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INTENTIONAL ICT:
CURRICULUM, EDUCATION AND DEVELOPMENT

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Intentional ICT:
Curriculum, education and development

by

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Introduction

Information and communication technologies (ICT) are being utilized extensively in education and have become an essential aspect of both formal and informal learning worldwide. Related to their widespread availability and use in education, it is suggested that ICT hold tremendous promise for society at large, and in particular, in shaping social and economic development (World Bank Group 2012). Rationalizations connecting ICT to education have long been documented, e.g. Kozma (2005) concluded that "[…] the desire to be globally competitive, grow the economy, and improve social conditions is often used to justify significant public sector investments in educational improvement and the application of ICT in schools" (p. 118).

On their own merit, ICT have been determined to be profoundly advantageous to society, in general (Tamim *et al*. 2011). ICT reduce the cost of communication thereby increasing flexibility and capacity for global trade of goods and services. ICT also drive global productivity and economic growth through continual returns from knowledge creation and innovation. Additionally, ICT promote social development through communication, collaboration, and knowledge sharing among people (see Kozma 2005; World Bank Group 2012). What then motivates ICT usage in education, in particular? Is education anticipated to produce better users and consumers of ICT for the 21st century? Or, are ICT expected to improve the quality of education for all members of society? Perhaps it is both.

Notwithstanding our unresolved motivations, significant public and private sector resources continue to be expended on ICT-based educational reforms. What is more, major emphasis is assigned to specific technologies, models/practices, or computing devices that promise to transform teaching and learning (World Bank Independent Evaluation Group 2011). Yet, despite these substantial investments, the evidence pointing to tangible educational improvements that are directly related to current ICT-based instructional initiatives is very little, or at best mixed (Clarke *et al*. 2013; Dodson *et al*. 2012; Lowther *et al*. 2003 and 2008; Tamim *et al*. 2011; World Bank Independent Evaluation Group 2011). One reason for this inconsistency of evidence is the alarming turnover of new technologies. That is to say, technologies are simply expanding too quickly to take into account their conceivable contributions to teaching and learning that can be both measureable and replicable.

An additional related issue refers to the nature of ICT adoptions in educational settings. For example, based on arbitrary administrative decisions, educators are sometimes expected to accommodate ICT in their teaching practice, often at the expense of core competencies (Cuban 2003). I refer to this as the *incidental ICT* approach; with this approach, technology takes on a peripheral role, akin to an afterthought. This view renders ICT-based reforms simply as technology "touch-ups" to the curriculum, typically offered in the form of new appendage instructional practices or stand-alone courses inclusive of the latest devices discharging sufficient "buzz" to attract only short-term enthusiasm. The question is raised; can this approach to ICT improve learning and the quality of education?

This paper argues for a new *intentional ICT* approach in which a relevant, sensible, and coherent curriculum guides the appropriate and defensible use of ICT for educational quality improvement. This approach focuses on the value of ICT to curricula efforts for educational improvement. In doing so, we may be better able to articulate the direct links between ICT in education and economic and social development.

The paper seeks to explore concentrations of discourse, research, policy, and practice that occur around ICT in education. I use the curriculum as a lens and sensitizing concept to explore in a critical manner how ICT are implicated in educational quality improvement. As such, I employ discourse analysis to look at how ICT are talked about and thought about in current literature (applied research and theoretical scholarship) and in public and private forums (Gee 2011). A critical analytical approach will inform recommendations for research, policy, and practice by illuminating both the opportunities and potential perils of ICT in education contexts. A critical analysis of the current discussions and practices involving ICT may serve to interrupt more common enthusiasm with respect to these innovations and may contribute to the emergence of a balanced collective discussion of their development and implementation in the field of education.

1. Technologies and society

Global enthusiasm about the promise of technology for society may be paradoxically linked to public pessimism about the state of the world economy. Unquestionably, across continents cynicism is on the rise, as responsible parties seem to have run out of ways to address present-day economic and political crises. Countries are feeling pressured to tighten their borders to protect scarce resources. Even within some borders, factional disputes are resulting in barriers being erected by some to exclude others. Millions of people are victims of oppression, sale, and trafficking as mere commodities in the global economy. War rages on. It could be argued that presented with this perceived social and political insecurity, people are desirous of an utopian future – if not for themselves, then for future generations – in which access to technology affords economic and social confidence and a lack of technological knowledge and skill constitutes significant disadvantage. It is through education that these utopian beliefs may be transmitted.

The field of educational technology is therefore encumbered with two persistent problems that are at once mutually affirming and somewhat contradictory. Technology is so ephemeral and subject to change that it is impossible to fully prepare for the innovations that appear with such breathtaking frequency. At the same time, however, they seem to hold so much promise for education that it seems that they *must* be used in preparation for an imagined, technology-rich future. To fail to make use of the newest technology is to be left behind, constantly craving a digital utopia that will forever be out of reach. These perceptions are perhaps even more salient in developing countries.

While we are enthusiastic about the promise of technology for learning, it is incumbent for us to critically evaluate and call into question what these technologies do to us and to society, more generally. It has been pointed out that there are

humanizing technologies and there are dehumanizing technologies and they overlap (Torres 2009). Technology implementation in schools and elsewhere is inherently connected to culture, social structures, and economic infrastructures. It is not neutral and has embedded in it values and agendas that are themselves not neutral and may be, in fact, hostile to many existing cultures and cultural elements and people.

We must have a view of the future that is ideologically committed to better education and a more just society and we must also question who will be the winners and losers of public sector investments in educational technologies and whether these technologies are being oversold (Cuban 2003) as the solutions to enhancing economic and social development. Finally, we must look to the structural realities of power and ownership in asking to what extent are these innovations authoritarian and/or instruments of empire.

As an example, Feenberg (2011) concluded that ICT "[…] enable new forms of sociability and multiply creative possibilities for ordinary people. The democratic implications of these technologies emerge as resistance grows to commercial exploitation and political suppression" (p. 870). Though on the other hand, in discussing the marketing of educational technologies, Buckingham has cautioned:

> "Technology is presented here as a source of innovation, of empowerment and liberation, and of authentic educational practice. Yet, in much less celebratory terms, it is part of a broader move toward bureaucratization, regulation and surveillance. These discourses define the roles of the student and the teacher in diverse ways, and they also invoke much broader assumptions about the nature of learning." (Buckingham 2007:13).

Considering the above points of view we must be mindful of notions of contextual relevance and of the dangers of "uncritical international transfer of policy and practice" (Crossley 2010:423) when articulating an ICT approach for educational improvement with all its inherent implications for economic and social development.

2.   Intentional ICT

So what does *intentional* mean and why is this an important concept in describing the utilization of ICT? In simple terms, intentional means (something) done purposefully, in such a way that is planned or deliberate or intended. The word intentional immediately implies that a person is cognizant of achieving a particular purpose or an end, and that the manner in which this end is to be achieved is also specified.

The definition of intentional also implies conscious knowledge and understanding of the significance or consequence of the particular purpose or end once achieved. In this case, I refer to knowledge of specific ICT and understanding of what could come about from applying them.

Another implication following from this simple definition of intentional is the suggestion of volition or choice. This means there is embedded in the definition a

sense that individuals use ICT with freedom. In other words, people use ICT voluntarily, readily, or according to their own choice or preference.

Lastly (but not exhaustively), the word intentional is an adjective, which signifies that there is a particular attribute that the word is used to modify or describe. In this instance, the word intentional modifies or describes ICT, or more precisely, intentional modifies our design, implementation, or use of ICT. And to speak of our "use" of ICT suggests a motivation or commitment or readiness to perform an act. Plainly, people must want to use ICT.

Thus, to say intentional ICT is to suggest having a motivation or desire to use ICT, that is a matter of choice or volition, with a particular end in mind, with conscious knowledge and understanding of the consequence of such use. It is important to consider all of these implications, since after all, we are referring to the use of "something(s)" or "object(s)" (ICT) that are themselves created, meaning that intentions have already been woven into their being that have the potential to affect social ecosystems.

Furthermore, by saying "use" we consider ICT as tools – implements for extending our reach – for doing something. Here the something is called "educational quality improvement." As such, we must ask what values and cultural proclivities are being stated here and from whose perspectives are they derived? Who occupies that privileged position?

But what of tools?

The suggestion that ICT should be viewed as tools is not novel, neither is the claim that technology should serve the aims of instruction (see Clark 1983, 1985 and 1994). In fact, Clark (1983, 1994) argued it was pointless to conduct research that compared media versus no-media conditions. He pointed out that it was not the media itself that impacted learning, but the instructional design, the pedagogy, and various teacher attributes that are all delivered by the media. Since then however, the proclivity for comparing the impact of different technologies has persisted (see Morrison 2001; Ross and Morrison 1989 and 2014; Ross, Morrison and Lowther 2010). Clark's (1983, 1994) observation that technology should be used as tools to support the aims of instruction makes sense, particularly for curriculum efforts. For one thing, if we consider the rapid expansion and turnover of technologies, it appears more sensible for us to think about the attributes or affordances of these technologies instead of the frequently-changing technologies themselves. The lesson is to move away from seeing each new technology as an intervention and take a broader view of understanding what these technologies offer us regarding our capacity to extend our reach to achieve learning goals.

Ross, Morisson and Lowther (2010) while arguing for other uses for technology in learning, also encouraged this shift in focus toward "how to use technology reflectively and scientifically to make teachers and curricula more effective." Further according to the researchers, the idea of thinking of technology as tools "is directed to enabling students in all ethnic and socioeconomic groups to use technology effectively to master and perform 21st century skills" (p. 22). Yet, even if we accept the premise to think of ICT as tools, we must further articulate the

intended purpose of these tools. To achieve success, ICT cannot simply serve as tools for content delivery. For example, researchers (Tamim *et al.* 2011), based on second-order meta-analysis of the impact of technology on education conclude, "there is the suggestion that one of technology's main strengths may lie in supporting students' efforts to achieve rather than acting as a tool for delivering content" (p. 17).

3.   Sustainable Development Goal 4 – Much more than mere access

It is prudent to restate that this paper is concerned with examining education from a development perspective. From this view, a quality education is believed to help individuals gain the knowledge, skills, competencies, and dispositions needed to participate fully in society and the world of employment. In short, education is a progressive path out of poverty and exclusion for individuals that reduces overall inequality and mitigates against social and political instability. At the national level, a more qualified human resource base coupled with domestic stability is essential for sustainable growth and regional and global competitiveness. As poor countries rise out of poverty through quality education development, equality and world peace and security become more possible.

Stakeholders in international education and development, through participation and dialogue conferences, have over the past two decades worked to articulate key goals and development aspirations for education, e.g. UN Millennium Development Goals (MDGs), and most recently, Sustainable Development Goals (SDGs) for post-2105. Related to education, SDG 4 challenges us to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." The major challenge for educators, policy makers, development professionals, and donor agencies remains precisely how best to implement quality education to achieve development goals for individuals and countries, amid increasing regional and global demands (IBE-UNESCO, 2015).

Implicit in SDG 4 and current global development agendas is a slightly more salient emphasis on the quality of education versus mere access to education. While MDGs recognized the need for both access to education and quality of education, there are two important lessons to be gleaned from the past 15 years. First, access to education has already been fairly improved in many contexts. For example, many developing Commonwealth countries have already achieved basic primary education and gender parities, where they exist, seem to favour girls (Crossley *et al.* 2009; UN ECLAC 2015). Even where no physical school buildings exist, mobile phones coupled with the Internet have also provided access to many who have been outside of normal provision (GSMA 2008 and 2013; West and Chew 2014).

The second lesson is that mere access to education is necessary but not sufficient in achieving desired development goals and thus quality education remains out of reach (UN ECLAC 2015). For example, despite near universal access to primary and secondary education in the Caribbean sub-region and higher female enrolment in secondary and tertiary level education institutions, females experience higher levels of unemployment and poverty. When employed, females

receive less in compensation and occupy disproportionately fewer positions of leadership. In Bermuda, for example, in spite of higher secondary educational attainment, women receive less in pension benefits and remain poorly represented in leadership positions (*ibid.*). Not ignoring the impact of other social factors, these examples illustrate that amount and access to education have not necessarily meant a better quality of education that can provide a meaningful impact on overall country development via individual access to social and economic resources and opportunities for advancement. Additionally, wider access to education without addressing the quality of that education, including social and cultural realities and their implications for development, does not necessarily advance economic and social development that is sustainable and contextually appropriate.

Want to improve education quality? Start with the curriculum

To achieve SDG 4 both educational goals and development aspirations must be considered in tandem. A quality curriculum can be thought of as the instrument needed to bundle these elements. In fact, many important components of education are conceptualized and operationalized via the curriculum, including the content, pedagogy, and learning contexts. The curriculum can then also be a proxy for the developmental features, such as equality, equity, inclusion, and sustainability (see for example IBE-UNESCO 2015; Amadio *et al.* 2015;). What follows is an elaboration of this idea. I describe the articulation of goals, continual dialogue, and contextual considerations necessary for designing and developing quality curricula. Figure 1 refers to the mutual influence between these three sets of features.

Figure 1. Triadic relationship among components of curriculum design and development processes
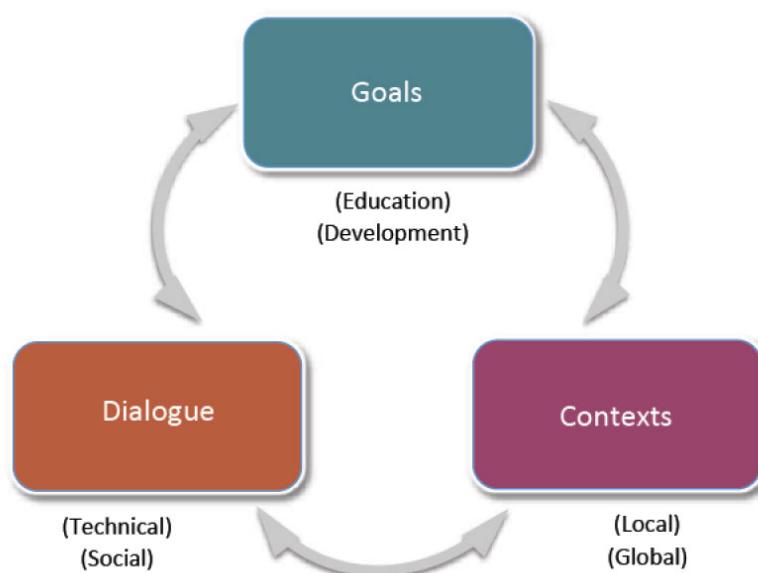
a. Goal articulation

To improve education quality it is important to fully grasp what are the goals. The education goals include the competences that citizens are expected to acquire as a result of their educational experience. That is, each society prescribes the relevant knowledge, skills, attitudes, values, and dispositions citizens should possess and as well as how they should be demonstrated.

Development goals can be separated into two parts – economic growth and social transformation. Short-term economic growth includes a focus on accumulating physical capital, as countries attempt to develop skilled and productive labour forces to facilitate expansion in agriculture, manufacturing, and commerce. Sustainable economic growth focuses on knowledge creation and research and development for the purpose of expanding technological innovation.

Social transformation concerns go beyond economic growth and move into the realm systemic change in society. The desired change could take many forms, but characteristic of social transformation is the indispensible contributions from all sectors of society. It necessitates a coordinated effort involving individuals, families, and communities, but also governments and business communities. The aim is to work together to create a better quality of life and standard of living for all members of society that includes communication among citizens, knowledge sharing, the protection of public resources, expanded protections under the law, and the preservation of public trust.

b. Continual dialogue

Continual dialogue is required to achieve education and development goals. The curriculum renders itself as the subject and substance of this dialogue. As the curriculum can (or should) encompass both the educational goals and the development priorities, curriculum dialogue must be both technical and social. Technical dialogue guides the design, development, and implementation of the curriculum along with the evaluation of the expected learning outcomes. Technical dialogue should also identify critical impediments to the delivery of quality education and responds with interventions to remove these impediments.

Continual dialogue must also have a social aspect. It is here that the substance of the curriculum is critically analysed for its proposed contribution to social transformation. Additionally, continual dialogue contributes to toward alignment and quality. For alignment, stakeholders negotiate the proportions and scope of the curriculum at individual, national, regional, and global levels. In terms of quality, it must be determined what is holistic, inclusive, equitable, and sustainable/lifelong and how to bring these into effect.

c. Contextual considerations

Researchers have often argued that issues of context and culture are consistently ignored when devising development policy (Crossley *et al.* 2009; Heyneman 2009). While there are a myriad of education settings and situations to consider, I wish to distinguish two contexts in terms of their seemingly diametric agendas. First, there

are the local contexts of developing countries, with their specific ecologies and needs. Education and development priorities comprise of how best to optimize limited educational resources to achieve sustainable economic growth and social transformation.

In contrast there are the international/global contexts, which are largely donor- and agency-oriented, and advance the dominant global development agendas. Development agencies (originating from developed contexts) engage in policy development and educational reform initiatives in developing countries. This represents an international transfer of priorities that is frequently one-directional and therefore criticized for inadequately considering the needs and capabilities of local contexts in which the reforms must take place.

The substance of the curriculum and the continual dialogue pertaining to its value can help to bring contextual and cultural issues into sharper focus for benefactors and for the local end-users. This could help to defend against further inequalities and inequities and to set the stage for developing countries to work cooperatively toward their own sustainable education and development achievements.

I concede that I have created an artificial bifurcation of the issues. That is to say, I have consciously adopted a binary analysis: incidental vs. intentional; economic vs. social; technical vs. social; local vs. global. I have chosen this dualistic approach to illustrate two important points. First, when it comes to education, these issues are often conflated and this results in a lack of clarity on how to address them. Second, it is sometimes useful to deconstruct certain assumptions and then later reconstitute them to show what could lie at the intersections. In this case, ICT not only intersect, but also are able to connect these binaries with some singular effect.

4.   Intentional ICT as an enabler to curriculum, education, and development

The curriculum, if properly enacted, is one of the most effectual protections against poor educational and development outcomes; however, it is not cure-all. For education to have maximal impact on development the mutual influence of the goals, dialogue, and context must not be ignored (refer to Figure 1 above). Additionally, the effectiveness of the curriculum is underpinned by the levels of provision in other areas of the education system, e.g. trained teachers, physical infrastructure, funding, evaluation systems, etc. Make no mistake – even a good curriculum can fail! This is where ICT come in. ICT can augment and enable the application of the curriculum to achieve success in education and development.

4.1 ICT emphasize knowledge

Globally, economic and social disparities can be visible along geographical lines (north-south) or, in economic terms, between the developed world and the developing world. These differences have historically been reflected as economic and material wealth that also translate into better quality of life and standards of living in developed countries. More recently, the emergence of information

technologies has facilitated knowledge societies that emphasize the power of knowledge over material hegemony. Yet again, it is the poorer developing countries that have remained incapable, unlike their developed counterparts, of exploiting the advancements in knowledge to their economic and social benefit.

ICT can be seen as a bridge to reconcile the social and economic divide between the developed and developing world. Figure 2 below helps to illustrate this point. These technologies are effective in two important ways. First, ICT provide a host of platforms, including the Internet, for capturing and storing digital content/knowledge. It can be thought of as an ICT storehouse. Second, ICT provide an array of tools for accessing, interacting with, and sharing this knowledge. This is the enabling power of ICT, since they provide the avenues for dialogue and exchange that could bring about sustained economic and social improvements via knowledge.

Importantly, not all the knowledge made available through ICT is essential or even appropriate for learning in school settings. Thus, we can discuss one of the intersections of ICT and curriculum efforts. There must be continual dialogue to determine what are the goals (expected learning outcomes and development aspirations) of a particular education for a specific society. The goals and end-users must be clearly identified so that the right technologies can be dispensed to present the right education to the right people in the right way.

Figure 2. ICT as storehouse and enabler
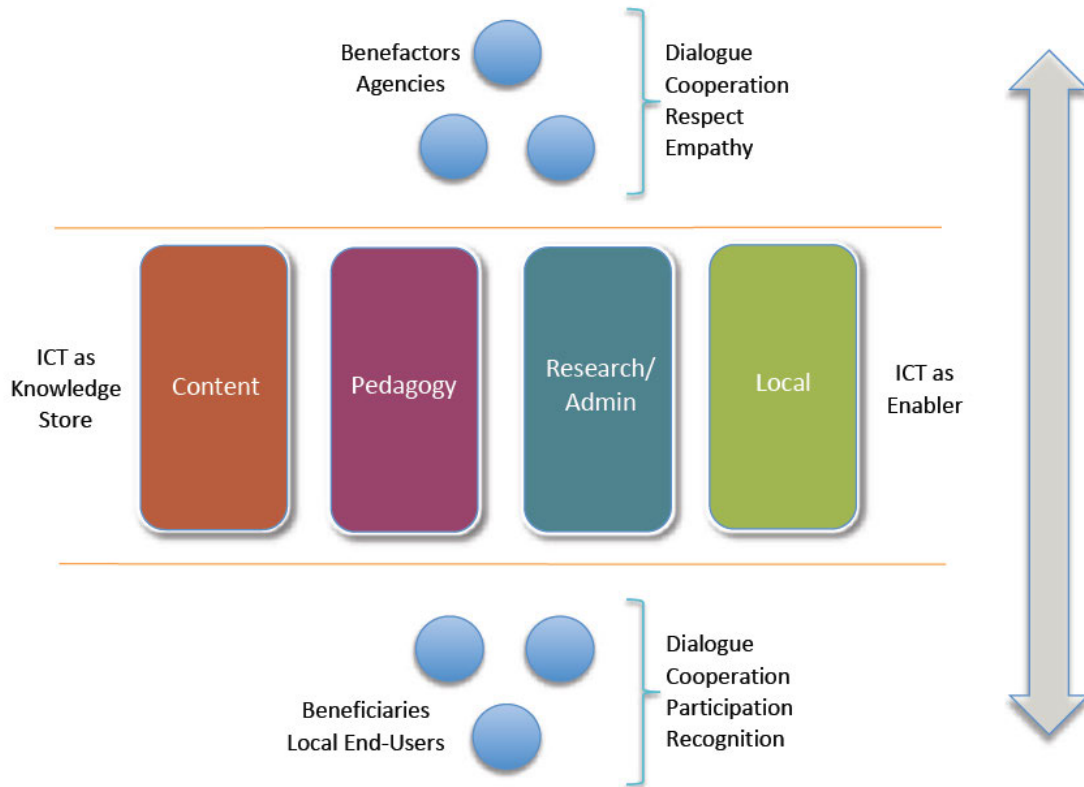
4.2 Important knowledge for education and development

Education begins with questions – with discourse and sometimes debate about how we know knowledge; the nature of reality and what is knowledge; what or whose values matter and goes into it; and how do we design and teach it. These questions bear assumptions (epistemological, ontological, axiological, rhetorical, and pedagogical) that drive the educational process. While a full examination of all these questions is beyond the scope of this paper, we still can discuss some types of knowledge to illustrate how ICT play a crucial role in education and development. Below I differentiate mainstream knowledge (e.g. content, pedagogy, and research and administrative) and local-specific knowledge.

Content knowledge and *pedagogical knowledge* represent systematized knowledge typically already harnessed in some developed as well as developing contexts to effect economic and social growth. From an educational standpoint this is packaged as disciplinary knowledge (content domains) and knowledge about teaching (Shulman 1986 and 1987). Acknowledging that both teacher and technology can be pedagogical agents in a classroom, a large volume of research has focused on Technological Pedagogical Content Knowledge–TPACK (see Mishra and Koehler 2006; Koehler and Mishra 2009). TPACK has become an important element of teacher training as it acknowledges that teachers and technology will interact, and that the content domain guides the choice of technology.

Research is defined as creative work that is done for the purpose of increasing the stock of knowledge about humans, culture, and society. Although the approaches to research are different among disciplines (e.g., sciences, arts, humanities, economics), a major goal of research is to use knowledge to innovate and create new applications (OECD 2015). While the developing world lags behind in this regard, developed countries have established records of using research to leapfrog development. Research knowledge consists of understanding the content of research domains as well as the methods and applications.

Administrative knowledge represents systematized technical knowledge pertaining to work or management of an organization, such as a donor agency, school, government, or business. It is a set of skills and processes possessed by individuals doing the work of the organization. Effective administration is essential for securing and safeguarding development finances. Both benefactors and beneficiaries are responsible for managing resources such as plant, staff, and equipment. Efficiency and transparency are of utmost importance as resources become less and less available yearly.

Local knowledge describes the local languages, cultural traditions, oral histories, and values that are represented, interpreted, and communicated by local peoples in their specific local contexts (Holmes & Crossley, 2004). Local knowledge (especially in developing contexts) is persistently under threat of marginalization due to the dominance of globalization agendas.

4.3 ICT enable partnerships

As mentioned above, development researchers have in conceptual terms arrived at several ways of differentiating developed and developing contexts, such as, the geopolitical Global North–Global South divide. Another differentiation is on the basis of the prevalence and use of technology; a distinction between knowledge societies from their counterparts who have yet to harness the potential of information technologies. Traditionally, the flow or transfer of mainstream knowledge was from the developed to the developing world. Thus, the developed world could also be thought of as the benefactors of such knowledge transfer, while the developing world as the beneficiaries. More recently the emergence of ICT has enabled transfer in both directions.

Figure 2 above illustrates two distinct contexts with different actors and some assumptions embodied by their roles. Benefactors are those who give money or help to other persons or causes, the beneficiaries. Such relationships invariably come with dynamics of power and privilege. Developed contexts have traditionally taken positions of superiority and domination regarding their development priorities around the world. This has resulted in "uncritical international transfer" of educational and developmental priorities and policies that are not always what are needed in developing countries (Crossley 2010:423). This posture has been criticized for being arrogant instead of empathetic and cooperative. Additionally, such a position results in misrecognition or denial of the people and the inherent value in local contexts of developing regions (Rangaswamy and Cutrell 2012).

ICT can facilitate multi-stakeholder partnerships across and within these disparate contexts that could interrupt high-handed relations and instead encourage participation, cooperation, and recognition for all relevant actors. First, dialogue and exchange among benefactors and donor agencies allow for creative thinking and multiple perspectives on how best to tackle global issues and how and where best to invest resources to break the causal cycle of global poverty. Second, ICT allow for cooperation among beneficiaries in sharing local knowledge to tackle common problems. ICT also provide platforms for codifying and systematizing local knowledge for innovation and creation of new applications. Communication among beneficiaries can additionally go a long way in developing and sharing local research and for improving the evaluation capacity among local partners. Third, ICT allow for respectful mutual exchange between benefactors and beneficiaries, as local knowledge and mainstream knowledge intersect in the form of structured expert dialogue – with the acknowledgment of expertise on both sides.

4.4 ICT enable universal commitments

Technology can enable efforts aimed at promoting universal values, such as human rights, social justice, equality, peace, and sustainability. The impassioned pursuit of these universal values must be counterbalanced with equally fervent commitments to preserving local values and ecosystems. Once again we see a tension of global forces versus local needs. What role does ICT play in this regard?

The lingering global economic crisis coupled with the expansion of globalization has yielded increasing inequality of income and power negatively

skewed toward the world's poorest in living in developing contexts. We are thus presented with global imbalance in terms of material, economic, social, and cultural authority that sees the world's poorest being dominated and exploited. One of the most concerning aspects of this hegemonic state of affairs is the denial of recognition and/or misrecognition of differences in *others* (Fraser, 1997). However, Fraser (1997) argued that we should not have to choose between the quest for social equality and the recognition of differences among people – we should aim for both.

One aim of current global development agenda is to interrupt these dynamics of domination and exploitation by eradicating extreme poverty through education. This is the social justice component of education: to arrive at a world that is just, including provisions of equality and human rights for all peoples of the world. Social justice further aims for all members of a society have equal access to the benefits and the burdens of their society.

While social equality refers to uniform status and access for all members of a society, recognition describes the social practices that allow people to freely express their claim as equal members in their society and to communicate their mutual respect for others. Recognition thus requires social action (participation) among people within a cultural context, and the use of technology is rooted in these social cultural relations (see Figure 2). Intentional ICT forces us to consider all participants and their communities, including billions of people who are typically excluded from discussions on the design of new technologies, worldwide. ICT allows for respectful dialogue and exchange of information, as well as the platform for democratic participation. This could lead to empathy and recognition.

5.   Policy implications

The above discourse and analysis can serve as an impetus for designing new frameworks on how to think about and engage with ICT for education and development. However, there are some key implications for curriculum decision-makers, designers, and developers concerning the use and integration of ICT. The focus on these professionals is to once more highlight the important role played by the curriculum in achieving the goals of education.

5.1 Recognize that ICT are not homogenous

Curriculum professionals may first need to acknowledge that ubiquity is both a true power and a perfect constraint of ICT. ICT are now widely accessible and extensively utilized for development, particularly those with mobile application (World Bank Group 2012). At the same time, ICT are so numerous and change so rapidly that it makes implementation and evaluation quite problematic. A worrying implication related to ICT ubiquity is that we may be tempted to lump together all ICT as an imaginably singular concept – *digital technology*. And, we think of this "technology" as having the capacity to fix educational problems.

Intentional ICT is a way to think about how exactly educational and development goals can be expressed in the curriculum, and then to see if and how

particular ICT can enable us to extend ourselves in pursuit of these goals. As Ross *et al.* (2010) suggest, "Educational technology is not a homogeneous 'intervention' but a broad variety of modalities, tools, and strategies for learning. Its effectiveness, therefore, depends on how well it helps teachers and students achieve the desired instructional goals" (p. 19). Curriculum decision-makers, designers, and developers are important mediators of this process.

5.2 Avoid privileging one type of ICT research: defend other diverse approaches

The current global development agenda is, to a large extent, responsible for encouraging and funding a particular approach to ICT research that boasts scientific rigor, high internal validity and demands conclusive outcome information on students' academic performance and achievement. This approach promotes the use of robust experimental designs, which by their very nature require experimental and control conditions – comparing technology versus non-technology conditions on the basis of effect size differences (Ross and Morrison 2014). From a funding perspective, this approach seems financially judicious and efficient and business savvy, on the surface. After all, if resources are expended on ICT-based interventions, there should be an expectation of results. What is more, funding agencies are motivated to replicate successes over multiple contexts and/or expand on previous successes. Thus, the relationships between funders and researchers are nearly always conditional and tenuous, pending the demonstration of success outcomes.

Education technology researchers are not the only ones influenced by current development funding models. Developing countries that enter into international research collaborations are sometimes pressured to implement ICT-based educational reforms that often do not reflect their needs. Nonetheless, many countries acquiesce to international priorities in order to retain development support. Correspondingly, it is not surprising for national policies to reflect the expectations for success common to funding agencies.

While acknowledging the dynamics of power that surrounds funded research, I support the concern raised by Ross and Morrison (2014) about the temptation to focus our expectations for success so weightily on media comparisons and effect sizes – what the researchers refer to as "technology effects studies" (p. 5). While effects studies aim at demonstrating which technologies or combinations impact students learning and achievement, it is well documented that most ICT supported innovations fail for a variety of reasons, including reasons not directly related to learner performance, sometimes long before field implementation (Graham 2010). Despite the increasing prevalence of ICT implementation failure, there are those who are unaware of or disagree with the degree of its frequency. However, based on current evidence, it might be detrimental to ignore this problem.

Therefore, in examining the existing body of research on ICT for education and development, curriculum decision-makers and practitioners have to pay attention to research that in the first instance considers additional ICT success metrics, such as favorable goal articulation, continual dialogue, and commitments to contextual and ecological factors, as discussed earlier referencing Figure 1.

Additionally, curriculum professionals are able to influence the academic research agenda by embedding more qualitative metrics into their curriculum evaluation plans.

5.3 Examine lessons learned for reasons why ICT fail

As illustrated in this paper, ICT can play a role in in attaining education and development goals. However, a growing body of research suggests we should make greater efforts to learn also from situations when ICT have failed rather than focusing only on when and how they have succeeded (e.g. Dodson *et al.* 2012). The reasons for ICT failure are plentiful, but I will discuss only a handful that have critical implications for curriculum decision-makers, designers, and developers.

Perceptions of need and agency: ICT are more susceptible to failure when we are not able to create the right kinds of environments to encourage adoption. It is becoming more apparent that just because we provide ICT does not mean people will want it or use it. As noted earlier, intentional ICT suggests that there must be a willingness or motivation to use the technology. In this regard I support the view of Rangaswamy and Cutrell (2012) who assert that "the poor have to be viewed as a dynamic social category with active agency to adopt technologies, rather than inert recipients of developmental action" (p. 52). The agency referred to here goes beyond mere willingness to adopt technologies, but extends to the notion of freedom to adopt and use technologies in a manner of the user's choosing, such as for entertainment purposes, even if the adoption does not align with conventional development evaluation modalities. According to Rangaswamy and Cutrell, young people must be able to accept or reject technology as tools of "development and social progress" and in fact, youth "purposively select aspects of technology use that best suit their lives" (*ibid.*).

Considering people and community: ICT innovations are less likely to fail when the needs and characteristics of individual end-users and communities are considered in the design and implementation, and vice versa (Alampay and Bala 2010; Dodson *et al.* 2012 and 2013; Wagner *et al.* 2010). In describing 'community-centric design', Dodson *et al.* (2012) argue that "it calls for community input and recognition of local circumstances in the design and deployment of the ICT." As the researchers further explain, "these initiatives give prominence to issues of social context, local culture, and other sociological and community-centered factors" (p. 21).

Curriculum professionals must therefore have a keen sense of user/learner need and agency and should consider incorporating local community input in the design of ICT-based interventions. This can only be done through respectful dialogue and exchange with the beneficiaries of ICT. By using intentional ICT as a guide, curriculum professionals can play a part not only in promoting development through education, but also in giving recognition to those regularly marginalized.

6.   Concluding remarks

The use of ICT for education and development is expected to continue into the foreseeable future. The expectations for success (e.g. student learning gains) for ICT-based educational reforms are enormous, despite significant evidence of ICT

failure. Presented with diminishing budgets and mounting expectations, education professionals feel pressured to implement ICT and demonstrate relevance to education and development priorities. This sometimes results in incidental applications of ICT that are characterized by poor planning, implementation, and evaluation, and do not lead to improvements in the quality of education.

I argue in this paper for an intentional ICT approach that places emphasis on using ICT to enable curriculum design, development, and implementation efforts. A well-designed and -developed curriculum should clearly specify both education and development objectives, while at the same time provide the pathway to continual dialogue and recognition of local contexts. An intentional ICT approach provides an opportunity to learn more about the linkages between ICT use in education and economic and social development.

It is prudent at this point to highlight that while the paper offers much by way of a general/reference framework, more often than not curriculum decision-makers, designers, and developers are seeking more specific, practical recommendations and advice. However, if decisions regarding ICT use are to be contextually based as argued throughout the paper, to what extent is it also possible to identify particular yet broadly applicable criteria that curriculum decision-makers, designers, and developers should take into account in their practice?

The issue of contextuality is therefore closely linked to and compounded by the issue of specificity. In other words, what is the appropriate level of specificity required in providing flexible and adaptable general principles, 'norms,' or 'standards' that can be widely accepted without being too prescriptive? This incongruity underscores the challenges for the current work and for contextually-based curriculum design and development in general. Accordingly, a number of practical and valid questions remain open as we seek ways to determine what an ICT-enriched curriculum could look like, whether the ICT are making/made the curriculum more effective, and how can we assess/evaluate whether the ICT are embedded in the 'right way' in the curriculum to support teaching and learning in a particular context? Future efforts must aim to provide good answers to these challenging operational questions.

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