Tangible vs Digital:

a Critical Response of *Designing for Emerging Technologies*

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Our visions of the future often portray digital information as having the ability to be manipulated or grasped, and are often depicted as a more diverse sensorial experience as opposed to the limitations of our current screen based technologies. Author and designer Stephen Anderson, in his chapter "Learning and Thinking with Things" from the book *Designing for Emerging Technologies*, discusses the methods and tools humans use to learn and develop, as well as its relationship to the tangible and the digital. Through thorough research and documentation of many concepts and projects, Anderson seeks to merge the digital with our bodies' range of capabilities. However, do the games that Anderson mentions really provide evidence that the inclusion of digital technologies improve the quality of pre-existing tangible learning experiences?

Anderson notes that in early development, we learn through embodied, physical interactions with our environments. For children, this includes the creation of materials and games to promote their learning (124). These patterns also continue into adulthood through examples such as using gestural actions while speaking as well as muscle memory exercised through sports and performance. Anderson links these connections between the mind and body as "embodied cognition" (119), summarized as thinking *by* doing rather than thinking *than* doing, "[using] our environment to extend our thinking skills" (119).

In comparison, it is no doubt that by this point the popular thought in academia is that virtual screens lack sensorial associations such as smell, taste, and a wider range of touch feedback, therefore providing an incomplete experience in relation to the physical world. Anderson is no outlier, clearly stating his arguments again the digital when it comes to learning. He notes that smartphones have many sensors we are not utilizing to enhance our experience with this technology, and that in our lifetime, we "will witness the emergence of more and varied forms of human-computer interaction than ever before" (127). He goes as far as to call digital experiences that include clicking and dragging, coined virtual manipulatives in one study, as an oxymoron (123).

As mentioned, due to the short fallings of current digital screen-based technologies, Anderson seeks to merge the digital with our bodies' range of capabilities by augmenting ordinary objects with digital properties (116). These hybrid objects would provide an active experience rather than a passive one. He states that these objects must be tactile work online or offline, and follow what he coins the five principles of a good learning object (117). Despite all of this, in a lot of cases Anderson's examples fall short of his explanations of digital, tangible learning objects.

The first example that Anderson mentions is the Sifteo Cubes (pictured below), a bunch of small screens that can be moved around to play different games from an app store. However this is not a new concept at all, thinking of similar games such as the collectible Tamagotchi and Pixel Chix of the 90s and 00s. These toys, while fun, were limited to the content supplied with them at purchase and could not be expanded once owned, unless another unit was bought and connected. Furthermore, the

experience was limited to the number of buttons on the item itself. If the Sifteo cube bypasses the limitation of physical buttons and content by instead having a touch screen and downloadable content, isn't that instead making it more like the dreaded smartphone?

Another example Anderson provides and praises is the game Aero, whereas the player stretches out their arms and moves around to control a flying bird. He states "that students are experiencing learning, with their entire body" (130). I couldn't help but notice that in the promotional video, while the opening scene shows kids playing Aero with their arms out, the rest of the video show the children in a classroom using the game on an iPad with their fingertips. Why? Furthermore, are they really experiencing these concepts of gravity, lift, drag, thrust while standing in a closed room and looking a screen with their arms out? What does the action of moving their body add to their learning experience? Even with their iPads, they seem to be retaining the information they are learning.

The difference may be in ingesting basic information versus problem-solving. Complex problems tend to need tangible methods to solve: Anderson himself notes the tangible methods people use to process information, using the example of software developers who utilize sticky notes to organize their ideas. To expand on this example, many people still use pen and paper to brainstorm before moving to the digital, and rapid physical prototypes are still created to test theories in many professional fields.

On another note, the iPads represent the issue of accessibility, mentioned briefly by Anderson in the chapter: the plethora of items that can be downloaded for free and would have otherwise cost money and taken up space, at the cost of tangibility (136). Even Anderson's own game based on counting Graham crackers with his children was digitized to be played on an iPad. He talks about the limitations of the screen, but his view of mixing the digital with the tangible can be summarized to "have it include an iPad". Despite this, I do not doubt Anderson when he mentions that these technologies should be explored, and he has an interesting view on where these tangible technologies could be headed. Furthermore, when introduced to these experiences in public spaces such as museums, the issues concerning accessibility and space are often alleviated.

Works Cited

Anderson, Stephen. "Learning and Thinking with Things." Designing for Emerging Technologies: UX for Genomics, Robotics, and the Internet of Things, by Jonathan Follett, O'Reilly, 2015, pp. 115–140.