Using online social networks to build healthy communities: a design-based research investigation[1]

Usando redes sociais online para a construção de comunidades saudáveis: um projeto de pesquisa

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Resumo: Este artigo apresenta o projeto e a avaliação de uma rede social *on-line* usada junto a 22 programas "pós-escola", envolvendo as três maiores áreas urbanas no Nordeste dos Estados Unidos. O principal objetivo foi capacitar os estudantes com relação à prevenção da obesidade mediante o uso de alimentação saudável e a prática de exercícios físicos. Uma rede social *on-line* foi projetada para dar suporte às comunicações entre os participantes. Os resultados indicaram o potencial das redes sociais *on-line* com cuidados preventivos e ações comunitárias em torno dos temas relacionados; contudo, uma atenção maior é necessária para programas voltados ao desenvolvimento profissional dos facilitadores, para características de projeto mais bem elaboradas, de modo a suportar o pensamento crítico, a presença social e as atividades sociais.

Palavras-chave: redes sociais, obesidade, saúde, comunicação.

Abstract: This paper discusses the design and evaluation of an online social network used within twenty-two established after school programs across three major urban areas in the Northeastern United States. The overall goal of this initiative is to empower students in grades K-8 to prevent obesity through healthy eating and exercise. The online social network was designed to support communication between program participants. Results from the related evaluation indicate that the online social network has potential for advancing awareness and community action around health related issues; however, greater attention is needed to professional development programs for program facilitators, and design features could better support critical thinking, social presence, and social activity.

Keywords: social network, obesity, health, communication.

INTRODUCTION

Online Social Networks, such as Facebook and MySpace, are extensively used by youth to connect with friends and maintain existing social relationships (LENHART & MADDEN, 2007). Coupled with widespread use, emerging research indicates that online social networks can engage participants around pertinent issues and influence lifestyle change (MANKOFF, MATTHEWS, FUSSELL, JOHNSON, 2007). Despite the potential benefits, attempts to use online social networks for constructive purposes within organized educational settings (such as formal schooling or informal after school programs) are often thwarted because such sites are blocked in school and libraries, and in some cases, discouraged by parents and teachers (AULA & LUBOMIRSKY, 2007). Ito et al. (2010) find that "when kids lack access to the Internet at home, and public libraries and schools block sites that are central to their social communication, they are doubly handicapped in their efforts to participate in common culture and sociability" (p. 347). Buckingham (2007) agrees, arguing that this is leading to a "widening gap between children's everyday 'life worlds' outside of school and the emphases of many educational systems" (p. 96). Because of this barrier, little research and development has been conducted where online social networks are used for educational purposes within organized settings, including after school programs that may be school or library-based.

In light of this these challenges, the authors had the fortunate opportunity to design and pilot an online social network for use within twenty-two established after school programs across three major urban areas in the Northeastern United States. The purpose of this after school program is to teach students in grades K-8 about obesity prevention through healthy eating and exercise, and to implement a service project for preventing obesity in their own communities. The online social network was designed to support communication among the participants in this after school program. The purpose of this case study is to address two primary research questions: *(1) Can online social networks support meaningful communication within an organized learning context? (2) Can online social networks strengthen the quality of psycho-social support children receive within an organized learning context?* To address these questions, we will discuss our design-based research approach that includes the initial design of the online social network, its use by students and after school program facilitators, and an evaluation. The evaluation will be used to better understand the potential for online social networks in educational settings and to influence successive design iterations to this particular online social network. We will begin by first discussing the relevant and growing literature in this area, followed by a presentation of the design process, and conclude with a mixed-method evaluation.

LITERATURE REVIEW

Online Social Networks

Social network sites, such as Facebook and MySpace, are used by millions of individuals per day to maintain existing social networks and to meet new people based on shared interests, political views, or activities (BOYD & ELLISON, 2007). boyd and Ellison (2007) characterize social network sites as allowing individuals to: 1) construct a public or semi-public profile, 2) articulate a set of social connections, and 3) view and traverse their list of connections and those made by others within the system. Social network sites and related technologies have been hypothesized to "hold great promise and challenges for transforming education research and practice;" however, more research is needed into how learner "creativity and online identity formation… intersect with, support, or suggest desired competencies, teaching practices, and policies" (GREENHOW, ROBELLA & HUGHES, 2009, p. 255).

With respect to how individuals use online social networks, boyd and Ellison (2007) note that the available research suggests that they are used primarily to maintain existing social relationships, even those relationships that might be weak in nature. For example, a Pew study found that 91% of teenagers use social network site to connect with their existing friends (LENHART & MADDEN, 2007). Thus, "the value of social media rests in their ability to strengthen connections" (BOYD, 2010, p.

113). In practice, this means that youth use online social networks for "socializing with those they knew from school, worship centers, summer camps, and other activities" (Boyd, 2010, p. 89). Because social network sites are used primarily to reinforce social relationships formed within such face-to-face contexts, we have reason to believe that we could develop a social network site to support the relationships formed within the after-school context. By providing a mechanism for buttressing these social relationships, the hope is that individuals within the program will gain social support through these reinforced connections.

In terms of issues of health, wellness, and nutrition, Ploderer, Howard, Thomas and Reitberger (2008) suggest that "Social network sites (SNSs) such as Facebook have the potential to persuade people to adopt a lifestyle based on exercise and healthy nutrition" (p. 245). They found this through their study of the social network BodySpace.com, a social network for body builders and aspiring body builders. Results indicate that the online social network provided a space where each other could seek and exchange appreciation among each other, which acted to motivate the actors using the social network.

Children's Health and Technology

Research indicates that childhood obesity can be alleviated through "comprehensive strategies to address dietary and physical activity change, together with psycho-social support and environmental change" (Summerbell, Waters, Edmunds, Kelly, Brown & Cambell, 2009, p. 2). However, can an online social network be used to facilitate the psycho-social support children need to prevent obesity and build healthy communities?

The use of information and communication technologies as catalysts may seem counterintuitive since there exists a perception that children's use of media (television, video games, and computers) is associated with obesity. A study of ICT use among children found "that an increased time spent on viewing television was positively associated with overweight in girls and in 16-year-old boys, as was using computer among girls" (Kautiainen, Koivusilta, Lintonen, Virtanen & Rimpelä, 2005).

Hiller (2008) suggests that "technology has contributed more to this problem than to its solution, but many technological innovations and applications hold promise for reversing this pattern" (p. 76). She finds that "all of the technological improvements in the past ten years provide limitless opportunities for researchers to advance our understanding of how children interact with the built environment and how to intervene to reduce childhood overweight" (p. 63).

An example use of social media to accomplish health goals is Chick Clique, which monitors how far a girl is walking and communicates that information to her friends with the idea that "when the girls see that their friends are walking a lot they may be inspired" (Toscos, Faber, An & Gandhi, 2006, p. 1874). However, research on using new media to accomplish children's health goals is relatively new and needs further development. The National Heart, Lung and Blood Institute Working Group's 2008 recommendations on future research directions in childhood obesity prevention and treatment found the need to create multilevel, multi-component interventions and to "Test interventions that use technology (e.g., the Internet, media, novel electronic approaches) to influence behavior change" (Pratt, Stevens & Daniels, 2008, p. 3). Although technology has rarely helped the issue of childhood obesity, there is a growing perception that it can potentially be used to support behavioral change.

Technology and Learning

Technology can be a catalyst for improved teaching and learning in both formal and informal educational settings (Wenglinsky, 2005). Still, this finding remains dependent on both the design of technology and the design of implementation. The International Society for Technology and Education (ISTE, 2008) recently recommended seven key conditions for use in support of student learning. Of those recommendations, five translate to the design of technology programs for after school use:

1. Professional development is needed to prepare educators to design and implement technology experiences for learning;

2. The application of technology for student learning must be embedded within the context of a thoughtful curriculum;

3. Technology must be integrated into the daily activity of students. Technology will not support learning if implemented as an occasional "add-on" activity. See also Kulik (2003).

4. Collaborative environments for technology are most effective for learning. See also Kulik (2003).

5. The support of knowledgeable leaders is central to the successful implementation of technology for learning in education. See also Meier and Mineo (2008) and Mineo and Meier (2008).

With respect to the recommendations, our aim is to use the online social network to support learning by engaging students in daily conversation and reflection around important topics and supporting the social relationships formed within the face-to-face program. This is achieved through designing an online social network that affords collaboration and communication (NORMAN, 1988). However, the placement of a feature does not guarantee the thoughtful use of the tool. Teachers still need to scaffold learning within the environment.[1]

To accomplish this, we offered professional development to program administrators, program facilitators, and college volunteers/mentors to support the thoughtful integration of the online social network into the after school curriculum. Professional development was delivered weekly over the first month of site's roll-out. In total, five formal online workshops were offered to program staff, and professional developers were available via email and phone for individual support for the first three months of implementation. Professional development topics included: writing essential questions to generate student discussion, involving parents in the online social network, and using video to enhance learning activities. Program staff used this time to generate technology-infused, project based ideas in line with the already established face-to-face program curriculum.

DESIGN PROCESS

This project employs a design-based research approach. Design-based research and design experiments look to create new, innovative, and experimental learning contexts that not only produce new learning environments but also generate useable knowledge (BROWN, 1992; BARAB & SQUIRE, 2004). Barab and Squire (2004) "note that the commitment to examining learning in naturalistic contexts, many of which are designed and systematically changed by the researcher, necessitates the development of a methodological toolkit for deriving evidence-based claims from these contexts (p. 2)."

Design-based research is conducted by having students interact with a design in a naturalistic setting, and the outcomes of those interactions both influence the design and can be formative in generating new theories with respect to how people learn (BARAB, THOMAS, DODGE, CARTEAUX, TUZUN, 2005). This process "involves design work coupled with the continual production of naturalistic interpretations based on both qualitative and quantitative data over extended time frames and at multiple sites" (Ibid., p. 92). Qualitative data is gathered when participants observe and interact with the evolving technical structures as well as "the social relationships, interactions, member produced work, and conversations (online and face-to-face) through which these structures are informed and take on meaning" (Ibid., p. 92).

For the design and development of the related social network site, the design phases included four-cycles: 1) design and development of the online social networking tool in conjunction with key stakeholders, 2) the online professional development of key players, 3) implementation of the online social network across 22 after school programs for students in grades 3-8, and 4) analysis of the formative data. The first phase of the design cycle included a number of sub-phases related to the design and development of the technological affordances of the environment,

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[1] For the purposes of this project, we use the term "teacher" and "program facilitator" interchangeably.

particularly phases for: 1) initial discussions and discovery phase with key players, 2) paper prototypes of the social network website, 3) producing three initial designs, 4) further refinements, 5) implementation, and 6) launch.

In the design and refinement phases, the primary task was to design affordances to support collaboration amongst students, teachers and parents. In considering this task, a number of issues arose around issues of: privacy, roles, developmental appropriateness, learner proficiency with online environments, usability, learner identity and personal goals, communication across schools and geography, curriculum and professional development and satisfying partner considerations as well as educational considerations. A screen capture from the developed online social network, after it had been used with participating schools, is illustrated in Figure 1.

Although all the design decisions will not be described here, a few of the more interesting cases will be discussed:

Privacy. According to boyd and Ellison (2007), the user profile is one of the primary ways that online social networks allow participants to communicate their identity. Similar to commercial social networks like MySpace and Facebook, students were also allowed to create a profile that others in the program could see. To balance privacy and individual expression, students could choose an avatar to express their identity but could not use a personal photo or their last name. However, unlike the profiles on commercial social network websites, the social network's profiles focused more on the goals of the program (healthy eating and living). Hence, participants could fill-out fields for favorite fruit, vegetable, and exercise, as well as a healthy goal for the year. The curriculum encouraged ongoing discussion around healthy goals, and program facilitators were encouraged to use this forum as a springboard for communication.

Communication across school and geography. A feature that was enacted was the ability for participants in one program implementation site to be able to see the activity of other sites. This is a feature that is unique to ICTs that could not be easily accomplished without them, and provides a way for students to comprehend that they are
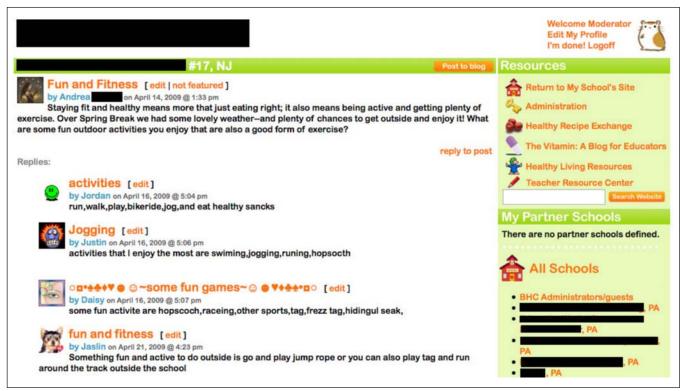

Figure 1: Social Network being used by participating schools with identifiers blacked-out.

apart of a larger network of young people working on a common goal. Furthermore, a "blog of the week" is publically featured on the program's home page. In all cases, students have the ability to respond or comment to participant postings. At the same time, all student comments need to be approved by a back-end administrator before being published to the community. Moderation is designed to be ongoing as not to interfere with the fluidity of communication. This process is not ideal, but arguably critical when dealing with sensitive topics and young children.

Developmental Appropriateness. The Social Network website was designed for students in grades 3 to 8. To make the site usable for the younger children, we eliminated aspects that are common to adult websites that we thought would be difficult for a young child to use. For example, most adult websites mask your password when you type it in. This adds a level of complexity to the task and is a security precaution we dispensed with for the sake of making the site easier for young children to use. We also eliminated many of the features common in blogging software, such as WYSIWYG text editors, that can be very complex and could easily frustrate a child. Instead, we opted for simplicity and clarity. To make the site appealing to the older children, such as the middle school children, we avoided the types of imagery and design choices that are associated with young children's media and instead opted for a bright yet mature design that could appeal to both age groups.

EVALUATION METHODS

The online social network was used in the 22 after school program sites for 5 months in three major urban areas of the Northeastern United States. The after school program met anywhere from 6 to 15 hours per week depending on the site. Formative data was collected and analyzed to inform the design of the social network and to elucidate the potential of online social networks for creating a space for meaningful communicative exchanges. Relevant data points include:

a) A program facilitator survey to measure perceptions of how the online social network impacted student learning and engagement (survey questions available at http://mysite.pratt.edu/~acocciol/bhc_survey.pdf),

b) A quantitative content analysis of the communicative exchanges amongst students and program facilitators, and

c) An informal content analysis of general communication patterns.

The purpose of the survey is to understand from program facilitators how they used the online social network to facilitate communication in the program. The content analyses are used to evaluate the quality and frequency of communication exchanged amongst program participants and facilitators.

The survey collected a variety of responses from facilitators, such as:

1) Demographics (description of their roles, location, and grades served);

2) The program's access to technology;

3) Professional development;

4) How they used the site and how useful it was; and

5) How it impacted professional engagement in a variety of areas.

The survey was designed by members of the software design and professional development teams, and pilot tested with program administrators before being distributed to participants via Survey Monkey. A small monetary incentive was provided for returned questionnaires. To interpret the survey, we use frequency counts to describe facilitator feedback.

The quantitative content analysis is to understand what kinds of communication from the facilitator prompted what kinds of responses by the students. Quantitative content analysis is "a research technique for the systematic, objective, and quantitative description of the manifest content of communication" (BERELSON, 1952, p. 18). We created a coding scheme designed to make clear the types of communication being exchanged within this social network site.

Facilitator prompts were coded with respect to having the following characteristics.

Content

1) Presentation of after school activities

2) Discussion of current events, news, facts

Type of Prompt

3) Teacher did not pose a question

4) Teacher poses a question that could be fulfilled with a one-word response from students (e.g., what is…)

5) Teacher poses a question that requires more than a one-word response (e.g., how or why…)

Student responses to the facilitator prompt were coded according to the following characteristics:

1) Social: attempts to connect with others

2) Information: provides information or answers

3) Personal: refers to personal experience or identity

4) Action-oriented: refers to personal or social action

Two independent coders were used to analyze the data and Cohen's Kappa was calculated for each variable to ascertain the reliability of the ratings (COHEN, 1960). Cohen's Kappa was calculated by uploading the coded data into an online calculator designed to calculate this value (GEERTZEN, 2009). Correlations between the teacher prompts and the characteristics of student responses were then calculated using correlation analysis in SPSS. In addition to the quantitative content analysis, an informal content analysis was conducted where the researchers reviewed the written transcripts to arrive at a set of impressions. These impressions, as well as the results of the survey and quantitative content analysis, are discussed in the results section.

RESULTS

Survey Results

The survey was administered in June 2009 and yielded 14 responses, for a 61% response rate (total of 23 facilitators)[2]. Results of the survey indicate that program facilitators feel the social network site can effectively advance the program's goal of supporting healthy communities. This is indicated by the overwhelming agreement (agree or strongly agree) that the social network site is a useful tool to engage students in: a) awareness of healthy living topics (90.9%), b) personal reflection (81.8%), c) development of personal goals for healthy living (100%), d) realization of personal goals for healthy living (90.9%), e) communication with peers around health issues (90.9%), f) building relationships with peers (72.8%), g) conversations with parents about healthy living (72.8%), and h) community action (72.8%). When asked if they were to participate for the following year, 72.7% would want to use the social networking site again and thought the social network site played an important role in the after school program.

The concrete activities that the facilitator engaged in, which may have led to such overwhelming support, is less clear. For example, only 60% used it at least occasionally to maintain a blog for their site and 63.7% used it to read the student blogs from their own site. Some of this could be explained by the fact that 72.7% experienced challenges to implementing the social network site within the program. For example, 35.8% believed that access to technology was an issue and 41.5% thought that usability of the site was an issue. However, when asked which grades the facilitators served, 50% of the facilitators had students in grades first and second, 42.9% had Kindergarten students, and 7.1% has Pre-K students in the program. Since the site was designed for students in grades 3-8 and not for

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[2] Additional data was collected as well, although it will not be discussed here. This includes design notes, feedback from administrators, verbal feedback from after school facilitators, informal data regarding access to technology, recordings of professional development webinars and related chat logs, and additional archival records pertaining to site usage (e.g., web-server access logs).

younger children, this could help explain some of these problems of usability. To explain the problems of access to technology, it appears that there is quite a bit of variation in how many working computers with Internet were available. For example, the average number of functioning computers available on-site was 10.8, but the standard deviation was 9.8, indicating a high degree of variation from site to site.

Furthermore, less than 40% of survey respondents participated in the related professional development program. Professional development was a suggested component of the program, but not required. Informal feedback from program administrators indicated that online participation in professional development was limited due to the conflicting commitments of the part-time facilitators.

Quantitative content analysis

General statistics include the following:

- 128 students and 23 facilitators logged into their accounts at least once

- 100 distinct students and 18 distinct facilitators made at least one blog post

- 70 facilitator written prompts and 317 student responses were coded

Facilitator and student written communications were independently coded using the aforementioned scheme. To ascertain inter-rater reliability, Cohen's Kappa was calculated for each variable coded. The average Cohen's Kappa value was .60 (the highest was .78 and lowest was .21). This indicates moderate agreement, with a range from fair agreement to substantial agreement (Landis & Koch, 1977). Because of this agreement, a single rater's codes will be used for further calculations.

Communications from the teacher on the online social network can be characterized by the following: 52% are presentations of the work from the face-to-face context, 4.3% discussion of current events, 45.7% no question was asked of students, 27.1% a question was asked that would require a one-word response, and 25.7% of questions asked were more complex "how" and "why" questions.

For each teacher communication, the quantity of student responses can be characterized as the following: 30% prompted high student response (more than 6 responses), 5.7% prompted medium student response (four to six responses), 27.1% prompted low student response (one-to-three responses), and 37.1% prompted no student response. The student responses can be characterized as the following: 27.3% were socially-oriented (an attempt to connect with others), 81.8% were informational (providing information or answers), 38.6% were personal (reference to personal experience or identity), and 11.4% were action-oriented (refers to personal or social action).

The only significant correlation found was between teacher asking no question and students responses being described as social. This would seem to make sense: where the teacher is not looking for a particular answer or response, students are using this as an opportunity to simply socialize. This could be described as somewhat similar to what one may find in a classroom: when not doing academic work prompted by the teacher, students seize the opportunity to socialize.

Informal Content Analysis

The informal content analysis revealed several trends that are worthy of discussion. In the writings of the program facilitators, there are points where it is clear that some facilitators did not understand that the social network was designed for communication with the students in the program. This is evidenced when the facilitator would write about "the children," which indicates that the facilitator was using the social network more as a way to communicate with the adults involved with the program than the children. In this case, the facilitator used the social network site as a way to present what he or she did with the children in the face-to-face context. This could be interpreted as the facilitator using the social network site as way to "report back" what he was doing with the students. In this case, the social network site is more of a monitoring system, or a way to keep tabs on the work of the facilitators. This is not surprising since technology has more often than not been used as a way to monitor and control then to make possible participation and

social engagement. This follows the current pull from teacher-centered to student-centered approaches to learning. Despite this interpretation, several facilitators clearly understood the intention of the social network site, as indicated by addressing their discussion posts to students. More often than not, these facilitators were participants of the related professional development program and implemented ideas generated in session.

Additional issues included the use of discussion questions that would not necessarily engage students deeply, such as ones that would require single word responses. For example, 27.1% of all facilitator discussion posts were questions that could be answered with a one-word answer (e.g., what is your favorite exercise?). 25.7% of discussion posts were questions that would require more thinking (for example, how and why questions). The heavy use of questions that could be answered with a single word is troubling since the professional development of facilitators included a section on using the social network to engage students in deep and reflective thinking. This is not surprising given the limited participation of program staff in related professional development activities.

With regard to the student writings, many appear to be statements shared at the request of the facilitator (for example, an answer to a very direct question). In this case, the social network site facilitates a traditional teacher student model, where the teacher asks a student a question and the student responds. There are many examples where the students do not go beyond the request of the teacher (for example, share more information or start discussing something that was not prompted).

Let us return to our questions: *(1) Can online social networks support meaningful communication within an organized learning context? (2) Can online social networks strengthen the quality of psycho-social support children receive within an organized learning context?* The survey results from program facilitators indicate that online social network can support meaningful communication and psycho-social support; however, the content analysis indicates that the types of communication achieved did not reach a level that

could be described as "meaningful" communication and psycho-social support. Thus, there is a division between the perception of program facilitators and the communicated content on the online social network. One possible explanation for this discrepancy is that the socially supportive effect of the online social network was perceived within the face-to-face context by the facilitator. An alternative explanation is that the program facilitators simply rated the positive effects of the online social network too highly. In either case, successive design changes can be extrapolated from this analysis that could potentially better support meaningful communication and psycho-social support

DISCUSSION

The results of the data analysis point to ways that the social network website can be altered in successive iterations. These points can be generalized to other educational projects that may be interested in including an online social networking component. These lessons learned including the following:

Emphasize Purpose. The analysis of the data indicates that some program facilitators did not understand that the online social network was for communicating with students. In some cases, they almost treated it as a way to "report back" to the program staff on what they were doing with the children. Making it clear to teachers that the program is for enhancing the communication with students (between teacher and student and among students) is the desired outcome, and that it is not a way for program staff to "keep tabs" on teachers. Tolmie and Boyle (2000) have described this as having participants reach a "shared purpose" (p. 119). If facilitators are interested in having a means to "report back" to program staff, creating a separate social network for that purpose may be appropriate. This could easily be accomplished through a larger commitment to professional development.

Scaffold Social Presence. The data analysis indicates that in some cases the program facilitators do not have a firm concept of whom they are communicating with. This problem has

been described in many computer mediated communication contexts, such as distance learning, where individuals have difficulty communicating where there is a lack of social presence (ROURKE, ANDERSON, GARRISON & ARCHER, 1999). In the case of this project, showing the avatars of the program participants when composing a message could heighten social presence.

Scaffold Critical Thinking. The results indicate that in some cases facilitators asked questions of students that would not require critical thinking (e.g., what is your favorite exercise?). Providing scaffolds that prompt facilitators to reflect on their questions before posting to students could lead to deeper questions. For example, a process prompt could be used that asks the facilitator to reflect on the responses he could expect from students given the question posed (LIN, HMELO, KINZER & SECULES, 1999).

Promote Student Ownership. The results indicate that communication within the online social network often conformed to a teacher student model, where the teacher would pose a question and the student would respond succinctly with a right answer. This arrangement is common to an organized learning context; however, ideally the site would facilitate a participatory culture, whose "members believe their contributions matter, and feel some degree of social connection with one another (at the least they care what other people think about what they have created)" (JENKINS, CLINTON, PURUSHOTMA, ROBINSON &

WEIGEL, 2006). This objective could be advanced through a more thorough integration of the online social network into the face-to-face curriculum, which could adamantly emphasize student ownership of the online social network. This could be achieved by clearly communicating to students that it is a place where they can share their progress, achievements and challenges (e.g., running a 5K, losing a few pounds, cooking healthy foods, etc.).

Spaces for Play and Social Activity. The quantitative content analysis indicated that students used opportunities where teachers were not asking a question to engage in social activity. This arrangement is similar to what one may find in a classroom setting. Youth increasingly use ICTs as places for socializing and simply "hanging out" (HORST, HERR-STEPHENSON & ROBINSON, 2010). Horst, Herr-Stephenson and Robinson (2010) argue that "youth mobilize new media communication to construct spaces for co-presence where they can engage in ongoing, lightweight social contact that moves fluidly between online and offline contact" (p. 38). Creating spaces within the online social network for just "hanging out" could facilitate stronger relationships between students. These stronger relationships could in turn be used for social support.

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