ICT in schools and intercultural education in Bolivia. Challenges of digital inclusion

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Abstract

This document attempts to get the challenges and opportunities in the use of ICT and inclusion in the educational process in Bolivia. The analysis is the application of a structured questionnaire to interview under qualitative research. The interview collects perceptions and perspectives from two teachers, who work with ICT and inclusion in the education field. The interviewees have long experience introducing ICT in education. The results can aim in the reflection and contrast the evolution of ICT in education towards improvements by interested stakeholders.

Keywords: digital inclusion, digital literacy, special education, postgraduate education, information society.

1. Introduction

Information and Communication Technologies (ICT) in recent decades have become relevant in all areas; especially in how they can support various activities like educational activities. Education is going to take advantage of increasing generational skills with technology.

In Bolivia, since the 1960s, the educational reforms recognize the different educational areas, including explicitly special education. The United Nations Educational Scientific and Cultural Organization (UNESCO) on its report (UNESCO, 2010) refers to the education reform enacted 1994 in law 1565, where establishes the democratic character of education since the whole of society participates in its planning, organization, execution and evaluation. The report (UNESCO, 2010) also refers to the incorporation of the intercultural approach and the bilingual modality in education, responding to the socio-cultural heterogeneity of the country. In the 1990s, most governments start the inclusion in their Constitutions the need to become aware of and take action on inclusive education. In the global context, Bolivia explicitly includes regulations on special education and the need to create a portfolio specifically dedicated to the issues for this type of training (Estado Plurinacional de Bolivia, 2010). Inclusive education is part of the rules, giving the possibility to disadvantaged students participate in the regular education classroom.

The use and exploitation of ICT in the educational task is a central axis. It is under the responsibility of action by the Ministry of Education and its vice ministries. It is a proposal since the 2010 educational reform.

With this legal framework, the spirit of this study is to collect the experiences of people involved in the teaching-learning process with ICT in regular, special and intercultural-indigenous education. The findings help to understand the real situation of ICT and education in Bolivia, the consistency of this reality with the regulations, the adequate support of the entities involved in education; such as government, teachers, students, industry, and others.

2. Methodology and characteristics of the Bolivian sample

The Qualitative research approach is used in the study. The data is collected with interviews using a structured questionnaire with open questions about general information (professional experience, the field of work, teaching/administrative position), implementation of ICT in educational institutions, and feedback about support development of educational ICT in favor of disadvantaged people. The interviews were conducted in a personal face-to-face meeting in a comfortable place se-

lected by the interviewee. All the interviews were audio-recorded with the consent of the interviewee. The interview duration was between 36 and 60 minutes. Finally, the data were analyzed using the interpretative paradigm.

The data researchers gathered in late-2019 through personal interview. Two professionals in the Bolivian city of Cochabamba answered the questions with the purpose to identify the challenges and opportunities in the use of ICT and inclusion in the educational process in Bolivia. The selection of the interviewees followed three qualifications: long time working with ICT in education, experience in the use of ICT with disadvantaged people, and participation in pre-service teacher or intercultural people training.

The first interviewee is a researcher professor working since 1996 in the Training Program in Intercultural Bilingual Education for the Andean Countries from the Universidad Mayor de San Simón (PROEIB[1]). The main activity of the interviewee is oriented to postgraduate training and research emphasizing intercultural-indigenous education (Interviewee 1).

The second interviewee is a teacher with more than ten years of experience in special education. He is currently teaching to pre-service teachers at the "Escuela Superior de Formación de Maestros Simón Rodríguez (ESFM Simón Rodríguez)". He has worked for seven years as a full professor in the special education field and has been director of a center for special education in for two years. The interviewee work focuses on special education and activities that allow educational inclusion (Interviewee 2).

3. Results

In the following sections, we present the results of analysis following eight criteria:

1) ICT use for inclusion in education

2) Obstacles to the introduction of modern ICT-based solutions in Bolivia

3) Hardware and human potential and ICT-mediated education

4) The role of business in the educational sector

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[1] http: //www.proeibandes.org/

5)   ICT and educational innovations in Bolivia

6)   Support the development of ICT-related skills among people responsible for learning and digital inclusion

7)   Open educational resources and work with disadvantaged groups

8)   Support the use of ICT in learning and social integration in Bolivia in light of government actions

These eight criteria will help to identify challenges and opportunities for Bolivia in the use of ICT in education.

3.1 ICT use for inclusion in education

The first interviewee mentions experiences of inclusion of ICT in post-graduate training, to facilitate the study of doctoral and master students under the intercultural framework.

The incorporation of ICT is an alternative to facilitate the study of doctoral students or teachers in blended training plans using Moodle (a well-known platform in the institution). The platform is an accessible space for students and teachers from anywhere across the Internet. Educational activities involve many tools and resources like search engines, emails, forums, virtual conferences.

The interviewee refers to this experience as successful and rescues how the different actors relate in the educational process is long overdue. The experience shows how the need to have the students of this study program connected during the development of distance courses.

"The experience helped us to add the use of technologies in a more improved perspective. In the Intercultural Education Specialization course, the design was an indigenous chair that was face-to-face. This experience had one of the indigenous leaders as a teacher, together with a university teacher. The courses took nine months; one month face-to-face and the rest of months were all mediated by Internet access by computers. … In our case, due to international circumstances and availability to the students, we adopted Moodle… The Moodle platform was the most appropriate selected to use in the course" (Interviewee 1).

"Although evidently, the idea was that all the strategies and pedagogical design have that (open) character; because our impact of the Specialty in Intercultural Education fell to both students, non-students like leaders of the indigenous people, leaders of organizations; let's say by rebound,

but the interesting thing about that effect is that the curriculum itself, in this case, forms a kind of community of interests" (Interviewee 1).

A fundamental element in the use of ICT tools in education is the design of educational materials with the strategies and activities that the student should develop. The plan of evaluation by cross-learning lets to students work without neglect; since their performance depended on others and in turn, influenced others. The educational process must take into account the culture and the essence of students and in the content and usage approach of tools. In the program study, from the experience of the interviewee, the teachers were indigenous leaders. They came from different places and universities giving face-to-face class during a determined time, and the rest of the course in virtual mode. The intercultural education having the participation of leaders of peoples, stands the principle of being a community with the same interests helps to perform well the course. The pedagogical strategy based on the principle of being a community of interests and leaders' participation are factors of success. But other aspects like the content of the study program, the teachers, and the blended context has importance and let themselves to use these tools and technologies successfully. In the experience of the first interviewee, the critical factors determining the successful use of ICT are the cultural trait, the knowledge of ICT by the people involved, the need of using ICT, and the digital infrastructure (connectivity and permanent service among others).

"... What we did was the design of teaching materials together the content to make it possible for not only everything to remain on the platform, our interest was not so much the platform, our interest was how to make the students not distance themselves from the course. What they were doing, that is the central point; how do you make a distance student, who you are not attending to, really discipline yourself to follow the course according to the guidelines? As a result of that we designed some materials of four compact discs with the contents, strategies, perspectives, all these things; In short, they forced the student to carry out the activities, since otherwise, it would harm everyone. The cross activities, so if you had an activity, if you did not do it, then you hurt everybody in their activities. Well, of course, the responsibility was being given to you insofar as you were responsible for the formation of these two and this cross form if it favored and had good results. It was a pedagogical strategy ... Hence we have a very high rate of graduates, practically 95% of the students who have passed the four versions " (Interviewee 1).

According to the researcher interviewed, over time, the use of ICT has practically turned into giving support to face-to-face teaching as a consequence of curricular designs that must fit in a face-to-face mode to accomplish the institution rules. The infrastructures become nearly

content repositories and for proposing and deliver tasks without a clear strategy. He also indicates the Bolivian idiosyncrasy makes the students wait to be in front of the teacher, to interact with the teacher, which will answer questions or make proposals.

"...Our idea was in the master program, which was entirely face-to-face ... to free some activities and resources with an ICT component. The former idea did not prosper much, because the strong weight in the face-to-face makes the same student not commit as much with the ICT use, he prefers to save himself the doubts and activities for the moment of being present with the teacher. We still have support in computing service, on platforms, but they have become practically repositories, there are the programs, the activities or tasks, the mail service and that is all. So this is highly complementary, we could practically do without all that, but we do not do it, because it has become a custom that we deposit programs, dossiers, files, images, videos there, but it is completely complimentary" (Interviewee 1).

Regarding the use of ICT in other educational areas such as higher and primary education, the researcher interviewee indicates they are used to support, above all, the distribution of materials and communication, through the use of computers, mobile devices and the applications that these provide. The most common software and resources are WhatsApp, platforms like Moodle, Facebook, and PowerPoint. The result is the underutilization of resources in environments not oriented to the teaching-learning process pushing all the effort in the face-to-face classroom again.

"To the extent that they are being used as a training medium, no; that if it is being used as a support medium, yes; There are several schools that use WhatsApp, platforms, Facebook, but that to exchange tasks, activities; to that extent if, simply as a complementary support medium" (Interviewee 1).

"I would say the use of technologies is positive. I believe we must distinguish in which it helps you; for example, things like communication: when they meet, when the task is delivered, the task consists of such a thing, deliver this, exchange of those things. But they are not necessarily oriented to the act of training, of teaching-learning itself, although of course, the effects will always be teaching-learning; but the separation between technologies and training act itself is the right thing to do. I can send my students, for example, homework through WhatsApp, and that is nothing and everything, but when is the teaching-learning process itself resolved? It is again in the classroom and face-to-face because that distinction is important to see. Using media of this kind is easy, you have it, on mobile phones, on tablets and that's it, but to think of another

way of using these media requires another type of vision, training, and thinking. How to use them, thinking about the logic that it has; which is different, because it is one thing for you to learn to use them, you are pending in the skill of using it" (Interviewee 1).

Educational ICT tools are complementary resources in the teaching-learning process. The teacher and student must be aware of the tools will help to improve the learning process; it is not useful to reproduce the traditional model into tools which need to apply different learning approaches.

"Another thing is that if you want to use them, it is like the PowerPoint, karaoke teacher is a filing cabinet where you put figures and read and expect the student also to read and learn from that. It is a point of criticism of many students, for that is what they call them, karaoke teachers (laughs). Still, another thing is that you use this resource as a complement to reinforce learning regardless of what appears, so you require a kind of change of vision about the resource, right? Not in the resource itself, but for what you want. And that is not very easy" (Interviewee 1).

Special education is inclusive in Bolivia, and the conditions of people with disabilities must be the same (UNESCO, 2010). The specialized software and devices to help children with special needs are expensive, and ICT usage is not used in public schools. Experiences like the second interviewee, with adapted devices to use computers through other parts of the body that are not necessarily the hands let teachers work with ICT and inclusion in schools. These experiences are a response to students' needs, to their curiosity about technology and the interest of teachers to provide an alternative solution. But the teachers have no experience with device construction, neither full access to the Internet and few of them involve in this kind of activities.

"They (children with impairment) see other people who are using technology, so they also want to use it. The focus of the law is inclusive, and we have to equalize the conditions of people with disabilities. Since 2010, thanks to a student with multiple disabilities who liked to play FIFA Soccer and had muscle spasms, he could not play it; he cried of impotence, so what do we do with this situation? We have looked for what tools we can use… but few teachers have become internalized in this. Teachers asking how can help with ICT to these students are rare. … we have discovered an infinity number of applications that we are completely unaware. The first experience has been a software called EViacam that allows you to move the mouse and have access to the computer only with the movement of the head to control some action in the computer game, we have done those first tests…" (Interviewee 2).

"After that, I became a supervisor at a special education center in Tiquipaya, where several students with autism are trained. In this educational center, we looked for and used this EViacam, and we also adapted some mice. I brought a mouse for them to use, and we have decorated it so that it catches their attention because students with autism need it to get their attention. It is a simple adaptation, but it has given us good results; we have put some pulse buttons in a table and headphones together computers instead of a traditional mouse because the students with autism are equally attracted by technology. These kinds of students do not dominate motor skills, so when you say left-click or right-click, they do not dominate motor skills. As a result of this motor skills issue, we have looked for what we can do; and we built this (he shows the manufactured device). With this device they already handled the clicks, this like-mouse (shows the device) have built with wires and pulse mouse buttons, they are in a trapper with adequate separation between the buttons; the device has decoration to catch the attention of students with autism. They entered and operated the computer with this device" (Interviewee 2).

Although there are these kinds of experiences, the interviewee indicates there is still a lot to do and know; teachers, who have computers to support classroom learning, do not use them, except for very isolated initiatives. He rescues the contact with people who have different abilities and lets the teachers question themselves and seek help or technological support to improve their work.

"For example, there is a teacher who did not know how to make pictograms. In the subject of autism, she does a lot of work with pictograms, so she has seen a resource called ARASAAC[2], which helps you in communication with autism students. She had an idea of how to do pictograms but did not know how to take them to the computer" (Interviewee 2).

3.2 Obstacles to the introduction of modern ICT-based solutions in Bolivia

There is a lack of computer rooms or equipment, either standard or specialized schools. This low school equipment is a significant obstacle to introducing ICT in the educational process. The same thing happens in the classroom since a large percentage of teachers do not use the computer provided by the government in the school. But there is another kind of obstacles in the use of ICT to support distance education: the design of the virtual course, which are face-to-face, and the intention is

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[2] An Augmentative and Alternative Communication System offered as an expression set other than spoken language, to increase and compensate for the communication difficulties of people with disabilities. http://www.arasaac.org/pictogramas_color.php

to use ICT for virtual support without any change to the plan. It leads to an inappropriate way of using ICT.

"It is alarming to see in the classroom the little use of technology. In 2012 the state provided a computer to each Bolivian teacher despite this, very few teachers use this as a tool to teach their students. Worse still is in the special education centers, it is rare for the use of computers by the teacher, or that a special education center has its computer lab is rare. Students with disabilities are surrounded by technology at home, like mobile phones. Still, sometimes the family restricts technology to people with disabilities because they think the children are going to damage it, so they limit the children's experience using this kind of device" (Interviewee 2).

"Maybe that is what we were talking about a little while ago: for what you are using it. I think if you design a course or a virtual training activity, the design itself already begins for those types of elements. Still, if you have not thought of them for that type of media and you have thought of it for a face-to-face vision, it becomes complementary, that is what has happened to us" (Interviewee 1).

The following reveals issues in actor training and for what ICT is useful. The interviewee considers how to use technology in education is misunderstood, due to a lack of openness in understanding the potential that technologies can offer and its use practically reduces to the generation of digital resources as a naive replacement for printed resources.

"You have an interesting issue in the sense of saying: if you train a teacher and are given technological skills, for what does she use it? Is it used to improve her teaching process? Or to, let's say, have the possibility of digital files on certain problems that are taught, part of daily life, let's say. It depends on what you are going to use it for, obviously, but the trend is this. One of these conclusions is: I believe that we are not very open to understanding the potential of technologies." (Interviewee 1).

Other point that highlights the limitations in the use of ICT is the sociological idiosyncrasy of both students and teachers. The objective to use technological resources for a task can dilute by how students are. As the interviewee stands a storytelling task becomes an emotional dramatization going away from the educational goal.

"The mandate was good; what teaching resources of the indigenous language can be elaborated using ICT. But see how it goes to practice distorting it because the results are that students prefer to produce dramatizations. Still, it seems a bit like the skill of storytelling where there are

some elements out there; what is striking is the use of the ICT medium to show the emotional experience of each student, not to enhance the technical education. Then the orientation of problems to the experience of migrants, abandonment of children, and the woman who is mistreated by society in the content media is not the goal of the mandate. Of course, the nature of a medium may address this kind of use; but, I think that is interesting because the limitation the user gives to this medium is by the distinctive sociological preference" (Interviewee 1).

Another important aspect when talking about ICT is the lack of knowledge of teachers regarding technology and specialized software to support students. The forms and customs of doing things are an obstacle when it comes to including technology in the teaching practice; since it is underused and in the long run, it does not have the impact that teachers expect. The teacher experience with ICT affects to students with disabilities, in a sense to get access to learning environments adequate for them; teachers do not know what to do when faced with a particular situation of having a student with a disability, in these cases, educational processes should adapt.

A requirement is to change the dynamics of the classroom for learning, not to replicate the traditional practices with the technology, like long magisterial class using blackboard.

"It seems to be another source where we can see this is the teachers: the government provides teachers with computers, but I have not seen the impact of computers in the classroom, in the teaching process. My daughter, who has finished school, by obligation, got a tablet. Still, if I see the contents of the course in the tablet it is really like a library, it is a repository of programs, activities that they have to carry out and all those questions, it is not necessarily a learning artefact. Because the teacher uses this device to send them their program, to review assignments, I am not saying that it is bad or that it is good. The devices can help in making an essay, or look at the multiple resources there are to teach math; which is not on the blackboard.... But it is because the teacher has not projected in his professional profile the potential that such an artefact may have. Still, also, our existing connectivity system is not so efficient. That is already telling you the logic, the technological culture here in Bolivia is still quite limited" (Interviewee 1).

"I think the teacher has a limitation in the educational pedagogical training; perhaps he has not been involved in ICT use or studying basic electronic-mechatronic. The teacher, who works in the classroom has endless ideas of resources. For example, a teacher wants to teach students with disabilities how to use traffic lights, and has seen those glasses (virtual reality), and says if someone could do it to me to simulate a

street, with traffic lights so that they live that reality without exposing to danger. They have initiatives, but, the limitation is we do not have those competencies to develop this type of resources" (Interviewee 2).

3.3 Hardware and human potential and ICT-mediated education

The new Bolivian generations, who have been born after 2000, have skills in the use of technologies. They are not finding in the primary or higher training system a way to exploit these skills. The new teachers are looking for this training abroad. He believes that this generation must be given the space for training in ICT in an independent way of their profession and even more.

"For me the issue is generational, well that is well known, it is not only my appreciation, you know that I study generational change and technologies, I think it is the context in which this issue must be thought. I see the new generations are going to say since 2000; they have that possibility, I think that potential would be there. These people are going to other countries because here they would not be finding a way to grow their potential" (Interviewee 1).

There is a need to start the training in the educational purpose of ICT tools and keep away exposing slides. This training is a responsibility of the educational institutions. The training must start in the service teachers, who have contact with the realities of special education and in training teachers. They see the needs of special education students. Some teachers in the special education system have experiences in the use and adaptation of technology and require an extra reasonable effort to learn about device adaptation topics not present in the teacher training. Many of the teachers have excellent ideas, but they have limitations to capture and deploy ICT adaptations.

"I believe there is the potential. You see very skilled people who are blurred in the same centers, in the institutes or if you see here at the University. You see very skilled people who solve software problems. Now, the sandwich generation, like me, access these resources and devices; we have the possibility, but we are still anchored in a tradition. If we use these means, we do not demand them; we do not squeeze them. Still, we are calm, I do not see any center that says or even proposes a policy on digital centers at the University, which we should do, but it is like we do not need…" (Interviewee 1).

"… The teachers have initiatives, but the limitation is they do not have those competences to be able to elaborate on this type of resources. Herewith the students from the ESFM, we have tried to replicate some

device adaptation experiences. It has been done because it is not too complicated, no in-depth knowledge is needed, we have tested which wires and circuits empirically and it has worked for us. This experience has caught the attention of some students showing the necessity to complement the training in these areas. I think it could be overcome, although it is a limitation, we in the area of education have little contact with technology. Teachers who use technology think it is to connect their computer to their data display and give presentations, doing the last they limit themselves. It must not be as it is now, it is extensive. I believe more things can be done, but we still lack it" (Interviewee 2).

3.4 The role of business in the educational sector

Our interviewees know of some initiatives of companies with schools for the provision of devices at reasonable prices. They also know some institutions offer training through technology workshops aimed at professionals outside the educational field. As far as the industry, it does not have a real impact in supporting the educational process, and his experience is more a relationship of economic order. There are unsuccessful experiences of approach to the most prominent software development industry in Bolivia searching for help to operationalize the teachers' ideas. Making strategic alliances and joining efforts between the institutions and the company is a pending task at the Bolivian level; for the support and collaboration of each party in pursuit of improvement in the special education process.

"At the level of agreements, the JALASoft Company has several agreements with schools. I am not sure if it is to support, coordination or training; for example, I know some people are going to train there, but they are graduates. I think there are agreements like to lower costs, for example in products. JALASoft offers tablets or laptops and sells to schools in an agreement at low cost, and technical service that has to do with hardware or software and that is all" (Interviewee 1).

"...we contacted the company JALASoft. This company develops software, but they told us to send a Project, they were accessible, they had projects in the area of education, but the educational management ended then nothing happened. It was always in my mind that someone who knows about ICT development can help us, for example, the University" (Interviewee 2).

"I think it is necessary to join forces to achieve true inclusion. As I tell you, the reality like the student who is included here (he is talking about the ESFM students) is harrowing because she does not understand what is being talked... We have presented all this material and many more ap-

plications aimed at people with disabilities at a fair for the ministry of education; unfortunately, has not interested them. I think it is necessary to make strategic links with some institutions that can help us with the development of educational material in the ICT area. For example, this (showing to the mouse built by himself) device; you are not going to find an adapted mouse in the market. We have searched and found in the Spanish market an expensive one, near to 75 Euros without transportation cost. This device is expensive, inaccessible for our society…" (Interviewee 2)

3.5. ICT and educational innovations in Bolivia

Our experience and assumptions from the experience of the interviewees are the knowledge in ICT applied to education are individual or low-cost projects not transferred to society. Some teachers have an interest in ICT education and inclusion; these teachers start replying experiences from the Internet and get it works for their class. Most of the innovations are solutions are tailor-made to the needs of the students in the special education experiments.

These innovations have to facilitate computer use or to improve aspects of their use in daily life.

"Speaking of which, just a colleague tells me: I have made a practice from platforms with my students on the topic of evaluation: because there are evaluation models, I made an evaluation and the idea was not that I evaluated the students, but they evaluate their learning through certain types of activities load by me in the model, and it works…" (Interviewee 1)

"In the special education area, where we work with people with visual, auditory, physical, and motor disabilities; the need is varied. A teacher, who had a student with visual disabilities, said she always had problems with the cane and with the architectural barriers; and suffered accidents, so she wanted a cane like a car that when she is going to collide emits a sound alarm, something so simple to incorporate on your stick and warns if there is an obstacle near to the user…" (Interviewee 2).

3.6. Support the development of ICT-related skills among people responsible for learning and digital inclusion

According to the first interviewee, support is required in two areas: infrastructure and training; both necessary and conditioning each other. Reflects on the need to provide better conditions in terms of services and equipment in spaces dedicated to education and the need to train

human resources in the proper use and potential of ICT. Training, especially for teachers, should not focus on the technical side of equipment and software, but in the conception of technology-oriented to teaching and research.

Infrastructure without adequate training to human resources is useless. The teachers need training in ICT for education drive by curricula and instructional design. The training initiatives need to respond to a vision allowing all efforts to be interconnected in pursuit of an educational purpose. There is an essential generational difference between teachers, a digital literacy gap that still needs to be filled.

"Maybe there would be two things to accomplish. One is in the field of services; I am referring to connectivity and access because first I believe the access must be installed and second for the access to work properly, you also have to give good connectivity, tools, and devices. It is one area, the other is at least to start a kind of training node for people who want to venture into ICT and education... you can have a good service all this thing, but if you do not have a center driving the generation of a critical mass, nothing happens either, because they are all scattered, right?. There is no interconnectedness of interests either, so I think you have to pay attention to both." (Interviewee 1).

"When talking about special education and people with disabilities, the word 'adaptation' will always be present, since nothing produced is intended for people with disabilities, you have to adapt everything... You find needs also on the kind of resources, which can help the student in the type of disability; for example, in the case of signs, the item of braille, an endless number of needs exists in special education..." (Interviewee 2).

3.7. Open educational resources and work with disadvantaged groups

The use of open resources is related to the design of the curriculum, according to the first interviewee, in Bolivia, there is a closed curriculum from the educational law; since it promotes training of competences for the current and internal market. He believes that open curriculum design is impregnating scientific knowledge that forces actors to observe what is happening in the world and can be a connection with the free educational resources. From their perspective, the curriculum directly influences how to share resources.

"I think it happens due to a matter that was presented to us when we did design, precisely in the specialty. It goes through what orientation the curriculum has, which is that conception. We have discussed it very

much; because it was necessary to be clear about what we wanted to do with a type of education which is remote and a theme that had to do with the training of educational managers for indigenous peoples, that was the framework. In other words, how we use the curriculum or what impact it may have on connectivity over these resources that you are calling open. Although evidently, the idea was that all the strategies and pedagogical design have that character" (Interviewee 1).

An alternative for the introduction of open resources in pursuit of inclusive and accessible education is training through technological schools. The school needs to cover three perspectives: technological training, technological thinking, education thinking. The technology is complimentary, and you need to think about technology, education and how to train it.

"Make a kind of node where you can deploy and respond to these demands, a small technical school, I think. Where unlike these other schools, you teach them not only technological training but to give it a technological thinking name. They are supposed to infect others is a good strategy, it works, it even applies to some cases of companies, where two starts, these two they spread to two others, there are already four, that's a strategy. It is a good possibility; it is a possibility that is neither bombastic nor raffles all at once. If some pedagogical strategy can be applied it is something like this because starting in a massive open way does not work" (Interviewee 1).

Education for disadvantaged groups requires and demands training alternatives. It is essential to have spaces in which other strategies cause a multiplier effect to benefit disadvantaged students. The alternatives include differentiated programs and individual attention. Since the training of competences should contemplate the particularities of each student and in these cases include the use of ICT to help him develop skills.

"Disadvantaged groups have many types of disadvantages; you have disadvantaged groups, for example, students from poverty, who come from rural areas, but there are also disadvantaged students who still come from schools. We are going to say 'good' in the city, and they are still at a disadvantage because the system has constrained them in that type of curriculum. For me, it is no coincidence that the University is becoming more widespread. The University teachers are aware the students are arriving without knowing how to study..." (Interviewee 1).

"...there are other disadvantages; those who have special abilities, but that requires another type of attention, it is distinct from having limited skills, right? I read an article, how to use technologies for deaf children

and a series of elements that allow them to display their skills like any other without impediments. I think the issue is, not to turn any program into a remedial plan, it must only have a component of a particular type of competencies" (Interviewee 1).

"Thinking of a visually impaired person, all the resources accessible in the platform are with audio that allows you to listen where you are. On the other hand, people with hearing disabilities, the platform could offer sign translation or the interpreter telling you in which sector of the platform you are or what you are going to do in that space. Finally, for the intellectual disability, what has wide use is the pictograms..." (Interviewee 2).

The learning content must be the same as the one for a regular student, which is the principle of inclusive education in the Bolivian law.

"Speaking about inclusion and education, they should learn the same things that others are learning, but differently..." (Interviewee 2).

Regarding people with a disadvantage due to their origin, for example, of language, our second interviewee reflects the ESFM is an inclusive educational institution. Still, effectively it is not paying attention to people who speak another language. The teacher is teaching in his speech or the majority speaker language as an imposition. In this field, work is on projects that oblige teachers and faculty students to learn Quechua (one of the indigenous languages spoken in Bolivia). In many cases, there is resistance. The strategy, in this case, would be the obligation through regulations to effectively address this context of disadvantaged people.

"We have two modalities of acceptance to ESFM: one to examine and the other for belonging to an indigenous/native/peasant student. It is a great difficulty in the subject of literacy and communication for the people who come from these contexts because they are Quechua culture, even though something happens at school. However, they still have these problems. It currently exists in our population." (Interviewee 2).

3.8. Support the use of ICT in learning and social integration in Bolivia in light of government actions

The law establishes the use of ICT in education; but, there are no policies of management taking into action the rules in the legislation. The training in ICT for teachers is low, and there is no training related to ICT for disadvantaged education.

"Well at least at the level of the law it is cited, it expressed the intention the ICT is going to be part of the training of new students. Another thing is that it is not done as it should it is lent very little attention, there is no technological planning unit in the ministry, for example, but this one is stated at least. As politics, there is nothing visible, at least, but it is fascinating that under the protection of the law..." (Interviewee 1).

"Although the Ministry of Education is working more on the subject of equipment and infrastructure, neglecting the subject of what is ICT and the preparation of teachers, such as I tell him all the teachers have received a computer, but we do not know how they are using it, so the Ministry of Education has ICT workshops, but they are not aimed at working with people with disabilities..." (Interviewee 2).

There are spaces like EDUCA INNOVA (https://www.minedu.gob.bo/) that promote the ministry, where teachers present their innovative initiatives; however, the majority directs to regular education and not pay attention to work in special or inclusive education.

"...fairs organized by the ministry are open, for all regular education and special education. Two years ago we presented ourselves, and we were the only special education center, everything was absolutely everything for regular school..." (Interviewee 2).

The activities promoted by government spheres such as the EDUCA INNOVA fairs are more to show teacher initiatives. There are no policies to encourage these innovation proposals beyond the festival. The result is not sustainable over time; the teacher presents the project but has no support to replicate. There is also no possibility of having access to the information of these proposals beyond the fair. Therefore, enthusiasm is born and usually dies in the space of the EDUCA INNOVA fair.

"The information is available only at the fair, they ask for contacts at that time. For example, I have been interested in the Augmented Reality Project of a school, at that time they explain how they have done it and tell you to contact me if you want more information and I got in touch, he said I would send you material, and the material never came to me, that happens, maybe it is a little suspicious, I don't understand, but as it says, this type of experience should be replicable, but in some cases, it doesn't happen" (Interviewee 2).

Discussion

Teachers play an essential role in the inclusion of ICT in education (regular, special, primary, and higher). In this understanding, the comput-

er provision to teachers by the project "one computer per teacher" aims to the use of technology in the teaching process and helps to improve the quality of teaching (AGETIC, 2018). The findings in AGETIC (2017) shows that the majority of students over fifteen years old have a mobile device, and is getting used with the applications installed on it. The experience and findings in Costas (2019) show that the use of technology is limited to communication and content distribution; the use is not as an instrument to support learning activities. The low-level technology knowledge is related to the low income of the majority of the population in Bolivia (Costas, 2019).

Teachers use platforms, unique applications for specific topics, and software to produce content (e.g. PowerPoint). The use of technology mainly for content production is a finding in the reports from (Farfan et al., 2015; Costas,2019), the interviewees state that the teachers widely use technology for content production.

From the perspective of academic planning, the curricular design in Bolivian education for all levels of education: regular, special and higher influences the application of ICT causing in many cases the underutilization or lousy use of ICT.

The teacher ICT experiences and the need to link the curriculum with ICT tools for the learning process is a perception of the interviewees and concur with the findings in Costas (2019). The challenge for teachers and students in Bolivia is changing the use of technology from communication into a learning tool. The interviewees mention the access to technology by teachers, but without adequate use in the education field. The interviewees state a need rethinking curricular designs to let teachers make changes in the classroom didactics.

In the case of special education, there is a lack of access to devices for impaired students; many devices are expensive and not available in Bolivia. Teachers have no experience, nor awareness of devices and software that are free and feasible to build locally; they need help from Universities and NGOs to work on this kind of ICT. The technological focus in special education is the use of ICTs to equate the conditions of study and improve the quality of students' life.

The following challenges in the ICT use for inclusion in education in Bolivia are:

• The teacher is a key person and responsible for the inclusion of ICT in education.

- Improve the connectivity, accessibility and availability of Internet

- Take advantage of the wide use of mobile devices by young people

- Include the use of ICT in curricular design

- Include in the classroom didactics use of ICT

- Promote Universities and NGOs in helping special education ICT tools awareness and accessibility.

- Awareness about cultural and idiosyncratic situations

The reduction of the digital divide in Bolivia has the main improvement in the access to the Internet by mobile devices, which has a broad penetration in the Bolivian society (Marin et al., 2014; ATT, 2019). The accessibility and connection speed are a persistent problem related to the quality of the service. The strategic plan PRONTIS, (2014) is to improve the accessibility to the technology by Bolivian population; the goal is to provide electricity and internet access to each community around the country until 2025. The PRONTIS implies the provision of computers to teachers and students. It includes the complete installation of the infrastructure to have computer laboratories in schools. Yet, today, not all schools have access to services such as the internet and electric power as well as adequate environments for their operation, and only the best-equipped schools receive the technological bases.

The reduction of the digital divide in particular in the area of education is the result of actions carried out since 2011 with projects like "One Computer per Teacher", "Community Educational Telecenters" and the inclusion of ICT in Initial Teacher Training (IIPE, 2014). The Complementary Training Program for teachers of the Plurinational Educational System of Bolivia (PROFOCOM) offer workshops training in ICT use, mainly in regular education (Costas, 2019). These actions are the starting point to increase the use of computers by teachers. The training of students efforts mentioned in (Costas, 2019) are projects not coordinated between the government and NGOs, the lack of coordination shows the students still using technology for content search and entertainment.

In the case of special education, the absence of computer rooms and the lack of attention to teachers in terms of technological support, training and knowledge to express their ideas, are obstacles to overcome.

The following are obstacles to overcome in regular and special education:

- Improve connectivity, availability and accessibility

- Lack of ICT equipment in educational units

- Reduce the digital divide in students

- Boost classroom didactics

- Teacher training in ICT as a complementary educational tool

In the Bolivian context, there are spaces like EDUCA INNOVA[3] and programs from the Ministry of Education for the training of teachers (Ministerio de Educación, 2016). The training plans have specific workshops related to ICT as a requirement for all graduates from PROFOCOM. The former is a requirement for the teaching practice, but the training gap persists and does not fill the need for competencies by the inclusion of ICT (UNESCO, 2011).

The application of ICT in education requires the assistance of different sectors and people, but undoubtedly teachers must be considered in their essential human potential. Supporting the teachers involved in special education is important, especially in training for pedagogical purposes and supporting classroom improvement initiatives for disadvantaged.

It is essential, in under developing countries, such as Bolivia, to incorporate the use of technology into education. The incorporation of ICT in Bolivia will need efforts, economic and trait approach with technology. Bolivian teachers and students need not only to learn to use technology in the learning and teaching process, but also convert it into a tool for this process. In the work of (Voogt, 2008), there are two routes to cover for education: social, and pedagogical. The former is about learning the necessary skills in ICT incorporated in school; the latter refers to the educational view; it means to think about teaching and learning, including ICT in the education process.

Regarding the point of analysis of Hardware and human potential and education mediated by ICT are the teachers, so the challenge is to work on:

- Encourage initiatives to improve ICT educational use by practicing teachers

- Strengthen the training of technological capacities of teachers

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[3] http://educainnova.minedu.gob.bo

- Improve the competencies of practicing teachers regarding ICT

In the case of Bolivia, our interviewees know that some companies have agreements to provide equipment to schools and recognize they are ready to give support to improvement projects in education. Although their participation looks minimal, the results will be useful to join efforts to enable the company collaboration with teachers who demand their involvement.

There are references to projects from companies in favor of education, as shown in (JALA, 2020; Tigo, 2020; UNDP, 2020). The projects range from the development of teaching material through educational videos to initiatives to alleviate the problem of connectivity. Other experiences (Rojas, 2011) have to do with the support of infrastructure to build virtual networks to share information and support interest groups, in this case, teachers.

Our interviewees refer to some initiatives that relate the company to education but consider that their participation is still low, the suggestion is to join efforts so that the company can collaborate with teachers who demand their involvement. They believe that providing solutions to problems that arise in special education can be a good start for organizations.

Regarding the role of the company in the educational sector, there are the following aspects in which it is necessary to work:

- Improve the incidence of companies in support of regular education

- Promote a business-education relationship that allows solving specific needs

- Promote a channel for the dissemination of company contributions in education

The interviewees' comments about innovations are a response to the needs of the students and teachers, who creatively want to respond to situations that arise in the classroom. Apart from the motivation they have, it is essential to provide spaces where these innovative experiences are made known or even areas to make their needs known. Currently, there is a space promoting innovative initiatives by teachers, the EDUCA INNOVA fair, in the EDUCA INNOVA site, there is a gradual change over time in the use of technologies and media. Each year the resources and the topics the participants introduce are related to specialized devices and even to the construction of basic hardware to encourage teaching in the classroom(see http://educainnova.minedu.gob.bo). This reality is con-

sistent with the interviewees' comments regarding innovations, which respond to the needs of either students or teachers, who creatively want to apply new alternatives to situations that arise in the classroom.

Some aspects to promote in educational innovation are:

- A repository of the experiences related to innovation in education

- Support for innovative initiatives

- Promotion of innovative initiatives

Specialized support for the development of skills related to ICTs among the people responsible for learning and digital inclusion, requires a critical training component, which allows meeting the specific and specialized needs in the care of disadvantaged people. Students with disabilities live surrounded by technology, and many of them are striking, so it is an opportunity to use this fact for educational purposes. However, to achieve this purpose, work must first be done on its use and then on adapted resources as potential teaching aids.

The provision of a stable, reliable and accessible infrastructure in controlled spaces requires trained people. These trained people must respond quickly to problems that may arise when including ICT in the teaching-learning process. In Bolivia, this scenario is present in higher education institutions, but in schools is practically non-existent, public schools practically do not have access to the Internet, and some private schools use communication platforms.

Support the development of ICT-related skills among people responsible for learning and digital inclusion require the following:

- Constant digital literacy programs

- Develop interconnected training programs for the different actors (teacher, student, school administrator) in digital inclusion

- Develop skills and knowledge in the use of technology-oriented to teaching and educational ICT research

Open educational resources and training disadvantaged groups with ICT need a lot of work according to the collected perceptions. The uses of these resources should respond to open curriculum design; however, when speaking of a sector of disadvantaged groups, the use of these resources is an enjoyable and quick alternative in response.

Open resources provide a wide range of possibilities in the field of education. Having tools catalogued as open resources, allow their use and become the main basis for the inclusion of ICT in education. Open educative resources are not a field of exploration in Bolivia. Thorough knowledge of an OER is very important in the training of an educator, whether for evaluation, production or use.

The innovations that teachers show within the framework of EDUCA INNOVA, lack a dissemination mechanism, and the experience sharing is a pending task. There is still no culture of having free access to the projects and their resources. One of the interviewees suggests that open educational resources are per an open curriculum design. In the case of Bolivia, the curricula have a closed trend, which may influence the generation of OER.

Regarding the attention of disadvantaged groups, the Bolivian government has taken actions that allow providing education to different sectors that are disadvantaged to reduce illiteracy through alternative education (Ministerio de Educación, 2017). In the document (Ministerio de Educación, 2012) the curricular and methodological guidelines of inclusive special education with the help of ICT tool; But, in practice, there is a lack of knowledge in the ICT tools to apply in special education as the interviewee stands.

The challenges need to face in working with disadvantaged groups, and the use of OER are:

• Teacher training in open educational resources

• Higher education alternatives other than university for disadvantaged groups

• Promote the construction of open educational resources

• Education for disadvantaged groups are opportunities for the inclusion of OER

Regarding the use of ICT in learning and social integration from government actions; is right to mention the educational law ponders aspects of training for all, multicultural and inclusive and considers the use of ICT to improve education. A proper space for teachers to show their initiatives is EDUCA INNOVA. Teachers see this activity as a showcase to show creative efforts. Still, they do not have continuity since there are no policies to make these initiatives sustainable or replicate them to other units. They comment that the financing of these initiatives is personal and

in some cases supported by NGOs represent costs covered by teachers if they want to use this promotional space. In this sense, teachers require the generation of action policies that in turn allow the Productive Cultural Society educational model to get useful in the classroom and society, in the spirit of right investments in the educational field.

Regarding the use of ICTs in learning and social integration from government actions, it should be mentioned that the educational law contemplates aspects of training for all, multicultural and inclusive and considers the use of ICTs in improving education.

The regulatory framework from Ministerio de Educación (2016) establishes the use of ICT in the educational system following the training for all, multicultural and inclusive aspects of the education law. But the framework has limitations in the connectivity and accessibility to the Internet; the same applies to technology. The government should take actions to succeed in advance of the education system and ICT use in education.

Both interviewees consider insufficient progress regarding government policies and law related to ICT for regular and special education; the reality does not reflect the policies in the documents. Both agree that laws exist and that the foundations have been laid to reduce the digital divide in a first facet; it is time to move on to the next step.

Regarding the support for the use of ICT in learning and social integration in the light of government actions, teachers demand:

• Training in the use of ICTs in education specialized in inclusive education

• Sustainability policies to innovative projects presented by the teacher

• Policies that allow the replication of good experiences

• Investments to aim sharing and replication of teacher experiences of EDUCA INNOVA fair

• Training in the use of ICT in teaching, on all specialized inclusive education

The experience accumulated on ICT applied to educational programs aimed at indigenous, always taking care of the indigenous as community and culture, is necessary. Clothey (2015), agrees there is a few research about ICT for promoting educational access for indigenous population

and sharing experience results between scholars and teachers is mandatory to improve the results from past experiences. The first interviewee is relating to the experience of education helped by ICT oriented to indigenous communities. ICT has capabilities and resources to promote and improve education for indigenous populations using their cultural values, as suggested in Clothey, (2015).

The results presented in this document show the perspective of two teachers with experience in ICT and education, one from the University and the other working with education for the people with disabilities; from the Bolivian reality regarding the inclusion of ICT in education. For this reason, the results are not irrefutable facts, however probably a set of them give an overview of some aspects with which many agree. In any case, the objective of releasing opinions regarding the. The use of ICT from two different perspectives has allowed us to find common ground and raise concerns about the exercise of ICT in education. The result of the study is useful information for teachers and stakeholders related to education in Bolivia. The results will help in the reflection and understanding the ICT use in education and evolution in contrast to experiences from other countries.

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