Digital Inclusion in Chilean in Rural Schools

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ABSTRACT

This paper analyzes conditions for improving digital inclusion in Chilean rural schools, using a multidimensional definition of digital divide. Using qualitative and quantitative data, we focus on teacher's skills, access to communication, Internet connection and expectations regarding the Internet in rural schools. We obtained data from interviews and surveys applied to teachers, students, principals and technology coordinators. Results show that even if teachers are not the primary figures for transmitting ICT knowledge to students, they are gatekeepers, producing conditions for students to learn of ICT use. In addition, data contributes to understanding the new role of teachers and schools in rural areas regarding social and symbolic integration.

Categories and Subject Descriptors
K.3.0 [COMPUTERS AND EDUCATION]: General

General Terms
Human Factors

Keywords
Rural schools, Internet, digital divide, teachers.

INTRODUCTION
There is now ample consensus that access to ICT is a contributing factor to meaningful participation in the knowledge society by taking advantage of educational, professional and leisure opportunities [1],[8]. In rural contexts, many people see technology as an opportunity to overcome the barriers of geographic isolation experienced by these kinds of communities, offering them new opportunities for education and employment, access to knowledge and communication with other people [14].

The concept of the digital divide emerged in the 1990's in order to describe the unequal distribution of the access, use and advantages of opportunities offered by ICT for societies and people [9]. Far from being an established concept, the digital divide has gone from being conceived as consisting of access alone, to having to do with use as

well. This has produced a lively debate with regards to the adequate criteria necessary to measure it [4].

A deeper question, however, is whether beyond the factors that might facilitate or discourage access for certain groups, if the process for the adoption of technology by differing groups is the same or not [4]. The analysis of factors that facilitate or complicate access and use could erroneously assume that these groups' experiences are the same, and that it is only a matter of time for the newcomers to reach the levels of the early adopters, as indicated by some theories on innovation [10]. On the other hand, supposing that there are different trajectories for different groups allows for the incorporation of cultural variables that contain more complex relations with the process for the adoption of technology.

Recent works have coincided in pointing out that the effective use of ICT is related to three dimensions: motivation, possession and digital skills. Motivation refers to the willingness of individuals to use technology and to include it in their home, work, and educational efforts. Possessions include physical access to computers and Internet. Skills refer to the ability to use the technology [13].

Research on the digital divide frequently emphasizes three fields or "structural contexts of opportunities" through which people access ICT: home, school and work [1],[3], and others such as cybercafés [2]. In both the school and family context, ICTs are subject to regulation regarding both content and time of use [5]. The concept of the gatekeeper describes the mechanism of regulation and control of the access and use of ICTs among children and young people. Kiran Gopakumar [7], for example, has described that those who work in Internet community centers act as gatekeepers, or very important intermediaries, to facilitate access and the transfer of knowledge to the communities.

In many rural schools in Chile a social context of poverty is mixed with an educational context of poor learning results, which makes for a complex problem of social and educational inequity. The absence of ICT infrastructure opens up a new dimension of inequality. Access to infrastructure is a necessary precondition, although not sufficient, for real equity in the use of ICT. The effective use of ICT supposes certain social and cultural conditions.

Chile has a population of sixteen million people with only 15% of the population living in rural zones [6]. A vast state program called Enlaces has installed infrastructure for connectivity and has trained teachers in the use of computers for education. It provided Internet connection to 56% of all Chilean schools, mainly in urban areas. The highest percentages of schools that still do not have access to Internet are rural schools [11]. The high cost of the infrastructure, the low population density, and the weather and difficulties in geographical access, are some of the reasons why these schools are on the margin of the connectivity initiatives.

In general terms, during the last two decades rural areas have improved their employment rates, levels of education, and their access to housing, infrastructure and services [12]. Because of the extension of the country and its geographic characteristics, in many of these rural communities people have enormous difficulties in as much as accessibility and communication.

The hypothesis that is analyzed in this piece is that the teachers in Chilean rural schools act as gatekeepers, in such a way that their skills, motivations and access to computers contributes to facilitating the conditions necessary for the adoption of technology by their students. However, we also hypothesize that the teachers are not those who initially introduce the students to technology directly, this being a role played primarily by peers within the community.

METHODOLOGY

Research data was collected from a sample of 102 rural lower and middle education schools, in 5 of the country's 15 regions that concentrate the largest quantity of rural schools (the 7th, 8th, 9[th,] 10th and 14th regions).

The data and information used in this paper were gathered through qualitative and quantitative techniques applied to different actors in the rural schools involved. These instruments were applied only once, between the months of October and November of 2006. In addition, the project team collected secondary data about educational, socioeconomic and cultural issues in rural communities.

The qualitative techniques used were in-depth interviews and classroom observation applied to an intentional sample of 14 rural schools included among the 102 schools sampled. The quantitative technique used was a survey applied to the different actors included in the study. For the survey, a self-applied document was implemented using closed questions.

Quantitative sampling was probabilistic and stratified. The stratums were defined proportionally according to the degree of the school's accessibility and to a classification from the Ministry of Education that indicates its distance to specific urban centers and the geographical difficulty in accessing the school.

The sample unit was the school. In consideration of the difficulties of access, the sample size was calculated by accepting a 6.6% margin of error, on a 2-sigma reliability level and with maximum variance (p and q = 50%). In each school 10 students from 6th to 8th grade were selected at random, as well as two teachers, one Enlaces coordinator and the school principal. In the smallest schools fewer students and teachers were obtained. The data used in this paper includes the sub-samples of teachers and students.

RESULTS

The context of the rural schools

The socio-familiar environments of the rural schools were characterized by their respective levels of economic vulnerability and the scarcity of the cultural resources within the students' families. The interviews showed a panorama in which the parents had, on average, an incomplete high school education and at times only up to a middle school education; in some cases there were even illiterate parents. Up to 59% of the fathers and 62% of the mothers had never gone to school or had only attended up to a middle school level. Nevertheless, up to 40% of the students said that their parents always help them, and 48% said that they sometimes help, thus demonstrating the willingness of parents to help their children.

In the context of the rural schools, the Internet is a territory that is being populated first and foremost by the youngest generations. When asked who had taught them how to use the Internet, 55% of the students replied that "their friends" had taught them, 34% said that "others" had taught them, while 29% said that they learned by themselves and 9% said that they had been taught by their teachers.

In rural communities with high levels of poverty, the school is a fundamental space for reducing the economic divide. In the case of Chile, the school is being transformed into a center for the diffusion of technology into poor communities. Much of the technological innovations that are not available either at home or in other community spaces are accessible through the school.

The school is the primary place for access to the computer and the Internet, in which 76% of the students are accustomed to using the Internet and 71% are accustomed to using a computer. Access to the Internet in other spaces is quite scarce in comparison.

In this panorama of rural communities with high levels of economic, social and cultural vulnerability, we found that the school provides access to the Internet where it currently does not exist. However, at the same time the teacher does not seem to be a fundamental agent of socialization, being passed up by peers and other subjects present in rural communities.

Teachers' access, expectations and Internet skills

In order to analyze the conditions from which the schools could become an effective space for reducing the digital divide, in the following we approach three factors concerning teachers in rural schools: access, expectations and skills.

Access

In school, 73% of teachers have access to a computer, and 68% have Internet access, while other spaces, such as at home and in cybercafés, have much lower levels of access for teachers.

In general, the teachers also admit to having a high frequency of access. We consulted them on the frequency of their access to a computer (productivity and educational software), to email and the Internet. With this data an Access Index was constructed and ordered into 4 categories describing the frequency of use. In this way, 41% of the teachers declared having a high frequency of access (every day or almost every day), and 38% said they had sufficient access (2 or 3 times a week).

Expectations of educational and social impact

Internet produces high expectations in the various educational actors in the rural schools studied. One common element that connects the various interviews held was the presence of a positive valuation of ICT sustained over a diffuse and unstructured perception. When parents, students and teachers express themselves freely about what they expect from the Internet, they tend to repeat a general and somewhat naive idea that could be summed up as "the Internet is a door to the world, filled with opportunities". Teachers' expectations about the relevance of the Internet in education are thus not very well aligned with real reflections on the educational and pedagogical conditions that would allow for "good practice" in using the Internet within the classroom.

The results include scores obtained from the survey considering three social dimensions in which teachers think that ICT would have an impact. The scores in each index range from 0 to 4, in which 4 express the highest level of agreement with the idea that the Internet has a high impact on the corresponding dimension. The highest score was obtained in the access to information dimension (measured as access to information faster and cheaper - average score of 3.542), while lower scores, although still with a high level of agreement, were obtained for the social recognition of the community dimension (measured as opportunities to relate to people from other places – average score of 3.308) and the equity dimension (improved quality of life for everyone and equality of opportunities compared to the city - average score of 3.301).

We analyzed the expectations that teachers have formed regarding the impact that the Internet has on the realm of pedagogy in three dimensions: conditions of learning, resources for teaching, and educational results. These dimensions were measured on a scale that oscillates between 0 and 4, in which 4 corresponds to the highest level of agreement with the idea that the Internet has a high impact on the corresponding dimension. Teachers perceived high impacts of the Internet in all three of the dimensions analyzed; that which received a higher impact was teaching resources (average score of 3.683), while that

which received a relatively lower impact were the learning conditions (average of 3.476) and educational results (average of 3.481).

Skills

The third dimension is the knowledge the actors express with respect to the management of informatics tools. We asked the teachers about their level of knowledge regarding 4 standard tools available in most Chilean schools: word processor, spreadsheet, Internet navigator and email. Based on their answers to the survey applied, we constructed an index based on the degree of their abilities with each tool. We grouped the index into categories of minimal, low, sufficient and high degrees of knowledge. The majority of the teachers could be classified in the category of sufficient knowledge, and 27% in the high knowledge category.

Correlating dimensions

The relation between these 4 variables (access, skills, expectations for the educational impact of Internet and expectations for the social impact of the Internet) shows a strong, statistically significant correlation between the expectations for the social and educational impact ($r = 0.562$; $p < 0.01$), on one hand, and between the knowledge and the use of the Internet ($r = 0.424$; $p < 0.01$) on the other (table 2). This means that those who have high expectations for the social impact tend to also have high expectations of the educational impact, while those who use it more also have more knowledge of the Internet. However, the expectations for the educational impact and the use and knowledge seem to run on different tracks. There is a weak and negative correlation between the expectations for the educational impact and the frequency of use ($r = -0.082$), which is not statistically significant ($p = 0.394$), and between such expectations and knowledge of ICT tools ($r = -0.031$), which also is not statistically significant ($p = 0.750$). Although this relation is not statistically significant, there seems to be a very slight tendency that whoever used and knew more about the Internet has lower expectations for the educational impact. The relation between the social impact of the Internet and the frequency of use is even weaker than the others ($r = 0.007$) and is not significant ($p = 0.935$), while the relation between the social impact and the knowledge of ICT tools is a little stronger ($r = 0.155$), but without achieving statistical significance ($p = 0.079$). This means that there is most likely not a relation between expectations for a social or educational impact and the use and knowledge of ICT.

CONCLUSIONS

The hypothesis that we have followed in this article is that the teachers in rural Chilean schools operate as gatekeepers, in a way that their skills, motivation and access to computers contributes to facilitating conditions for the adoption of technology by the students. However, they are not who directly introduces the students to the technology. In the rural communities these tasks are more strongly associated to peers and other people. The teachers,

even if they are not the main figures who facilitate their students' learning of ICT, do work as gatekeepers [7], generating conditions for students to learn in the school how to use the ICTs, but leaving the work in the hands of other people (mostly peers). This is interesting because, in the first place, it allows us to advance in characterizing the role that the teacher plays in rural schools, generating fundamental conditions regarding socialization for certain ICT tools.

Secondly, the data allow us to advance on the identification of finer factors for the analysis of the digital divide, beyond the "access/no access" dichotomy, which can be nuanced by using other variables that would allow use to explain and better understand this problem [3]. Variables such as those that we have used in this study, more than definitive conclusions are clues in the search for more complete variables to measure this issue, which should be studied more in depth.

Thirdly, the data allow for a description of the widening of the role of social and symbolic integration that the school has traditionally filled in Chile. With the arrival of the Internet, that role acquires a new dimension. The context in which rural Chilean schools are immersed makes the process of technology installation and connectivity more complex, but at the same time more urgent. Without real access to participation in the knowledge society, a new dimension is incorporated into the already existing social and educational inequality, this time regarding access and use of ICT.

However, for teachers, the Internet can be a very positive tool to improve learning conditions, to access resources for teaching and to improve educational results. But in addition to exclusively educational expectations, rural communities have high expectations in terms of access to information, recognition and social inclusion. The school plays, and has always played in those communities, a role of social and symbolic integration and a space of sociability; but with the Internet, the schools begins to play a new role, that of the diffusion of technology and equitable access not only for the students, but for many of their families as well.

Finally, we have also described how the different contexts of opportunity for access are related to each other in the rural areas. The school functions as a context of the dissemination of technology, which has an impact on the families. The results obtained indicate certain patterns of "reverse socialization" in the sphere of the ICTs, in which access to knowledge is no longer exclusive to adults, but is rather concentrated in the children. It will be interesting to see how this changes (or not) the place of each member in the traditional rural family structure.

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