Information and Communication Technology (ICT) Integration in Education: A Holistic Framework

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Abstract
The constant evolution of ICT integration in K-12 settings has been accompanied by research into the relative effectiveness and efficiency of technology to enhance learning and achievement. Based on the literature surrounding the integration of ICTs in pedagogical contexts, this paper provides a constructive reading of the current state of educational technology integration in k-12 settings by taking Bronfenbrenner's Systems Theory as a starting point to understand the ecological subsystems and/or multi-level factors such as pedagogical, social, cultural and structural contexts impacting on the integration of ICT in the classroom. Analysis of ICT in education using Bronfenbrenner's systems theory allows us to be aware of the messages in sub-ecologies when integrating ICT at the classroom level so that collisions or opposite signals do not materialize. We have come to expect that technological tools improve learning by default. Technology is not the be-all and end-all. It is just a tool. We need to let education lead technology. Before integrating technological tools in education, all stakeholders including teachers should have a vision and a clear plan of how to implement that. It is all about technology being led by pedagogy and not the other way around. Unless we make sure that the whole sub ecological systems supporting ICT integration in educational settings do not have contradictions, we will forever stay in the trap of ICT being 'oversold and under-used,' as Larry Cuban says (2001).

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Introduction

Technology is key to meeting globalization needs, advancing Canada's economic status, promoting political accountability, and enhancing our young adults' educational opportunities (Information Technology Association of Canada, 2013). The knowledge and communication breakthroughs that society can achieve using information and communication technologies (ICT) are vast. Institutions in Canada are accordingly investing in ICT tools in an attempt to develop citizens who are ready to face the challenges of the 21st century where media, manufacturing industries and commerce have become increasingly technology-oriented (Raby, Karsenti, Meunier, & Villeneuve, 2011). Indeed, the integration of information and communication technologies (ICT)[1] in educational settings in North America has reached a point where one is hard pressed to find a classroom devoid of any digital technology.

Despite the fact that digital technology potentially facilitates new approaches of teaching and learning, it cannot guarantee per se that effective and appropriate learning outcomes are achieved (Kirkwood & Price, 2005). Several studies claim that the way in which technology is being supplemented or utilized to aid teaching instruction in the classroom can lead to either higher or lower student achievement (Becker, 2001; Edwards, 2003; Gray et al., 2001; Lei & Young, 2009; Stallard & Cocker, 2001; Tienken & Maher, 2008).

Previous research often ignored the systemic nature of ICT integration, including the role of school characteristics (Tondeur, Devos, Houtte, Braak, & Valcke, 2009, p.224). Contextual factors are paramount in 'facilitating' the use of ICT for teaching and learning, thus making its use in the classroom more accessible (Tondeur, Devos, Houtte, Braak, & Valcke, 2009). Tondeur et al. claim that ICT integration in education is influenced by certain characteristics of the school such as structural characteristics which constitute the infrastructure, planning and support systems, as well as cultural characteristics which include school vision and mission. "[A] mere focus on teacher characteristics could lead to 'individual blame' rather than 'system blame' when focusing on explaining variables related to limited ICT integration.

The goal of this paper is to present a theoretical framework that can be useful in engaging critically with the literature on ICT implementation in pedagogical contexts. This will help develop new understandings of the debates surrounding ICT integration in education. In education, which acknowledges the fact that the classroom exists in a much larger, complex framework of direct and indirect environmental forces, the environment is not composed only of the teacher and the students surrounded by classroom walls. Through a multilayered perspective to technology integration in education, stakeholders will be provided with the necessary foundation to develop richer understandings of the current educational technology integration in pedagogy and, perhaps most importantly, towards realizing the educational potential of these technologies engaging in the teaching and learning process.

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[1] *For the purpose of this paper, ICT in educational settings is used simultaneously with educational technology to refer to the use of technology for communication and information processing purposes to impact the knowledge of learners.*

Theoretical Framework

Bronfenbrenner's ecological systems theory (1979) presents a useful theoretical lens to engage critically with the literature surrounding ICT integration in schools. Bronfenbrenner's theory accounts for the person, the various nested environments, and the interaction between the two in the examination of that child's interaction with technology in the classroom. Bronfenbrenner claims that " a child's ability to learn to read in the primary grades may depend no less on how he is taught than on the existence of and nature of ties between the school and the home" (Bronfenbrenner, 1979, p.51). In his theory, Bronfenbrenner (1979) emphasizes the importance of individual-environment interrelations and the mutual effects of these interactions on the resulting relationships. It necessitates that we look further than individual settings to see how environmental sub-systems are related to each other, and how they interact and influence the development of the student in the center (for a visual, please refer to Appendix A).

Urie Bronfenbrenner (1979) stresses the importance of accounting for the environment, the person, and the interaction between the two when studying human development. The layers of distinct yet interrelated environments or ecological systems surrounding the child at the center include: the microsystem, the mesosystem, the exosystem and the macrosystem. The microsystem embeds the structures with which the child has direct contact. These include the family, home, school, peers and neighborhood settings. The mesosystem includes the interrelations between the child and/or the microstructures surrounding the child, such as the link between a child's family and their school.

The exosystem delineates the larger social system surrounding the child and has an indirect impact on the child. These include but are not limited to the parents'/guardians' workplace, local government, school board and the like. As for the macrosystem, it demarcates the cultural context in which individuals develop, including the broader cultures, beliefs and ideologies. "[The macrosystem] is viewed as a manifestation of overarching patterns of ideology and organization of the social institutions common to a particular culture or subculture" (Bronfenbrenner, 1979, p.8). Bronfenbrenner considers that this holistic approach to ecological subsystems surrounding the child is an indication of possible predominant ecologies and ideologies existent and interactive with the child and the shared structures of a particular culture (Bronfenbrenner, 1979).

As scholars investigating an educational technology subject, Bronfenbrenner's contextual delineation leads us to discover new connections and allows us to demonstrate the complexity of ICT integration in education. Bronfenbrenner's perspective talks about the interplay of the individual with the structural, academic and social environment. We are focusing on this broader concept of the theory drawing parallels from this conceptual approach to synthesize a holistic framework to the integration of ICT in a student's classroom.

This paper is not a suggestion that all educational technology researchers would benefit from Bronfenbrenner's theory as a lens in their analysis on ICT integration in the classroom. However, using Castell's (2000) words, it might be helpful to consider this perspective a 'disposable theory' – a theoretical lens that is helping us at this

specific time and context in the construction of an analytical framework that could benefit further research in the field of ICT integration in pedagogical settings.

Bronfenbrenner's Nested Systems of Influence

Bronfenbrenner's systems theory has been utilized many times by educationalists to analyze students' development and progress in topics such as academic achievement, dropouts, effects of small class size, and the role of media and technology with regards to the academic needs of at-risk students (Ceci & Konstantolpoulos, 2009; Jordan, 2005; Mammen, Baur & Richards, 2009, and Bogg & Finn, 2008).

As shown in the visual (see Appendix A), the student is at the center, surrounded by several subsystems that are labeled according to the child's proximity and time spent in those environments with the closest being home and school contexts. It is important to note that although the visual denotes a defined circuit of sub-ecological systems surrounding the student, in reality, those systems may interact with the child and/or other surrounding systems in more than one dialectical trajectory.

Student-level Analysis

Prensky's digital nativism articulation introduced more than ten years ago in his essay titled *Digital natives, digital immigrants* (*see* Prensky, 2001) still continues to be debated in the literature and research discussions related to ICT integration in education. Indeed, a quick Google search[2] to the term "Digital Native" produced 621,000 documents to be viewed. According to Prensky, digital natives do not consider educational technology to be an added device or learning tool, it is their language. They grew up with technology in an environment built around the internet, smart phones, instant messaging and computer games.

As such, Prensky (2001, p.2) claims, "Digital Natives are used to receiving information really fast. They like to parallel process and multi-task. They prefer their graphics before their text rather than the opposite. They prefer random access (like hypertext). They function best when networked. They thrive on instant gratification and frequent rewards. They prefer games to serious work". Prensky's concept of digital nativism argues for a new teaching approach to better suit digital natives, where the students will teach themselves and the teacher (i.e. the digital immigrant) will only play the role of the facilitator on the side.

Searching for empirical evidence to back up the digital nativism argument, we placed the term "Digital Native" in the ERIC database[3]. The search resulted in 175 hits thereby signalling a huge difference with the findings[4] we obtained earlier. What is also interesting is that this new search resulted in studies with contrasting results

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[2] *The search was executed by placing the term "Digital Native" in the browser "google.com" on the morning of February 25, 2014*

[3] *The search was executed by placing the term "Digital Native" in the following website "eric.ed.gov" on the morning of February 25, 2014*

[4] *The comparison of findings are based on the comparison of the 621000 hits on Google for the search "Digital Native" vs. 175 hits for the term "Digital Native" via Eric database.*

regarding the digital generation. For example, Kennedy, Judd, Dalgarnot and Waycott (2008) conducted a large-scale survey of 2096 secondary and postsecondary students in Australia for their access to, use of and preference of technology. Their findings reveal that the "Net generation" is heterogeneous and divided into four types of technology users such as power users, ordinary users, irregular users and basic users.

Elsewhere, Jones, Ramanau, Cross and Healing (2010) report very similar results. Similarly, Jones et al. surveyed 596 "Net Generation" students, for their use of technologies across five academic institutions in England and found that the "Net Generation" students are not "homogeneous" at all in their use and appreciation of ICT with a lot of variations and divides across the age band. In fact, they discovered that technology use does not necessarily decrease as students become older (Jones et al. 2010). Contentions between Prensky's digital nativism argument and its empirical justification make us agree with Ito et al. (2008) who advocate "be[ing] wary of claims that a digital generation is overthrowing culture and knowledge as we know it and that its members are engaging in new media in ways radically different from those of older generations" (p.4).

Immediate Environment-level Analysis

To understand the complex impacts of ICT on learners, it is important to analyze how students act, interact and react to technology manipulation in their closest surrounding ecosystems, such as the home and school.

Home-level analysis.

Media is becoming a pervasive force in our students' lives at home. The Kaiser Family Foundation Study (2010) states that, on average, children aged 8 to 10 are exposed to media eight hours per day and teenagers more than 11 hours per day. The existence of ICT equipment in students' bedrooms tends to augment that reported total number of hours (Kaiser Family Foundation, 2010). Furthermore, participating students in the Kaiser Family Foundation study (2010) report that many parents tend to have few rules when it comes to the use of ICT equipment.

According to the report titled *Connected Minds* published by the Organisation for Economic Co-ordination and Development (OECD, 2012), there are many types of online risks that students are exposed to through Internet browsing and online participation. Online risks include: consumer related risks (such as online marketing and deceptive transactions), content and contact risks (cyber bullying and cyber pornography) as well as privacy and security risks (such as digital footprints and the like). Morever, Okeefee's (2011) report advises caregivers to understand the consequences of unsupervised and prolonged media exposure. The report also accentuates the necessity of teaching students as well as caregivers safety guidelines including media literacy and digital citizenship guidelines so that families understand healthy usage of ICT.

In addition, in December 2013, the American Academy of Pediatrics (AAP) published a policy statement declaring that certain media exposure needs to be accompanied by literacy and safety guidelines in order to promote knowledge, skills and social connectedness. This is not the first policy statement that concerns an array of

hazardous effects of media emanating from unsupervised and/or prolonged media exposures. Previous American Academy of Pediatrics policy statements have targeted other potential risks linked to children's media exposures that include violence (AAP, 2009), sex exposures (AAP, 2010), and obesity (AAP, 2011). In light of this, negative as well as positive affordances of media exposures must be taught to teenagers as well as parents since ICT is a pervasive force in students' lives outside school.

Classroom-level analysis.

Various researchers claim that ICT may help in enhancing student engagement simply by bringing in devices that children enjoy and use for entertainment when they are out of school (Dede, 2005; Oblinger, 2003; Papert, 1993; Strauss, 2000; Tapscott, 1999; 2001; Zemke, 2001). Engagement can be briefly defined as "being attracted to work, persisting despite challenges and obstacles, and taking visible delight in accomplishing that work" (Schlechty, 2005, p.7). Kuh (2009) explains the significance of student engagement by saying that "years from now, one of the storylines of the first decade of the twenty-first century likely will be the emergence of student engagement as an organizing construct for institutional assessment, accountability, and improvement efforts" (p. 5).

Various researchers have claimed that sustaining high engagement levels in the classroom has never been easy (Klem & Connell, 2004). Small and Vorgon (2008) argue that educational technologies, when integrated well can improve a student's memory and perceptual learning potential. "Shared community spaces and inter-group communications are a massive part of what excites young people and therefore should contribute to [the students'] persistence and motivation to learn" (Mason & Rennie, 2007, p.199).

A recent study by Karsenti and Collin (2012) has investigated students' and teachers' perceptions of the use of laptops in elementary and secondary schools in Quebec English Schools. Their survey of 2,712 students from (grades 3-11) and 389 teachers shows that the perceived use of available laptops appears to be particularly conducive to student learning. It appears that most of the teachers were able to integrate teaching techniques to give technological tools a focus in the process of writing and hence contribute to students' learning. The authors list other benefits such as a higher student engagement ratio, immediate access to a plethora of information and resources. That being said, Karsenti and Collin (2012) report that major obstacles reported by teachers and students are the availability of up-to-date technological equipment and managing classrooms.

However, the laptop research results do not mirror the 2013 research results of Karsenti and Fievez (2013). In the latter, the authors investigated Quebec students' and teachers' perceptions of the use of iPads in Quebec school contexts. The results of their massive survey consisting of 6,057 students and 302 teachers from 18 different schools in Quebec offer a positive skew to the use of iPads in the classrooms in terms of 'cognitive potential' (p.5). That being said, results are not as positive as the Karsenti and Collin (2012) survey. Karsenti and Fievez (2013) claim that school students still enjoy many educational uses of ICT since they promote access to information related to the course and also because they allow communication and collaboration with the course instructor and colleagues. The use of available ICT

tools, in addition to an integrated platform with frequently updated course information, appears to be particularly conducive to student learning. However, certain challenges exist. These include students getting distracted by the iPads with some reporting a lowering of grades because of the distraction. In addition, teachers need more training and preparation time. And last but not least, students seem to avoid lengthy writing tasks because of the lack of spell check and similar advantages available on the laptops. According to the authors, the iPads provide an essential contribution to students' learning, only when they are used well by teachers. Karsenti and Fievez (2013) end the report with a set of recommendations to school stakeholders in order to guarantee the successful integration of iPads in classrooms. These recommendations address students, teachers, parents, programmers and researchers. They also target by priority, training and familiarizing all stakeholders in using iPads for scholarly purposes such as reading, writing, creativity and accessing information.

Reviewing research studies investigating ICT integration in pedagogical settings, we cannot but notice that most of these articles end with recommendations for teachers to undergo professional development on how to implement or utilize technology in their teaching plans (Kanaya, Light, & Culp, 2005; King, 2002; Silvernail & Buffington, 2009; Swan & Dixon, 2006; Swan, Kratcoski, Mazzer, & Schenker, 2005). This is one objective stakeholders need to put in place for successful ICT integration in classrooms because many studies warn that there is a lack of proper professional development workshops given to teachers to implement ICT in their teaching (Kleiman, 2000; Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009; Zucker & Hug, 2007).

Teachers will be more willing to implement these technologies in their classrooms if they know not only how to use these technologies but also how to implement them in their teaching plans. However, teachers need more than professional development workshops to help them utilize these technologies. They also need research that shows them how these various technologies can be incorporated in their daily lesson plans and the benefits of learning they can cultivate out of doing that (Samarawickrema, Benson & Brack, 2010). If teachers do not buy into these technologies, they will remain just a fashionable add-on in our curricula.

Provincial and National-level Analysis

The school district environment is an outer layer that limits and shapes the immediate settings of the student through its implementation of local education policies. These local school board policies regulate the functioning of schools and define the roles of caretakers, teachers, principals, and all other stakeholders present in the home and school environments. These in turn are affected by provincial policies and education acts.

In Québec, media-related objectives are currently found under cross-curricular competencies in the Québec Education Program: Elementary and Secondary Education

(retrieved from *http://www1.mels.gouv.qc.ca/sections/programmeFormation/index_en.asp),* where students are encouraged to learn the necessary skills "to exercise critical

judgment" when acting and responding to facts and happenings around them. Students are also expected to be taught how to discern "other people's opinion" and how the latter could impact their judgment.

Media literacy components are also present under the English Language Arts subject in the Québec Education Program: Secondary Cycles One and Two (retrieved from *http://www1.mels.gouv.qc.ca/sections/programmeFormation/index_en.asp*), where students have to "represent [their] literacy in different media" incorporating oral, written and text formats.

While researching media-related objectives in provincial educational acts and curricula, we were struck by the absence of ICT objectives under various subject matters. Researching further, we found that this is referred to by researchers as the inability of technology to integrate fully in the subject matter 'subculture' (Selwyn, 2011). This articulation of technology vs. subject matter curricula integration may be better analyzed in the light of Lave and Wenger's Situated Learning theory. Lave and Wenger (1991, p.101) state that " the artefacts used within a cultural practice carry a substantial portion of that practice's heritage … Thus understanding the technology of practice is more than learning to use tools; it is a way to connect with the history of the practice and to participate more directly in its cultural life". ICT integration in subject matters needs time and practice, that is, enough time for teachers and students to immerse the technology in the culture of that subject matter creatively and effectively, and translate that into effective ICT integrated instruction.

Broader Ideologies-level Analysis

The integration of educational technology in pedagogical contexts is not an independent force (Brown and Murray, 2003). The global development discourse and the shrinking of the world to a small village have played an important part in the debate on integrating ICT in education. The argument set forth by techno-advocates and supporters of ICT integration in education hovers around integrating ICT in classrooms in order to respond to the needs of the Information Age in terms of global economic system requirements, new job employment markets as well as communication needs of the 21st century (Ananiadou & Claro, 2009). Technology development in that sense aids in the advancement of a nation's communication, economy, labor and production (Thomson, 2005).

Consequently, those aforementioned changes in global measures have changed the way we look at technology and education. ICT in education has become the symbol of efficiency and effectiveness within the education system. While technology is being pushed forcefully into education systems, ICT integration does not emanate specifically from the needs of the schools, students, or the teachers. Developed as well as developing countries have "techno-centric, utopian and economic driven mindset towards [tech integration in education] (Zhao et al. 2005, p.674).

Aside from the unjustifiable costs, given the conflicting results of some education technology investments (Bennett et al., 2008; Cuban, 2001; Sawchuk, 2009; Weston & Bain, 2010), some schools do not even have the necessary infrastructure to integrate the newly bought technological equipment in their premises. In his book, S*chool and Schooling* Selwyn (2011) describes how in England when the government

furnished all schools with smart boards, some institutions had Victorian premises with very high ceilings that smart board cables could not hang onto. The end result was smart boards dangling 1.5 meters above the floor that were difficult for teachers and students to use properly. Parent committees had to intervene and fund schools with wooden stools for the students to be able to reach the boards (Selwyn, 2011). This is a prime example of buying ICT tools not catered for the needs of the schools and the students.

From an environmental sustainability issue, the situation is even more problematic. Electronic waste currently represents that largest growing waste system. Duan, Miller, Gregory, Kirchain and Linnell (2013) report that the United States discarded around 258 million electronic devices to the waste system in 2010, with only around half of that amount able to be recycled (Duan, Miller, Gregory, Kirchain & Linnell, 2013). According to the United Nations, the unrecyclable parts contaminate land water and air since most of technological devices are made from lead mercury and other highly toxic materials (Duan et al., 2013). In light of that, the UN has launched the Step initiative (see *www.step-initiative.org*) , a fifty-member organization designed to raise public awareness regarding electronic wastes.

ICT integration therefore needs to arise directly from the needs of students and not simply be forced on our students because of the "unchecked fear of missing the fast ICT train to global prominence" (Zhao, Lei & Conway, 2005, p.673). We believe there is a need to cross to a 'post-digital technologies' (Selwyn, 2014) era where we are not bewildered by the technology anymore. A 'post-digital technologies' era in education means stakeholders are conscious, critical and self-reflexive of all actions when it comes to technology integration in education and when it comes to the connections to their surrounding environment.

It also means that technology is used not only to connect to the worldwide world but also to connect us as humans and as education stakeholders at different levels of subsystems. A 'post-digital technologies' era in education means we realize that technology may not help when integrated if it does not fit the culture of the school, the needs of the students and the society as a whole. Last but not least, the 'post' era hopefully will have the benefit of all the sciences we have been developing and research we have been analyzing to secure the benefits of ICT integration in education.

Conclusion and Recommendations

While there are many more things to learn with regards to the educational technology literature covering each of Bronfenbrenner's subsystems, this review outlines the benefits of broadening our lens when investigating ICT integration in education to include multi-level contextual factors so that we identify elements that may be impacting the integration of technologies in teaching and learning settings.

For one thing, we can notice the tensions at the student-level analysis between the digital nativism claim and the empirical evidence that shows a more heterogeneous generation. Students will benefit immensely from digital literacy and digital citizenship by being able to use ICT effectively, safely and to its full potential. Students and parents need to know the negative and positive affordances of media exposure. At the classroom level analysis, we can see that teachers need ample time,

resources, practical training and support to integrate the tools in their lesson plans successfully. At the same time, we notice how structures such as school boards and provincial ministries do not completely integrate ICT in most subject matters' curricula. ICT is left primarily to be integrated in languages curricula and cross-curricular competencies. An analysis of the tensions between provincial curricula and the integration of ICT in subject matters other than languages and cross-curricular competencies is also outlined. Finally, a major factor that pushes towards integration of ICT in schools is delineated by globalization and the need to teach our kids to Information Age skills. We also recognize the push from socio economic environments and employment sector including markets and industry. This push in turn is putting pressure on the schools to embed technology in classrooms.

An analysis of ICT in the classroom using Bronfenbrenner's systems theory allows us to be aware of the messages in one sub ecology and try to make it better by adding to it from other sub ecologies or by providing interventions to secure countermeasures. We have come to expect that technological tools improve learning by default. Technology is not the be-all and end-all. It is just a tool. We need to let education lead technology. We need teachers to guide its way into children's education. Before integrating technological tools in education, all stakeholders including teachers should have a vision and a clear plan of how to implement that. Unless we make sure that none of the sub ecological systems supporting ICT integration in the classrooms have contradictions, we will forever stay in the trap of ICT being 'oversold and under-used,' as Larry Cuban says (2001).

As such, the following set of recommendations was developed for all stakeholders involved in the process of ICT integration in pedagogical contexts to reflect on the situation from a holistic perspective. These recommendations are nested into Bronfenbrenner's interconnected subsystems so that resulting change will impact those delineations surrounding the child and hence create change at several sub-system levels. Recommendations are to be followed in parallel and not in sequence in order to ensure maximum effectiveness and progress.

Student-level recommendations:
1. Learning how to use ICT tools is not enough. In order for students to benefit from technology they should also learn to use ICT safely and in meaningful ways. Caregivers at home and school should teach them how to surf safely. That is the only way to give our students learning opportunities. It is also essential to teach all caregivers at home and at school.

2. ICT should be used by students to create knowledge not only to facilitate communications or to access information.

Immediate environment-level recommendations:
1. Pedagogy should precede technology. As such, technological pedagogical programs and games should be developed by educators and not technologists.

2. Professional development and teacher training should incorporate ICT training in subject matters. Teachers need to know and be trained in how to incorporate technology in their lesson plans and subject matters. They need to have criteria for its implementation in the classroom and not only be trained in using the machine.

3. For each and every investment of ICT in the school, there should be a clear monitoring and evaluation scheme for progress, development and efficiency in education. ICT integration in the classroom should be a step-by-step process. Rushing and missing steps do not help.

Broader community-level recommendations:

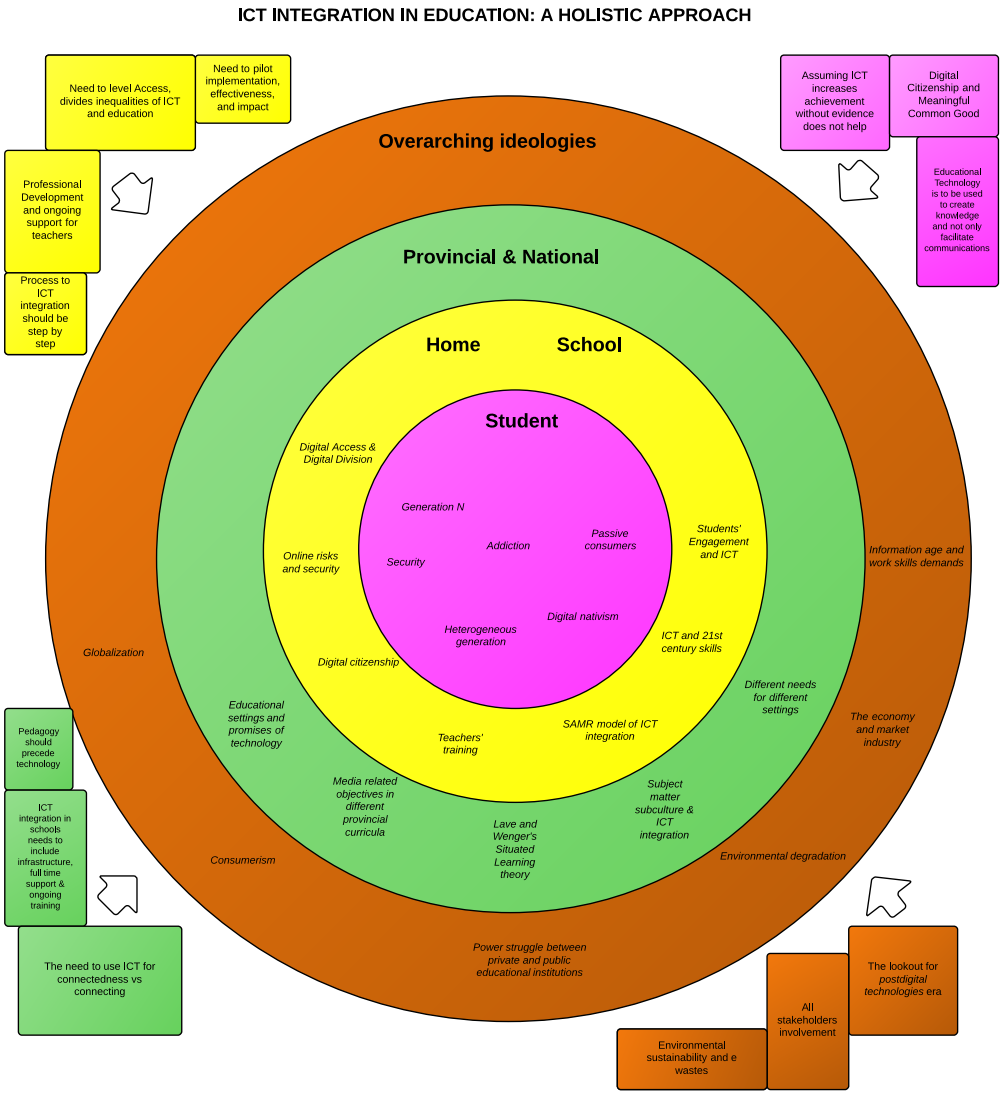
1. ICT in education should not be about which educational institution has more equipment or which are more recent. Governments should monitor public and private institutions to manage inequalities due to the ICT industry and private education. Quality education is a public right for all citizens. Provincial and national government should make sure that the aim of schooling is the construction of a society based on non-exploitative relations and social justice, thereby making life qualitatively better for all citizens.
2. When integrating ICT equipment in schools, budgets should include updating school infrastructure, ongoing professional development of teachers, and ensuring the presence of full-time IT support in each and every school.

Overarching ideologies-level analysis:

1. We believe it is our duty to let students recognize the hegemony of those ideologies by letting them problematize and reflect upon these ideologies.

2. There is a need for governments to take into consideration environmental sustainability issues and the minimizing of electronic waste when implementing ICTs in educational institutions.

Appendix A


ICT INTEGRATION IN EDUCATION: A HOLISTIC APPROACH
Need to level Access, divides inequalities of ICT and education
Need to pilot implementation, effectiveness, and impact
Professional Development and ongoing support for teachers
Process to ICT integration should be step by step
Assuming ICT increases achievement without evidence does not help
Digital Citizenship and Meaningful Common Good
Educational Technology is to be used to create knowledge and not only facilitate communications
Overarching ideologies
Provincial & National
Home
School
Student
Digital Access & Digital Division
Generation N
Online risks and security
Addiction
Passive consumers
Security
Students' Engagement and ICT
Digital nativism
Heterogeneous generation
ICT and 21st century skills
Digital citizenship
Different needs for different settings
Educational settings and promises of technology
SAMR model of ICT integration
Teachers' training
Media related objectives in different provincial curricula
Subject matter subculture & ICT integration
Lave and Wenger's Situated Learning theory
Information age and work skills demands
Globalization
The economy and market industry
Consumerism
Environmental degradation
Power struggle between private and public educational institutions
Pedagogy should precede technology
ICT integration in schools needs to include infrastructure, full time support & ongoing training
The need to use ICT for connectedness vs connecting
The lookout for postdigital technologies era
All stakeholders involvement
Environmental sustainability and e wastes

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