environment.

4.1. Organization

Organization relates to how the course is put together. In traditional 4-wall classrooms, there are shelves, boards, posters, desks, chairs, cabinets, and other resources. Students know where everything is, how to find resources or instructions, and when and how to talk or interact with others [17]. Students personalize their learning in their learning spaces, such as journals, desks or lockers. In a mobile learning environment, digital classrooms may be set up with platforms such as Moodle or Blackboard, where students can access resources, participate in class activities, and personalize their learning. They may also use a variety of other online tools such as Google, Edmodo, Schoology, or Seesaw to interact with their class. Regardless of platform, students enter their course room, interact with their class, and utilize learning resources.

4.2. Resources

Resources relate to available learning materials. In a traditional classroom these include textbooks, handouts, posters, videos, instructions, lab equipment, and other tangible items. Student produced work may be included on the walls, in portfolios, and other areas of the room. In a mobile learning environment, possible resources include links to course content, multimedia files, documents, and information collections [18]. Also included is student produced work, as well as class generated resources found in forums, wikis, chat rooms, blogs or other interactive locations. In these environments, student work as well as feedback is

public and shared, and resources build over time. This makes interactions and exchanges to become class resources themselves.

4.3. Exchanges

In a typical learning environment, students are asked to share work, collaborate, provide support and assess one another's work to develop language and build knowledge [19]. Often they need to ask questions, get help, or find clarifications about their work. This has traditionally been done face to face in the classroom, around school during the school day, or through the telephone after hours. In a mobile learning environment students can send files, notes, questions, videos, pictures, websites, or a variety of files or links to one another through their devices. In addition to enabling students to engage in learning while away from the classroom, mobile tools enable students to interact in class differently with one another, their teachers, and the outside world. Through forums, wikis, file exchanges, and other online resources, students can work together to complete activities and build both personal knowledge and shared group understandings [20].

4.4. Activities

In normal classes, the teacher sets up learning activities to help students gain knowledge and skills. Students complete assignments, work on projects, study vocabulary, practice problems, make reports, develop research, and interact with others. In traditional classrooms these activities are limited to the classroom and outside the classroom in the form of assignments or projects. Teacher feedback is vital to ensure that students can progress and meet curricular objectives. Feedback is usually private and limited by time and place. In a mobile learning environment activities to encourage the development of knowledge and skills can be a blended mix of traditional and online learning where feedback can be instant and can be ongoing, private, public, or shared [21]. Feedback can be from the teacher, automatically generated, or peer- and self-assessed. It can also be composed of text, video, audio, or any combination of multimedia. In these environments, records of student learning are retained so teachers can provide feedback and analyze student growth over time, and students can effectively reflect on growth.

4.5. Social

Often in any learning environment, contacts with people and resources outside of the classroom are required to help advance learning. In a traditional classroom contacts could occur through field trips, school-wide activities, special events, performances, or parent conferences [22]. In a mobile learning environment social media, blogs, forums, research databases, galleries, and other networked tools can be used to extend classroom boundaries. With these tools, students can interact with students in other schools, participate in different initiatives, meet with experts, or celebrate their learning while developing expert knowledge. By communicating with one another through different media and extending the time and place of their social environment, students can build networks of knowledge to extend their learning.

4.6. Communication

Effective communication requires messages and replies going back and forth; the intention of the messages should be met and be recognized in the response [23]. In a normal classroom, communication occurs through lectures, group or pair work, reports, meetings, and perhaps the telephone. In a mobile learning environment a variety of communication channels exist. These include texting, voice and video messaging, email, blogs, forums, calendars, and other notifications. The tools, or apps, for accessing these channels are also varied and frequently change, especially in smart phones. In connected classes learners can use the tool that best meets their particular needs. For example they can use instant messaging groups

to ask one questions and provide support, make additions to wikis, reply to others on a forum. Or leave comments on a blog. Teachers can also use emails, forums, and comment areas in online activities to provide feedback, report on learning, and discuss matters with students and parents.

4.7. Engagement

As previously discussed, engagement can be looked at in terms of behavior, emotion, and cognitive processing [24]. In a traditional class information about engagement can be found in student records, and is typically found in such form as attendance data, assignment grades, quiz and test scores, portfolios, collections of works, communication records, or anecdotal observations. In a connected learning environment, information about student engagement can be viewed through collections of student work, as well as analysis of network data logs that show what students do in their virtual environment and when they do it. Data can show when both students and parents access information, post messages, make comments, ask questions, upload files or multimedia, update or change information, or give feedback to others. This information source makes it possible for teachers to make better conclusions about student actions, as well as understand the actions that precede or cause different outcomes. This information can help teachers or instructional designers better evaluate their lessons and instructional delivery.

5. Discussion

Kirschner states, "Modern day learning and accompanying learning environments are characterized by their place and time independence, their integrated presentation and communication facilities, and their opportunities for re-use of instructional materials in the form of learning objects" [25]. As learning opportunities arise that require varied connection strategies and original sources of information, notions of what a typical classroom looks like are discarded. In an environment full of so much potential where the creation of new knowledge through connections is possible, the boundaries of the classroom must clearly be redefined.

Some teachers express the belief that student use of mobile technology has limited impact on learning. This belief may be based on the common experience of witnessing students becoming less engaged in learning and more engaged in bells and whistles. These teachers may not be conceptualizing how independent student use of connected mobile tools can aid the learning process. They may instruct students to use technology tools, but not connect with them on-line. Students on their own, however, are already engaging in learning in rich dynamic manners, though unstructured.

One tool for helping teachers conceptualize learning in a mobile environment is the SAMR model for integrating technology into the classroom [26]. This model looks at technology using a framework that measures to what extent learning is redefined. The S and A refer to student use of technology that demonstrates Substitution and Augmentation. Technology use mirrors what would occur if there were no technology present; basically, technology is used to complete work more efficiently and effectively. This occurs through such activities as making slide shows, writing reports, completing research, analyzing information, and communicating with others. The M and R refer to Modification and Redefinition, or how the use of technology is seen as changing the nature of the learning experience and what is learned. The learning that occurs in these situations could not occur without the integrated ubiquitous use of technology. Examples of such learning can be found in how students interact with others through connected networks to collaborate, discover, evaluate and reflect on learning. When the SAMR model is applied to the 7-Traits Framework, each trait can be evaluated in terms of how the experience of learning redefines the learning occurring in the classroom. It does not measure how much learning occurs, or how effective the learning is, but gives a measure of how students are redefining their learning [27].

Teachers and designers should familiarize themselves with how students remain connected so that they

can create more effective and engaging learning opportunities. By looking at the 7-Traits of a learning environment, instructional designers and educators can examine learning needs in relation to learner abilities and context to develop instruction that encourages engagement for the particular context. This model provides a framework for educators to look at learner engagement that supports the expansion of learning opportunities. While the 7-Traits by themselves do not provide the means to evaluate learning, they provide a framework in which to apply such learning theories as Reciprocal Determinism [28], Connectivism [29], Cognitive Load Theory [30], and SAMR [31]. Research that seeks understanding of these theories within evolving mobile learning contexts should provide actionable multi-contextual information for designers, teachers, and other educators.

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References

[1] Keengwe, J., Schnellert, G., & Jonas, D. (2014). Mobile phones in education: Challenges and opportunities for learning. *Education and Information Technologies, 19(2)*, 441-450.

[2] Andujar, A. (2016). Benefits of mobile instant messaging to develop ESL writing. *System, 62*, 63-76.

[3] Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology & Distance Learning, 2(1)*.

[4] Mitew, T. (2017). Teaching digital media in a systemic way, while accounting for non-linearity. University of Wollongong, NSW, Australia.

[5] Ciampa, K. (2014). Learning in a mobile age: An investigation of student motivation. *Journal of Computer Assisted Learning, 30(1)*, 82-96.

[6] Merriënboer, J. J. G., & Ayres, P. (2005). Research on cognitive load theory and its design implications for E-learning. *Educational Technology, Research and Development, 53(3)*, 5-13.

[7] Paas, F., Tuovinen, J. E., Merriënboer, J. J. G., & Darabi, A. A. (2005). A motivational perspective on the relation between mental effort and performance: Optimizing learner involvement in instruction. *Educational Technology, Research and Development, 53(3)*, 25-34.

[8] Harris, L. R. (2008). A phenomenographic investigation of teacher conceptions of student engagement in learning. *Australian Educational Researcher, 35(1)*, 57-79.

[9] Ch'ng L. K., & Samsudin, Z. (2014). Mobile devices: Toys or learning tools for the 21st century teenagers? *TOJET: The Turkish Online Journal of Educational Technology, 13(3)*.

[10] Chametzky, B. (2014). Andragogy and engagement in online learning: Tenets and solutions. *Creative Education, 5(10)*, 813-821A.

[11] Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice-Hall.

[12] Brito, P. Q. (2012). Teen conceptualization of digital technologies. *New Media & Society, 14(3)*, 513-532.

[13] Ch'ng L. K., & Samsudin, Z. (2014). Mobile devices: Toys or learning tools for the 21st century teenagers? *TOJET: The Turkish Online Journal of Educational Technology, 13(3)*.

[14] Atkinson, R. K. (2013). *Learning Environments: Technologies, Challenges and Impact Assessment*. Hauppauge, NY, USA: Nova Science Publishers, Inc.

[15] Kirschner, P. A. (2005). Learning in innovative learning environments. *Computers in Human Behavior, 21(4)*, pp. 547-554.

[16] Opdenakker, M., & Minnaert, A. (2011). Relationship between learning environment characteristics and

academic engagement. *Psychological Reports, 109(1)*, 259-284.
[17] Opdenakker, M., & Minnaert, A. (2011). Relationship between learning environment characteristics and academic engagement. *Psychological Reports, 109(1)*, 259-284.
[18] Tay, H. Y. (2016). Longitudinal study on impact of iPad use on teaching and learning. *Cogent Education, 3(1)*.
[19] Dornyei, Z. (2009). Individual differences: Interplay of learner characteristics and learning environment. *Language Learning, 59(s1)*, 230-248.
[20] Mitew, T. (2017). Teaching digital media in a systemic way, while accounting for non-linearity. University of Wollongong, NSW, Australia.
[21] Karlen, Y. (2016). Perceived learning environments and metacognitive strategy knowledge at the upper secondary school level. *Journal for Educational Research Online, 8(2)*, 212-232.
[22] Veletsianos, G., & Navarrete, C. (2012). Online social networks as formal learning environments: Learner experiences and activities. *International Review of Research in Open and Distance Learning, 13(1)*.
[23] Brito, P. Q. (2012). Teen conceptualization of digital technologies. *New Media & Society, 14(3)*, 513-532.
[24] Vaughan, N. (2014). Student engagement and blended learning: Making the assessment connection. *Education Sciences, 4(4)*, 247-264.
[25] Kirschner, P. A. (2005). Learning in innovative learning environments. *Computers in Human Behavior, 21(4)*, 548.
[26] Puentedura, R. R. (2012). The SAMR model: Background and exemplars. Retrieved from the website: http://www.hippasus.com/rrpweblog/archives/2012/08/23/SAMR_BackgroundExemplars.pdf
[27] Khartoum International Community School. (2017). *7-Traits SAMR Design Rubric for Sharing*. Retrieved from the website: https://docs.google.com/spreadsheets/d/1aM24BcDozsb2mToMtQRHaKxyRPgLAsAXolNt3souxLI/
[28] Bandura, A. (1978). The self system in reciprocal determinism. *American Psychologist, 33(4)*, 344-358.
[29] Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology & Distance Learning, 2(1)*.
[30] Merriënboer, J. J. G., & Ayres, P. (2005). Research on cognitive load theory and its design implications for e-learning. *Educational Technology, Research and Development, 53(3)*, 5-13.
[31] Puentedura, R. R. (2012). The SAMR model: Background and exemplars. Retrieved from the website: http://www.hippasus.com/rrpweblog/archives/2012/08/23/SAMR_BackgroundExemplars.pdf

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