A School-Based Badging System and Interest-Based Learning:

An exploratory case study

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Abstract:

Described as "… a symbol or indicator of an accomplishment, skill, quality or interest" (Mozilla, 2011), badges are public representations of what one has learned and experienced (Plori et al, 2007). This study investigates a school-based implementation of a badging system and explores the relationship between the badging system and students' interest. Analyzing interview transcripts of participating students suggest that elements of the badging system were key to connecting to students' interests. Specifically, these elements included the personal connection students could make to a badge, the recognition and reward they would receive through the badging process, the novelty of the badging system in a school setting and the extent to which a badge aligned with the long-term values of the students. These findings suggest important design elements for badging systems that may be considered for future designs.

Introduction

Engagement and motivation amongst students is an established challenge to school success (Fredricks, Blumenfeld, & Paris, 2004; National Research Council and the Institute of Medicine, 2004). With the link to learning firmly established, increasing engagement and motivation in students is sought as the key to implementing ambitious instructional units (Blumenfeld, Kempler, & Krajcik, 2006). While engagement and motivation are constituted in a variety of ways, a key aspect of both is student interest. However, student interest has been addressed in schools with mixed results. (e.g., Hidi & Renninger, 2006; Tobias, 1994; Hidi, 2000;).

Consequently, education reformers are seeking out novel, effective ways to promote student interest in formal school settings. Proponents suggest educational badges and badging systems as a way to connect and enhance student interests (e.g. Mozilla, 2011). The purpose of this study was to identify and explore the connection between student interest and badges qualitatively and provide documentation of various factors that constitute student interest in the context of a badging system in a formal school environment. We conducted a small-scale study of a school-based badging system: a collaborative project between an independent school, the Covenant Foundation, and Global Kids, Inc. Our goal is to inform potential and current badging system implementations by highlighting relevant motivational factors and to present implications for designers and practitioners of future badging systems.

Badges and Learning Environments

Described as "… a symbol or indicator of an accomplishment, skill, quality or interest" (Mozilla, 2011), badges are public representations of what one has learned and experienced (Plori et al, 2007). Badges have been used to indicate accomplishments, skills, identity, values, credentials, and interests in digital environments (Antin & Churchill, 2011) as well as face-to-face environments. In education, badges have also been used to motivate students to set goals and represent and communicate achievements within a learning community (Abramovich, Schunn, & Higashi, 2013; Abramovich et al, 2011; Halavais, 2011; Higashi et al, 2012). Perhaps the most well-known educational badges are those of the Boy and Girl Scouts' merit badge system. In scouting organizations (e.g. Boy Scouts, Girl Scouts) children can choose a badge based on their interests, and follow through with activities to meet certain requirements to earn the badge. For example, a boy scout might select the entrepreneurship merit badge if he is interested in learning about how to start and run a business. To earn that badge, he will need to come up with a business plan, and then conduct a feasibility study (Boy Scouts of America, 2012). Once he has earned the badge, he can then display it as a representation of a level of competency and accomplishment.

Advocates for badges in education commonly point to the potential for badges to act as assessment for expertise or learning typically undocumented by formal education institutions. However, badges are not limited to simply offering an alternative model of credentialing (Joseph, 2012). Badges could connect to student interests and motivate learners by allowing for feedback and reward outside of traditional assessments. It is this advantage of badges, the extent to which a badging system can connect to learners' interests and motivation that we investigate in our study.

Theoretical Background

In order to investigate the ways in which a badging system can connect to interest-based learning, we drew on two motivational theories: Expectancy-Value Theory (Eccles, 1987; Eccles et al., 1983; Eccles & Wigfield, 2002; Wigfield & Eccles, 2000) and Cognitive Evaluation Theory (Deci & Ryan, 1985; Ryan & Deci, 2000). While a variety of theories could be utilized to investigate interest-based learning, these two theories were chosen due to their relationship to children's motivation and persistence in an activity and serve as a lens by which we could determine what motivational aspects of badges can exist.

Expectancy-Value Theory

Since expectancy-value theory was conceptualized (Eccles et al., 1983), it has been applied extensively to a variety of settings including both academic and non-academic contexts (Eccles & Wigfield, 1995). Expectancy-Value (E-V) considers the generally positive relationship between individuals' expectancies, or expectations, for performance and the reasons they value a particular task or domain. These expectations and values are thought to be domain and task specific, as people can hold varying levels of expectations paired with different values towards specific content (e.g., mathematics, video games). Contextual changes between content areas, such as how information is conveyed or how learning is demonstrated, can be associated with distinct social and cognitive factors that may affect a child's expectation and value towards that task. For example, a child's perception of their ability to play soccer is not necessarily related to their perception of their ability towards mathematics.

Eccles, Wigfield, and colleagues (1983, 2002) distinguish between different types of task-value, many of which were salient in our coding scheme. Specifically, we examined why a

child chose to participate in a Badging system, which helps us explore the values the children hold towards a task and its content. E-V theory posits that choices are related to both the positive and negative features associated with a task and choosing to perform a particular task occurs at the expense of participating in alternative activities. In this sense, the likelihood of a child investing in a badge system and the activities within that system may depend on their valuing participation at the expense of alternative choices.

The expectancy dimension of E-V Theory encompasses individuals' expectations for success in an upcoming task (*task specific*) as well as their overall beliefs about their abilities in a particular domain (*domain specific*). While there has been evidence that young children do not always distinguish between their expectations for success for a task (e.g., how they expect to perform on an upcoming math test) and their overall ability beliefs in a domain (e.g., their mathematic ability) (Eccles & Wigfield, 2002), we chose to code for these instances separately, as they may be distinct in badge systems. For example, a student might decide to pursue a badge because they believe it to be a task where they can succeed, even if the content area associated with the badge is one that they struggle with in formal academic settings.

Children can value a task for the personal connection they associate with that task, as it relates to aspects of their identity and self-schema. In other words, if a task affords the opportunity for a child to confirm or develop his or her perceived self-schema (e.g., "I am a person who is good at computers so I will earn the information literacy badge"; "I always am the first to try new things"), they are more likely to place high value on the task, and will be more likely to engage in that activity. A student might pursue a particular badge because they believe it to be an accurate representation of their level of knowledge.

Additionally, a task may hold intrinsic value for a child. Intrinsic value refers to a children's interest in a task and is closely related to the concept of intrinsic motivation (Deci & Ryan, 1985). This value dimension also refers to the enjoyment children receive from participating in a task. A task holding high intrinsic value for a child would be of interest for the specific content of the task. The child may find participating in the activity enjoyable, often expressing enthusiasm towards the task or domain. In our data, when some aspect of the badging system possesses intrinsic value for the child, she may describe her liking or loving the content related to badge ("I just love computers").

Intrinsic value differs from utility value, in that utility value refers to a child valuing a task for its usefulness towards another goal not necessarily related to the current task. In the case of utility value, children may not be particularly interested in the direct content of a task or even find that task particularly enjoyable; nonetheless, they may value this task for its support towards meeting a current or future goal (e.g., high-school or career aspirations). A child expressing utility value may say, "I chose to earn the information literacy badge because I will need to learn how to use a computer and assess the credibility of online information when I get a job." This child may not enjoy the content or process of this course, but is likely to participate in the activity due to what that the content affords them in relation to their future goal. Due to the potential lack of relationship to the content of the task, utility value somewhat mirrors the concept of "extrinsic" motivation in self-determination theory (Ryan & Deci, 2000).

Both expectancies and values are important to consider when examining children's motivation towards engaging in an activity. While these dimensions can be considered independently, they exist more dynamically in the real-world experience of a child in a social context. Often, a child's expectations and values have a multiplicative effect, in that the greatest

motivation and achievement can be found when a person holds high levels of expectancies for success, confidence in his or her abilities, and value for the task at hand (Nagengast et al., 2011; Shah & Higgins, 1997). In a badge system, a single badge could capitalize on this multiplicative effect by appealing to both expectancies and values for students.

Cognitive Evaluation Theory

Cognitive Evaluation Theory (CET) is a sub-theory of self-determination theory that posits that intrinsic motivation towards an interpersonal task can be increased when the task is structured to allow for both a feeling of autonomy and competence (Ryan & Deci, 2000). The contextual structure of a task, including the type and degree of feedback a child receives, the rewards related to performing a task well, as well as how information is communicated, can all influence a child's intrinsic motivation towards engaging in a task (Harackiewicz, 1979). According to this theory, by encouraging both a sense of autonomy and competence, a task can aid individuals towards meeting a basic psychological need for competence; therefore, increasing the likelihood of a child's participation through their intrinsic motivation towards the task.

A child's sense of autonomy relates to her perception of her choice to engage in a task and influence its progression, whereas perceptions of competence relate to capability or proficiency towards completing a task. Similar to E-V theory where both expectancies and values meaningfully combine, CET states that a feeling of competence alone is insufficient to promote higher levels of intrinsic motivation. This sense of competence must also coincide with perceptions of a task being autonomously selected (Ryan, 1982). For example, when earning a badge, this might include students' selection of a badge, selection of a task to earn the badge, as well as their sense that they are competent enough to earn the badge. Additionally, CET argues

that intrinsic motivation can only be supported when a person initially has some degree of intrinsic interest in the content of the task. A task must appeal to a child for its novelty, challenge, or aesthetic value in order for intrinsic motivation to be encouraged (Ryan & Deci, 2000).

An additional aspect of CET is the concept of rewards (i.e., a tangible or intangible consequence given for performance of a task). While rewards are known to influence the context of an activity, there is debate about the role they play towards children's motivation. There is literature demonstrating the negative impact external rewards can have on children's intrinsic motivation for an activity (Deci, 1971; Lepper, Greene, & Nisbett, 1973; Deci, Koestner, & Ryan, 1999). However, there is discussion regarding the structure of a reward itself (e.g., how connected it is with the content of the task; how externally imposing it may be) relating to such consequences. Additionally, there is evidence that externally motivated actions, paired with a perception of autonomy, can lead to positive learning and engagement in a task (Skinner, Wellborn, & Connell, 1990; Grolnick & Ryan, 1987). We felt it necessary to examine rewards in the context of badging since earning a badge was accompanied by various additional rewards in addition to the reward of the badge itself.

While some aspects of both E-V theory and CET overlap to some degree (e.g., confidence in abilities according to the expectancy dimension of E-V theory and feelings of competence in CET), the frameworks remain theoretically distinct and provided differentially meaningful coding outcomes. Consequently, these two distinct theories provided us with a framing to describe the ways that the badging system connected to students' interests. To this end, we generally relied on the way students described the expectations for success they had for participating in the badging system, what elements of the content they valued in their

participation in the badging system, the sense of autonomy and competence they perceived, and the rewards that were embedded in the badging system.

Research Design and Methods

For our study we investigated a badging system implemented at an independent school, primarily relying on interviews with students, interviews with teachers, and design documents to provide context and confirm some of the students' statement. The qualitative focus of our study seemed particularly appropriate for understanding students' perceptions of their engagement in the badging system and aided in providing rich accounts of their participation in their own words.

Site

This study took place at an independent, religious-based school located in a suburban area in the Southern United States. The school enrolls approximately 500 students in early childhood programs through eighth grade. Instructionally, most teachers integrate project-based instructional units into their curricula and utilize an array of software packages in order to support content learning as well as expose students to software that may be useful in the future.

The Badging System

In describing the school-based badging system (SBBS), it is worthwhile to note our intentionality of referring to the system instead of simply the badges. Similar to what Cobb and Jackson refer to as an instructional system (2008), there are tasks, activities, tools, and discourses related to badges that are interdependent and together constitute the system.

The SBBS was designed to support the development of what Henry Jenkins cites as the necessary skills for the 21st century's participatory culture (Jenkins, 2009). Specifically, the targeted skill set includes skills that are useful both in and out of formal education environments and that rely on mastery of digital media. These skills are considered important for future success even though they are not traditionally part of formal educational curricula.

The specific learning goals were reflected in four different types of badges: information literacy, collaboration, acceptance, and empowered learning (Table 1). The learning objectives provide general descriptors of what the students will be able to do to demonstrate competency for each badge.

Insert Table 1

Students selected a badge and were then, over the course of the school year, asked to supply evidence indicating completion of three distinct learning phases: **Recognize It, Talk About It** and **Do It**.

The **Recognize It** phase required students to indicate understanding of the targeted skills of their selected badge. The **Talk About It** phase required students to show evidence of their ability to communicate effectively about the badge. The final phase, **Do It**, asked students to

supply evidence of their mastery of the badge content. Each student's evidence was compiled into a digital transcript that served as a record of his or her badge progress. In Figure 1, we can see the digital transcript. Each triangle represents a potential competency space. As a student completed each piece of the badging process, for example the **Recognize It** phase, a corner of the triangle for the competency would be filled in. When all three corners of the triangle are filled in, this signifies that the badging process is complete and the student has earned the badge.

Insert Figure 1

The school's teachers served as determiners of the quality of the evidence and whether a student passed each badge phase. We have included an example rubric in appendix one. Upon completion of each badge phase, students were rewarded for their success. The rewards included ceremonies where students received an indicator of their accomplishment in the form of a wearable badge. In Figure 2, we can see an example of the actual badge. The badge says, "Badger At Work" with an accompanying picture of a real badger. The badge can be worn around a student's neck to publically recognize their work.

Insert Figure 2

Non-tangible rewards were also associated with earning badges. These rewards were called power-ups. The power-ups included additional in-school privileges such as unsupervised computer time or the ability to leave a class to work on completing the next badge phase. Upon most participants' completion of their badges, which coincided with the end of the school year,

badge earners would get an exclusive catered lunch and a field trip related to their badge. For example, those students who earned the Informational Literacy Badge were promised a trip to the local office of Google. It is important to note that participation in the badging system was entirely voluntary and incompletion of a badge contained no repercussions besides lack of reward.

The badging system was co-developed by faculty, staff, and students at the school in partnership with Global Kids, Inc., a leading non-profit educational organization for global learning and youth development. Global Kids, Inc. works to ensure that urban youth have the knowledge, skills, experiences and values they need to succeed in school, participate effectively in the democratic process, and achieve leadership in their communities and on the global stage. Global Kids, Inc., prior to working with the school, had developed badging systems for various schools and after-school programs. Consequently, the school-based badging system has certain core features similar to other Global Kids, Inc.-created badging systems. For example, the design of the SBBS included student participation. Similar to prior Global Kids, Inc. badging systems, specific students were selected by school administration and asked to offer their opinions and suggestions during the initial design of the badging system. Other features that the SBBS shared with prior Global Kids, Inc.'s efforts included the distinct phases toward badge completion and the use of digital transcripts.

Other features of the badging system were designed based on the independent school's mission of Jewish education. The school integrates Jewish values into its curriculum, instruction, and facilities and, consequently, certain features of the badging system were also designed to integrate specific Jewish values. The badges were named after famous Jewish individuals who were selected based on their appropriateness to the badge learning goals as well as suitability as

role models. We can see this in Table 1 where Sergey Brin, one of the founders of Google, is associated with the information literacy badge. The badges were all designed to be compatible with Jewish values as well as allow for integrations with specific Jewish curricula such as Hebrew Language or Judaica.

In addition to these aspects of the design of the system, administration and teacher participation were key to the badging system's implementation. The SBBS had the support of both the head-of-school and the middle school's principal. Specific teachers were given the task of both participating in the design process and also the daily implementation of the badging system. The teachers' vigilance, in spite of several challenges of implementation was crucial to the badge system's functionality.

Consequently, the SBBS provides an appropriate case to explore the relationship between a badging system and participating students' interest-based learning. Drawing upon Expectancy Value Theory as well as Cognitive Evaluation Theory as a means of characterizing student interest, we sought to describe the ways in which students' interests were related to their participation in the badging system as well as their choice to engage in the badging process for specific badges. In the next section, we will describe the design of our investigation.

Data Collection

We drew on three sources of data: transcripts of interviews with students, documents detailing the badging system, and student work accomplished to earn a badge. However, interview transcripts were the primary source of data used in our analysis. This was an intentional choice based on the transcripts' ability to illustrate the phenomena of interest. Interviews took place over a four-day period in the spring semester, 2012. These face-to-face

interviews were conversational and semi-structured following a protocol, but allowed for digressions and probing where saliency was found in students' comments. Although not directly part of this analysis, we also carried out interviews with participating teachers, which served to provide the researchers with additional contextual information as well as to confirm some of the statements that students made.

Three researchers interviewed nine students who had participated in the badging system and three who had not. The students were selected out of a pool of 20 who participated in the badging system. The selection of students who had participated in the badging system was based on a combination of student volunteering, availability, and the recommendation of teachers at the school. Recommendations were used solely to gain variability in students' achievement levels. Non-participating students were interviewed to provide potentially contrasting points of view. Interviews were conducted in empty classrooms during school-time near the end of the school year and available students were those who did not have class or another school-related commitment during the interview sessions. Each interview was approximately 30 minutes in length.

We acknowledge that our sample size limits the inferences we can make to the broader population of students. However, there are some affordances of the site and the participants that guided our selection. Because we sought an active, school-based implementation of a badging system, we accepted a small sample size in exchange for the likelihood that our data would allow us to examine the relationship between badges and interest. In addition, this purposeful selection of our sample of students participating enabled us to explore our phenomenon of interest (Cresswell, 2005). That is, we perceived our site and participants to provide useful information

with respect to badging and students' motivation and better understand the phenomenon (Patton, 1990).

Analysis

The analysis process began during data collection. After each day of interviews, the three interviewing researchers wrote analytic memos to clarify the dimensions of the coding categories (Corbin & Strauss, 2008). All of the interviews were digitally recorded and transcribed verbatim. Interview transcripts were uploaded to Dedoose, a web-based platform, where we coded our data[1]. The coding schemes were developed based on our theoretical framework and prior research (Green, 2002; Ryan & Deci, 2000). This research provided specific labels for codes that we used as we analyzed the data. Qualitative coding for student interest under an expectancy-value framework has been found useful in other data sets using a similarly aged sample (Bathgate, Schunn, & Sims-Knight, in review).

The theoretical framework provided the analyses with inductive themes with which to identify dimensions of motivation. These themes included rewards, values, personal connections, recognition and enjoyment and independence. These themes served to provide a detailed description of student motivations and interests as they related to the badging system.

The research team wrote descriptions of these themes before beginning the analysis in order to reach consensus on how to apply the codes. The research team met in stages throughout the coding process to read and discuss the transcripts, as well as to clarify and refine the coding scheme. Four researchers independently coded a set of three transcripts, and all transcripts were discussed in the group. All of the coded transcripts were available to all of the researchers.

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[1] The website for this platform is: www.dedoose.com

We sought credibility in our analysis through a number of strategies (Lincoln & Guba, 1985). First, we sought to maintain methodological consistency through our data collection and analysis (Morse et al, 2002). Therefore, our data and analysis were aligned with our research question and theoretical framework. This was not intended to constrain our analytic process but to ensure a "trustworthiness" (Lincoln, 1995) in that our point of inquiry, analytic approach, and analysis were carried out systematically and as intended. Second, we maintained regular open and critical discussions of our analysis within the research team. This allowed us to compare each other's codes, challenge one another's analysis, and refine our own coding definitions to reach a common understanding for our group. When consensus was not immediately reached, additional examples were brought to bear from the data for discussion and the coding category was refined until consensus was reached. Third, we shared an initial draft of our research report with the teachers and other collaborators to check our interpretations, the logic and the applicability of our analyses. Further revisions were made based on this member checking.

Results

Conceptualizing and capturing evidence of interest is complex. The findings suggest that student participation in the SBBS was related to an array of dimensions that the students perceived in the badging system. These dimensions or themes serve to provide a description of how students' participation in the badging system came to bear on their interests. Through our analysis, we highlight themes related to student interest that were predominant in their responses: enjoyment and independence, recognition, value, personal connection, and rewards. While there is some overlap, these themes supply us with distinct interest-related elements present in students' responses. It is also important to note that these themes come directly from the

theoretical lenses with which we approached the study: cognitive evaluation theory and expectancy-value theory. The themes provide us with data to provide a more specified articulation of students' motivation to participate in the school's badging system.

The SBBS allowed students to distinguish themselves from their peers through extra effort. The SBBS was voluntary and so this extra effort was above and beyond the day-to-day work in the school. Moreover, the SBBS embodied features that the students valued such as being innovative, new, and building skills they deemed necessary in their personal life. In addition, the SBBS was seen as a conduit for connecting achievement to a students' identity either through exposure to the content of the badges or the activities completed to demonstrate badge competency. Finally, the rewards associated with the badges were quite prominent in the students' responses. These rewards included the badges themselves as well as the in-school and out-of-school benefits they gained through engaging in the badging process like additional freedoms in school and fieldtrips out of school.

Enjoyment and Independence

When students talked about their participation in the badging system, they often spoke about the appeal of doing something fun. For example, one student described the appeal of the SBBS as "I think it's a way to make learning a lot more fun, a lot more exciting and intriguing." Another student similarly stated, "I think everyone likes to do it because they're new, they're different and most people like the new trend thingies." Even amongst students who did not participate in the SBBS, perception was that badges were a fun activity. One student said, "…it looked fun and I'm sure it felt good to succeed in getting your badge and being trusted by your peers." This enjoyment or fun often overlapped with other aspects of our analysis and was

evident in the way the students expressed how the badges enabled them to be somewhat autonomous in the badging process.

Students also expressed a sense of autonomy associated with their participation. One student described her non-badge schoolwork as "I don't want it to seem like we have no freedom or independence at all, but…" then described two parts of the badging system that afforded her more agency. She said, "One, you're not obligated to do it; two, you go at your own pace. You can go whatever pace you want. I guess it because you get to choose. You get to choose; you get to go at your own pace. Now you have more freedom." Here she highlights that the badging system was completely voluntary, which was a point often made by participants and non-participants alike. She also mentions the fact that she could move at her own pace in accomplishing her badge-related work. As another student said, "…you don't have a deadline." Interestingly, students also recognized their autonomy as limited by deadlines. As our interviews were taking place, many of the students also made clear that they understood that the school year's end was rapidly approaching and that presented a clear deadline for completion. It is also worth noting that none of the students had completed more than one badge, which was possibly a result of self-pacing.

By design, the SBBS fostered students' sense of autonomy by enabling students to choose whether they participated, which badge they wanted to earn, and how they demonstrated their competence for the badge. During the Recognize It and Talk About It phase of the badging process, the students demonstrated their understanding for specific badge content by choosing what are appropriate tasks to demonstrate their competence and communicate that competence. One student said, "In school we learn about science in a book, but for this badge you get to say what you think about it and not what the book says." The student highlights that authority or

ownership of knowledge and the learning process belong to him and not necessarily what is written in the textbook.

The themes of enjoyment and independence that we identified in the badge system are aligned with CET. In prior research, data have suggested that one's sense of personal autonomy on a particular task is important for intrinsic motivation (Ryan & Deci, 2000). Moreover, the students' perception that earning a badge as being enjoyable relates to Expectancy Value Theory and reveals a perceived aspect of the badging system that the students valued as important. These too were salient themes in the students' discussions about their participation in badging.

Recognition

By analyzing students' responses for expectations associated with working for badges, we noticed that student participation was related to high aspirations. More specifically, students expressed expectations that earning badges required effort beyond what they perceive as minimal. Consequently, students described how the SBBS provides an opportunity to receive recognition for their effort.

Many students saw the badging system as a way to show they have high aspirations or that they want to do more than expected. One student said of working on badges, "I think it shows that it's harder working. I will try my best to get more in there than needed." This student is saying that he wants to provide more examples of work in order to earn his badge. According to him, this also demonstrates the effort that he is putting forth. Similarly, another student said, "I wanted to push it a different level. I don't like just the bare minimum. I like going out there for more stuff."

In order to achieve a badge, students were able to draw upon work they had been doing in other classes, outside of school, or initiate completely new work. In this way, the badging system could validate the value of work students were already engaged in or initiate new projects for students. This, too, provided a way for students to highlight their effort and desire to go above and beyond. One student said, "…showing work that you've already done during school, and being able to put it out what you felt like you thought was good about your work, I think it's harder to do. I thought that was better." Here the student is illustrating that the SBBS allowed her to identify and show work she was doing from other classes to fulfill her badge requirements.

The theme of recognition, which we identified in the data, can be seen as being related to Expectancy-Value Theory and Cognitive Evaluation Theory. For example, some students perceived the badges as enabling them to show good work that they done in school suggests that badging system allows them to show what is important to them. However, one could also use recognition to show that engaging in good work and doing more than what is expected of the student provides an opportunity for self-expression.

Values

What students valued about the badging system suggests the most appealing aspects of the SBBS. We can think about these values as elements of the badge system that drew participation. These values coalesced around some general themes of novelty, utility, challenge, and personal connection.

Many of the students noted the novelty of the badging system as being something they valued. For example, one student noted, in comparing typical activities in school to the SBBS, "It's still educational … you do it on your own time and you don't have to do it. It's not required.

It's completely optional and there's not really a time limit." This student is saying that the fact that you can work on the badging work at your own pace combined with its voluntary nature is different than what typically occurs in school. Another student mentioned, "I thought it would be different; I wanted to try something new. I've never done anything like this before and I thought it was a cool new addition for the school."

Several students stated that there was utility to participating in the badging process, whether that meant they thought the process was useful for learning something new or useful in preparing themselves for their future. While acknowledging that the SBBS's newness was appealing, many students also recognized that the SBBS serves a greater purpose in their long-term goals. For example, one student said, "…what I had originally signed up for—one, I was looking forward to something to go on my record." Another students said about badges, "…those are gonna be on your resume and if you're applying for a certain job, then certain badges would help. If you're applying for a research job, then the information literacy badge would help." For this student it was less important which badges will sustain some sort of place in their permanent record or even aid in their finding a job. Rather, the badge was fulfilling a role for the students that they saw as preparing them for the future. As one student referred to it, "…an extra credit thing that will get you something on your record…"

However, students did not just connect their badging participation with their long-term career goals. Some of the students saw their participation in the SBBS as learning skills they identified as needing or wanting. For example, one student mentioned that she was earning the collaboration badge because it was addressing a skill she needed to work on. She said, "I sort of need to work on working in groups." Similarly, students spoke about how the information

literacy badge served a similar purpose. One student stated, "I love technology, I love—well I mean I like getting the right information. I don't like having the wrong information."

The prominent theme of values that we identified in the data align to Expectancy Value Theory. This theory specifically highlights the generally positive relationship that exists between individuals' expectations for performance and the reasons they value a particular task.

Personal Connection

Participation in the SBBS gave students an avenue to personally connect with work they were doing in school. For example, students saw choosing a particular badge naturally aligning with who they are and what sorts of activities they do. One student earning the information literacy badge said, "Using technology, finding useful information; that's mostly what I would do." Likewise, another student earning the acceptance badge mentioned, "I'm big on acceptance and equality and just stuff like that." In both cases, the students associated the requirements for their selected badges with what they like to do and who they are. While this can be seen as a way that the SBBS is validating activities that students are engaged in outside of school, this personal connection also indicated that the SBBS supplied a chance for students to deepen their own understanding of their interest.

To illustrate this we looked specifically at the acceptance badge. Although some students were drawn to the acceptance badge because it coincided with an important idea that they held, engaging in the badging system also granted an opportunity delve into what it means to be accepting. For instance, one student spoke about this,

"I've always been a little more into like acceptance and just more than just,

oh accept people for who they are, blah, blah, blah, just more interested in

that than my peers. I sort of realized that *(through the badging process)* there're

a lot of people that—and it's not like everyone's against people that are accepting, there

are people that are different. I've sort of been very defensive, so—just sort of being

more—just sort of learning about how other people look at acceptance."

In this quote, the student first describes how acceptance has been an interest of hers in the past

and how that interest has been different than that of her peers. The quote then goes on to show

how the badging experience has exposed her to how people view acceptance. In this way, she is

describing how she is learning how she is being perceived as someone who expresses tolerance

for others.

The SBBS additionally connected to students who see themselves not only in their

relation to the content of the badge, but also how they demonstrated their competence. This was

evident through comments on the software tools, like Voicethread and Hyperstudio, which

students used to complete different badge phases. For example, one student stated, "I decided I

wanted something different that just shows what I like doing, taking pictures and not exactly

being in front of the camera. I decided that would be more what I like to do." In this quote, the

student expressed his preference for using a camera. Consequently, the student generated badge

work that included pictures or videos.

The theme of personal connection that we identified in the data aligns with Expectancy-

Value theory of motivation. Similar to what the theory posits, that students can value a task for

the personal connection they associate with it, our data suggest that students' motivation to earn

a badge could be partially explained by the fact that the badging process reinforced their perceived sense of self.

Rewards

The SBBS provided opportunities for students to earn rewards through progress toward earning a badge. Student descriptions of the rewards suggest that this was a key motivating factor for their participation. There were three ways that the students primarily discussed the rewards. First, there was the importance of receiving a reward. Second, there were the school-based benefits that students received by participating in the badging system and earning their badges. Third, there were out-of-school benefits that students also noted as being important.

As mentioned prior, the extra rewards that students receiving through earning a badge were called power-ups. One student summarized the importance of power-ups this way:

Interviewer: If another school wanted to have a badging system like you guys have

and they   wanted to hire you as an advisor or as a consultant to help

them, what do you think the best parts of the badge system are that they

should make sure that they have?

Interviewee: The power-ups.

Interviewer: Yeah? What would you tell them about the power ups that are important?

Interviewee: You have to have good power ups related to your school. We don't have

good food so if we get a special lunch, it's good. [Laughter] That's a good

power up for our school. If they have good food, then they could have

other stuff that relates to the school that they need to improve on. They

could have one day, if they're not that rich of a school and they don't have

that many computers, they could have one computer day and stuff, to

work on the computers.

There are at least two points worth noting in the student's comments. First, the student states that

the power-ups, or rewards, are a significant part of the digital badging system. In fact, the power-

ups are labeled the best part of a badging system and integral to its success. Other students made

similar statements. Second, this student states that the rewards should be tied to a need or want of

students. That is, the benefits of the badging system need to be informed by what the students

want and what they would see as valuable.

Students noted that the badge was a tangible reward that they received and appreciated.

Although there was a prominent digital aspect to the badging system, the tangible aesthetic

element of the badge was noted by students. For example, a student noted, "…it has a picture of

a badger digging up something. Then on the back, it says your name." Here the badge is not just

a web-based or digital symbol, but something students can see, wear and show-off to others.

This tangible aspect of the reward also led to in-school and out-of-school benefits that

students saw as desirable. By in-school benefits or rewards, we mean that the students received

some benefit that enabled them to opt out of an aspect of the school day or gain some additional

autonomy (i.e., unsupervised time). For example, one student stated, "In school they're like

personal benefits. We get like—when we got the first badge we got an actual badge. So like if we

wanted to leave at, like I said, writing class, we could go put on the badge and go down to the

computer lab to work on our badges." This kind of benefit was not lost on the student who did

not participate in the badging system. One non-participant noted of the students participating in

the badging system, "…they can go into the computer lab or into another room and do homework during class if they finished their work already, and they don't have to have teacher supervision…Well, everywhere we go as middle schoolers, we have to have teacher supervision, so to be able to be in a room without a teacher is cool, because you don't have to be like babysitting…" The out-of-school benefits refer to field trips that students could earn related to the badging system.

The theme of rewards that we identified in the data relates to research connected to Cognitive Evaluation Theory. The literature on rewards is mixed and has shown to demotivating in some contexts. However, there is also evidence that externally motivated actions that are coupled with a participant's perception of autonomy, can lead to positive learning and engagement in a task (Skinner, Wellborn, & Connell, 1990; Grolnick & Ryan, 1987).

Discussion

Insert Table 2

Our analysis leads to several takeaways. First, the evidence suggests that student choice is a notable piece of the SBBS in that it connected students' identities and students' sense of autonomy to activities and content. This type of connection has been an important design feature of constructivist learning environments (e.g. Krajcik, Blumenfeld, Marx, Bass, Fredricks & Soloway, 1998; Krajcik, Czerniak, & Berger, 2003) as well as informal learning environments (Allen, 2004). One can reasonably assume that the success of a badge system relies on forging this connection and that badge systems should identify and maintain the parts that are perceived

as fun. Additionally, allowing participants to select a badge and the means to earn the same badge can further enhance interest.

In addition, our data suggest that the recognition that students receive from their experience in the badging system is also important to their engagement in the system. In this way, the recognition not only validated interests and activities students were doing outside of school, but also provided students with an opportunity to give extra effort and demonstrate their commitment to school-related work. This suggests that an important feature of the badging system is the opportunity to recognize the activities of students and the efforts that they give as they engage in those activities.

While the system has the potential to provide recognition to students, it also possesses values that are important to the students. These can be ephemeral like the fact that the system is new and different, or it can be something more tangible like the badge's ability to credential skills that are of long-term importance to the students. The implications of this for others who wish to implement such a system may be to capitalize on the novelty initially in order to garner early participation, but demonstrate the long-term benefit to students based on what is important to their future, such as for a job, or college admissions.

Our data also suggest the salience of the personal connection students were able to make to the badging systems activities. Many of the students described their choice of badges due to the fact that the badge related to who they are and what they do. In this way, students had ready access to the domain and saw the badging activity as an opportunity for self-expression (Nasir & Hand, 2008). This suggests the importance of integrating students' out of school activities as a way for students to reinforce their individual identity. However, it is worth pointing out that we

do not know if the nature of this personal connection is to communicate one's identity to others or to reaffirm one's identity for the child him or herself.

Finally, the prevalent role that rewards played in the SBBS led to a final take-away. Students consistently reported rewards as an integral part of the SBBS. This prevalence of rewards is seemingly contradictory to other educational research findings related to rewards. Prior research indicates that rewards can have a negative effect on intrinsic motivation to learn (Deci, Koestner, & Ryan, 2001). Yet, students in the SBBS, while citing the importance of rewards related to their interest in participating, also never indicated that the reward supplanted their desire to earn a badge. Students seemed able to draw the distinction between the rewards and the badges, seeing rewards as an enhancement to the SBBS. Based on our findings, we conclude that appealing rewards is important to attracting participants in voluntary badge systems. Further, the blend of in-school and out-of-school rewards along with tangible and intangible rewards serves to ensure a broad range of appeal to students.

It is important to make note that while the focus of these findings is based on students who willingly participated, this only represented about half of the students in the sixth grade. Our analyses did not make contrasts between the interests and motivations of those who engaged in the system and those who did not participate. While this was a methodological decision in order to better understand the motivations of students who did participate, this also limits our understanding of the overall landscape of students' interests and motivations to earn badges in school settings.

Future Research

Because badge systems are still novel educational reforms, there is a dearth of knowledge regarding their use. Consequently, several specific areas of future research emerge from this study. First, we acknowledge that the small-scale nature of this study limits the inferences we can make to the broader population of students. For further study, we shall expand this study to other sites. This will enable us to make meaningful comparisons across sites as well as ascertain how representative our findings our. While our findings may not generalize to a broader population of students, the findings will enable us to generate hypotheses to further this work in the future.

In addition, expanding the study in the future would enable us to make comparisons across the different factors of student interest. This may enable us to understand the relative importance of the different factors as well as dig deeper into the factors. For example, we could further interrogate the notion of personal connections that students make with the badging system and whether or not that connection facilitates their identity making for others in their school or if this serves to reinforce one's own identity for him or herself.

Because our interviews were conducted at the end of the SBBS's first year of implementation, we are unsure as to how student interest changed over time. It is possible that the SBBS resulted in an initial singular boost in student interest that persevered over the course of the year. Another possibility is that student interest increased and decreased during specific badges phases.

Another area of future research regards the affects on student interest as the SBBS enters its second year. Although all participating students reported a desire to continue their pursuit of badges, we do not know how badges systems affect the students' interest longitudinally. These

effects may subside or, as we expect, could be compounded as more number of students choose to participate. This will be especially important to distinguish between the personal and situational aspects of the students' interests (Hidi, 1990).

A third area of future research is related to how rewards function with a badge system. It is unclear from our finding as to what are the effects of a reward structure for the long-term. As one student put it, ""I mean, truly I think that the reason that most people are doing the badge is not because of curiosity and because we want to actually do it. Truthfully most people did it, including me, to get the reward. There are rewards that—like one of them is you take a field trip. I think for the Brin we go to Google headquarters or something. Then there's a lunch if you finish the badge. Then there are certain power ups for each badge that you can do." Further research is necessary to unpack this relationship.

Finally, while our findings do not make claims about the participating students' learning, investigating the connections that the system makes with students' interests is key to ultimately making sense of the participating students' learning. The various design features of the SBBS as well as our findings align with previous frameworks related to interest-driven learning (Edelson & Joseph, 2004). However, future research will need to focus on learning as well since we acknowledge the difference between students being motivated to engage in an activity and being motivated to learn within an activity (Edelson & Joseph, 2004).

Conclusion

The SBBS connects to students' interests in a variety of ways. In short, this connection is related to the fun the students experienced through the system, the greater independence it provided for the students, the ways in which students could distinguish themselves, the parts of

the system that served needs that students had and valued, and the rewards that the system offered students. We hope that these findings can serve to lay the ground work for future designs of badging systems in formal and informal educational settings as well as encourage empirical research toward current badging systems. While the thrust for badging systems in the field of digital media and learning currently is evident (Hastac Competition, 2011), we need research to assess the role these systems play in the learning and teaching enterprise.

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Appendix 1: Rubric for Brin Informational Literacy Badge

	Exemplary Performance	Proficient Performance	Partially Proficient Performance	Poor Performance
Recognize It Phase	Clearly and consistently recognizes the skill when it is enacted. Can accurately differentiate between high and low skill levels and between this and other skills.	Often recognizes the skill when it is enacted. Occasionally differentiates between high and low skill levels.	Sometimes recognizes the skill when it is enacted. Occasionally differentiates between high and low skill levels.	Does not recognize the skill when it is enacted. Cannot differentiate between high and low skill levels.
Talk About It Phase	Accurately talks about the skill. Can state multiple examples of when it is enacted. Articulates importance or value of the skill.	Accurately talks about the skill. Can state examples of when it is enacted.	Can talk about the skill in a basic way, sometimes inaccurately. Provides weak examples of when it is enacted.	Cannot talk about or abstract the skill. Fails to state examples of when it is enacted.
Do It Phase	Clearly identifies what information is needed to address research questions. Intentionally uses and modifies search strategies that yield relevant information. Evaluates quality of sources for credibility and effectively selects credible sources. Gathers sources and information	Identifies most of the information needed to address research questions. Uses and sometimes modifies search strategies that yield somewhat relevant information. Sometimes evaluates quality of sources for credibility and somewhat effectively selects	Identifies few of the pieces of information needed to address research questions. Uses search strategies that yield little relevant information. Rarely evaluates the quality of sources and does not effectively select credible sources. Gathers sources and information with	Fails to identify what information is needed to address research questions, Uses search strategies that yield no relevant information, Never evaluates the quality of sources and often uses inaccurate sources, Gathers sources that are irrelevant to research questions,

	highly pertinent to research questions. Creatively designs an original product organizing and presenting information from multiple sources. Synthesizes content from multiple sources to make larger arguments.	credible sources. Gathers sources and information mostly pertinent to research questions. Designs a product organizing and presenting information adequately. Synthesizes multiple sources to support argument.	little relevance to research questions. Designs a basic product that poorly conveys content. Rarely integrates multiple sources into argument.	Copies or relies on others for product design, merely repeats information provided; denies evidence without adequate justification, fails to communicate content accurately or effectively.

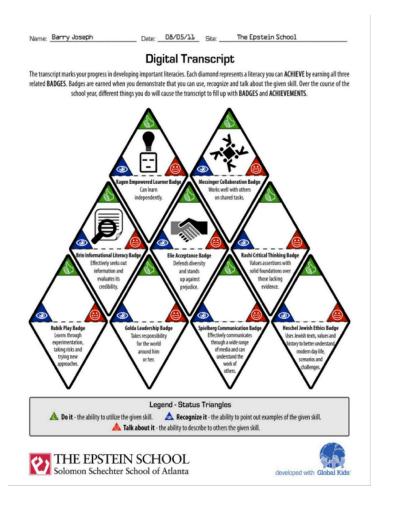Figure 1: Digital Transcript: Making the Badging Process Visible.

Figure 2: Wearable Badge Award

Table 1: The Four Badges in the System with Learning Objectives.

Badge Name	Learning Objectives
(Sergey) **Brin Informational Literacy Badge**	Badge earner demonstrates ability to identify the need for information, use effective strategies to seek out information, parse significant information from less significant information, critically evaluate the credibility of information, and synthesize information from multiple sources.
(Elana) **Kagen Empowered Learner Badge**	Badge earner demonstrates ability to learn independently through preparation, self-assessment, skill assessment, and perseverance.
Elie (Wiesel) **Acceptance Badge**	Badge earner demonstrates ability to recognize ones values and beliefs successfully negotiate a shared understanding with and fair treatment of those different from oneself, and standing up for targets of prejudicial treatment.
(Ruth) **Messinger Collaborating Badge**	Badge earner demonstrates ability to collaborate within a group to develop creative solutions to complex challenges by employing the resources at hand and assuming varied roles while considering divergent points of view and negotiating for mutual benefit.

Table 2: Summary of Findings

Aspect of Interest	Evidence within the SBBS	Relevance to Badging Systems
Enjoyment and Independence	1. Students perceived badges as fun. 2. Students liked having choices in terms of the type and level of their participation.	1. Identify and maintain fun aspects of badges. 2. Allow participants to select a badge and the means to earn it.
Recognition	1. Students indicated a preference for badge-based recognition for work that extended beyond their typical academic activities.	1. Create badges that allow for recognition of skills or learning this is otherwise unrecognized.
Values	1. The novelty of the SBBS was attractive to the students. 2. The learning associated with earning a badge was seen as beneficial to short-tem and long-term goals.	1. Badge systems should reside outside of formal school structure. 2. Badge-based learning goals should have clearly identifiable benefits to students.
Personal Connection	1. The SBBS allowed for students to connect out-of-school activities with their academic pursuits. 2. Students chose badges that had personal relevance. 3. Student earned badges through methods that were selected based on appeal.	1. Badges should include non-school based pursuits. 2. Badges should have direct relevance to student interests. 3. Students should have the ability to choose amongst methods to earn a badge.
Rewards	1. Students valued rewards for earning badges based on the direct appeal of the reward. 2. Students indicated appeal of school-based and out-of-school benefits.	1. Badge rewards must be appealing to students. 2. Rewards should include school privileges and out-of-school benefits.