



Preparing Teachers to Use Laptops Integrated to Curriculum Activities: the experience of One Laptop per Student project at Unicamp

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Abstract

The objective of this paper is to describe the process of preparing teachers at schools that are receiving the educational laptops (also known as the US\$100 laptops) as part of the One Laptop per Student Project, developed by the Ministry of Education in Brazil.

The article describes the structure of the training plan which is being implemented and, specifically, the training of teachers from four schools in the state of São Paulo. Teacher training at these schools is under the responsibility of Universidade Estadual de Campinas (State University of Campinas - Unicamp). These teachers are gradually appropriating the laptop resources and as part of their training, are working with students using laptops in the classroom and in different school spaces, and exploring different school curricula.

Keywords

Project UCA, one laptop per student, educational laptops, teacher training, Unicamp

Introduction

In 1968 Alan Kay presented an idea that seemed impossible: every child should have his/her own computer. Kay put forward this idea right after having visited Seymour Papert at the Massachusetts Institute of Technology (MIT), who was beginning his work with Logo. Kay was impressed by the fact that the children were using the computer to solve complex mathematical problems, and understood that every child should have his/her own portable computer.

The idea of the portable computer became concrete in 1972 with the Dynabook, which was developed by the Learning Research Group (LRG). Kay created the LRG as part of the Xerox Park laboratory (Kay, 1975). The Dynabook can be considered one of the precursors of current laptops. According to Kay's conception, this tool should be a portable computer that is interactive and personal, and as accessible as books. It should be connected to a network and offer the users word-processing, images, audio, and animation. Laptops today have all the characteristics described in Kay's vision.

The idea that every child should have his/her own computer became real in 1989 when the Methodist Ladies' College in Melbourne, Australia proposed that every child in 5th grade should have his/her own personal computer. This experience extended to the other grades until all the students from 5th to 12th grade had their own laptops (Johnstone, 2003). The "P" in the term "PC – Personal Computer" was taken seriously, and the computers were literally personal (Sager, 2003). Since 2001 many schools and educational institutions in the United States of America



have implemented the one laptop per child – known as 1-1 laptop, or 1-1 computing.

The arguments used to justify the 1-1 scenario, in general, consider improvements in the student's behavior and disciplinary issues, performance on national or international assessments, social inclusion of students who are socioeconomically disfavored, and preparation for the work force.

However, the ideas Kay developed concerning learning environments are in fact not yet being implemented; much to the contrary. As noted by Kay, the way in which, for example, science is treated in school has nothing to do with doing science. The student does not have the opportunity to deal with uncertainties, to question, and to work with incomplete or imprecise models; challenges that can be debugged with the help of technologies, classmates, teachers, and specialists (The Book and the Computer, 2002). In general, computers are used to access already confirmed facts, and to replicate much of what already happens with a pencil and paper. This can be seen in many of the studies that discuss implementing laptops in schools.

The *UCA Project* (*Um Computador por Aluno* or One Computer per Student) being implemented by the *Ministério da Educação* (Ministry of Education - *MEC*) in Brazil envisions, amongst the changes that will take place when implement this technology in schools, a change in the way in which curricula is approached in the classroom. This does not mean a change in the curricula itself or a change in the content; rather, this new pedagogical approach considers the possibility of the student experiencing the ideas presented by Kay. For example, the student would do science rather than study accumulated knowledge in the field of science. However, as Kay already mentioned, the simple presence of technologies does not guarantee the necessary and desired pedagogical changes. In addition to the presence of the technology, it is necessary to train teachers so that they are able to integrate laptops into their curricular activities.

The *Journal of Technology, Learning, and Assessment* dedicated the entire January 2010 issue to the theme of the use of laptops in a 1-1 situation (JTLA, 2010). Other works try to synthesize the results of various articles published on the subject (Penuel, 2006). The results in the different experiences described are not 100% favorable: some aspects of the projects present considerable gains, while as other aspects of the use of laptops in a 1-1 situation do not bring about significant improvements.

However, it is important to note that teachers are mentioned in practically all of the studies as having a fundamental role in the implementation of laptops in schools. For this to happen, teachers must receive training on how to use the laptops, on how to develop learning projects that are centered on the student, to become better prepared to help students, and on how to create a learning environment that is favorable to the use of this technology.

A positive aspect is that if this training is effective, impacts become apparent in different situations. Those teachers who are better prepared may come to view the laptops' use in a more favorable light. The teachers also become more able to track the students' progress, and understand how students apply curricular content to problem solving situations (Penuel, 2006; Windschitl & Sahl, 2002).

Therefore, the objective of this article is to present and discuss how teacher training is taking place in the schools affiliated to the *UCA Project*. This training is under the responsibility of *Universidade Estadual de Campinas* (State University of Campinas - *Unicamp*). Our aim is to discuss the structure created for this training, and how the teachers are working with both the researchers from Unicamp and their own students in the classrooms. The following sections provide a brief description of the *UCA Project*, the methodologies used to train teachers in the schools affiliated to the *UCA-Unicamp Project*, and the results of this training. The latter is done



through a discussion about the ways in which teachers have implemented the laptops in their own classrooms.

The “Um Computador por Aluno – UCA” Project

The *UCA* Project anticipates the deployment of educational laptops in schools, as well as a preparation of teachers and administrators for the use of this equipment with students during educational activities. This is a pilot initiative developed by the *MEC* in 2010 to be under the responsibility of the *Secretaria de Educação a Distância* (Secretariat for Distance Education - *SEED*). With the extinction of *SEED*, in 2011 the Project was transferred to the *Secretaria de Educação Básica* (Secretariat of Basic Education - *SEB*).

The *UCA* Project's objective is to promote an improvement in the quality of education, digital inclusion, and the Brazilian computer industry's participation in the development and maintenance of the equipment. Considering the work that had been taking place in the field of the use of technology in education, particularly the work being done with desktops in school informatics labs, the *UCA* Project is innovative in many ways. For example: the use of the laptop by all the students and educators in public schools in a context of immersion into the digital culture; the mobility to use the equipment in other environments inside and outside of the school; the connectivity by which the laptops can be used for teachers and students to interact by means of the wireless Internet connection; and the pedagogic use of the different medias available in the educational laptops.

The *UCA* Project was conceived by a group of technicians from *SEED* and the *Grupo de Trabalho UCA* (*UCA* Work Group - *GTUCA*), which is made up of research specialists in the area of the use of Information and Communication Technology (ICT) in education from the following universities: UFRGS, USP, UNICAMP, PUCSP, PUCMG, UFRJ, UFSE, UFC, UFPe. These universities are called *Instituições de Educação Superior Globais* (Global Institutions of Higher Education - *IES Globais*). The *GTUCA* participants developed the document with *UCA* Project Objectives (Princípios, 2007). *GTUCA* was then subdivided into three working groups responsible for the development of the following three documents respectively: Development and Monitoring, Evaluation, and Research.

The process for implementing the *UCA* Project began with the purchasing of 150,000 laptops in 2007. This purchase was made through a national bidding, where the winner was the ClassMate brand laptop, developed by Intel and produced by a Brazilian company.

Approximately a total of 350 schools were selected, and these are spread out amongst the 27 States. Roughly 10 schools were selected per State: 5 municipal schools, selected by the *União Nacional dos Dirigentes Municipais de Educação* (National Union of Municipal Education Leaders – *UNDIME*); and 5 State schools, selected by the respective *Secretarias de Educação Estadual* (Secretariats of State Education). In six municipalities (Barra dos Coqueiros/SE, Caetés/PE, Santa Cecília do Pavão/PR, São João da Ponta/PA, Terenos/MS, and Tiradentes/MG) the *UCA-Total* was implemented, in which all of the schools in each of these municipalities become part of the *UCA Project*. The 350 schools were selected with the intent of complementing different types, such as urban, rural, indigenous, and etc. Each school could have no more than 500 students and teachers. The *MEC* delivered laptops and a server to each school, and each school was then responsible for providing infrastructure such as space, electricity, internet, and closets for storing the equipment and charging their batteries.

Teacher and administrator development was based on the proposal “*Formação Brasil*” (Brazil



Training), elaborated by the *GTUCA* subgroup Development and Monitoring. In order for this training proposal to be implemented a network of universities and *Núcleo de Tecnologia Educacional* (Education Technology Nuclei - *NTE*) was created in each State. *Global IES* created teams of researchers and interns on fellowships from the *SEB/MEC* to be responsible for the preparation of local training teams, which were in turn responsible for implementing teacher and administrator training at the schools. The training teams were made up of researches from the State's universities (*IES Locais*; Local *IES*), professors at the respective Secretariats of Education, and *NTE*. The local training teams are responsible for teacher and administrator training at the 10 schools in the *UCA* Project in each State, including those with *UCA-Total*. Another form of participation anticipated for the training process was that of student-monitors or interns, who would be prepared to give technical support to the teachers at the schools.

Methodology used for the teacher training in schools affiliated to the *UCA-Unicamp* Project

The activities of the *UCA* Project that took place in 2010 and 2011 had the objective of implementing the Project in the schools, and training teachers and administrators in the schools to use educational laptops with students during activities for learning and teaching (Projeto *UCA-Unicamp*, 2010).

The *UCA-Unicamp* Project corresponds to the *UCA* actions developed under Unicamp's supervision in three Brazilian States in the Northern Region of Brazil (Acre, Rondônia, and Pará), and in four municipal schools in the State of São Paulo, as described in Figure 1.

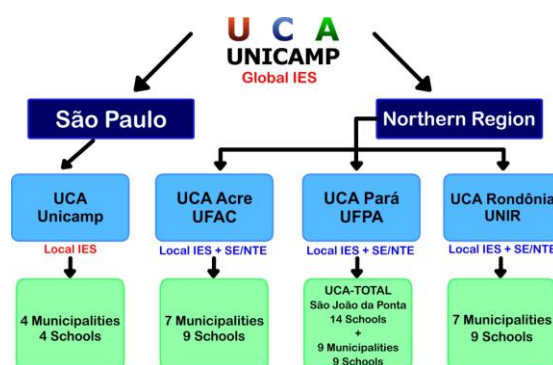


Figure 1: *UCA-Unicamp* Project Structure: states, universities, municipalities, and schools involved

As seen in Figure 1, the *UCA-Unicamp* Project is acting in schools in the State of São Paulo, and in universities in the Northern Region of Brazil, in the States of Acre (AC), Rondônia (RO), and Pará (PA). It carries out activities with teams at local universities – UFAC, UNIR, UFPA – which are responsible for the *UCA* Project activities in their respective States. These universities, in partnership with Municipal or State Technology Nucleuses and Secretariats, carried out the implementation of the *UCA* Project in schools, as well as teacher and administrator training. In this article we will highlight some of the activities and results obtained in the *UCA-Unicamp* context of the State of São Paulo.

The *UCA-Unicamp* team is comprised of researchers, trainers, and tutors. In the State of São Paulo the *UCA-Unicamp* carried out activities with 4 local teams responsible for applying the teacher and administrator training at the following schools and municipalities: EMEF Prof. Jamil Pedro Sawaya (São Paulo), EMEF Profª Elza M. Pellegrini de Aguiar (Campinas), EMEF Dr. Airton Policarpo (Pedreira), and EMEF José Benigo Gomes (Sud Mennucci). These schools



correspond to a population of about 1503 students and 130 teachers.

In 2010, when the equipment and infrastructure provided by the *UCA* Project became available, the process of implementing the program in the schools began. This reality demanded a large interaction between the various teams (*MEC*, University, secretariats, schools) providing information and support to each school so that they could make decisions. During the second semester of 2010, with a few operational and infrastructural issues having been solved, teacher and administrator development sessions, as well as activities using educational laptops with students, took place. The first meetings involved administrators and teachers at the school, and, gradually, the teachers began to work with the students as part of their training process.

The “*Formação Brasil*” course has five modules of a cumulative total of 180 hours that should take place in a blended manner. The face-to-face activities in the course were scheduled to take place at the school. These involved activities where the teachers were working directly with the students using laptops in the classroom. The activities that took place at a distance, through the virtual environment *e-Proinfo*, anticipated an exchange of experiences by the teachers, where they would share reflections, uncertainties, questions, and debates about their experiences while using the laptops with their students, as well as while studying the theoretical principles involved in using technologies during the processes of teaching and learning.

In general terms, each module encompassed certain content that give direction to the practices teachers and administrators use in schools. These included, for example: the appropriation of technological resources available on the laptop; the use of applications available on the laptops and on the Internet with the intent of integrating these resources into curricular content; the issues related to the administration of ICT within the school’s structure; the pedagogy that should be applied in projects that contemplate the specificities of disciplinary and interdisciplinary knowledge; and the last module geared towards elaborating a *Projeto de Gestão Integrado com Tecnologia* (Management Project Integrating Technologies - *ProGITEC*) for the following school year in each school. The creation of the *ProGITEC* demands a delineation of guidelines for the use of the laptop in the school, thus encouraging teachers and administrators to make explicit their conceptions, proposals, and discussions regarding the strategies for using the educational laptops in a way that is aligned to the Pedagogical Political Plan of the school.

The local training teams should have adjusted the training proposal made by the *UCA* Project, thus allowing for accommodations that take into consideration the real contexts and conditions of each school at the moment when the training was taking place. Therefore, each training team selected from the training modules content, supporting materials, and activities that were most relevant to the school’s context, and added other elements to the training, thus adjusting the training so that it best meet the needs of each group of teachers and administrators.

Results of the training activities in four UCA-Unicamp schools

To exemplify the work dynamic as well as some of the results obtained, we will, in this article, focus on the training and monitoring that took place by the team at Unicamp together with the four training teams at the municipal schools of São Paulo, Campinas, Pedreira, and Sud Mennucci. Between June and December of 2010 five meetings took place with the local teams at these four municipalities with the objective of orienting and promoting an exchange of ideas amongst the teachers and administrators at the four schools. The meetings would assist each team in the process of developing training actions.

The training activities in the schools took place between August and December of 2010, and,



throughout the year of 2011, also involved the inclusion of topics from the “*Formação Brasil*” Course. In November of 2010 the activities for the use of laptops in the classroom began, thus favoring an association between theory and practice. During the year of 2011 the training activities were resumed, and the teachers carried out activities that related to the five modules in “*Formação Brasil*.” Part of these activities took place in the classroom with their own students. This training work took place at the school. Each school relied of the supervision of one researcher from the UCA-Unicamp team that monitored the teacher trainings, and assisted the teachers with the activities related to the topics discussed in the five modules, as well as with the actual use of the laptops in the classroom.

The training sessions in the schools took place weekly and each lasted for an hour. Activities that took place at a distance also complemented this training, and were implemented with the help of the *e-Proinfo* virtual environment. As the teachers, initially, did not have any experience using distance education environments the *e-Proinfo* tool was introduced slowly.

When the UCA Project was initially implemented in the schools, one of the challenges faced relates to the teachers’ insecurity towards using the educational laptop. The equipment was new, and its use in the classroom by students was an unknown for both the teachers and the administrators. The initial challenges related to classroom management, and to the use of the equipment by the students. These insecurities were frequently manifested in the training sessions, as can be seen in the following testimony:

Z.A.B.S. – Pedreira, SP: I feel insecure. I don’t know how it is going to be with all the students manipulating the computers at the same time; what if we have a problem, how will I solve it? Will I be able to handle this?

G.T. – Pedreira, SP: I am very anxious, this is a new project that will give the students many opportunities. However, at the same time I am apprehensive about not knowing how to use the laptop.

During the initial months of the training it was possible to observe a progressive involvement of the teachers and administrators in the activities, thus improving how they used the equipment, *e-Proinfo*, and the Internet. The initial resistance and uncertainty were slowly substituted by a desire to overcome their own personal challenges appropriating the technology. Gradually, rooted by the practical context and exchange of ideas, the teachers began to catch a glimpse of the possibilities of using the educational laptop in their classroom. It is important to note that the initial challenges faced by the teachers were circumvented by the constant acting upon by the professionals at the school (colleagues, administrators, and technicians), who addressed or passed on the questions, and encouraged the teachers. From a technical-pedagogical standpoint, the constant support given by the researcher from Unicamp to the teacher, both regarding the use of the educational laptop and the implementation of the from-a-distance training sessions, was a differential that rooted the engagement of the teachers in the project. This created a space where the teachers accepted the challenge of using the educational laptop in the classroom with their students. Therefore, with time, one can observe that the school teams became more fluent and secure, which influences their motivation to use the laptops with the students. During this process we noted that strategies for using the technology daily in the school’s context began to appear, as expressed by one of the teachers at one of the schools:

E.A.F. – Pedreira: Dear UCA colleagues. (05.11.2010). We began to use the laptops with our students, simply an activity for them to explore the Classmate. We have worked in 9 classrooms so far, we are working in stages because the closets are not ready yet, we are charging the laptops’ batteries in the informatics laboratory using the stabilizer, 15 laptops at a time, and it is working. The children are fascinated, not to mention the students’ abilities. It is a success. Hugs to all!

In the report above, we observe that the process for using the laptops with the students takes place



incrementally. The initial activities involved a free exploration of the laptops within the classroom. Some technical-operational strategies were planned to make this activity feasible, such as: scheduling time to use the equipment (due to the need to charge the laptops' batteries), and the support from other people (such as administrators and technology technicians). Such demands were a result of the teachers' initial predictions about what it would be like to manage a classroom where each student had his/her laptop; and predictions about the challenges students would face when using the laptop (due to their young age or lack of experience using computers). Figure 2 shows the use of laptops in the classroom, where one can see the students working in groups and individually, and the teacher provides guidance to the students.



Figure 2: First activities using the laptops with students from the school in the city of Pedreira.

Opposite to some of the predictions expressed by the teachers during some of the initial training sessions, these initial experiences with the laptops in the classroom allowed for some satisfactory results: the students handled the laptop with ease, helped each other, and focused on the activity and exploration of the equipment, as observed by some of the teachers.

M.L.G. – Pedreira, SP: .. The students made us surprised, we did not have any challenges during this class, they only asked for me to check on their work all at the same time to make sure they were doing the right thing.

A.C.S. – Campinas, SP: The students' first contacts with the laptop gave the teachers more confidence, they understood that the students "treat" the equipment with composure, they interact amongst themselves sharing their discoveries, and deal with problems with the equipment in a natural way

The teacher's accounts of success throughout the time when the first experiences with the laptops were taking place, made the other teachers calmer, thus creating an environment of greater security, which is important for the success of this stage, as well as continuity of the project.

The next step in the training was the creation and implementation of scenarios for the laptops' use with the students, in a way that would align with curricular content. This factor, during the initial stages of the training, seemed like a huge challenge. In order to start this new phase, for example, the teachers at the municipality of Pedreira elaborated lesson plans that had specific themes to be address, specific dynamics, and the specific resources on the laptops that would be needed. These plans were created individually or in groups. Some teachers who work with a same grade-level, for example, preferred to create a common lesson plan, as seen in Table 1. In this table one can observe the theme for the project, the anticipated learning objective, the resources needed, and the grade involved.



Lesson Theme	Learning Objectives	Resources	Grade / Year
Poetry by Cecília Meirelles	“Leilão de Jardim” (Garden Auction) Recognizing letters (by finding them on the educational laptop’s keyboard). Manifesting creativity (illustrating a section). Improving the ability to understand poetry.	Tux Paint (word processing and stamps)	1 st grade
Animals in the Pantanal	Activities that relate the laptop to “Reading and Writing” Searching for information about a few animals that live in the Pantanal. Organizing information in into taxonomy cards (found in the textbook) Collaboration (partnerships)	Internet Books “ <i>Ler e Escrever</i> ” (Reading and Writing)	2 nd grade 3 rd year
Creating Stories with Fables	Gathering information (interviewing family members), reading and writing essays, working within the genre of fables.	Internet Kword Tux Paint Projector Multimedia	3 rd grade 4 th year
Pedreira, Porcelain Flowers	History of the city, tourist points, economic sectors, political sectors, educational sectors, cultural sectors, and geographic locations. Production of an essay based on the information found on the Internet.	Internet Kword	4 th grade 5 th year

Table 1: Synthesis of a few lesson plans developed for the use of laptops to address curricular content.

The testimonies below express some of the important aspects of the training courses for the teacher: incentives for the appropriation of technologies by the teacher; experiencing new pedagogical possibilities together with the students; development of work in groups and spaces for exchanges of knowledge amongst the students; proposals for articulate projects with technological possibilities; and practical activities for the use of technology to help teachers reflect on their pedagogical work.

Teacher C – Pedreria, SP: I believe it was a continuous process, for everything we learned throughout the course made us reconsider our pedagogical practices in order to insert the computer so as to improve the students’ learning, in addition to providing us with an incentive to get to know this virtual world.

S. R. M. G. – Sud Mennucci: It was gratifying to create moments that were relaxed and meaningful for the students, for, using the technological tool, we were able to create a project as a team in which the students behaved very well, and did not hesitate to help their classmates solve any questions regarding the use of the technology.

It is still not possible to identify significant pedagogical changes, considering the time in which the UCA Project has been implemented in the four schools. However, we have observed that the



teachers, in a general sense, have already adopted a new attitude towards their work. There are various indications that important pedagogical changes might take place, changes which demand time and new experiences in order to become concrete. The teachers incorporate new learning spaces, work dynamics, reflect with partners in order to elaborate projects, and exchange strategies. Thus, it is possible to note that there is a general mobilization in order to increment scenarios for teaching and learning. These include: use of the laptops by teachers and students in the school creating an environment of digital inclusion; pedagogical use of different medias available on the educational laptop; connectivity – use of the wireless networks connected to the Internet – allowing for communication and interactions between the students and the teachers; and the mobility to use the equipment in other environments inside and outside of the school. Figure 3 illustrates some of the students using the laptops in the library, in the patio, and carrying out different activities related to the scenario of “social entrepreneurship” taking place within the school.



Figure 3: Dynamics of the use of the laptops in the School José Benigo Gomes, Sud Mennucci, SP

Such dynamics show that activities related to the use of the laptops are no longer restricted to the classroom. Students can be actively engaged in their class-work or pedagogical activities even while not in the classroom or under the teacher’s supervision. One of the benefits teachers noted is that schoolwork is now productive, while as before it was restricted to the classroom. Now, schoolwork and pedagogical activities take place anywhere and at any time, and are no longer limited to the confines of the classroom or the class-period.

Conclusions

The educational laptops (also known as US\$100 laptops) are beginning to become part of the reality of some Brazilian schools, thanks to the *UCA* Project, developed by the *MEC*. However, simply installing these laptops in the schools does not mean that they will become a part of curricular activities. For this to happen, it is important to train teachers and administrators in the schools so that they can implement the necessary changes in different aspects of the educational process, such as the school’s space, the class period, as well as curricular activities.

In Brazil, training of teachers and administrators from the schools that are receiving the laptops is being carried out by universities whose representatives participate in a *MEC* advisory committee for the implementation of the *UCA* Project, called *Global IES*. In the case of *UCA-Unicamp*, we interact with universities in the State of Acre, Pará, and Rondônia that work directly with local schools that are part of the *UCA* Project. We are also responsible for training teachers in the four schools participating in the *UCA* Project in the State of São Paulo. For the purpose of this article, we described the teaching training process taking place in four schools in the State of São Paulo.

The results obtained up to the present moment indicate that the teachers are gradually appropriating the laptops as a resource, and, as this takes place, start to use the laptops with their



students for activities taking place within the classroom. These experiences with technology within the classroom are still isolated and, up to this point, were part of the activities done during the training process. In addition, teachers have begun to see the laptops' potentials, and understand the different resources that can be used in activities taking place in varying learning spaces within the school or used to explore different curricular content. It is still early to describe the benefits of the use of the laptop for the students themselves. However, there is great enthusiasm on the part of the students, which has been transmitted to the teachers and administrators, thus creating an educational environment where teachers are collaborating, and establishing partnerships with the students. To experience this enthusiasm and to be able to channel it towards pedagogical issues is, in and of itself, a great accomplishment. We hope that these are the first steps towards more profound changes that could take place in schools, and that, through these, we are able to achieve the UCA Project's objectives of improving the quality of education, and of promoting the digital inclusion of students within the school context.

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