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## Differences in Views of School Principals and Teachers regarding Technology Integration

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### ABSTRACT

This paper studies the similarities and differences among the views of school principals and teachers regarding a mobile computer lab (MCL) initiative implemented in 1,591 public schools in Chile. It also characterizes the aspects in which their views diverge. A mixed methods study was carried out in two stages: first, a quantitative stage, where a self-administered (web-based) questionnaire was sent to the schools; and second, a qualitative stage, where a case study was conducted with three schools. The results show a greater convergence of the teachers' and school principals' views regarding the contribution of ICT resources to teaching, with more divergence when it comes to the implementation process. More specifically, these differences were related to two points: (1) how appropriate the conditions were for using and learning how to use the new resources within the context of the school, and (2) who should be held accountable for integrating ICT resources within the school organization. Furthermore, the qualitative results revealed that school principals only had vague information on the pedagogical integration of the MCLs in their schools. These findings suggest that in order to have more effective technology integration processes in schools, a closer presence of school leaders in the teachers' everyday pedagogical activities is required.

### Keywords

Technology integration, Mobile computer lab, Teacher, Principal

### Introduction

Any strategy that seeks to change the teaching practice should consider the social and cultural context of the school organization (Hargreaves, Earl, Moore, & Manning, 2001; Tondeur, Devos, Van Houtte, van Braak, & Valcke, 2009). This means taking into account sociocultural aspects relating to the knowledge, meanings and understanding of the new strategy by the members of a school organization, as well as the changes in social relations it may produce (Cooper, 1988). One common issue when implementing new strategies with ICT is that they tend to focus on adopting the technology, without providing the appropriate conditions for the social and cultural learning that is required for innovation (Hargreaves et al., 2001). Among these conditions, a shared view by the school members that are involved is essential. This shared view includes their perceptions and beliefs of the new strategy that is to be adopted, as well as the physical, human, and organizational conditions required for implementation (Alghamdi & Prestridge, 2015).

### School principals' and teachers' perspectives

Every organizational change deals with different sub-cultures or a diversity of interests and perspectives that influence the processes and practices of schooling (Ertmer & Ottenbreit-Leftwich, 2010; Prestridge, 2012). When integrating a new technology, the school members' beliefs and attitudes regarding the use of technology have a direct impact on the integration (Alghamdi, & Prestridge, 2015; Howard, Chan, & Caputi, 2015). As Selwyn (2011) states, there are two relevant sub-cultures in schools: the administrative and the academic. Each one of these has a different logic and way of influencing and perceiving the school processes (e.g. technology adoption).

For school administrators or principals, the predominant logic is one of efficiency. These stakeholders are vital for creating the necessary conditions for a school reform to be successful (Hargreaves et al., 2001; Neufeld, Dong, & Higgins, 2007). Evidence shows that school principals who support and lead teachers when integrating technology into their practices have a clear vision of how the technology will contribute to the school project (Chang, 2012). Their involvement is vital for the technology to be sustainable over time, notwithstanding the amount of teacher training (Law, Pelgrum & Plomp, 2008; Peled, Kali, & Dori, 2011).

On the other hand, teachers' beliefs regarding the nature of the teaching and learning process is directly related to technology integration (Kim, Kim, Lee, Spector, & DeMeester, 2013). In this sense, the use of technology is motivated by the belief that ICT can help them achieve their pedagogical objectives (Ertmer & Ottenbreit-Leftwich, 2010). Consequently, any new ICT strategy within a school should consider addressing teachers' beliefs and ideas (Buabeng-Andoh, 2012; Chen, 2010; Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Mama & Hennesy, 2013).

### **The importance of a shared vision among school members**

Having a shared vision and an ICT policy plan are essential conditions for technology integration (Alghamdi, & Prestridge, 2015). A difference in the views of the school principal and the teachers can be a significant obstacle when it comes to implementing public policy and strategies. In fact, perceptions of how useful an innovation is to professional practice are as essential to its success as the usefulness of the innovation itself (Kirkland & Sutch, 2009; Prestridge, 2012; Shin, 2015; Teo, Milutinović, & Zhou, 2015). These perceptions may be built on the teacher's beliefs and attitudes, as well as on the influence of the school principal (Kirkland & Sutch, 2009).

The vision and understanding that the school principal may have of the role of ICT in their school should translate into concrete measures to provide teachers with the space to learn how to effectively use ICT in the classroom (Kim et al., 2013; Law et al., 2008). For example, providing the necessary time and support for teachers to prepare to use the technology, research digital materials for their classes, and become familiar with the hardware and software (Jones, 2004). In general, an atmosphere that supports innovation and the use of ICT encourages teachers to try out new practices (Kirkland & Sutch, 2009). In order to do so, it is necessary to implement methods of professional planning and learning that are well-integrated with the teaching process (i.e. not just an accessory), and where learning to teach becomes part of the teaching process itself (Hargreaves et al., 2001; Kim et al., 2013).

In summary, research indicates that the beliefs and understandings of school principals and teachers shape classroom practices. Furthermore, it also reveals the importance of having a shared vision of the usefulness of a new technological strategy, as well as the conditions for integrating the strategy into school practices. Consequently, identifying the teachers' and principals' perceptions of a new technological proposal can lead to more effective strategies for integrating new technologies in schools. This paper presents a study elaborating on the views of principals and teachers with regards to a new technological proposal. In order to do so, we consider the implementation of a classroom initiative in Chile that had very limited adoption (Claro, Nussbaum, López, & Díaz, 2013). The research questions are:

- How similar or different are the views of school principals and teachers with regards to a mobile computer lab strategy?
- Where do the teachers' and school principals' views of a mobile computer lab diverge?

## **Methodology**

The aim of the research was to study and compare the views of principals and teachers regarding the implementation of a new strategy developed in Chile based on a Mobile Computer Laboratory (hereafter, MCL).

### **The mobile computer lab strategy**

This intervention consisted of promoting new classroom practices by providing state primary schools with a cabinet containing laptops loaded with productivity tools. The total number of devices depended on the number of students per class in each school, so that each student in third grade had access to a device. The strategy also included one laptop per teacher, with software to control the class and communicate with students, as well as wireless network technology (intranet) to allow computers within the classroom to communicate (Ministry of Education, 2009). In addition to the technology, a website was also set up to provide information on the project, as well as digital resources in Mathematics and Language Arts to support the teachers' lessons.

A mixed methods study was carried out in two stages.

### *Stage one: Survey*

In the quantitative stage, an online, self-administered questionnaire was used to study the teachers' and principals' views regarding the adoption of the MCL project within their school. The study's sampling frame consisted of 1,591 schools that participated in the MCL project. Stratified random sampling was applied, using the criteria of Region and rurality to form the required strata. A probabilistic sampling of schools was then applied to each stratum in order to maintain the proportion of schools in each stratum and guarantee the representativeness of the sample. A total of 565 schools were contacted through three successive calls. An e-mail with the URL to access the survey was sent to each school and only one representative from the school could answer the survey. The questionnaire was answered by a total of 242 schools (teachers, school principals, Head of Curriculum and Instruction, or Head of ICT), with a 75% response rate. Given the schools that did not respond, weightings were used to reconstruct the representativeness of the various segments based on their relevant weighting within the overall distribution (for more details, please see Claro et al., 2013). To study the differences or similarities between the views of the school principals and teachers, a chi-squared analysis was conducted using the responses from the school members regarding the main dimensions of the two strands of this study:

- Evaluation of the contribution and adoption of ICT within the school. Specifically, their views on: (a) the contribution of ICT in general; (b) the contribution of the MCL in particular; and (c) the level of pedagogical adoption of ICT within the school.
- Implementation and use of the MCL in the classroom. Specifically, their views on: (a) planning and coordinating the use of the MCL; (b) level of teacher preparation for making pedagogical use of the MCL; (c) technical and pedagogical training for teachers in the pedagogical use of the MCL; and (d) innovative practices and use of the MCL in the classroom.

The specific conditions that were surveyed were selected based on previous research relating to key human and organizational conditions for integrating new technologies in the classroom. Specifically, time for teacher preparation (Jones, 2004), technical and pedagogical support (Kirkland & Sutch, 2009; Law et al., 2008), the school director's support and leadership (Law et al., 2008) and the school's ICT plans and strategies (Tondeur, van Keer, van Braak, & Valcke, 2008; Vanderlinde, Aesaert & van Braak, 2014).

### *Stage two: Case studies*

In the second stage, a multiple case study was carried out (Creswell, 2007). Two interviews were conducted at three schools, one with the principal and the other with the teacher. The aim was to further elaborate on the views of each of them and identify areas of convergence and divergence, as well as the difficulties they faced when implementing the MCL strategy in the classroom. For this purpose, and based on the data collected through the questionnaire, three schools were randomly selected: one from the group of schools that reported high use of the MCL, one from the group of schools that reported medium use of the MCL, and one that reported low use of the MCL. This selection criterion was based on the hypothesis that the frequency of use reported by the school may be related to the convergence of the views between school principals and teachers regarding the school's experience with the MCL. Subsequently, the school principal and a teacher taking part in the project were interviewed at each school. The interviews were conducted following a single set of open-ended questions regarding their perceptions of the same core strands and dimensions included in the quantitative stage: (a) evaluation and adoption of ICT within the school, and (b) implementation and use of the MCL.

The interviews were conducted individually at each school. The principals were interviewed in their offices, whereas the teachers were interviewed in a classroom. Three researchers analyzed the interviews, so as to compare the information and triangulate the data. The interviews were analyzed following a process based on grounded theory (Corbin & Strauss, 2008). In the first stage, the information from the interviews was broken down into units of meaning, which were coded and classified for each of the topics covered. The information was coded using categories for each topic, which in turn were summarized in order to reach a single definition expressing the content of various semantic contributions at three different levels within the discourse that emerged from the interviewees:

- A first level, relating to each interviewee's *general perception* of the topic.
- A second level, relating to the in-school or out-of-school *organization and/or material conditions* that may favor or hinder the development of the topic.
- A third level, relating to those *responsible* inside or outside of the school for implementing a particular strand.

In a second stage, the categories stemming from each topic at the three levels of discourse for each school member were compared by school. The aim of this was to identify the similarities and differences between the views of the principal and the teacher.

The following cases were studied:

- **Low Use School:** This school serves 381 pre-school, primary school, and secondary school students, of which 80% come from families classified by the Ministry of Education as vulnerable. According to the Ministry of Education's classification, the school's level of technology was *Elementary*, which implies basic infrastructure and precarious pedagogical use of technology. The person in charge of implementing the project, appointed by the school principal, was the Head of Curriculum and Instruction, who organizes and plans all MCL activities. One peculiarity of this school is that the person responsible for teaching the lessons is the Head of ICT, who has to agree on the content and objectives of the MCL classes with the corresponding classroom teacher.
- **Medium Use School:** This school serves 208 kindergarten and primary school students, of which 75% come from families classified as vulnerable. Their level of technology is *Advanced* according to the Ministry of Education, which implies they have excellent technological infrastructure and pedagogical use is very frequent. At the time of the interviews, the school principal had been in the position for two years and arrived following the implementation of the MCL. A pro-ICT culture is promoted throughout the school, as witnessed in the posters on the walls of the computer room, encouraging the use of computers. The computer room is managed by a teacher who coordinates the timetables and proposes class content to teachers using the MCL. The school premises are seen to be very clean and tidy, which contrasts with the school's surroundings.
- **High Use School:** This school serves 639 kindergarten and primary school students, of which 60% come from families classified as vulnerable. According to the Ministry of Education, the level of technology is also *Advanced*. At the time of the visit, the school Principal and the Head of Curriculum and Instruction had been in their positions for two years. The principal mentioned that many ICT projects had not been implemented on account of problems with the school's internal organization. The school's Head of ICT provides the MCL on request, but does not give pedagogical support to teachers. In general, there is a positive attitude towards ICT within the school.

## Results

### Stage one: Survey

#### *Evaluation of the contribution and adoption of ICT within the school*

The chi-squared analysis shows there are no statistically significant differences between the views of the school principals and teachers in any of the types of contributions consulted (Table 1).

*Table 1. Percentage of teachers and principals who perceive that ICT and MCLs contribute towards teaching*

	Teachers ( $N = 38$ )	Principals ( $N = 53$ )	$\chi^2$
ICT are relevant to teaching	94.1%	94.3%	$X^2 = 2.93$ $p = 0.394$
MCLs are an opportunity to improve digital literacy	74.5%	74.3%	$X^2 = 0.001$ $p = 0.978$
MCLs are an opportunity to promote pedagogical innovation	92.2%	88.6%	$X^2 = 0.425$ $p = 0.515$
MCLs are an opportunity to motivate students	88.2%	75.7%	$X^2 = 3.005$ $p = 0.083$
Would recommend adopting MCLs	94.1%	97.1%	$X^2 = 0.682$ $p = 0.409$

With regards to the adoption of ICT in general, the chi-squared analysis shows there are no statistically significant differences between the views of school principals and teachers (Table 2). In both groups, the majority of respondents reported that they either agreed or strongly agreed that these resources are starting to be used to teach school subjects.

Table 2. Percentage of teachers and principals who say they agree or strongly agree that ICT are starting to be used to teach school subjects

	Teachers ( <i>N</i> = 38)	Principals ( <i>N</i> = 53)	$\chi^2$
Agree or strongly agree that ICT are starting to be used to teach school subjects	95.1%	94.4%	$R^2 = 1.52$ $p = 0.676$

### Implementation and use of MCLs

With regards to planning and training for the use of MCLs, the chi-squared analysis reveals statistical differences between the views of teachers and principals (Table 3). A significantly higher percentage of principals report that teachers are provided with support in preparing their classes and time for training in how to use the MCL in their subject.

Table 3. Percentage of teachers and principals who report that the following administrative measures are in place in their school

	Teachers ( <i>N</i> = 38)	Principals ( <i>N</i> = 53)	$\chi^2$
Assigning time for teachers to plan ICT-based classes	45.7%	74.3%	$\chi^2 = 9.76$ $p = 0.002$
Scheduling time for teacher training to improve the use of the MCL in their subject	65.3%	85.3%	$\chi^2 = 6.40$ , $p = 0.011$

There are significant differences when it comes to the views of teachers and school principals regarding technical and pedagogical support (Table 4). In this sense, teachers have a significantly more critical view than principals regarding the frequency with which such support is provided.

Table 4. Percentage of teachers and principals who say the following practices always or never take place at the school

	Teachers ( <i>N</i> = 38)	Principals ( <i>N</i> = 53)	$\chi^2$
Never receive pedagogical support from school authorities	40%	10%	$\chi^2 = 17.39$ $p = 0.001$
Principal never visits MCL classes	37.5%	11.6%	$\chi^2 = 12.54$ $p = 0.06$
Always receive pedagogical support from school authorities	14%	37%	$\chi^2 = 10.63$ $p = 0.014$
Always receive technical support from ICT Coordinator	26.5%	54.3%	$\chi^2 = 10.31$ $p = 0.016$

With regards to using MCLs, there are significant differences between the views of teachers and school principals (Table 5). Principals have a statistically significant more positive view than teachers on this topic. Nevertheless, when it comes to adopting new practices with ICT and MCLs, there were no statistically significant differences between the two groups.

Table 5. Percentage of teachers and principals who say that MCLs are used in the classroom to innovate

	Teachers ( <i>N</i> = 38)	Principals ( <i>N</i> = 53)	$\chi^2$
Teachers in the school use MCLs in the classroom	71%	88.4%	$\chi^2 = 8.120$ $p = 0.044$
Internet is used in the school to support the teaching of different subjects	81.6%	94.1%	$\chi^2 = 4.49$ $p = 0.034$
Agree or strongly agree that the school is involved in adopting new pedagogical practices using MCLs	94.1%	98.5%	$\chi^2 = 1.62$ $p = 0.219$

### Stage two: Case studies

The results from the previous section revealed a convergence of opinions among principals and teachers with regards to their perception of the contribution of ICT and MCLs to teaching (Table 1), their adoption in teaching (Table 2), and the development of new pedagogical practices using MCLs within the school (Table 5). Nevertheless, when analyzing the questions related to the process of implementation, statistically significant

differences appear. More specifically, this relates to the conditions for planning the use of MCLs (Table 3), teacher support and preparation for using MCLs (Table 4) and the teachers' use of technology in class to support the teaching of school subjects (Table 5).

To understand these results in more detail, a case study was developed to learn about the views and beliefs of teachers and principals regarding the topics under analysis. As mentioned in the Methodology section, the final categories for each topic are presented at the three different levels of discourse that emerged from the analysis of the interviews:

- A first level, relating to each school member's *general perception* of the topic.
- A second level, relating to the in-school or out-of-school *conditions* that may favor or hinder the development of the topic.
- A third level, relating to those *responsible* inside or outside of the school for implementing the relevant strand.

#### *Evaluation of the contribution and adoption of ICT within the school*

In terms of the general perception of the contribution of technology, the teachers and principals had a similar perception that ICT in general, and MCLs in particular, contribute to education by motivating the students. With regards to the specific contribution of MCLs to learning, there was also a general agreement within each school (Table 6). This topic was only addressed at the general perception level since it aimed to elicit the interviewees' general ideas and opinions on ICT and MCLs, which did not directly involve the school conditions and responsibilities, unlike the other topics.

*Table 6. Views of principals and teachers regarding the contribution of ICT and MCLs to teaching*

General perception	Low use school		Medium use school		High use school	
	Principal	Teacher	Principal	Teacher	Principal	Teacher
Contribution of ICT	Student motivation	Student motivation	Better outcomes in learning and motivation	Student motivation	Student motivation	Student motivation
Contribution of MCLs	Access to digital culture and review of school subjects	Review of school subjects	Subject learning and digital skills	Significant learning and digital skills	Significant learning and student motivation	Student motivation and attention

*Table 7. Views of principals and teachers regarding the adoption of ICT and MCLs in teaching*

Level of discourse	Low use school		Medium use school		High use school	
	Principal	Teacher	Principal	Teacher	Principal	Teacher
General perception	Some teachers still do not adopt them	Some teachers still do not adopt them	Smooth adoption, no resistance to change	Adoption has been good	Adoption is ongoing, some teachers more than others	Most teachers use ICT
Organization and/or material conditions (obstacles)	Need for change in teachers' culture	More resources (technology) for new teaching practices	Need for change in school culture and processes	Need for technical support for new teaching practices	Need for change in teacher culture and practices	Need for technical support for new teaching practices
Responsibilities inside and outside the school	School leaders and teachers	School leaders and teachers	School leaders and teachers	School leaders and teachers	Teachers	Teachers and Head of Curriculum and Instruction

Principals and teachers had similar views in terms of their general perception, the organization and/or material conditions of ICT adoption in teaching, and the school responsibilities (Table 7), with some differences when it comes to their perception of the conditions. In this case, the principals presented a broader view of the organization (e.g. teacher culture, school processes), whereas the teachers approached the topic in more material terms and from the classroom perspective (e.g. need for technical support to change teaching practices).

### Implementation and use of MCLs

Although there is some convergence in terms of their general perception, when it comes to describing the organization and/or material conditions (obstacles) and responsibilities in formal planning, the views of the principals and teachers are completely divergent (Table 8).

Table 8. Views of principals and teachers regarding lesson planning for MCLs

Level of discourse	Low use school		Medium use school		High use school	
	Principal	Teacher	Principal	Teacher	Principal	Teacher
General perception	There is no formal planning	There is no formal planning	There is formal planning	There is no formal planning	There is no formal planning	There is no formal planning
Organization and/or material conditions (obstacles)	Temporary problem in infrastructure (earthquake damage)	Permanent problem of time management	There is formal time for planning within school hours	Planning is done outside of school hours (at home)	There is no trained individual to organize school planning	Head of ICT assists with planning
Responsibilities inside and outside the school	Ministry of Education	School leaders	Teachers	School leaders	School owner	Head of ICT

When it comes to preparing the teachers for using the MCLs, the views are divergent at every level, with the exception of the general perception within the low use school (Table 9).

Table 9. Views of principals and teachers regarding the preparation for teachers to use the MCL

Level of discourse	Low use school		Medium use school		High use school	
	Principal	Teacher	Principal	Teacher	Principal	Teacher
General perception	Teachers are well prepared	Teachers are not well prepared	Teachers are well prepared	Teachers are not well prepared	Teachers are not well prepared	Teachers are well prepared
Organization and/or material conditions (obstacles)	Training could be better	Insufficient, superficial training	Sufficient training (not an obstacle)	Insufficient training, superficial	Insufficient training	Sufficient training (not an obstacle)
Responsibilities inside and outside the school	Teachers	Ministry of Education	Teachers	Ministry of Education	Ministry of Education	ICT Coordinator

When it comes to organizing school support in order for teachers to use the MCLs, the views of the principals and teachers diverge at every level, with the exception of the general perception within the low use school (Table 10).

In terms of innovative practices, the general perception of the principals and teachers are divergent in the sense that they provide different definitions of the changes and new practices that are expected from the MCL (Table 11). For the conditions that are provided to support innovative practices, the principals and teachers from the low use and medium use schools have divergent views, which is not the case in the high use school. Finally, when it comes to school responsibilities, the teachers and principals from the low and medium use schools have



convergent views, which is again not the case in the high use school (the director and teacher assign each other the responsibility).

*Table 10. Views of principals and teachers regarding the support provided to teachers for using MCLs*

Level of discourse	Low use school		Medium use school		High use school	
	Principal	Teacher	Principal	Teacher	Principal	Teacher
General perception	There is no formal organization. However, there is support among teachers	There is no formal organization. However, there is support among teachers	There is formal organization	There is informal organization	There is no coaching	Coaching is provided by the ICT Coordinator
Organization and/or material conditions (obstacles)	Temporary difficulty (earthquake damage)	Permanent difficulty (no formal support)	Individual formally appointed by the principal (not an obstacle)	Informal help among teachers	Ministry does not provide the necessary conditions	Teacher support is organized by the ICT Coordinator
Responsibilities inside and outside the school	External, earthquake	Internal, organization	ICT Coordinator	Principal	Ministry of Education	ICT Coordinator

*Table 11. Views of principals and teachers regarding innovative practices in the classroom using MCLs*

Level of discourse	Low use school		Medium use school		High use school	
	Principal	Teacher	Principal	Teacher	Principal	Teacher
General perception	There has not been any innovation, and therefore profound change is needed	There has been some innovation in the sense of new strategies that break up the routine	There has been some innovation in the sense that the technology has been adopted	There has been some innovation in the sense of doing things differently to motivate students	Teachers have not changed their practices	I have changed my practices, but I don't know about the others
Organization and/or material conditions (obstacles)	Need for pedagogical integration of MCLs, teachers need to change	More technology will bring more innovation	Conditions are provided to learn about new practices (not an obstacle)	Time to learn about new practices	Need for sharing new practices	Need for sharing new practices
Responsibilities inside and outside the school	Teachers	Teachers	Teachers	Teachers	Teachers	School Principal

## Analysis of results

With regards to the first research question, “*How similar or different are the views of school principals and teachers with regards to a mobile computer lab strategy?*”, Table 12 provides a summary of the main quantitative and qualitative results in terms of the convergence and divergence of views among school principals and teachers in the two main strands studied. In general terms, the quantitative and qualitative data are consistent in showing a greater convergence of views among teachers and principals for the first strand (i.e. evaluation of the contribution and adoption of ICTs within the school), than the second strand (i.e. the process of

implementing and using MCLs in the school). More specifically, for the first strand both stages of the study revealed a convergence of views when it comes to the contribution of ICT in general, and MCLs in particular, as a learning resource. The qualitative study also revealed that the evaluation is mostly linked to the resources' ability to motivate students and assist with the revision of school subjects, as well as developing digital skills. Furthermore, both stages of the study showed a convergence of views among principals and teachers with regards to the adoption of ICT for teaching within their schools. The qualitative study revealed that principals referred to this topic from a broader viewpoint (i.e. based on the organization as a whole), while teachers had a more specific perspective (i.e. based on the classroom and material conditions). However, these views were not contradictory.

In terms of the second strand, regarding the implementation and use of MCLs, both the quantitative and qualitative data revealed divergent views among principals and teachers. The quantitative data revealed statistically significant differences (with a  $p < .05$ ) for topics related with planning time and preparing and supporting teachers in the use of MCLs. The qualitative data, meanwhile, revealed that the views of the principals and teachers were generally divergent with regards to these topics. This is particularly the case with the in-school or out-of-school conditions that may favor or hinder the development of a particular strand and the responsibilities inside or outside the school for its implementation. The only strand where quantitative and qualitative data were contradictory was in the use and innovation of teaching practices in the classroom using MCLs. Although the vast majority of teachers and principals on the survey agreed that new pedagogical practices using ICT were being adopted within their schools, the qualitative data revealed differences in their definition of innovation. In this sense, the principals and teachers did not converge on a concrete view of what they intended to achieve with the new resource in the classroom, nor how they expected to achieve it.

Table 12. Convergence (C) and divergence (D) of the views of principals and teachers – Summary of qualitative and quantitative results

	Quantitative results	Qualitative results			
		Discourse level	Low use	Medium use	High use
<b>Strand 1: Evaluation of the contribution and adoption of ICT within the school</b>					
Contribution of ICT and MCLs	C*	1.Perception	C	C	C
Adoption of ICT for teaching	C*	1.Perception	C	C	C
		2.Conditions	C	C	C
		3. Responsibilities	C	C	C
<b>Strand 2: Implementation and use of MCLs</b>					
Class planning	D*	1.Perception	C	C	D
		2.Conditions	D	D	D
		3. Responsibilities	D	D	D
Teacher preparation for using the MCL	D*	1.Perception	D	D	D
		2.Conditions	D	D	D
		3. Responsibilities	D	D	D
School support for using MCLs	D*	1.Perception	C	D	D
		2.Conditions	D	D	D
		3. Responsibilities	D	D	D
Use and innovation with MCLs	C*	1.Perception	D	D	D
		2.Conditions	D	D	C
		3. Responsibilities	C	C	D

Note. \* $p < .05$ .

With regards to the second research question, “Where do the teachers’ and school principals’ views of a mobile computer lab diverge?” the main results are summarized below.

First, the analysis reveals that the teachers’ and school principals’ views diverged on two main points: (1) how appropriate the conditions were for using and learning how to use the new resources within the context of the school, and (2) who should be held accountable for integrating ICT resources within the school organization (qualitative data).

With regards to the first point, both the quantitative and qualitative results showed that, in general, teachers had a more negative view than principals on a series of issues. These issues included the conditions for planning the use of the new technology (e.g. formal planning time), the length and quality of the training they received, and the formal technical and pedagogical support they received when using the MCL in the classroom. Although the quantitative data revealed similar views in terms of the use and adoption of new practices using MCLs, the qualitative data showed that the views diverged when it came to defining the expected innovation and the time and conditions required for learning about new practices.

In terms of who should be held accountable within schools for integrating ICT, the qualitative data showed that teachers and school directors, assigned different responsibilities for most of the topics within the implementation and use strand, suggesting that this has not been formally defined. The data also revealed that the school principal did not have a specific leadership role when it came to the use of the MLC within the organization.

As is consistent with the role played by each member of the school, the analysis also revealed that the school principal had a broader approach to most of the topics. This is presumably related to the fact that they are responsible for managing the school organization as a whole. In contrast, the teacher had a more specific approach, based on their responsibility for managing the resources and learning in the classroom. Although this was to be expected, analysis of the interviews also showed that principals were not very involved in the process of implementing and adopting the new technology in the classroom. More specifically, they did not have any concrete information on the type of activities that were carried out, the difficulties encountered, or the results obtained with the students. In general, their perspective on the school conditions was broader and more positive than the teachers' perspective.

Furthermore, the qualitative data showed that the interviewees' view of the contribution of MCLs to learning was quite vague. In this sense, the contribution of MCLs tended to be identified with ICT in general (e.g. student motivation, digital skills etc.), failing to see the specific contribution of students having 1:1 access to technology in the classroom.

Finally, no relationship was found between the reported level of use of MCLs (High, Medium, and Low) in the survey and the characteristics of the respondents' views. This is probably because, in pedagogical terms, the use of the resource in all three cases was neither relevant nor innovative.

## Conclusions

This research aimed to understand how aligned the views of teachers and school principals were with regards to a new ICT strategy, as well as characterizing the aspects in which their views diverged. In order to do so, a mixed methodology design was implemented. The quantitative and qualitative data was consistent in showing a convergence of views among principals and teachers regarding ICT in general, and MCLs in particular, in terms of being well adopted and contributing to the teaching and learning process within the school organization. The divergence of opinions emerged with regards to two main points: (1) how appropriate the conditions were for learning how to use the new resources within the context of the school, and (2) who should be held accountable for integrating ICT resources within the school organization.

The qualitative study also revealed that, despite the views of the teachers and principals being aligned with regards to the value and general contribution of the new ICT strategy, there were two fundamental problems. First, there was a vague notion among all interviewees regarding the specific contribution of the new resource, which led to an absence of pedagogical intentionality. This is an important obstacle since not properly understanding the usefulness of a new strategy or resource greatly limits the results of its implementation (Kirkland and Sutch, 2009). Secondly, the principals and teachers had different views of the conditions that were in place to adequately incorporate the resource into the teaching and learning process. In this sense, there was no shared diagnosis of the gap between the innovation and the current pedagogical practices. There was also no agreement on the resources that are required in order to achieve this innovation (Kirkland & Sutch, 2009).

Furthermore, the qualitative results revealed the absence of leadership by school principals. This was reflected in their lack of knowledge of what happens on a day-to-day basis in the classroom and the difficulties faced in terms of the time needed for planning and learning in their schools. Additionally, principals did not take direct responsibility for the topics included in the interview. This presents another key problem that has already been identified in previous studies, namely the importance of leadership by the principal for the successful implementation of new strategies. This should translate into providing the appropriate conditions for the

implementation, such as providing time for reflection and learning (Law et al., 2008; Jones, 2004). Finally, the interviews at the three schools also revealed the lack of a suitable environment and organization for learning within the schools. This was clear from the interviewees' discourse regarding the lack of formal organization for planning classes, technical and pedagogical training, and an exchange of practices and innovations, among others.

In summary, the findings of this study show that having an aligned view of the positive contribution of technology is not enough for successful adoption of ICT in the classroom. More specifically, the qualitative and quantitative data was consistent in showing that the views of school principals and teachers were different, particularly with regards to school conditions and responsibilities. Furthermore, the qualitative results also showed that teachers and principals only had a vague notion of the exact pedagogical contribution of the mobile computer labs, while the school principals did not have any specific information on the process of implementing the new technology in their schools. These findings call for a closer presence of the school principal and other members of the school's administrative staff in everyday pedagogical activities. Having school leaders be more involved in everyday classroom activities would help close the gap between their views and those of the teachers, regarding how to successfully integrate technology into the classroom. In turn, this should lead to the implementation of more effective technology integration processes in schools.

One limitation of this study is the scope of the technological innovation. Future research should consider the introduction of another type of technological innovation. This would allow us to verify whether the pattern of views found among principals and teachers here is repeated or, alternatively, whether these views are specific to the mobile computer lab strategy in this study and/or the country's school culture.

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