Levelling the Playing Field: Assistive Technology, Special Education, and a Canadian Perspective

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Abstract

In trying to appraise the current public school educational experience and its understanding of and use of assistive technology (AT) in programming for students, one finds a situation that is both eclectic and gallimaufry. As a direct consequence, there appears to be a dearth of extant literature which closely examines this very important and ever expanding issue. Consequently, this small-scale exploratory investigation is a first attempt at addressing some of these concerns as it purposely sets out to specifically examine one set of perceptions on AT; namely those held by a sampling of principals. The results of this study appear to corroborate earlier findings from a scattering of studies in that a wide range of barriers still continue to impede the effective use of AT within general educational practice. The findings also underscore the need for a move away from directive forms of assistive technology to more inclusive forms, with an increased level of pedagogical understanding and collaboration required. This small Canadian study has become the prototype for a much larger one that is currently ongoing.

Introduction

The very nature of the field of special education brings with it an expectation of support. In short, it is the "special" in education which clearly defines this perspective. Over the years the types and level of support offered to students with "special needs" and their parents has continued to evolve. This evolutionary process has taken us to a time and place where, with very little exception, technology is now highly regarded by many educators and parents as offering some promise and a considerable degree of hope for students with extraordinary educational need (White, Wepner, & Wetzel, 2003).

More specifically, there is hope that technology will somehow be able to bridge the gap that exists between teachers and the differentiated instructional requirements that are needed for a student with identified special need(s). For the most part, this promise has largely been taken for granted by many educators, parents, and scholars in terms of its effectiveness. The taken-for-granted nature within this dynamic (assistive technology and its ultimate effectiveness), is substantiated by the dearth of empirical research in most areas specifically targeting the special needs of identified students (Edyburn, 2009; Okolo and Bouck, 2007), with, perhaps, the one exception being the use of assistive technology (AT) in enhancing the reading effectiveness of the extraordinary learner, where some modest work has been done (Edyburn, 2007; Hasselbring & Goin, 2004).

It was noted more than fifteen years ago by Okolo and colleagues (Okolo, Cavaalier, Ferretti, & MacArthur, 1995) that the research being conducted on AT was "*scattershot*" at best. In summary, it was their claim that it lacked a central focus on issues pertaining to specific programming. This lack of defined foci, they suggested, when combined with large differences in the types of research being conducted, made it difficult to render any conclusions about the true value of any particular research effort within the broad field of AT. Sadly, with a few notable exceptions, Okolo and Bouck more currently claim that not a whole lot has changed in the intervening decade and a half (2007).

In essence, it would appear that the promise of AT seems to be filled with proliferate wishes, hopes, and dreams (particularly within the broad domain of Special Education) but whether or not these proliferate wishes, hopes, and dreams have ever been realized, or whether or not any obstacles have been concretely identified along the way has, for the most part, largely been ignored within the wider research community.

Key Considerations: Putting the Technology Before the Pedagogy

A review of the educational literature on AT programs clearly emphasizes the key role of K-12 educators in the process of selecting the appropriate technology, designing programs, and implementing the AT plan on a day-to-day basis (Temple, 2006). However, in one major study, in surveying 405 teachers, only 20% of the respondents believed that they had the adequate training and support in order to effectively implement AT in their particular learning environments (Derer, 1996, p. 77). Related directly to this, is the observation made by Margolis and Goodman (1999) whereby they note that the type of AT training that tends to be generally offered to educators, often lacks a crucial emphasis on the pedagogical framework for its use. Instead, they claim, the emphasis is often placed on the more technical elements of the AT device or software application. Hence, the general training that is offered tends to be more focused on demonstrating how to use a specific application, and less concerned about the questions of *Why should we be using it?* and *How can it enhance overall learning?* (Barnett, 2001; Edyburn, 2004; Lonergan, 2001).

To restate, when it comes to AT and its current application within the current public education schooling experience, there would still appear to be a distinct emphasis on putting the technology well before the pedagogy. It is certainly a trend in the workshops, in the training, and in the purchasing of devices and software related to educational technology that we have noted for several years now as educators and researchers within a large teacher training facility. However, in fairness, both administrators and teachers alike report to us that when it comes to the consideration of AT within their respective jurisdictions, on many occasions they are presented with very tight timeframes in which to spend budgeted monies, often resulting in the adopting or purchasing of technologies that are unnecessary, impractical, not sustainable, and without any pre-investigation of the pedagogical underpinnings. This type of "technolust", as Lin so accurately describes (2007, pg. 416), represents a key barrier between the effectiveness of AT and the marginal role that it is currently playing in education. As he specifically noted, "…an appropriate performance analysis, which emphasizes the analysis of performance gaps, the learning needs, goals, and identification of the underlying causes of the problems, should be conducted to justify which technologies are the best fit and can supplement the intervention" (Lin, 2007, p. 416). Regrettably, what should be a collaborative, personalized and thorough review process, as described by Lin, rarely takes place within the context of public education.

Beyond Awareness

Despite some of the challenges presented directly above, today many educators are more aware of AT devices and the general space they occupy within education - particularly within the "special" educational domain (Guernsey, 2011). However, similar to the concerns expressed by Lin (2007), Edyburn cautions that "Success is dependent not only on having access to [and awareness of] a device, but also on factors involving the selection, acquisition, and the use of the tool" (2005, p. 242). Hence, for both Lin (2007) and Edyburn (2005), in considering AT you must not only consider the needs of the individual and the environment, you must also be aware of constantly emerging developments in the larger field of AT and the multiplicity of new devices that are currently being made available. With very little question then, as continually reported to us, there appear to many issues which daily confront public educators, of course, within an overall process that sees AT considerations within public schooling environments as increasing in an almost exponential fashion (Parette et al., 2006).

For example, we now know that *low tech* AT devices are those that have minimal moving parts and are passive in nature (Lagone, Malone, & Kinsley, 1999). In contrast, *high tech* devices are those that are more complex in orientation, have an electronic component, and require considerably more training and understanding (Lagone et al., 1999). The variability of devices, usefulness, cost, and especially the training required to operate them - is considerable within both of these categories. As a direct result, there is a both a need and demand for training, support, and awareness amongst special educators, teachers, students, and parents that is specifically harmonized with these profound technological advancements, (especially where *high tech* devices are concerned).

However, current research by Judge (2008) indicates that the training and support that are required to adopt *higher tech* AT solutions into educational settings is not happening at the required rate given the continued reliance upon, overwhelmingly, *lower tech* devices; this is despite the availability of many newly developed *higher tech* devices and software applications.

It is the view of Ertmer (2005) that the environmental conditions for the successful inclusion of educational technology into regular teaching practice have never been better. She notes that it is the convergence of policy, training, and the access to high-level technology that has made this so. Notable is the fact that although her research and observations are specific to the educational technology landscape in the United States, it has some direct application to the Canadian experience as well (Chalghoumi &Viens, 2009; Accessibility for Ontarians with Disabilities Act). Unlike many others, Ertmer (2005) presents a compelling support model for advancing the use of *high tech* in public educational settings. She claims, it begins with nothing more than first gaining a general understanding of the basic pedagogical beliefs of teachers. In her estimation, truly understanding and nurturing these belief systems within teachers may be all that is needed in facilitating an overall approach that has as its primary motivation the successful integration of AT within public school systems (to the benefit of all of its students). Supporting Ertmer's claims, is Cuban (1998), who further calls on educators to be more inspired in their use of existing technologies in broadening the learning experience for some of its neediest of students.

A Principal Role!

Within the context of public education, given the current and historical state of the research on the topic of AT, (some of which was consulted for this study), we feel it is legitimate to say that there still remains many unanswered questions, and large gaps in the service delivery and supports that are presently offered to teachers and students alike within public education. To start addressing some of these questions and bridging some of the gaps, we decided to start with those who ultimately make the decisions within schools; namely principals (Blase & Kirby, 2009). With very little exception, they are overwhelmingly the ones who can strategically offer the kinds of support and mentoring that teachers and students need to effectively implement AT within schools and individual classrooms. As noted by Mullen and Hutinger (2008), the principal plays a crucial role in prioritizing the professional growth of teachers. It is further recognized by these researchers that it is the exclusive responsibility of the principal to ensure that teachers receive the developmental opportunities that can expand their practitioner knowledge and overall instructional repertoire. The obligation for support and mentoring outlined by Mullen and Hutinger is a critical one; however, it is premised on the fact that educational administrators have the time, ambition, and knowledge to perform it. It also represents a challenge for educational leaders to find innovative ways to achieve this type of support within a teaching environment that is constrained by economic realities and the overall demands of accountability and efficiency that seem to be at the forefront of education today.

The issues raised above are a key concern for MacNeil and Delafield (1998) as well. The fact that not all principals may be able to offer the kind of guidance and support required, given the considerable demands of their position, represents a critical barrier in itself (Friedman, 2002). Nevertheless, conceding certain limitations, most would agree that a fundamental starting point for addressing some of the concerns outlined in this brief review, and the concomitant expectation for the effective use and vision regarding AT, needs to begin with school leaders, particularly principals. As such, it is hypothesized that by taking their *temperature* on the subject, a critical and insightful perspective will be offered that may contain some of the ingredients for a tonic that is capable of curing some of what is ailing AT as it relates to its utilization within the public schooling experience. In short, we feel it is a very good place to start.

Research Questions

The purpose of this exploratory research investigation was to try and discover what some of today's barriers associated with the effective integration of AT within the context of education are. Within the school system there are the following nine possible *perception-sets*: (a) principals/administrators school level,(b)administrators-board level,(c)administrators Ministry level,(d)teachers,(e)students,(f)parents,(g)community partners,(h)non-English speaking schools, (i)higher education training programs. Given the reduced time frame and small-scale nature of this research assignment, the focus and scope of this project were purposefully narrowed to spotlight only one of the perception sets: principal/administrator at the school level. Quite naturally, subsequent investigations will consider other perception sets with a long-term goal of triangulating all of the data gathered.

For this specific project we opted for a qualitative research methodology using a comparative set of case studies. This was based upon a few key considerations. Because this study was exploratory in nature and the main purpose was to gain some essential insights into a perplexing and long-standing issue confronting professional educators, it seemed that a qualitative methodology born of an interpretivist epistemology was imperative. Although Stake (1995) notes that case study appears to be a poor basis for generalization, he also acknowledges this framework for research places considerable value on the experiences, social reality and insights of others acting within that specified reality. It is not uncommon then for case study researchers to make assertions based upon a small number of cases (Ruddin, 2006). Importantly, Stake cautions the small sample size invokes the privilege and the responsibility of interpretation. Based upon this advisement, this methodology would best allow for the types of insights we were hoping to obtain and fit well with the limited sample size.

With this conceptual framework to build upon, the following research questions were key to our study:
1. What barriers do principals face with regards to the implementation of AT in their schools?
2. How are principals coping with the existing barriers?
3. What can be done to remove existing barriers?

Methods

Instrument

For this research endeavour we used in-depth, face-to-face semistructured interviews. The choice of this method is substantiated by Seidman (1991). Using a developed structure and what he calls the "art" of interviewing, researchers are able to gain considerably deeper level insights versus what he regards as merely public insights.

To develop the actual interview question set, we first located other studies that have conducted interviews around the topic of AT. One key investigation that provided a general framework for our overall approach was provided by Temple (2006) in an unpublished dissertation. However, in the end, the questions we ultimately utilized were largely derived from the following three repositories: from information culled from an examination of the existing literature, from information specifically provided on qualitative research by Irving Seidman (1991), and finally in consultation with other faculty members with whom we work.

Participants

As noted earlier, due to the exploratory nature of this investigation and the short amount of time governing its completion, the sample size was intentionally kept low (N=2). Specifically meaning two principals responsible for individual schools comprising 20 staff and 289 students in the first case, and 26 staff and 237 students in the second case. The selection of the research participants was not based on any standardized sampling technique. Some may regard it as a *sample of convenience*. As presented by Ferber in 1977, this form of sampling, unlike probability samples, is selected on the basis of just that, convenience. Furthermore, Ferber adds, "The object in this case is not to measure any sampling errors or biases but rather to make it as simple and economical for the researcher to get a set of data" (p. 57).

In order to add a small element of objectivity to the convenience sample used for this research project, we created and were guided by two simple criteria that we set in advance of our selection process. In order to be a candidate for consideration, the administrator had to have been in her/his position for no less than 5 years. It was our assumption that this would be an adequate amount of time for the administrator to have gained some insights into the nature and state of AT within her or his school and district. Because many technological advancements with regards to AT can and have been made in a period of 5 years, it would also allow for some reference to what has taken place within this time frame. Second, the administrator should be someone who is passionate and concerned about issues surrounding the use of AT in her/his school. The passion/concern criterion was added because we assumed such a person would be more committed to, and invested in the interviewing processes, and in seeing this small research endeavour through to its completion. Ultimately, our final selection of candidates was made from a list of five administrators, both of whom were recommended as meeting the pre-established requirements of our study. Future research, of course, will certainly consider a more heterogeneous sample population for study.

Procedures and Process

Both participants in this study were contacted by phone to arrange a scheduled interview. Prior to the interview, both were sent an electronic reminder of the meeting.

Attached to the e-mail was an electronic version of the consent form that outlined in detail the overall research endeavour. An invitation to clarify and ask questions in advance of the interview was offered. The average time for the *formal* interview process was approximately 45 minutes. Noteworthy is the fact that a total of 20-30 minutes (approximately) of *off the record* conversations took place both before and after the interview. In order to enhance the reliability of the transcribed data, each participant was invited to review the transcript and to attest to the authenticity of it.

Results

Data Analysis

Phase 1: Transcription (technological and ethical considerations/insights). The process for data analysis took place in phases. The transcription stage was completed using NVivo8 software. The transcript mode that is built into NVivo8 was very functional and mostly intuitive. The process of listening to the audio and then converting it to text was an insightful and useful procedure in itself. Noteworthy was the ability of the software to reduce the speed of the audio playback. Another motivation for completing the transcription phase (in the manner that we ultimately chose) came from our levels of discomfort with having the audio file shared and transcribed by another person (an outsider). It was our strong feeling this would have been a violation of the ethics protocol (as it was previously outlined to our participants).

Phase 2: Towards a theoretical sensitivity. During the transcription phase there were many themes that became readily apparent within and between the two interviews. During this time we formally recorded many notes and observations. These served us well, as they provided a starting point for interpreting the data. Another key source of "theoretical sensitivity" (Strauss, 1990, p. 42) that was heavily relied upon during this analytical phase was our many years of experience in the field of educational technology and, more generally, education. As noted by Strauss, "this knowledge, even if implicit, is taken into the research situation and helps you understand events and actions seen and heard, and to do so more quickly than if you did not bring this background into the research" (p.42). To begin, we were able to cull from the transcripts key words, phrases, and concepts that were immediately evident. We were able to then locate these in a table for each of the key questions that were asked during the interview. In turn, this was also done for the three research questions that were proposed at the onset of this investigation. This served as a valuable first step for graphically organizing and labeling /naming the data (see Tables 1 and 2).

Table 1: Key Interview Questions Asked Coded With Participant Responses in the Form of Key words, Phrases, and Concepts

Table 1 Summary of key interview questions and participant responses key word, phrases and concepts	Participant A	Participant B
1. What types of AT are teachers currently using in your school?	**software based**, old, entry level, low tech	**s**oftware, low tech
2. What are the guiding policies and procedures for your teachers and yourself with regards to AT?	Provincial testing	school board level (supportive), not on the cutting edge of what is out there
3. What are the barriers within your school that you feel exist with implementing AT?	**structural**, space, financial	**time**, support/trouble shooting, AT limited to the domain of special education, too comfy with existing AT
4. Where do you find AT experts to support your teachers?	**big challenge**, built up resources from past work and dealings	creative, board level, **collaboration**
5. What type of training specific to AT do your teachers and you have?	**minimal**, left to figure it out, how it works	expert, voluntary, **range of experiences in terms of quality**
6. How does AT fit into a student IEP?	depends, difficult	personalized, **need for courageous conversations**

Table 2: Research Questions With Hierarchal Participant Responses in the Form of Key Words, Phrases and Concepts

Table 2 Research question key word/ concept interview matrix (note: words and phrases are placed in order of the perceived importance that they were given during the interview)	Participant A	Participant B
What barriers do professional educators face with regards to the implementation of AT in their classroom?	*structural*, space, finances	*time*, support/troubleshooting, AT not seen as a spec ed. tool only by teachers, comfort level
How are educational administrators coping with existing barriers?	*big challenge,* use of connections, planning	*collaboration*, building capacity within the school
What can be done to remove existing barriers?	*move away from directive technology, move away from just this child thinking*	*principal setting AT as priority*, learning as much about learning disabilities as AT

Phase 3: Dare to compare. Another crucial step in the qualitative data analysis process, as prescribed by Stake (1995) and Strauss (1990), is to invoke a method of comparison. As recognized by Strauss, this process is once again heavily immersed in personal knowledge, professional knowledge, and most importantly, the professional literature. This higher order process of analysis yielded further insights. As such, there were many commonalities between the research participants and their responses. However, there were also some notable key differences between the two.

Key Barriers: Notable Discrepancies

As noted in the earlier literature review (Derer, 1996; Edyburn, 2005; Lin, 2007; Margolis & Goddmna, 1999; Okolo & Bouck, 2007), there remain many barriers and issues that impede the effective use of AT in public educational practice. Many of the issues raised and documented previously are the same ones identified by the two principals who provide the central focus of this particular study; however, there were some notable additions and discrepancies delineated as well.

Both participants identified several key barriers at the onset of the interview. Interestingly, the barriers identified were different for each participant. As noted by participant A (April 22, 2010), the primary barrier for implementing AT was related to the age of the building, or as it was phrased, "structural," and issues related to "space." Second in line, identified as a key barrier for participant A, was "finances". This was interesting given that many in the field of education often cite money as the fundamental barrier to most things (People for Education, 2006). More political in nature was participant A's comment that parents' lack of knowledge about AT is prohibiting the advancement of funding for it. As stated, "I don't think that their knowledge of what it can do for students is at a point where they are ready to rally around it. I think, you know, if parents knew how valuable the technology was, perhaps that would make a difference where decision making is focused with money" (Participant A, April 22, 2010). This is a critical insight, as it ultimately signals what some researchers have highlighted as the marginal role that parents play in the decision making process around AT (Judge, 2002). Reciprocally, involving parents more in this process will, without question, lead to higher levels of understanding and engagement by them (Ontario Ministry of Education, 2011).

For participant B, the notion of space, finances, and parent knowledge as key barriers were not specifically portrayed; instead, the ultimate barrier seemed to be a lack of time. Elaborating on this, participant B said, "because we rely on outside support (within the board), with regards to installing the computers, you have to find time for the teachers to learn how to use it, and they have to find time for the kids to learn how to use it" (April 27, 2010). Inherent in participant B's statement is the realization that support for technology and, as it was stated, "troubleshooting," although available, is not necessarily immediate. Without question, the delays in getting support seemed to be a key barrier for participant B.

In this time of fiscal restraint, at least here in Canada, it was further noted by participant B, "that everybody is being asked to do more with less." Any expectation that this particular problem could or would be rectified did not seem apparent to this administrator. What was evident though, was this educational leader's desire to find *creative collaborations* in order to overcome some of the many the barriers. In fact, this theme of creative collaboration was prevalent during both interviews, with both participants emphasizing its importance.

Notably absent from participant A's "key barriers"was any indication of teacher motivation or negative attitudes acting as an impediment. In fact, as stated by participant A, "[Teachers] are extremely willing here" (April 22, 2010). This finding represents a positive departure from some of the research that identifies the lack of willingness and teacher motivation as being a key concern (Cuban, 1998; Ertmer, 2005). However, this was not necessarily the case with participant B who stated, "The other piece that I believe is a huge barrier is that AT is still seen by many staff as a Spec. Ed. tool. That it is a double-edged sword" (Participant B, April 27, 2010). In fact, throughout the interview it was raised several times by it participant B, that although there was a general level of comfort amongst the teachers surrounding the use of *low-tech* AT, when it came higher levels of AT technology, there was the general view that this it was definitely pushing many of them (teachers) out of their general "zones of comfort". For participant B, to somewhat rectify this situation, goals would have to be reprioritized with an emphasis being placed on the acquirement of updated *higher tech* AT skills and knowledge for all of the staff within the school; specifically noting, "I am not on the cutting edge of understanding what is out there" (April 27, 2010). To this end, participant B readily acknowledged throughout the interview the significant leadership role that the principal has in guiding programs and professional development within the school a whole.

With very little exception, participant B seemed to fit with the prototypical image of the educational leader as outlined by Mullen and Hutinger (2008). However, although acknowledging the responsibility for guidance in the general area of AT, participant B exposed the "reality of the day" as a definite obstacle. More specifically, although participant B seemed willing to accept a leadership role in advancing the use of AT within the school, it was obvious that some of the same constraints identified by Friedman (2002) did not fully allow for it. For example, as noted by participant B, the ever-increasing demands of being an educational leader, which calls for a much greater level of accountability and efficiency at all levels throughout the entire system, although necessary, definitely subtracts from the abilities of the principal to fully support key areas within the school, like professional development, teacher mentoring, and, in the specific case of AT, overseeing its growth and development.

The Need for Courageous Conversations

Where there seemed to be conflicting insights on the specific types and levels of barriers that exist within the participants' respective schools, there seemed to be no such incongruence with whether the technology offered in their schools was either *low tech* or *high tech*. With respect to this, both respondents unanimously agreed that it was indeed *low tech*, with an overriding emphasis on software-based applications. As expressed by participant A, "We are at an entry level" (April 22, 2010).

The above findings are not surprising given the abundance of research that consistently emphasizes the reliance within public school systems upon *low tech* technologies in spite of the preponderance of available *high tech* options (Judge, 2008). Within our own study, some important insight on this particular perspective is offered by participant B who noted that by better understanding the nature of learning disabilities in general, we may in turn be guided to more appropriate forms and levels of AT to concretely support them. It was obvious during our discussion that participant B was in fact identifying a critical barrier within the larger AT domain, that being a fundamental lack of understanding by educators directly related to profound learning difference and identified learning disability.

As participant B specifically stated, "I think that there is not the link between our understanding of what a piece of AT actually does in terms of assisting students and what that particular student's needs are, and as principals, we really need to start having those *courageous conversations* around whether we really understand how each child learns best and what the best match for AT is" (April 27, 2010). This poignant statement contains an essential link to what we believe to be the central principle in guiding the conversation around AT specifically, and the fully inclusive public schooling experience. To us as researchers, the link that participant B seems to be referring to, and one that all too often seems to be missing from the larger debate/discussion, is the crucial link between technology and pedagogy.

Within the broader education/technology debate, Lin (2007) claims that when the pedagogical link is missing, you are left with nothing more than "technolust", a term he coined to describe the unnecessary and unfounded purchasing of technology (p. 416). Intrinsic to this term, and Lin's overall academic position, is the view that when it comes to making technology work within basic public educational practice, the lack of attention devoted to the pedagogical underpinnings in acquiring the technology in the first place, makes success a much more elusive target than it truly needs to be.

Making the Move From a Bells and Whistles Approach

The essential missing link, pedagogy, that participant B so astutely made reference to above, was further expanded upon by both participants when they were asked to describe the types of AT training opportunities that were being made readily available within their respective schools. In both cases, where participant A and participant B were specifically concerned, the general observation was made that when it came to their schools the AT focus was largely placed on the more technical elements of any given program or device, with substantially less attention given to any discussions on the pedagogy behind it. This particular finding is certainly substantiated by Margolis and Goodman (1999), who also identified in their research forms of AT training that seem to lack an emphasis on pedagogy; instead being more concerned with what they might describe as the *bells and whistles* approach to the problem (see also Eisenberg, 2001). Further, although participant A and participant B quite correctly identified the absence of pedagogy within the overall AT discourse, at least as it relates to their particular schools, they both however identified the importance of including students and parents within any future AT discussions/deliberations. "I ultimately believe that the kids need to be trained through whichever model is available to us" (Participant A, April 22, 2010).

Without question, the theme of inclusivity was one that permeated both discussions with both participants. For example, for both participants there was the strong belief that AT must be a learning tool for all, and not relegated to just an exclusive few. Both stressed that a concerted effort within both of their schools should be directed at trying to remove the current stigma that seemed to be attached to the use of AT by trying to greatly expand it and offer it to all of their students. As participant A distinctly states, "there is a need to distance ourselves from a just this child mentality."

Although both participants emphasize inclusivity when it comes to the purchase and implementation of AT, it appears that financial concerns might have considerable influence on the shaping of their opinions here, as is illustrated by the following comment from participant A. "Well once again, that child is not going to use that technology all day long, so you are investing in something that is going to be used during a specific time in the day, maybe a specific time in the week…..so maybe you are investing in something that you are not getting the most out of." Of course, this fairly pragmatic position on inclusivity fails to address the differing needs of students with higher level requirements and, of course, the specialized technologies that they may require to address some of their identified need.

In fact, what appears to be missing from the larger discourse, at least where participant A and B are concerned, is the recognition that some of the newer technologies can be strategically implemented to address some of the very individual and profound need(s) of some of their "hardest to serve" students. We feel that this, in and of itself, is a very interesting finding, as this universal view of AT, which both participants so consistently and eloquently spoke of throughout the interviewing process, perhaps provides a key guiding assumption held by many other principals thereby partially explaining why so many of the AT devices currently being purchased and used within public schools settings are of the *low tech* variety. They are definitely more affordable and, and as a direct, result can be purchased in much larger quantities.

Discussion and Implications

This small-scale exploratory investigation has corroborated some of what the existing literature has already identified. As well, it has also provided some differential perspective that will hopefully add to the larger discussion as we try and move forward; of course, all in an effort to better understand and assist educators, students, and parents in more effectively utilizing assistive technology within the public schooling experience. The findings of this small study highlight the existence of a wide-ranging set of barriers, which are not always linked to financial capacity. Related directly to this, as noted by the participants, some less apparent barriers can include structure/space limitations and time constraints. Coping with the existing barriers, according to the principals interviewed, will present a "big challenge" (Participant A, April 27, 2010).

However, both participants admitted to willingly accepting the "big challenge" and were cautiously optimistic that with higher levels of collaboration and an extended vision on their part it "is doable". As emphatically noted by participant A, "If you don't have a plan and a vision, you are in trouble" (April 22, 2010).

Where the two participants of this study are specifically concerned, the question of where AT fits into the bigger educational picture, that each must devise for their respective schools at the onset of each new school year, is the much greater question that currently needs to be addressed. Doing "much more with much less," as participant B cited (April 27, 2010), would appear to be the new reality. However, with this point being conceded, when it comes to AT within the public educational experience, both participants view collaboration and vision as being two essential ingredients in an overall recipe for success. They note that these attributes (vision and collaboration), when combined with a move away from the use of "directive AT", which is the practice of taking students out of the classroom for AT purposes, and instead bringing it to students within the regular classroom setting, would assist tremendously in starting to dismantle some of the currently existing barriers (Participant A, April 22, 2010).

However, an immediate finding of this study, and one that should serve as a starting point for ongoing discussions on AT within public education, is the significant role pedagogy should play in all future deliberations. Restated, as is confirmed by our own results, and certainly substantiated by the wealth of literature consulted in this study's completion, the better selection and more effective use of AT within public school settings will only truly occur when we have a better understanding of the types and ranges of abilities and disabilities that can be significantly enhanced by the strategic introduction of technological support (Participant A, April 22, 2010; Participant B, April 27, 2010). Consequently, this key finding should encourage educational leaders to consider planning, and the setting aside of specific funds, which would then facilitate more in depth discussion, and hopefully workshops, geared to nurturing more informed assessments on the nature of learning difference, and how technological adaptations can serve to dramatically level the academic playing field, especially for some of the most vulnerable students. Similarly, as a direct result of this study, it is also our view that educational leaders within public school settings should be strongly encouraged to put a considerable degree of pressure on "technology vendors"- imploring them to place more prominence on the pedagogy behind their product, and less time on the *bells and whistles* of their offerings.

On another level, this investigation also seems to underscore the absolute need for a formalized provincial and/or national thrust which advances a communal approach to education and the use of AT; perhaps utilizing an overall approach such as the one advanced by Wenger, McDermott and Snyder (2002) when they describe "communities of practice". Also, with an eye to alleviating some of the barriers identified within this research, perhaps developing an online community specific to AT would allow for the convenient and dynamic exchange of information. This repository would not only function as a central source of knowledge, but more significantly, would most likely serve as a key source of inspiration; perhaps providing for teachers, what Kitchenham (2006) identifies as a truly transformative learning experience.

In conclusion, future research in this area should continue to investigate a wider range of perception sets, with a larger sample size. Constantly taking the *temperature* of these various groups will not only offer some valuable insights, like the ones gained through this project, but will also give us some indication as to whether or not any substantial advancements are being made within the larger field of AT.

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