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Measuring Student Engagement with Learning Technology

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ABSTRACT

The nature of education, interaction, and engagement is rapidly changing as new modes of communication and technologies enter the hands of learners. While teachers are the greatest lynchpin for keeping students and classrooms engaged, there are many features tech tools can employ to help. For maximum engagement, technology tools in learning must appeal to social motivation, have opportunities for creativity, personalize the content and experience, engage a mentor or teacher, and provide interactivity and immediate feedback. Measuring this engagement must combine insights from both qualitative and quantitative data.

OUTLINE

- Background
- Existing frameworks for student engagement
- Frameworks for student engagement while using technology
- Measuring engagement while using technology

INTRO

In the age of mobile computing, attention and engagement have become commodities. Advertisers are willing to spend millions for just 30 seconds of a viewer's attention. With all the ads and apps buzzing in students' pockets in the 21st century classroom, we had to ask ourselves: how are learning technologies (books, desktops, tablets, and otherwise) keeping up with the rising bar of grabbing attention? What are the best practices for engaging students today? Specifically relevant to the NewSchools Seed Fund, how can we measure the role technology can play in student engagement?

In this paper I seek to explore how existing frameworks for engagement in education can be adapted to better account for new technology and to suggest a framework for evaluating qualitative engagement using technology. As consumer and learning technologies continue to grow, improving methods to capture and grow student engagement becomes increasingly more challenging – and more important.

BACKGROUND

While much has been written on engagement in the classroom and on engagement with technology tools, not much research has been done on the intersection of the two. A roomful of students with tablets in their hands tapping away at the screen, quiet and engaged, is becoming an increasingly familiar scene (with 10 million iPads sold to US K12 schools at time of publication). With use cases proliferating, how can a teacher truly understand students' thought processes and level of intellectual engagement with the material?

To answer this question, let's first reflect on what we know about student engagement. Engagement is a prerequisite to learning and has many benefits backed up in the literature. Research suggests the depth of engagement correlates to the depth of learning (Carini 2004). Moreover, engagement has been shown to be a "protective factor" with respect to education risk (Resnick 1997, cited in Christensen 2012). Third, longitudinal studies have found that small changes in measures of school engagement could dramatically change a students likelihood to complete higher education and go on to a professional or managerial career, even overcoming longstanding socioeconomic barriers (Abbott-Chapman 2013).

How we define student engagement has evolved over time as well, from the observable (turning the pages in a book) to the emotional and cognitive (grappling with the content in the book). In other words, researchers have progressed from tracking behaviors such as participation and time on task to students' investment in learning and use of deeper learning strategies (Fredericks & McColsky 2011). As a concrete example, in the early 1990's, Apple Inc. felt pressure to measure engagement by recording the time students spent looking at the screen or instructor (Sandholtz et al 1992). By comparison, the Apple iPad is now analyzed for its contribution to "engagement, collaboration, and perseverance" (Harrold 2012).

EXISTING FRAMEWORKS FOR ENGAGEMENT

Given that student engagement is both valuable and complex, the next step is to measure and strengthen it. A full review of engagement techniques is beyond the scope of this white paper, but many of the popular views all rely on one central point: the teacher.

Indeed, in a classroom the teacher holds the most effective tools for enhancing engagement. In his book *The Art and Science of Teaching,* Robert Marzano lays out the dimensions of engaged learning, noting that it is the role of a teacher to supply the following through instructional design and practice:

* High energy: through physical activity, pacing, focus, and enthusiasm
* Missing information: games, fill in the blanks, and other gaps
* Appeal to the self system: putting work in the context of each individual learner
* Mild pressure: to focus student attention
* Mild controversy or competition: structured debate or points

Marzano notes that each of these techniques is a tool to be used at the right time by a teacher, who ought to be constantly assessing the level of engagement in a classroom and making a judgment call on which technique to use.

Beyond Marzano's toolkit, other frameworks for understanding engagement have different insights and uses. Daniel Pink has made himself famous for breaking motivation into three categories: autonomy, mastery and purpose (Pink, 2009). Strong, Silver and Robinson put forth a similar theory in a piece in Education Leadership, stating the keys to motivation are SCORE, or:

- *Success* (the need for mastery),
- *Curiosity* (the need for understanding),
- *Originality* (the need for self-expression),
- *Relationships* (the need for involvement with others).

Whatever model a teacher wants to use, it will still need to be measured. While many tools exist, they all center around three core techniques: self-report, teacher-report, and observation.

FRAMEWORKS FOR ENGAGEMENT WITH TECHNOLOGY

On the opposite end of the spectrum, the term "engagement" is thrown around a lot in Silicon Valley when talking about apps and websites. Engagement in this sense often does not get beyond "did the user login every day" or "how many pages did the user visit" and "how long did the user stay?"

Educational apps like eSpark have done a great job breaking down how to think about the value of an individual app when it comes to engagement. You can read more in their whitepaper Student Engagement in Educational Apps where they lay out a rubric of app quality (Lopuch 2013). According to Lopuch, the quality of an app depends on the Alignment, Authenticity of Task, Scaffolding of Learning, Intuitiveness, Student Engagement, and Cost. In this situation, engagement is measured simply by asking a student the yes or no question "did you like this activity?" Through this metric they can conclude that animation, background music, and badges or rewards

have a positive effect on student engagement while menus of activities, drill and kill problems, silent apps have a negative effect.

This is where apps for use in the classroom play a unique and un-researched role in the education ecosystem. They keep the teacher in the center and also have the benefits of measurement that traditional direct to learner apps have.

To understand engagement with hybrid technology tools that blend the digital and the physical worlds to engage students from multiple angles, I propose a new framework for looking at engagement as well as an initial student- and teacher- report survey to dig into the results. A good technology tool for use in the classroom should include measurable elements of social motivation, creativity, personalization, educator engagement, and interactivity.

1. Social Motivation: put the learning in the context of the student's social environment. Can include elements of competition, collaboration, and gamification. For example:
- When a student gets stuck in math app Front Row Education, they are connected to another student in the classroom that has demonstrated mastery on the concept to receive help
- When a students submits answers to closed or open response questions on Socrative, the teacher has the option of displaying that student's name – raising the stakes on the quality of her answer

2. Creativity within structure: tie the amazing creation technology of tools in the classroom to lessons to enhance autonomy, curiosity, and originality. For example:
- Nearpod enables students to take pictures, remix media, and draw ideas before submitting them for the teacher to review or share
- Students are able to bring their imaginations to life by using Tynker to visually code animations and interactive programs

3. Personalization of content: keep students in their Zone of Proximal Development with content that is relevant to their lives and at their competency level and modified for their learning profile. For example:
- Glean will feed students a different video based off how long you engage with different styles of

online teachers (at a whiteboard, animated videos, using PowerPoint, etc.)
- Newsela will level current events and news stories to five different levels so all students can access the content
- Knewton quizzes students and gives them formative math problems that fill in their gaps in understanding

4. Educator engagement: how well can a teacher or mentor see what is going on or give live feedback. For example:
- Classwork for iPad allows teachers to see exactly what is happening on every screen in one mission control view as students work through worksheets or draw pictures on the iPad
- Teachers aren't limited to multiple choice data, either: FreshGrade allows teachers to capture qualitative data in the classroom and share that with students and parents, involving more stakeholders in the learning process

5. Interactivity: provide immediate feedback, ability to rewind or review, and checks for understanding. For example:
- Students are able to dynamically interact with sheet music on Pluto Media music apps allowing them to receive multimodal stimulation through sight, sound, and touch while studying music in the absence of an instrument
- When students finish a quiz on Nearpod, they are immediately shown their results on any quantitative items so they can correct and understand their mistakes

MEASURING ENGAGEMENT

As a first step towards understanding how students engage with hybrid learning models we recommend sending a survey to students using different products.

This survey is designed for students and can be used for teachers by replacing "I" with "my student(s)." These are starter questions for entrepreneurs and tech companies to start thinking about what types of questions will be useful when performing engagement surveys for their users. The questions are intended to be answered on a Likert scale of agreement, frequency or quality.

- I have meaningful interactions with other students while using EDUAPP
- Someone I care about will see the work I do in EDUAPP
- I feel like I can improve my learning by working on EDUAPP
- I try hard on assignments given to me on EDUAPP
- I am able to express my creativity while using EDUAPP
- How meaningful do you find the topics you study while using EDUAPP
- My teacher knows how I am doing in this app
- EDUAPP helps my teacher or parent teach me better
- My teacher plans lessons where EDUAPP is embedded in a bigger unit
- The content and questions in EDUAPP challenge me
- Using EDUAPP helps me understand the content
- I am personally interested in the topics I learn about on EDUAPP
- How often do you go back and review material from earlier lessons using EDUAPP
- How easy is it to get help while you are using EDUAPP?
- Anything else you want to tell us about this app? What were the best things? What could be better?

If you run a survey on student engagement with your tool, please share it with NewSchools Venture Fund (twitter: @nsvf).

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