Learning By Teaching, or, Imitation Is the Sincerest Form of Flattery, or, Reinforced Learning (By Turning Students Into Authors (of Educational Software))

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Abstract

In an effort to foster learning by teaching, we propose the development of a canvas system that makes authoring e-learning modules intuitive. We empower and liberate non-technical module users by turning them into module authors, which in turn stimulates learning through teaching. By making a damn fine piece of software, we furthermore make module authoring more pleasant for experienced authors as well. We propose a system that initially enables users to easily author H5P modules. These modules are successively easy to share and modify. Through gamification we encourage authors to share their work, and to improve the works of others.

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1. Introduction

Motivation: The economics of educational services. The "Bottom Of the Pyramid" (BOP) is a term central to the development of value-chains in emerging markets in developing countries. It is understood as the largest, although poorest segment of the population. Numerous works, in particular Coimbatore Krishnarao Prahalad's seminal work "The Fortune at the Bottom of the Pyramid", suggests that the key to economic development then lies in activating this segment of the population, enabling them not only to use modern (digital) services, but to author them as well[1].

The inspiration for our idea comes from applying this general framework to the field of education software.

2. THE PROBLEM

Alas, most software is written for only a small subset of the population. H5P[1] is one of many novel examples of software providing added-value to tech-savvy teachers and educational software developers. However, the BOP would in this case be the students.

By providing the correct tooling and educational framework, we enable students to act not only as users of off-the-shelf (OTS) educational software, but also as authors of their own or their co-students' learning experience. By doing so, we allow the student to feel some degree of ownership to the coursework, allowing for reinforced learning, as well as sharing (viral) effects (perhaps due to pride), a major force in the modern network economy.

Such a framework would also encourage the students to create services and tools more adapted to their particular learning situation, allowing for an overall better user experience, as well as a valuable source of inspiration (and usage data/analytics) for educational software developers and user interface designers.

3. OUR IDEA

We suggest developing an engaging "canvas" for authoring e-learning modules, taking cues from RPGツクール[2], Game Maker[3], and other similar software that succeed in take advantage of an intuitive interface with a capacious featureset. By "canvas" (or "scene graph"), we mean an easy-to-learn system of widgets and composite stores (with rich content), and flows connecting them together to a cohesive system.

An example of such a system might be a quiz leveraging media like GNU Mediagoblin, Nasjonal Digital Læringsarena[4], Youtube, NRK, and Twitter to showcase the issue at hand, before testing the user's comprehension at the end. Thus, the student-come-software-developer is able to prove their comprehension of multimedia (as mandated by the curriculum), and other students allowed to take part in the learning experience. Incentives for doing so might be given by the teacher, or by arranging competitions that invite the students to share their best ideas.

Taking cue from Minecraft, we also propose another viable incentive: The student is provided with ready-made canvases with actors and stores, and encouraged to make the application perform certain actions ("gamification"). This is akin to the redstone system found in Minecraft, where even young users are able to construct discrete logic circuits providing useful functionality like opening doors, or switching on lights[2].

Through use of our canvas, we eliminate the BOP by liberating and empowering it to make its own user experience. As an added bonus, our canvas may spark some latent creative souls, or inspire technological awareness and interest. In our increasingly computerised society, this is in itself a noble cause.

Thus, this canvas might prove to be a force for bridging the gap between just being a computer user, and having a promising future career in computer software. While Computing At School[5] have had great success in the UK, there is as of today no readily-available path for acquiring the advanced knowledge needed to develop modern systems given the current education system in Norway. Grassroots organisations such as Lær Kidsa Koding[6] are doing good work, but have yet to strongly influence the education system. If our canvas is picked up by prominent e-learning providers like Nasjonal digital læringsarena we can liberate and empower users through direct action, circumventing bureaucracy.

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[1]http://h5p.org/

[2]http://www.rpgmakerweb.com/

[3]https://www.yoyogames.com/studio

[4]http://ndla.no/

[5]http://www.computingatschool.org.uk/

[6]http://www.kidsakoder.no/

In addition to users teaching themselves technology, they also teach themselves the curriculum more effectively. The student becomes the teacher, and we achieve learning by teaching, an often sought-after method of reinforced learning. By only being e-learning module *users*, students are limited to learning through observation, experimentation, and (to some extent) mistakes. Learning through teaching offers advantages not possible to fully realise through either of these; advantages that won't manifest if the student is exclusively relying on an external teacher[3].

We aim to make our canvas the easiest to use way of authoring e-learning modules, and at the same time making it powerful enough to entice power users and established e-learning module authors. Consequently, the target demographic of our canvas is not limited to the BOP, but extends to include current e-learning module authors.

To further underline our empowering of the BOP, we make sharing of works very simple, and make it equally simple to author derivatives (forks) and meta-works (collections). Incentive for sharing your work, and improving or remixing the work of others is provided through gamification of the canvas. As an example, there may be a reward system for users whose modules are often remixed, and for users who make an improvement to a module that then gets integrated back into the original module itself.

With gamification, we can also help ensure high quality modules. With a rating system and achievements for obtaining a high rating, we realise a self-regulating community.

Initially we aim to support authoring H5P modules, focussing our development at H5P integration. But with a good modular design we can extend our canvas to support other standards as well in the future.

4. Related work

H5P has rudimentary editing support[4]. Our described idea is orders of magnitude more so-phisticated. We should take care to ensure that our canvas is not more unfriendly to newbies than H5P's own solution.

Moreover, one of our goals is to have a flexible design that permits extending the system to support other standards than H5P in the future.

5. Conclusions and further work

Our idea is a canvas for authoring e-learning modules, initially targeting H5P. It should be intuitive to use, yet potent enough to make sufficiently refined modules. A simple user interface is vital to construct a ladder out from the BOP, whilst a capable set of features is important to attract users in general. Via gamification, users are encouraged to share their modules, and to improve the modules of others. We encourage a self-regulating community that promotes quality through a rating system for modules.

By authoring modules, the student becomes the teacher, which leads to more effective learning. Learning by teaching is a powerful concept that enhances the self-efficacy of students.

References

[1] Coimbatore Krishna Prahalad. *The Fortune at the Bottom of the Pyramid, revised and updated 5th anniversary edition: Eradicating poverty through profits.* FT Press, 2009.

[2] Jeffrey Brand and Shelley Kinash. Crafting minds in Minecraft. 2013.

[3] Claudio G Cortese. Learning through teaching. *Management Learning*, 36(1):87–115, 2005.

[4] H5P. H5P for content creators. http://h5p.org/for-content-creators, 2015.