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Space-related Factors that Affect Performance in Online Forums

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Background

The term "anywhere" has been extensively used in online collaboration; however, this term is questionable since there are many characteristics of space that may drastically affect the performance of the participants. For instance, Gumper and Drucker (2003, p.35) claim that *safety* is the primary defining criterion by which individuals choose where they work, play, live and interact in real-physical space. In a report by the NTT-AD in 2012 named "Digital Communication Survey" (Dijitaru komyunikeshon raifu chosa) conducted among 5,660 users in major cities in Japan (Sapporo, Tokyo, Nagoya, Osaka, and Fukuoka), it was found that 88.8% of the total users accessed the Internet from their personal computers at *home*. Another survey from the same country called "Home vs Outside? What's the Place in Which You Can Concentrate?" (Jitaku vs jitaku igai? Anata ga shuchyushite benkyou dekiru basyo wa?) also showed that 66.6% out of 1000 respondents preferred to work at *home*, and only 33.4% preferred other places (cafes, family restaurants, commuter trains, private study rooms, and offices). Those who preferred to study outside their home considered TV, videogames, etc. as threats to their concentration. Similarly, virtual environments are filled with risks. Thus, environment characteristics such as safety should not be ignored in online settings because they are likely to affect the performance, motivation and engagement of the participants (Skold, 2012). In order to identify other factors that may affect "anywhere" collaboration, the following paper takes a look at three different types of space found in virtual environments and examines the factors of each which may affect users' performance in online collaboration.

Defining Space

Based on Newton's Principia, space is considered an essentially absolute, independent, infinite, three-dimensional, externally fixed, uniform container into which God placed the material universe at the moment of creation (Ray, 1991). However, space is not confined to the *physical*, but also *perceptual* and *conceptual* (Strate, Jacobson & Gibson, 2003). *Physical space* theoretically exists independently of human beings; whereas *perceptual space* is the impression of space that people obtain through information being received and sent through the body's senses －visual, auditory, tactile, thermal, kinesthetic, and olfactory－ (Dix, Finlay, Abowd & Beale, 2004). This spatial perception is acquired when humans first receive information about space through their mother's breast. Later this perception is expanded through the contribution of hands, and eyes, until the auditory orientation comes into play and the child begins to focus on unseen space (Akhundov, 1986). On the other hand, *conceptual space* is the space generated in people's minds that holds memories, imagined and fictional spaces never before perceived.

Others have seen space as a way of looking at human behavior. Scheflen and Ashcraft (1976) considered it a relation of or pattern of behavior and movement. Later, Malpas (2008) acknowledged that sociability and space are related. He argued that any creature whether capable or not of controlled movement has a degree of awareness of space in order to utilize a spatial framework. In other words, for a creature to use a spatial framework, it must at least be capable of locating itself physically in relation to its environment. Human beings are able to move from a personal space (the individual's sense of territory) to areas that are shared with others. By interacting with others, human beings are able to expand their spatial frameworks (Tulku, 1997), and with the development of internet technology, these spatial frameworks have been displaced and expanded through virtual spaces.

Three Spaces and Related Factors Affecting Online Collaboration

Taking into consideration the classifications of real-physical spaces in the literature review above, this paper divides online space into *material space* (the virtual platform where work is done); *reflective space* (the place where users' engage knowledge); and *relational space* (the space where human relationships occur). Several factors that may affect online collaboration can be clearly identified by looking at each type of space separately rather than as space as a whole (See Figure. 1).

Material space

Material space refers to the space designed for participation, interaction and collaboration in a virtual environment. This could be an online forum, chat or any other bounded virtual space assigned to hold discussions in the form of posted visuals or messages. This space is affected by two main factors: The *user's prime space* and the *spatial design*. The *user's prime space* which addresses the students' preferences when selecting a device (e.g. a desktop computer, tablet computer, etc.) and the platform to collaborate online (e.g. Facebook, Moodle, a chat application, etc.). This choice can be based on the Technology Acceptance Model (TAM model) which considers "perception of usefulness" and "perception of ease of use" as two key factors that influence an individual's intention to use technology. The *spatial design* refers to the user-interface design. A well designed user-interface can help students operate the system more easily by reducing their cognitive load, and can guide users in the appropriate to learn (Liu, Chen, Sun, Wible & Kuo, 2010).

Reflective space

On web-based forums people's bodies become irrelevant and only the presence of their minds matters (Schultze, 2010). The *reflective space* refers to that space in which people think and engage with knowledge. The ability of engaging in conceptual thought has been connected to the ability of using language since language is a partial representation of thought. This space may be affected by two factors: The *individuals' silent space* and the *feedback space*. The *individuals' silent space* is the silent space that helps users to think and become engaged with knowledge. It

is a place for self-reflection generated in people's minds which include memories, images and experiences. According to Zembylas and Vrasidas (2007) silence can work as an aid to reflection and as an important part of personal growth. It can also be used to help make sense of thoughts, ideas, emotions and actions. The *feedback space*, on the other hand, is the space that provides the opportunity to evaluate the work of others to recognize how to improve upon it and how to take learning further (Espasa & Meneses, 2009). Constructive comments can enhance the motivation, interest and self-efficacy of students and also improve their performance (Lu & Law, 2012).

Relational space

Connection is the reason for people to exist and what gives purpose and meaning to their lives (Brown, 2010). By being connected, human beings can expand their spatial frameworks with other human beings; therefore, this space is affected by two main aspects: The *community presence* and the *shared spatial cognition*. The *community presence* refers to the degree to which members are perceived as "real" in the virtual world, as well as their ability to express themselves socially and emotionally with other users. This also includes the degree of perception and feeling of belonging to a certain online community. The *shared spatial cognition* addresses the shared space for cognitive involvement, via a linguistic capacity, which is related to the cohesion of the group activity as a whole. The participants may opt for using alternative media when collaborating online (e.g. Skype) switching from exclusively written to spoken communication or a mixture of both.

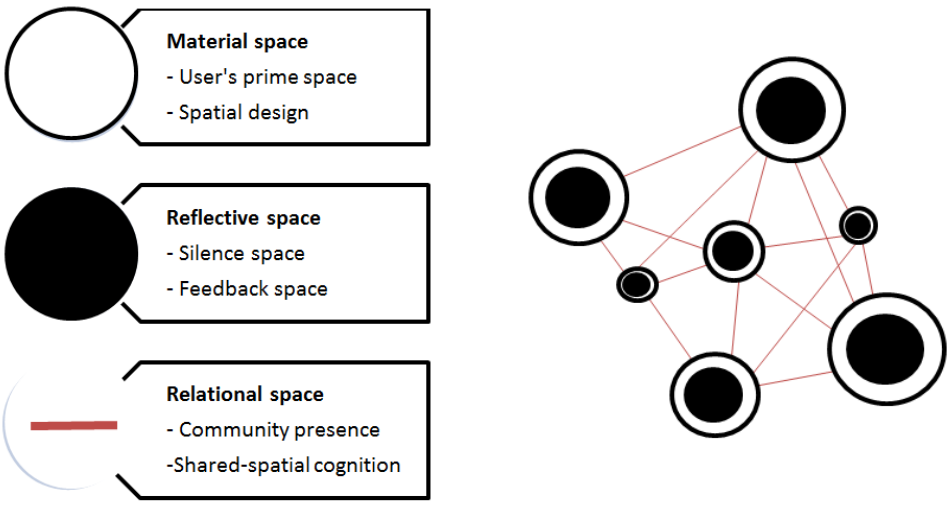

Figure 1. Spaces and related factors affecting online collaboration

Conclusion and Future Research Direction

This paper classifies virtual space into three different types—*material, reflective* and *relational*—based on a literature review regarding real-physical space. It also provides insights into the possible space related factors that may affect students' performance in each of these spaces when

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they collaborate online. In addition, it questions the term "anywhere" by providing examples of factors such as safety, preferred workspace, sense of group belonging, etc…that can restrict anywhere collaboration. The way these spatial factors are handled by computer designers and instructors alike could make online collaboration more or less sustainable. Nowadays, with the rapid increase of personal mobile device use, virtual environments have become more and more flexible allowing students not only to switch from a physical to a digital context, but also from a personal to a social context (Wong, 2013). Nonetheless, it is still not clear how the combination of both the physical and virtual environments affects the participants' online collaboration. For example, in a previous study by Garcia Mendoza (2014), some of the participants stated that going around asking people for further ideas to contribute with a comment in an online forum discussion, while using smartphones, was not possible. They argued that that the device itself created a private space, similar to a bubble, which was extremely difficult to share with others. Therefore, it is not only crucial to be aware of the different space related influences, but also the technology to be used as the main medium for collaboration. Even though this paper supports the idea that online collaboration may not happen "anywhere" as has been commonly believed, further research on environments both virtual and real-physical is still needed to better understand how both affect students' performance in online forums.

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