Objective

The objective of this writing exercise is to reflect on and consider the following quote from “Facilitating Learning with the Adult Brain in Mind: A Conceptual and Practical Guide” (Taylor & Marienau, 2016):

> *""“The game is a great hook to maintain a high level of activity and interest,” Ron says." ~ (Taylor & Marienau, 2016, page 212)*

In the text above, Taylor & Marienau are quoting Ron Stadsklev, an expert in ‘using formally structured games and simulations to facilitate learning.’ The quote is positioned in a chapter that lists reasons why using games as learning tools improves educational outcomes, including: “gamification creates a fun and engaging experience”, “simulation creates an environment – a model of ‘reality’ – that will help learners feel and experience situations that are comparable to, or symbolic of, real-world situations”, and “the element of fun helps to attenuate what in other circumstances might be perceived as threatening.”

The text really is in reference to a movement called the ‘serious gaming movement’, the title of which distinguishes games used for educational purposes from games used strictly for entertainment.

There is extensive publicly available research from the serious games movement, that aims to demonstrate how gaming can improve educational outcomes; however, in the context of computer programming and web development, I’d like to reflect on whether or not we should expect the same outcomes from the creation of games.

In other words, can the ‘serious games movement’ be seriously considered from both the ‘users’ side, to reference the term for ‘consumer’ in software development, and the developer side, by which I mean the software developer, or in this case the web developer.

The answer to that question should provide some theoretical foundation as to why offering the creation of a game as a capstone project for a web development course should be ‘a great hook to maintain a high level of activity and interest’ (Taylor & Marienau, 2016, page 212).

Reflective

The subject of the effect of creating games on learning outcomes in web development is of interest to me because I was hired to write course modules for the curriculum of a web development course that was, and possible still is, taught to Amazon (and other industrial) workers, who opted to take Amazon up on the retraining programs they offer their drivers, warehouse staff, and other workers.

My job was to write beginning to advanced level JavaScript courses, and to include, if I wanted to, a game or two in the course material. I designed and built two games for the courses, a quick casino game and what is more or less the first level of an arcade game, though it was built to run in the browser.

I found the experience of creating the games and the course material that teaches students to create the games, exciting and entertaining, to the extent that I pushed through under tight timelines to ensure I built more entertaining games.

While I did not administer the course, my intuition tells me those who took the course are likely to have shared in the same uplifting and entertaining experience creating the games as I did.

Interpretive

There are two papers that can help with our objective of determining if the benefits of serious gaming apply to the creation of games in software development curriculum. The first is “Priming creativity: Doing math reduces creativity and happiness whereas playing short online games enhances them” (Haase and Hanel, 2022). The second is a literature review titled “Constructionist Gaming: Understanding the Benefits of Making Games for Learning” (Kafai and Burke, 2016).

The Haase and Hanel paper gives an additional perspective on gaming and learning. In particular, Haase and Hanel look at ‘priming’ creativity, which they describe as, more or less, subconsciously activating specific mindsets, adjusting thinking patterns, and preparing for subsequent tasks.

They tested the impact of playing short online games — both games that require divergent thinking (multiple solutions) and games that require convergent thing (singular solutions) — on creative performance, which they suggest requires greater ‘cognitive flexibility’ and increased ‘working memory’, in order to process ‘broader’ and more ‘remote’ associations (Haase and Hanel, 2022). The notion is that a more creative mindset enhances learning, by inducing a state with more readily available working memory, and increases happiness and engagement, a notion which they claim their results support. As far as Haase and Hanel are concerned, playing games increases engagement, interest, happiness, and learning.

Kafai and Burke are addressing the ‘glaring omission of the constructionist approach’ in the serious games movement. They review research papers to come up with an overview of game development as a learning tool.

While they encounter fewer comparative studies than they’d prefer, where comparative means measuring learning outcomes in game making courses as compared to courses without game making, in terms of learning software development, they find that game development is particularly effective in teaching specific programmatic features, for example loops and conditionals, which are bread and butter programming concepts that are used heavily in game development. They also mention concepts like parallelism, events, conditionals, operators, and data structures, as well as debugging and refactoring.

In my own experience, game development is an excellent medium for introducing object-oriented concepts, since there are many games that are centered around objects (pieces).

They also note that “computational perspectives such as expressing, connecting, and questioning”, which they view as design concepts, are also enhanced through game development.

They did find one comparative study that showed elementary students “improved significantly in computational practices such as writing and debugging programs when compared to students who were learning Logo programming solely in the context of smaller independent projects unrelated to gaming” (Kafai and Burke, 2016).

The intuition from this research is that creating games is also more engaging as a tool for learning programming, just as playing games is more engaging as a tool for learning in general.

Not only does creating a game illicit a playful and fun-ready mindset, which primes learners to be more cognitively active, interested, and engaged, it also serves as an excellent medium to introduce complex foundational programming concepts in an experiential environment; a working game can be illustrative of a practical implementations of sometimes abstract programming concepts.

Decisional

The upshot of this reflection is that using game development in course material to teach web development is a good idea. Of course I knew this already, since I’ve included game development in curriculum before, but it was helpful to see

research supporting my own experience. It was also helpful to see the breakdown of specific concepts that can be taught during game development.

One way I could apply this reflection in practice is to prepare components that could be used in games in various ways without supplying the final completed game. Students could then complete the game in various ways (a puzzle that can be completed in many different ways). This would give students the opportunity to learn foundational concepts such as loops, conditionals, data structures, and object-oriented programming concepts, like methods, properties, classes, constructors, and prototypal inheritance, while exercising and growing creative thinking skills, which are critically important in game development — and other innovative areas like product development — but can be difficult to cultivate into efficient excellence.

Another practical application is to ensure that the learning environment itself proxies, and therefore primes, to some extent the same mindset that both game playing and game creation primes. Creating a fun and sometimes mildly competitive atmosphere in the classroom is likely to increase engagement and focus to improve learning outcomes.

References

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