New Incentive Structures for the Widespread Adoption of Educational Technology

Jin Bai

College of Computing, Georgia Institute of Technology
801 Atlantic Dr NW, Atlanta, GA 30332, USA
jerrybai@gatech.edu

Abstract— **The purpose of investigating this phenomenon is to gather feedback and opinion from different user types of educational technology regarding new incentive structures in the usage and adoption of educational technology. The scope of the research is to find an new incentive structure to support the adoption of educational technology through interviews, design, and surveys.**

Keywords— **Educational technology, incentives, incentive structures, adoption, educational systems.**

I. Introduction

The current online learning approaches and attempts to incentivize people to continue learning is very underdeveloped. From a historical perspective of online learning, e-degrees, and incentives, there has been a negative connotation through and through. Traditionally, "gaming the system" [2] was a way to cause backfiring in incentivized systems. Innate methods that learning is incentivized is the flexibility that online learning provides to the student. Some classic methods in incentivizing online learning consist of providing extra credit based on online participation, or performing extra work. These methods do not break the mold of traditional education and share many commonalities with traditional classroom incentives. This paper provides research in this area with the goal of pushing the limits of educational technology and glean insight on whether there are different incentivized learning structures that better support the adoption of educational technology.

II. Current Approaches

There are many publicly available scholarly articles regarding the adoption of educational technology in relation to faculty use, home use, gender differences, and many other topics. There are fewer articles regarding the widespread adoption of this on a global scale. Many people have tried to address why it is so difficult for the adoption of educational technology. Online learning insights is a website dedicated to learning about online education. In a popular article in 2014, Debbie Morrison quoted F.Z. Moser in his famous article "Faculty Adoption of Education Technology," saying "If an institution's stated strategy is to promote the use of education technology, that institution must establish an adequate framework … to use technology successfully."[5]

In the world we live in, we are governed by a heavily incentivized structure of doing things. If the structure of incentives is not there, or its insufficient, no matter how strong the educational technology support is, the system will be doomed to failure. Usually when one thinks of education and technology, they immediately try to build something that helps people learn. This research addresses what is preventing the rapid adoption of education technology on a global scale and what new incentive structures promote the adoption on a global scale.

Modern techniques employed in developed online courses such as Codecademy or Udemy involve giving the learner a sense of accomplishment through completed courses lists, or certificates. Again this is just an online version of something one would receive in a traditional classroom. These incentives do the job but they do not break the mold or create anything new. These current online approaches to incentives learners to continue learning are providing very cookie cutter incentives that employ no real value proposition.

1

Some of the more compelling incentives in online learning is the promise of a guaranteed job offer after the completion of a course, or promise of some guaranteed prize, award, or accolade. Many of these programming bootcamps incentivize learning by offering a full-time job. This is one of the most compelling and disruptive method of incentivizing learning that I have found to date. Courses are targeting and incentives are clear/aligned properly. Teachers want to train a future workforce and learners want to be part of a future workforce.

There has not been a lot of research and statistical measurements done on this topic on how popular these courses are, but the evidence does show a significant increase in the offering of these courses [4], in fact, "Coding bootcamps alone produced 15,077 graduates in 2016, then another 22,949 in 2017, according to Course Report, an organization cataloging industry trends. More than 90 boot camp programs offer remote or in-person training in North America." These offers are tantalizing for anyone potentially looking for employment. Because the barrier to entry is so low, this is another galvanizer of the massive usage and adoption rates. Compared to university backed online degree programs, these programs promising jobs may have little to none barriers of entry. Although there is a cost associated with these programs, anywhere from $6000-$20,000 for a 14 week long bootcamp, it seems that has not been as large a barrier as a traditional four year university online program. A four year online data science masters at UC Berkeley costs upwards $50,000. The incentive structure here is directly aligned, which is a reason for the massive adoption. This is a non-traditional path for learners; it bypasses the idea of a four-year degree entirely.

The failure in many incentive structures in education as a whole is the lack of alignment in incentives. Although incentivizing a student to do more learning is one facet, this is by no means an all-encompassing method of reaching out to every student (though sometimes it feels like it is meant to be). Due to the fact that everyone has different circumstances and are in different situations,

researching this area will push the limits of the adoption of educational technology.

Historically speaking, most incentives used in school have failed or have been described as a negative thing. Many research papers and articles advocate why incentives should not be used in education, or why they don't work in education. Traditional education often has trouble keeping up with educational technology. Educational technology has the advantage of faster implementation, which is reason to believe cash or token incentives can be a good way to motivate students to continuously use educational technology; even though it is an idea that is contrary to popular belief [3] and is considered "taboo" in the educational sphere. This is a this topic that this paper delves into.

The flexibility and efficiency of an online course is something many new highschool graduates would enjoy as a change of pace. In order to break the traditional notion and negative connotation associated with an online degree, research must be performed to view the current perspective, as well as create some structure that makes people want a degree, instead of feeling like it is necessary for the longevity of a future career.

III. QUALIFYING QUESTION

In order to explore ideas that go against normal convention and swim upstream, we must ask questions before performing the research.

- Why do we need to pay for education?
- What can we do to pay our students or incentivize them to learn and use technology?
- How fast can we break the barriers of mass adoption?
- What will happen to traditional schools of education after a massive technological disruption?
- Who will pay for all of this?
- Can the usage of educational technology be made in such a way that students profit based on using the technology?

- How can we reward the student for learning and build a sustainable system for them to participate in?
- Is there a way to eliminate student debt and student loans?
- Is it possible for students to come out of a four year undergraduate degree with more money in their pockets than when they entered?
- Can being a student be profitable from both an educational standpoint, as well as a monetary standpoint?
- Are there any new problems that these incentives bring to the table?

With traditional brick and mortar schools, a lot of these questions become major deficiencies which are very difficult to be overcome, but with educational technology, much of the overhead of running a school can be eliminated and many things can be reused. Students dig themselves in such a huge pit by paying for college, leading to a dichotomy with some going to college and some never going to college. Educational technology already allows for a system that reduces this split.

At a high level, the question to be explored is "Are there different incentive structures for the global adoption of educational technology?" The goal isn't just to create innovative tools, but provide a way that makes sense for real learning and adoption.

IV. IDENTIFYING USER TYPES

The user type that I am researching consists of all users who seek higher level education or have in interest in furthering their education with regards to any personal goals they have. People who utilize educational technology can be from a diverse range of demographics, as anyone of any background that understands education or have used any educational tools such as a computer meet the requirements necessary.

In order to simply the identification of all user types, users are first categorized by user base before delving deeper into different specific user properties. From these user bases, we will perform further research and investigation on our phenomenon. We categorize users based on asking some simple questions.

- Who are the users? Would it only include people who have used educational technology before? Or would anyone who is interested in education be a valid candidate for research?
- What is the context of the research? Does it make sense for the user to participate in the research?
- What are their incentives for participating in the research? Would the user provide important information or would they disregard the importance of this research?

Based on these questions, the initial list of user bases are as follows:

- Students varying from high school, undergraduate, graduate
- Teachers and professors
- Working adults

Upon providing this list and the reasoning for this list to 5 different people of different educational and industry backgrounds. I recategorized the user bases into two main categories:

- Users with prior educational experience
- Users without prior educational experience.

Users with prior educational experience could either currently be in school, or not in school. These two categories will be the primary categories I will use in conducting my surveys.

V. DATA COLLECTION

To address the problem, surveys are necessary to gather data on the current mentality of students, teachers, and

the general audience regarding their views on education, technology, and its intersection.

After gaining this information, further insight can be generated on how a functional incentive system for educational technology can exist.

A. Survey Questions

The initial iteration of the survey consisted of the following questions:

1. Do you think there could be better incentives in place in education and educational technology that facilitates wider adoption of educational technology? [Yes / No]
2. Are there better incentive systems you can think of for educational technology? [Yes / No]
3. Which of the following incentives would you like to see in school systems using educational technology? [Cash/tuition incentives, Guaranteed job upon graduation, Guaranteed research position upon completion of prerequisites, Direct path to masters/PhD upon graduation of previous scholastic level]
4. Do you think having multiple incentives in using educational technology allows students to be more encouraged to choose it over traditional classroom education? Why? [Long Answer Text]
5. How easy is it for you to adjust to a new system, where grades would also correspond to receiving a particular incentive? [1-5 (Very Easy-Very Hard]
6. Would this incentivized learning provide better satisfaction than the existing system? In what way? [Long Answer Text]

B. Survey Design Feedback

After showing the to 5 different experts in different educational and industry backgrounds. Some general consensus advice was to remove question 2 in the survey as it is a dead-end question, or at least add a follow up question after it. Then the issue arose that the survey may become too long-winded. It was decided to add the question and made all the questions skippable so that if

the user did not know how to answer it, they were not obligated to make anything up. Most of the feedback received from the design involved keeping the first interview short so users are interested, and also to make sure the results give you insights on what people would like to see in the proceeding research.

C. Biases

Various pitfalls were involved in performing this survey. It was imperative to avoid include observation bias and confirmation bias. Moving through the research, it was object to want to compare users but important to make sure not to try and elicit particular responses based on previous users feedback. This becomes a way of incrementally trying to reach the answers desired. When evaluating users and their responses some preconceived ideas may bias the results, which needs to be avoided.

D. Survey Iteration

Based on the initial survey design feedback, the second iteration of the survey consisted of the following questions:

1. Do you think there could be better incentives in place in education and educational technology that facilitates wider adoption of educational technology? [Yes / No]
2. What incentives can you think of that exist in educational systems right now? In educational technology? [Short Answer Text]
3. Which of the following incentives would you like to see in school systems using educational technology? [Cash/tuition incentives, Guaranteed job upon graduation, Guaranteed research position upon completion of prerequisites, Direct path to masters/PhD upon graduation of previous scholastic level]
4. Do you think having multiple incentives in using educational technology allows students to be more encouraged to choose it over traditional classroom education? Why? [Long Answer Text]

5. How easy is it for you to adjust to a new system, where grades would also correspond to receiving a particular incentive? [1-5 (Very Easy-Very Hard]
6. Would this incentivized learning provide better satisfaction than the existing system? In what way? [Long Answer Text]

E. Results of Survey

1. Do you think there could be better incentives in place in education and educational technology that facilitates wider adoption of educational technology? [Yes: 66, No: 13]
2. What incentives can you think of that exist in educational systems right now? In educational technology? [Many different areas of incentives listed that are currently being used. Categories include: grades, jobs, recognition, and etc.]
3. Which of the following incentives would you like to see in school systems using educational technology? [Cash/tuition incentives: 54, Guaranteed job upon graduation: 44, Guaranteed research position upon completion of prerequisites: 28, Direct path to masters/PhD upon graduation of previous scholastic level: 43]
4. Do you think having multiple incentives in using educational technology allows students to be more encouraged to choose it over traditional classroom education? Why? [No: 10, Yes: 38, Maybe/Unclear: 31]
5. How easy is it for you to adjust to a new system, where grades would also correspond to receiving a particular incentive? [Very Easy: 2, Somewhat Easy: 6, Neither Easy nor Hard: 20, Somewhat Hard: 34, Very Hard: 18]
6. Would this incentivized learning provide better satisfaction than the existing system? In what way? [No: 12, Yes: 20, Maybe/Unclear: 47]

F. Survey Iteration

The two primary changes to the survey is include adding a new question to allow users to present their own incentive opinion that wasn't in the previously listed items. Additionally, an option of none of the above should be included in the previous question so to make it more clear to users that they are not obligated to choose one of the preselected choices, even though they can just leave it blank. Change one question to make it more clear that the system of incentives currently in place would still be in place and the new incentives would work on top or in cohesion with the current system, and not simply replacing the existing system. These two question iterations are based on the answers received, clearly showing some miscommunication of the question.

G. Final Results

1. Do you think there could be better incentives in place in education and educational technology that facilitates wider adoption of educational technology? [Yes: 83, No: 17]
2. What incentives can you think of that exist in educational systems right now? In educational technology? [Many different areas of incentives listed that are currently being used. Categories include: grades, jobs, recognition, and etc.]
3. Which of the following incentives would you like to see in school systems using educational technology? [Cash/tuition incentives: 70, Guaranteed job upon graduation: 58, Guaranteed research position upon completion of prerequisites: 36, Direct path to masters/PhD upon graduation of previous scholastic level: 55]
4. Do you think having multiple incentives in using educational technology allows students to be more encouraged to choose it over traditional classroom education? Why? [No: 14, Yes: 50, Maybe/Unclear: 37]
5. How easy is it for you to adjust to a new system, where grades would also correspond to receiving a particular incentive? [Very Easy: 2, Somewhat Easy: 7, Neither Easy nor Hard: 25, Somewhat Hard: 43, Very Hard: 23]
6. Would this incentivized learning provide better satisfaction than the existing system? In what way? [No: 14, Yes: 33, Maybe/Unclear: 53]

VI. ANALYSIS

Greater than 80% of people surveyed believe there could be better incentives in place in education and educational technology that facilitates wide adoption of educational technology and survey takers chose many different areas of incentives listed that are currently being used. Categories include: grades, jobs, recognition, and etc.

The current list of options for new incentives in educational technology were noted as stellar options by a few survey takers. Some interesting new ideas for incentives in school such as vacation days, guaranteed internships, and preference application to top firms were presented by survey takers as well.

Many results ended up being opinions on the topic that lie in the middle or are unclear. This is a new area to explore so it is natural that about ⅓ of survey takers have special/unique opinions on this topic that aren't simply a yes or no answer.

The majority of survey takers believe it will not be easy to switch to a new system. Even after rephrasing the question in the final survey iteration to mean adjusting to an addition to the existing system, as a new system as whole may not be necessary, certain incentives can simply be added on top of the existing system, it was found that this was a difficult adjustment for most people.

VII. REFLECTION

Throughout the research process, I worked spoke with and worked with many subject matter experts. They helped in the process of revising and iterating my surveys and research questions. By doing this, there was a vast improvement on what was originally laid out and planned for the research. Many insights were gathered and received before the initial surveys. Because of the organized survey programs and plans created in planning, this allowed for seamless execution. The data generated in the initial surveys were highly impactful on the final survey and data. The filtering of the survey questions before launching the survey helped optimize the data from the initial survey. From this, it was possible to see clearly the needed gap in incentives which allowed for the role of providing incentives in educational technology to improve the adoption and usage of educational technology. Although a few issues did arise after receiving the data, it was due to performing surveys through an online interface, where questions could be misinterpreted, or options may have not been properly included due to certain oversights as you are performing a passive interview as opposed to going up to someone in real life and performing an active interview.

By not over analyzing the data and over speculating, it was possible to perform statistical measurement on the data and present compelling arguments in the research. Readers are encouraged to make their own observations from the data.

REFERENCES

1. "The Power and Pitfalls of Education Incentives - Scholars at Harvard." https://scholar.harvard.edu/files/fryer/files/092011_incentives_fryer_allen_paper2.pdf. Accessed 2 Jun. 2018.
2. "Why incentives don't work in education—or the business world ...." 5 Aug. 2010, https://opensource.com/business/10/7/why-incentives-dont-work-education%E2%80%94or-business-world. Accessed 2 Jun. 2018.
3. "Why cash incentives aren't a good idea in education - Phys.org." 9 Oct. 2014, https://phys.org/news/2014-10-cash-incentives-good-idea.html. Accessed 2 Jun. 2018.
4. "Not Your Typical Coder | Pittsburgh Post-Gazette." https://newsinteractive.post-gazette.com/not_typical_coder/. Accessed 10 Jun. 2018.
5. "Why is Adoption of Educational Technology So Challenging?… 'It's ...." 5 Mar. 2014, https://onlinelearninginsights.wordpress.com/2014/03/05/why-is-adoption-of-educational-technology-so-challenging-its-complicated/. Accessed 28 Jul. 2018.