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# ENGAGING K-12 STUDENTS IN THE MANAGEMENT OF EDUCATIONAL TECHNOLOGY IN SCHOOLS:

## A strategy for self-determination development

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**Unlocking the Future of Education in Colombia** is a research effort aimed to understand some of the conditions related to the effectiveness, transferability and scalability of models for ICT integration in the educational system, to increase the job opportunities for Colombian youth.

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# ENGAGING K-12 STUDENTS IN THE MANAGEMENT OF EDUCATIONAL TECHNOLOGY IN SCHOOLS: A STRATEGY FOR SELF-DETERMINATION DEVELOPMENT

Camilo Vieira
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## Abstract:

Initiatives that have brought information and communication technologies into classrooms across the world often struggle to engage the school community to effectively use them. At the same time, involving students in extracurricular activities at school has demonstrated to bring benefits in student motivation and academic achievement. This paper explores how Colombian K-12 students experience their participation in networks created –both at school and city level– to manage educational technologies in their schools, under the lens of self-determination theory. The results suggest that student participation in these networks supports the development of the three psychological needs supporting intrinsic motivation: competence, autonomy, and relatedness. Students feel competent after participating in workshops and learning activities designed to support their responsibilities as members of the network; students feel the need to investigate and become more competent to be able to support teachers, other students and their own families; students demonstrate autonomy by proposing activities within the network that may benefit their school and the school community; finally, students report changes in their relationship with teachers and other students as they become recognized as providers of technological support to their communities.

## Keywords:

## Introduction

The almost ubiquitous presence of information and communication technologies (ICT) has resulted in a broad interest at all levels to bring technology into the classroom. Governments around the world have invested in projects such as one-laptop-per-child to provide students access to ICT and to digital content, and to promote student learning (Hourcade, Beitler, Cormenzana, & Flores; Kraemer, Dedrick, & Sharma, 2009). However, investing in technology and bringing into the classroom is not enough. Several elements such as understanding the local environment, teacher training, and ICT maintenance and troubleshooting play an important role in such implementation projects (Kraemer, Dedrick, & Sharma, 2009). Furthermore, additional challenges may be faced when these projects are implemented in developing countries. In these contexts, the government may allocate enough resources for hardware purchase, but not for content development, teacher training, or ICT support.

The UbiTAG model (Zea, Lalinde, Aguas, Toro, & Vieira, 2012) suggests that such developmental process towards ubiquitous learning requires the schools to advance in three dimensions: technology, learning, and management (Tecnología, Aprendizaje, y Gestión – TAG in Spanish). The technology dimension involves all that is related to hardware, software, and infrastructure. The learning dimension involves the different teaching and learning strategies that should be used to enable an ubiquitous learning environment. This dimension also includes the change of roles for the teacher to become a facilitator of the learning process and the student to take an active role in such process.

Engaging K-12 students in the management of
educational technology in schools: A strategy for
self-determination development

Finally, the management dimension corresponds to all the elements that often come from the school direction including curricular management, organizational development, and educational engineering.

This study presents one of the strategies used for the management dimension in the context of a project called Saber Digital. The project aimed at creating innovative learning environments taking advantage of the existing technology in the public schools of Bogotá, Colombia. The strategy presented here consists of getting students involved, engaged, and empowered with the information technologies available in their schools. A group of students and one teacher per school have control of this equipment, and are also in charge of providing support in their schools. Besides their responsibilities within their own schools, these groups of students meet with other groups from different schools for specific personal development activities and networking. This paper explores students' experiences as they participate of this strategy under the lens of self-determination theory. The guiding research question is:

> **How do students experience their involvement in the ICT management program of their schools as represented by the needs of autonomy, competence, and relatedness?**

## Literature review

Student engagement is an important aspect of education. While students participating in leadership programs can have a positive effect on their academic and professional development process (Fletcher, 2003; Rosch & Schwartz, 2009), student disengagement can be associated to dropping-out phenomena (Christenson, Sinclair, Lehr, & Godber, 2001; Finn, 1989). Involving students in classroom and school activities may develop a sense of belonging to the school, having a positive effect on student behavior and emotions (Christenson, Sinclair, Lehr, & Godber, 2001; Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2014). Student engagement can increase by giving students the control of the learning environment, providing relevant learning activities to students, and keeping these activities challenging but in balance with students' skills (Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2014). The strategies to increase student involvement and engagement should not be limited to classroom strategies, though. Co-curricular and extra-curricular as well as social groups can have a positive impact on student engagement, and thus, in academic success (Silins, & Mulford, 2002).

Such involvement can have a positive effect on implementation projects of educational technologies in schools. However, students often feel ignored from the school transformation projects (Fletcher, 2003). Students and teachers working collaboratively can have a positive effect on learning, teaching, and the school environment. One of the important components of ubiquitous learning is to change the traditional roles and empower students to take responsibility and control of their learning process (Cope & Kalantzis, 2009; Zea, Lalinde, Aguas, Restrepo, 2015). This change of roles can and should be promoted and supported by teachers and administrators in the schools (Fletcher, 2003). Administrators should promote this shift from a paradigm of control towards a more participatory one using transformation practices such as (Silins, & Mulford, 2002): (1) working towards consensus in school priorities, and communicating those goals; (2) promoting a culture of trust with teachers and students; (3) making students, staff, and teachers participants of the decision making process in the school; (4) encouraging reflection in staff towards their expectations and goals with students; (5) providing moral support and considering individual's opinion; and (6) having high expectations for

teacher and student performance. The positive effect of such a shift goes beyond retention rates. Meaningful student involvement may have positive effects for the students, the teachers and administrators, and the school itself (Fletcher, 2003). For students, it may increase their motivation and commitment, strengthen the relationship between students and educators, and promote critical thinking and community building skills. For teachers and administrators, these activities can increase their commitment and can help to negotiate their cultural differences with students. For schools, such involvement can help to create connections with the community, create safe and supporting learning environments, and connect a diverse student population. This study explores how students and teachers experience their involvement in a city-wide implementation project aimed at creating innovative learning environments integrating information and communication technologies into the public schools' system.

# Integrating ICT into Bogotá Classrooms

### Saber Digital

Saber Digital (Digital Knowing) is a city-wide project in the capital city of Colombia: Bogotá. Saber Digital aims at integrating information and communication technologies into the public-school system to support the teaching and learning processes at the middle and high school levels. The goal of this project is to make these technologies accessible to the school community, to provide them access to existing knowledge, promoting active citizenship and the development of change agents that can transform their own realities. The project is guided by the principles of the UbiTAG model (Zea, Lalinde, Aguas, Toro, & Vieira, 2012). Saber Digital does not focus on bringing technology into the classrooms, but on designing strategies to impact the learning and the management dimensions to enable the school community to take advantage of these technologies.

### Getting Students Involved

Monitores Líderes is one of the pedagogical strategies of Saber Digital, focused on the creation and development of a network of volunteer students who support the use and management of ICT resources in their school. This network is composed by middle and high school students, school teachers and staff.

Students participating in this network may have multiple responsibilities, depending on each school's priorities. For example, students may carry out basic computer maintenance and help lending devices to other students. They may provide tech support for academic and cultural events within the school. They may have teaching responsibilities about ICT adoption involving the community (i.e., parents, elderly, and school administrative staff), as well as teachers and younger students. Finally, they may also manage the school's website and, in some cases, the school's radio and newspaper.

The process for conforming the student network comprises four phases: (1) paving the way; (2) creating the network; (3) consolidating the network; and (4) looking forward. Phase 1 (paving the way) includes activities for creating a base team –composed by the school principal, a teacher and a student who might be interested in leading the initiative–, exploring experiences from other schools –as a way of inspiring ideas and showing possibilities–, and doing an initial recognition of the context, an important issue given that schools often have existing equipment available that may or may not be used –because it is outdated, broke, or because people at the school are concerned about using it or do not know how to do it. A first inventory of the existing technology and of the challenges and opportunities relevant to the school is created during this phase.

The second phase (creating the network) is focused on the definition of the processes that the school will use to create a wider network, as well as identifying a group of students who may be interested in getting involved. Sometimes, this is done through an individual selection from the lead teacher, and sometimes by means of an open call to participate. In any case, the base team makes an explicit definition of the expected profile and responsibilities of the students that will be part of Monitores Líderes, as well as the incentives available for participation –if any–. For example, even though the main incentive to participate is the opportunity to learn new things, some schools may decide to provide a certificate of participation, or to use this participation as community service –hours that Colombian students are required to complete as a requisite to graduate from high school–.

The number of students in each network depends on the specific needs of the school, and it may change as some students drop out while some others become interested in participating later in the process.

Once the initial team is selected, the base team and the rest of the network discuss goals, roles and responsibilities, as well as identity symbols –a name for the team, and sometimes a logo. Students that become part of the network receive a distinctive jacket they get to wear at school–. Also during this phase, a spokesperson is selected among the students. This leading role may change every academic year, and the way it is chosen is by common agreement among the students. The spokesperson, along with the base team, is responsible of presenting the network –their members and aims– to the school's community.

The third phase (consolidating the network) focuses on identifying and putting in place tools and procedures to organize the processes and work of the network. Students establish measurable goals for the team according to the needs selected in previous phases, and participate in internal and external personal development activities involving other schools, non-governmental organizations, and youth groups. This phase aims at making these networks sustainable over time.

Finally, the fourth phase (looking forward) has the goal of expanding the reach of the network, once their first objectives are reached. In this phase, the students are expected to propose new ways of interacting with the community and improving their school, getting inspiration from the work of other student networks. From here, the network can go back to the third phase, or recruit new members going back to the second phase. The whole process can be revisited depending on the situation of each school –for example, the start of a new year, changes in the base team or change in priorities and needs–.

## Theoretical framework

Motivation is an important factor in student academic achievement, retention, and course satisfaction (Chen, & Jang, 2010). Motivation can be divided as the one derived from the task itself, and the one related to external stimulus or coercion (Ryan & Deci, 2000). Intrinsic motivation relates to students' intention to devote more time on a task, with the only goal of getting satisfaction derived from the activity (Lee, Lee, & Hwang, 2015).

Although the intrinsic motivation is present in humans since we are born, external support may be needed to maintain such interest and curiosity, as external factors can also negatively affect it. On the other hand, extrinsic motivation corresponds to the intention to complete a task to get an outcome that is separate from the task itself. These external outcomes can have a detrimental effect on intrinsic motivation when the task is intrinsically motivating itself, if they are perceived as controlling factors (Lee, Lee, & Hwang, 2015).

Self-determination theory (Deci & Ryan, 2002; Ryan & Deci, 2000) is the theoretical framework that guides this study. The self-determination literature suggests that competence, autonomy, and relatedness are three psychological needs that can have an effect on both intrinsic and extrinsic motivation of people (Chen, & Jang, 2010; Ryan & Deci, 2000). Competence refers to the individual's ability to perform a task. Autonomy corresponds to the control the individual has on the approach to the task. Relatedness refers to how relevant and connected the individual perceives the task with respect to her/his own interests.

The cognitive evaluation theory, a subtheory of the self-determination theory, explains how competence, autonomy, and relatedness can affect the intrinsic motivation, and what other factors may influence this outcome. For instance, positive and negative feedback can have opposite results on student intrinsic motivation. While positive feedback may enhance intrinsic motivation, negative feedback can be detrimental, even in comparison to no feedback (Deci, Koestner, & Ryan, 1999).

Moreover, providing rewards as well as deadlines and threats negatively affects intrinsic motivation on task (Deci, Koestner, & Ryan, 1999).

Likewise, the self-determination theory contains another subtheory called Organismic Integration Theory, which helps to explain how competence, autonomy, and relatedness can influence student extrinsic motivation. According to this theory, the extrinsic motivation is an intermediate step between amotivation to intrinsic motivation in a continuum of types of motivation (Ryan & Deci, 2000). Through the processes of internalization

and integration, students become more intrinsically motivated. Internalization refers to adopting the value of the task, while integration corresponds to the process of taking that value as our own. These processes are enabled by the needs of competence, autonomy, and relatedness.

We hypothesize that by getting students involved in the Monitores Lideres strategy, we are developing competence, autonomy and relatedness on their students, having a positive effect on their intrinsic and extrinsic motivation towards the school. This paper presents an exploratory study where we qualitatively analyze students and teachers' experiences as part of the Monitores Líderes strategy.

## Methods

### PARTICIPANTS AND DATA COLLECTION
Nineteen middle and high school students from four different schools participated in this study. A focus group was conducted at each institution with students involved in the group of Monitores Líderes. These students were distributed from sixth to ninth grade as follows: one sixth grader, three seventh graders, six eighth graders, and nine ninth graders. These students participating in one of the four focus groups answered the following list of questions. These questions were designed to explore students' experiences as part of the Monitores Líderes strategy, operationalized as autonomy, competence, and relatedness:

- What was the process of conforming the Monitores Líderes team like?
- What are the characteristics of the students that were considered for becoming part of Monitores Líderes?
- What are the roles that you assigned within the student network? [autonomy]
- What are the activities that the student leader is in charge of? [competence]
- How is the instructor leader supporting the student network? [competence]
- Has the team established a working plan for the activities yet? Who did participate on the definition of such plan? [autonomy/competence]
- What are the activities that the student network has carried out so far? [autonomy/competence]
- What out-of-school activities has the team participated on? [autonomy/competence]
- What other activities would you like to participate on? [autonomy]
- What does it mean for each of you being part of this student network within your school? [relatedness]
- ¿Why did you become interested on participating in this student network? [relatedness]
- What is the meaning of wearing the distinctive jacket? [relatedness]
- How have the following elements changed since you started to participate in Monitores Líderes? [relatedness]

1. Your role within your institution
2. Your relationship with other students
3. Your relationship with teachers inside and outside the network?
4. Your interest in information technologies

### DATA ANALYSIS
Student responses to the questions from the focus group were analyzed using directed content analysis (Hsieh & Shannon, 2005). This approach allowed us to classify student responses using the three psychological needs as described by the self-determination theory (Deci & Ryan, 2002; Ryan & Deci, 2000): competence, autonomy, and relatedness. Each of the themes that were identified on these three dimensions are presented with sample quotes from students' responses. Note that the focus groups were conducted in Spanish, and therefore, the research team translated them into English for the scope of this paper. In addition to these three psychological needs, this study discusses instances of the effect that the Monitores Líderes strategy has had on student motivation and involvement within the school.

## Results

### COMPETENCE
The psychological need of competence was the most common one mentioned by students participating in the focus groups. First, students mentioned the different workshops and learning activities that they started to participate in, as they got involved in the

Monitores Líderes strategy. Students in two of the groups explicitly mentioned workshops in virtual reality, holograms, Microsoft Office365, interactive whiteboards, video projectors, and tablets. These activities were in collaboration with the instructor leader who is part of the initiative, and an instructor that provided support to this strategy across schools. For instance, one student said: "*We are learning so that the school classes become more dynamic, how to use the interactive whiteboard and the tablets to identify what digital contents are available for the teachers*". These activities also increased their interest in information technologies because "*there are many things that I did not know, and thanks to this project we have learned [them], and we now know how to use them.*"

As students started to establish working plans and projects, they also identified the need for additional competence: "*with these courses, I get more intrigued and I want to know more.*" For instance, one of the students said that being part of this network has affected their interest on technology because "*as Monitor there are some things that you don't know, and you realize that you should learn more, to be able to use it for the benefit of the school as well as for your own good.*" This intention to be more competent, becomes actions to achieve such goal: "*Then, you start to investigate to learn more*". Another student highlighted that they need to learn to be able to help teachers: "*We have office hours with the teachers. First we learn, and then we work with them.*" Likewise, a third student connected the working plan to their need to learn more, become more competent: "*The plan was to learn more programs, so we can teach the teachers*".

Such perception of competence and the need for additional competence turned into their opportunity to support the school community: students – "*everything we learn, up to eleventh grade, we teach it to other students and try to motivate them to get involved*"; teachers – "*[we] support teachers so that they can learn how to use information technologies*"; themselves – "*This initiative has opened our minds regarding some things about technology that we did not know, they have taught us, and that will be useful in our lives*"

### Autonomy

The Monitores Líderes strategy addressed the student psychological need of autonomy by enabling them to propose specific activities in their school, as evidenced by some students' responses during the focus groups. A common theme across groups corresponds to students' interest on designing strategies to support teaching practices. For instance, the leader of one of the institutions sees their role as "*thinking about how to use the technological resources to make the classes more efficient and dynamic*". Such interest seems to be persistent in time beyond the strategy, as one group of students said that they wanted to "*continue supporting their teachers, even if the strategy does not continue.*" Students participating in this strategy are motivated by the goals that were established within their network: "*In this project, the goals are what matters. I think about goals and I say 'I will not leave this group until I achieve those goals'.*" And this group of students continued to consider future goals: "*We are working step-by-step, we will achieve the goals we proposed as a group, and we will then propose new activities*".

When discussing the working plan of the network, students brought some of the ideas they wanted to implement. These ideas included courses in technology use for instructors, creating a radio station and an online newspaper, and creating games for learning. These plans were designed in collaboration with the instructor leader in the strategy, but students proposed these ideas as they had identified opportunities to contribute to their school.

Being part of this project also helped students to explore and find new ways to use technology, for example, to support their career choices: "*I feel that what I have learned in this project can help me in my professional career because if I choose a specific field, these technologies will help my professional career to take off.*"

Engaging K-12 students in the management of
educational technology in schools: A strategy for
self-determination development

## RELATEDNESS

The third psychological need that was affected by the Monitores Líderes strategy corresponds to students' perception of being part of the network, the school, and the community: relatedness. This was most evident when students talked about the meaning of wearing the distinctive jacket: "*To me [the jacket] means responsibility, as well as a form of identification. They ask you questions about technology because you are wearing the jacket*" and "*the jacket identified you as a Monitor, and it gives you the power to help others who struggle to use technology.*" Students even see the jacket as a symbol: "*This represents a great responsibility and I feel responsible, and when I wear the jacket, I feel that I wear it just to help other people.*" The use of the distinctive jacket has also intrigued other students who then become interested on participating: "*Beyond the jacket, they [other students] want to know what is it that the IT group does, and if it sounds interesting to them, they ask how they can be part of it.*"

When students discussed how this experience had changed their relationship with the teachers and with other students, their experiences also showed how they started to be more related to the school community: "*When other students ask, we tell them that this is an activity that allows us to learn, and based on what we learn, allows us to help our school to become more modern, working with technology.*" And "*[the other students] think that we have a good position, and that just as the teachers teach us, we can also teach them.*"

Students in all four groups described the pride they felt to be part of this initiative to be able to help others: "[participating in this initiative] means to be able to help other people who don't have the same knowledge as I do. Being able to help other people, I feel important. " *But also, to be recognized within the school:* "*Before, I was a common student, now they say 'look, this kid participates in Saber Digital', that is an acknowledgement here at the school*". However, the effect of participating in Monitores Líderes goes beyond the school to the family, as three students described it: "*For instance, I told my family and my cousins ask me to help them to create a Blog*", "*I told my mom, and she says that it is good that people recognize that I am good with technology*", and "*I told my dad and he hug me and told me, seize that opportunity that it is a good one.*"

# Discussion and conclusions

Following a path towards ubiquitous learning in schools requires more than just bringing technology into the classroom. Integrating information and communication technologies (ICT) into the schools have demonstrated to be a challenge when the intervention is limited to the use of technologies (Kraemer, Dedrick, & Sharma, 2009). Researchers argue that besides the technological dimension, the dimensions of learning and school management need to be considered to develop higher levels of ubiquitous learning (Zea, Lalinde, Aguas, Toro, & Vieira, 2012). This study explores a specific management strategy called Monitores Líderes where students get involved in managing the ICT at their own schools. The guiding research question for this study is: How students experience their involvement in the ICT management program of their schools as represented by the needs of autonomy, competence, and relatedness?

We hypothesized that by getting students involved in the Monitores Líderes strategy, they will develop competence, autonomy, and relatedness within their school, psychological needs for intrinsic motivation (Deci & Ryan, 2002; Fletcher, 2003; Ryan & Deci, 2000). Extra-curricular and social activities can have a positive impact on student involvement (Silins, & Mulford, 2002), and this strategy involves both extra-curricular activities and social interaction as the strategy becomes a student network. While students working collaboratively with teachers and the school community to transform their schools can have a positive impact for this process, students often feel ignored from the school transformation projects (Fletcher, 2003).

This study showed how a school transformation project such as the integration of ICT into public schools can be supported by getting students involved in the technology management activities. As described by prior research on student involvement (e.g., Christenson, Sinclair, Lehr, & Godber, 2001; Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2014), participating in the Monitores Líderes strategy had a positive effect on students' sense of belonging into the school, and on their emotions as a member of the school community. This strategy also provided them with the autonomy to propose new transformations in the schools, such as creating a radio station or a digital newspaper.

A limitation of this study is that it only explored students' experiences within the Monitores Líderes strategy qualitatively in a small sample of the participating schools. Future research will explore changes on student competence, autonomy, and relatedness in their schools as they start to participate in the Monitores Líderes strategy across all schools involved in this project. Future research may also measure the effect that this strategy has on student motivation and persistence in schools.

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