

Assistive Technology User Group Perspectives of Early Childhood Professionals

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Abstract: With the increasing usage of assistive technology (AT) usage in early childhood education settings serving children who are at-risk or who have developmental disabilities, there is a corresponding need for effective professional development experiences such as user groups to develop skills in using AT. Using a collective case study approach, 10 teachers who had participated in AT user groups and who were using an AT toolkit in their classrooms were interviewed and provided responses regarding (a) perspectives of user groups, (b) use of the toolkit, (c) benefits of user groups, (d) concerns regarding user groups, (e) perceived effects of AT on teaching and decision-making, and (f) perceived effects of AT on the classroom. Themes of interviews are presented, supported by statements from teachers.

The role of instructional technology (e.g., computers, software, learning manipulatives) and its implementation in early childhood education has been repeatedly noted in the professional literature (Anderson, Grant, & Speck, 2008; Hains, Belland, Conceição-Runlee, Santos, & Rothenberg, 2000; Hohmann, 1994; National Association for the Education of Young Children [NAEYC], 1996; Tsantis, Bewick, & Thouvenelle, 2003). A vast array of new and emerging instructional technologies has assumed a powerful presence in the educational marketplace, calling attention to the fact that “Technology is not going away” (Appel & O’Gara, 2001, p. 36). This presence is often embraced by administrators, education professionals, and family members alike, reflecting a general societal acceptance of the potential for technology in education settings for young children (Loveless & Bore, 2002). As noted by Tsantis et al., “Well-prepared teachers, who recognize the power and limitations of technology, are needed now more than ever” (p. 8).

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Similarly, a wide array of assistive technology (AT) applications for young children with disabilities is increasingly being used in early childhood settings nationwide (Judge, 2006; Mistreet, Lane, & Ruffino, 2005). An AT *device* is defined by the Individuals with Disabilities Education Improvement Act of 2004 (IDEIA) as “any item, piece of equipment or product system, whether acquired commercially or off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities” [20 U.S.C. 1401 § 602(1)]. AT devices may be both low-tech (e.g., picture boards, adapted writing tools, switches) or high-tech (e.g., computers and software, augmentative and alternative communication [AAC] devices) in design. Potential benefits to young children who are at-risk or who have developmental disabilities and who use AT devices include increased (a) access to the curriculum and development of emergent literacy skills; (b) opportunities for play, movement, and communication; and (c) parental care giving (Campbell, 2004; Judge & Parette, 1998; Mistreet et al.; Moore & Wilcox, 2006; Sandall, Hemmeter, Smith, & McLean, 2005).

However, the mere presence of technology, whether instructional or assistive, is inadequate to ensure its effective use and implementation in early education service settings (Hutinger & Johanson, 2000). Professional development is a critical component for de-

veloping the requisite knowledge base and skill sets to use technology effectively in classroom milieus (Bruder, 1998; Epstein, 1993; Parette, Peterson-Karlan, Smith, Gray, & Silver-Pacuilla, 2006; Smith & Allsopp, 2005; Robinson, Schneider, & Huting, 2007). In considering professional development needs for teachers of young children to be able to use technology effectively, Epstein (1993) recommended that effective approaches should include (a) practical experience, (b) workshops, (c) models and mentors, and (d) supervisory follow-up. The importance of repeated opportunities to develop new skills has also been noted (Joyce & Showers, 2002), with particular emphasis on the importance of additional professional development *after* an initial workshop has been presented (Fullan, 2002; Joyce & Showers).

One approach that has been demonstrated to have great potential to develop AT knowledge and skills among early childhood education professionals is through implementation of user groups (Parette, Peterson-Karlan, Wojcik, Watts, & Stoner, 2007; Parette & Stoner, 2008). Parette et al. defined a user group as:

a group of education professionals who (a) have a shared interest in AT, (b) are committed to developing new skill sets about an array of AT devices and implementation in the learning community, (c) are supported for their participation in the user group setting, and (d) *share* [emphasis added] their learning with other education professionals in the community. (p. 30)

In essence, the user group is a learning community (i.e., a group of people sharing common values and beliefs and who are actively learning together; Wikipedia, 2007) that relies on the expertise of one or more professionals having advanced AT skill sets, and who work/s with other education professionals seeking to develop new AT competencies for classroom implementation (Parette & Stoner, 2008). Group sessions are conducted using one or more of the following formats: (a) *open-ended* (that respond to issues and concerns solely identified by users); (b) *scaffolded* (to allow user input regarding direction of the group, while also communicating expectations for

performance or accomplishments by the end of the session); or (c) *highly structured* (to allow specific content to be delivered based on assessed needs of participants). In each session, participants have opportunities to learn and use specific technology applications (e.g., specialized software for producing instructional materials to promote communication or literacy skills)—learning which can be immediately applied in their respective classroom settings. This new approach to learning is supported by the user group leader/s who provide instruction, information, resources, and who encourage individual and group problem-solving. *Sharing* of products that have been created in the sessions is also encouraged. At the core, then, user groups have the potential to (a) culminate in a dynamic learning community in which individuals develop advanced technology skill sets, (b) use these skills in developing and implementing the early childhood curricula, (c) consult with others within the learning community to jointly develop curricula products, and (d) make newly created classroom products available to others. The resulting learning community that evolves from the implementation of user groups has not been systematically explored, nor do we understand what education professionals who have participated in such a professional development approach perceive to be the benefits of user groups and the resulting learning community.

The purpose of the current study was to examine the perceptions of teachers and aides who had participated in a series of AT user groups. Specifically, the aim of this examination was to provide a better understanding of the perceived benefits of these user groups related to the development of AT knowledge and skill sets that were translated into early childhood education classroom practices. To further focus the study, three research questions were proposed:

1. How do teachers describe their perspectives regarding AT user groups?
2. What are the perceived benefits and concerns of user groups?
3. How do teachers describe the effect of AT on their teaching, decision making, and students?

TABLE 1

Teacher Demographics¹

<i>Teacher</i>	<i>Education Level</i>	<i>Yrs Experience</i>	<i>Classroom</i>
Barbara	B.A.	10	At-risk
Carole	B.A.	17	At-risk
Donna	M.A.	12	Developmental Disabilities
Ellen	B.A.	30	Developmental Disabilities
Jane	B.A.	1	At-risk
Karen	B.A.	5	At-risk
Kenneth	M.A.	7	Bi-Lingual Developmental Disabilities
Kathy	B.A.	0	Developmental Disabilities
Toni	M.A.	35	Developmental Disabilities
Teri	B.A.	3	At-risk

¹ All teachers hold state teaching certificates

Method

Participants

Participants were 10 teachers at an early childhood center in a Midwestern city. Five of the teachers were teaching children with identified developmental disabilities; four of these teachers taught full time, teaching one class in the morning and one class in the afternoon, and one teacher only taught in the morning. The remaining five teachers taught children who were identified as being ‘at-risk.’ One of these teachers taught in a bilingual classroom with a Spanish interpreter. Eight of the teachers participated in user groups and their perspectives are reported. The remaining two teachers (one taught the bi-lingual class and one taught children with developmental disabilities in the morning) were new to the school and did not attend user groups. Their perspectives are also reported since they offer valuable insight about entering a school “mid-stream” that was infused with AT. All teachers held state teaching certificates and had varying levels of education and experience. Teaching assistants were staffed in each classroom (see Table 1).

Each of the teachers were participants in a 3-year project, Making a Difference Using Assistive Technology (MDAT), funded by the Illinois Children’s Healthcare Foundation (Parette, Stoner, & Watts, 2007; Parette, Watts, & Stoner, 2005; Parette, Wojcik, Stoner, & Watts, 2007). This project provided AT tool-

kits (Edyburn, 2000; Lahm & Case, 2003; National Center for Technology Innovation and Center for Implementing Technology in Education, 2006) to help develop children’s emergent literacy skills in 10 preschool classroom settings. The toolkit contained a (a) Dell™ personal computer and keyboard, (b) microphone, (c) scanner, (d) digital camera, and (e) ceiling-mounted projection system with Bluetooth keyboard and wireless mouse. Software included in the AT toolkit included the Intellitools® suite, Boardmaker™ with Speaking Dynamically Pro®, Writing with Symbols 2000, and Clicker® 5.

User Groups

Four morning two-hour user groups were offered in Summer, 2006, and four after school two-hour user groups were offered in Fall, 2006. Both sets of user groups were held at the university campus in the assistive technology center and teachers had access to computers with all the toolkit components installed on them. One member of the research team facilitated all user groups sessions, with the remaining researchers provided additional support when schedules allowed. Typically there was the user group facilitator and at least two other researchers in attendance at session. Teachers received a stipend of \$250 for attending at least six out of eight sessions and program assistants were given \$150 for attending three out of four Fall sessions. At each

TABLE 2

Interview Questions

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1. Describe your impressions of the user groups.
 2. What experiences within the user groups did you value the most? Why?
 3. What experiences were the least valuable? Why?
 4. In each user group you set individual goals—Can you talk about that process and the outcomes?
 5. Describe how the AT has affected your students.
 6. How have you used AT in the classroom?
 7. Describe any collaboration that has resulted from the user groups. Have you shared and has anyone shared with you?
 8. How has this AT experience influenced your teaching and decision making?
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session a primary facilitator having an Assistive Technology Practitioner (ATP) credential led each user group session. Prior to user group sessions, both teachers and program assistants were queried via email regarding their preferences and interests in using the AT toolkit. This enabled the facilitator and other participating faculty members to ‘customize’ the user group content. CDs containing information used at the group meeting were provided to participants that included listings of Web resources, Microsoft PowerPoint™ files, PDF files, multimedia productions, and other supports.

At most sessions, participants could discuss their learning needs and issues at the beginning of the user group session, followed by a response on the part of the facilitator and support faculty to meet those articulated needs. User group sessions focused on direct training in the use of each of the applications to create classroom literacy products, coupled with use of multiple tools to develop products. Specific topics for user group sessions included (a) Using Boardmaker™ and Speaking Dynamically Pro®, (b) Social Stories™ and Power Cards for supporting positive behavior change, (c) Using Writing with Symbols 2000, (d) Multimedia Interactive Books, (e) Microsoft PowerPoint™, and (f) Introduction to Clicker® 5 and Intellitools®.

Research Design

Qualitative methodology was used to allow the researchers to deeply explore the perspectives and gain insight into the feelings, emotions, and thought processes of the participants (Creswell, 2002; Strauss & Corbin, 1998). Nu-

merous researchers (e.g., Bogdan & Biklen, 1998; Leedy & Ormrod, 2001; Millan & Wergin, 2002) note the benefit of using qualitative research to investigate a phenomenon or experience about which little is known. Specifically, no research has investigated the perspectives of teachers about AT user groups. Additionally, understanding the perspectives of teachers as user group participants was deemed essential to the MDAT project.

Interview questions were developed to address the research questions (Kvale, 1996) and semi-structured interviews lasting approximately a half-hour were conducted with all participants individually. Semi-structured interviews allowed the researchers to ask for clarification or additional information. (See Table 2 for a list of interview questions.) All interviews were audio-taped and transcribed verbatim to ensure accuracy. The user group facilitator did not interview the teachers. Two researchers, who had been present at the school for the past two years conducting assessments, collecting writing samples, and working on other training aspects of the MDAT project conducted the interviews. This procedure was intentionally implemented to remove any hesitancy on the part of the participants to express concerns to the user group facilitator and to ensure a level of familiarity with the interviewer.

Data Analysis

This study employed collective case study methodology (Stake, 2000), involving the study of more than one case in order to “investigate a phenomenon, population, or general condition” (p. 437). This approach as-

sumes that investigating a number of cases will lead to better comprehension and better theorizing. Cross-case analysis was used to analyze each individual participant responses as a whole entity. A comparative analysis of all participant responses was then conducted which allowed researchers to see processes and outcomes across many participants, thereby developing a deeper understanding of the emerging phenomena through more powerful descriptions and explanations (Miles & Huberman, 1994).

After completion of the interviews, the data were analyzed using a line-by-line multiple coding approach (Barbour, 2001). The researchers analyzed each interview independently and then met frequently as a group and developed categories based on their individual line-by-line coding. Disagreements about the categories were discussed, categories were refined, expanded, and/or deleted as needed, and concordance was reached (Barbour). The constant comparative method by which researchers continually returned to the data for analysis was used as an overall methodological framework (Charmaz, 2000). Three members of the research team (i.e., three faculty members in a Midwestern university's Department of Special Education) analyzed the data. Outside expert validation was completed by the fourth member of the research team, who was presented with the categories and transcripts and concurred with the findings.

Confirmability

Confirmability of the findings was achieved through three approaches: (a) *triangulation* (Creswell, 2002) of incidences that occurred across cases and confirmed through observations in the classroom, (b) *respondent validation* (Creswell, 2002), i.e., confirmation of graphic and textual findings presented to participants regarding the researchers' understanding of observations; and (c) *member checks* (Janesick, 2000), or allowing participants and the school principal the opportunity to review and quotes used in this report. All participants confirmed the findings.

Findings

The findings are organized by the research questions: (a) perspectives of user groups, (b)

use of the AT Toolkit, (c) benefits of user groups, (d) concerns regarding user groups, (e) perceived effects of AT on teaching and decision-making, and (f) perceived effects of AT on the classroom. In addition, interviews with two teachers who were new to the school, had not participated in the user groups, but had begun teaching at the school with the AT in their classrooms, are discussed.

Teacher Perspectives of User Groups

When asked to describe their impressions of the user groups, teachers spoke of the knowledge they had gained and the camaraderie they had enjoyed. Initial responses were overwhelmingly positive.

I've really enjoyed the user groups. I think they've been very helpful. This year after the user groups I really feel like the first year, we were just inundated with stuff, which we fully appreciated, but then this year after the user group I really felt like I got the time to implement it in the classroom and learn about it. And become proficient in it, you know?

Responses like Barbara's above were indicative of the overall positive perspectives the teachers held. Subsequent questions elicited more details of user group benefits and specific concerns.

Use of AT Toolkit

Teachers were asked to describe their use of the AT toolkit and a wide variety of AT was mentioned and is listed in Table 3 with quotes illustrating how each was used.

Benefits of User Groups

Benefits of user groups emerged in response to the first question as well as in responses to the question that specifically asked teachers to describe what was most valuable. Responses were categorized and the resulting categories included benefits of time, individualized support, collaboration, and an increase in knowledge, skills, and self-confidence. Each of these categories is discussed in detail.

TABLE 3
AT Toolkit Use

<i>Selected AT Tools</i>	<i>Selected Quotes Exemplifying AT Use</i>
Boardmaker™	<p>We're using a lot of the pictures, the Boardmaker™ pictures, for requests and you know things like snacks. We usually make a lot of them and we've got them for everything. We've got little visual prompts outside of the classroom because they can't remember what they're supposed to do when they get to school. <i>Donna</i></p> <p>We had an intervention meeting [on a particular student] and I'm using Boardmaker™ cards specifically for her intervention. And in the meeting they said 'Well, who wants to make them?' and I said 'I've already got it done!' Anytime I felt like I could complete something that I knew I would use, that just made all the difference to me. It made it all worthwhile, going to the user groups. <i>Carole</i></p>
Writing with Symbols	<p>Writing with Symbols has been awesome with the students who are more verbal especially as far as telling me a story about something. Like my dinosaur in New York. And then having them see their words coming up on the screen and matching some words with pictures and knowing the value of their words. And they can't always read it back but the pictures help them remember what they've talked about. <i>Ellen</i></p> <p>Using Writing with Symbols, I can produce something to put on their locker with their art project and their words are there. And they say, 'That is what I said!' And they remember what they said. <i>Jane</i></p>
Projection Screen	<p>Well, if there's a picture of them on a power point you've captured their interest forever. I will say that. I mean the [projection] screen has been really fun. We've had a really good time with that. <i>Toni</i></p> <p>I think the students enjoy it, like what I did with power points, they're excited and they want to watch it over and over again on the screen. <i>Barbara</i></p>

Benefit of Time

Anyone who has ever been in an early childhood classroom understands the response of all teachers that focused on the benefit of having a large block of time set aside to learn and use AT. Jane spoke specifically of the pressure she feels during the school day due to lack of time, “So, that’s why the user groups are so beneficial to us because we only have, sometimes a half an hour before school, maybe a half an hour during lunch and planning time, and then a half hour at the end of the day. And that’s not really a lot of time . . . where do I begin and then have to stop in 15 or 20 minutes because I’m out of time.”

Benefits of time included the time to learn a specific AT *and* have the opportunity to practice and explore that AT. Toni stressed this in her response, “And you got to practice the skill so that you knew that skill and you kept that skill rather than doing something new every time but never having enough prac-

tice to actually acquire it.” The value of time was intertwined with the organization of the user groups and exposure and time to practice were unanimously viewed as a benefit.

Additionally, teachers spoke of the benefit of having the time to actually produce a product that addressed the needs of their classroom. Carole stated, “Anytime I felt like I could complete something that I knew I would use, that just made all the difference to me. It made it all worthwhile, going to the user groups and stuff.” Time is a resource that is extremely valuable to teachers at all levels, especially preschool. The teachers readily identified the benefit of having the time to learn, explore, and produce products that were relevant to their needs.

Benefit of Individualized Support

The structure of the user groups allowed each participant to produce an individual class-

room product. These products were designed by the teachers and varied in complexity of technology. For example, one teacher who had no experience or knowledge of PowerPoint™ before the MDAT grant, was thrilled with her PowerPoint™ product which contained clipart and sound effects. Another teacher, with more advanced technology skills, produced a power point that had digital pictures of students embedded with the student voices. Yet, each of these teachers was appreciative of the support that addressed their abilities, gave them knowledge to gain more skills, and focused on their individual classroom needs. Donna's response highlights the importance of support to produce her own product:

Because the training has to be hands-on, particularly for me, and then we were allowed to work on things that were of our own interest. And that is much more motivating, much less frustrating, than sitting in a classroom and talking about, you're going to do this and by the time you get back to work you've forgotten.

Ellen, who was the teacher with the highest level of AT skills, also stressed the benefit of having support available:

The user group, first of all it was nice to have a defined time that you knew that you were going to be working on something at that time and that place. So, that was good. Also, to have resources and people available to answer your questions right on the spot so that you didn't give up something in frustration and put it off for a later time and then never get back to it. So that was a good opportunity.

Individualized support coupled with blocks of time to create a functional product was highly valued by all teachers.

Collaboration

Sharing of products was encouraged throughout user group sessions. Individual products were available on a shared network drive at the preschool. In addition, teachers readily shared created products with each other via

email. As Toni states, "People are very quick to share."

All teachers spoke of the benefit of sharing products (e.g., PowerPoint™ presentations, Boardmaker™ visual charts) when individual products were sent to all teachers in the building. Karen spoke of the value of receiving products and AT information from other teachers,

We [all the teachers] had sent emails when we finished a PowerPoint. We just said 'you're welcome to use this' and then you get feedback saying the kids liked it. Or even the websites, you know, 'Hey, I found a good website, check into it'. So, just sharing what works and what doesn't, or if we're talking about a theme and someone says 'Oh yeah, I did this.' It's just really opened up another door as far as using the technology.

Teri stressed the time saving component of collaboration, "So, it's really easy, you know, everybody makes one for winter and suddenly you've got eight books to read with the kids and you only had to spend the time to make one."

However, collaboration encompassed more than just sharing products. Teachers spoke of being more comfortable with asking others for technical assistance. Jane illustrated this,

I mean if we created anything before [user groups] we might, if we had a ditto or something, we might leave one down at the mailbox with a note saying feel free to copy this or whatever. But now, we're really using our skills and then if we see something, if someone puts sounds or a movie or something on the PowerPoint for instance then you're more inclined to go to that person and say, 'That was really cool. Can you show me how to do that?' And it kind of opens it up a little bit more for communication.

Teachers worked in the same room during the user groups and that close proximity sparked an interest in their colleagues' products and ideas. Barbara excitedly talked about learning from others, "I came [to the user groups] with some ideas and sometimes I still came without much. But being with fellow teachers, there was, you know, a lot of buzz in there and I

thought, oh yeah, here is something that someone else is talking about.”

Collaboration encompassed sharing products as well as technical skills. Collaboration was appreciated by all and became an underlying value of user groups that transferred to the school setting.

Increase in Knowledge, Skills, and Self-Confidence

One of the most predictable benefits of user groups was that of an increase in knowledge and skills related to AT. All teachers, regardless of their pre-existing skills, identified numerous areas of growth in AT knowledge and skills. Carole, who acknowledged her low technical skills:

“I felt like I wasn’t on the same page or level as some of them [teachers]”, reported major gains in her technical ability. Well, the most valuable thing to me was just to get a sense that I can do these things, you know. That I felt like I had some training. That I could go to a computer, turn it on, go to Websites. I can use Boardmaker™!

An increase in skills, regardless of initial technical ability, was confirmed by Ellen, who may have had more technical knowledge because she had an university course in AT, “The opportunity to have people to answer questions and at the same time giving you as much help or as little help as you needed was of great value.”

Yet, beyond the technical aspects of using AT, teachers gained insight into application of AT to meet class and individual student needs. AT was used to supplement teaching materials and also to assess IEP objectives. Donna describes how she uses AT with assessing her students, “When I test students on things like shape identification, interactive things on the computer are just more interesting to them.”

Each user group began with teachers setting individual goals for themselves and then at the end of the user group they evaluated how well they met that goal and what they had produced. While not all teachers liked this process, many found they were able to focus on learning a specific aspect of AT and had the added benefit of leaving with a product. Jane favorably described this process:

We were given a piece of paper that kind of helped us write out what we wanted to accomplish that day and then at the end of time, what did I accomplish, what did I produce? It was good to be able to put it on paper. Okay, I have all of this at my disposal, all these new software and materials that I’m not familiar with or not familiar with at all. ‘What do I want to master today?’ A lot of mine just started out, like the social story, I don’t know what a social story is. I want to know what that is and how I can use it in my classroom. And I did and I created some of those . . . setting goals was a good way to hold yourself accountable.

Teachers identified an increase in AT knowledge and skills, an increase in AT application, and an overall increase in their self-confidence with AT. When coupled with the previously discussed benefits of time, individualized support, and collaboration, the user groups were perceived as a significant benefit. However, concerns also emerged about the user groups.

Concerns Regarding User Groups

Teachers identified three primary concerns regarding user groups: (a) lack of time, (b) feelings of frustration based on varying technical abilities, and (c) logistical concerns. Each of these is discussed in the following section.

Lack of time. Lack of time emerged specifically over the introduction of a particular AT product system that included specialized software with numerous templates and activities for use with an adaptive keyboard, and the resulting difficulty in achieving operational competence. This AT was introduced during the last user group; however, it was complex and truly required more time for practice than the teachers were given. Toni described her frustration in stating, “It [the product system] was introduced to me. I do not know how to use it. We didn’t spend enough time on it, we didn’t get to review it, and we didn’t actually use it.”

Lack of time to practice with this AT was an unintentional error on the part of the trainers. Yet, this situation illustrates and reinforces the perceived value of practice that offers nov-

ice users a sense of operational competence enabling them to effectively learn to use the technology and then apply it when developing and implementing functional classroom activities.

Frustration. As mentioned previously, there were varying levels of abilities and experience regarding AT among the teachers. While the user groups were designed to offer individualized support and allow participants to work at their own speed, there were times when all had to proceed as a group. This was especially evident at the beginning of the user groups when software had to be installed and the basic elements explained to all. Interestingly, this led to feelings of frustration among those with advanced as well as basic technical skills. One participant, Teri, who may have been very proficient with AT because she completed an university course in AT, explained her perspective, "Sometimes though, we spent so much time on installing a program or something that I knew pretty well . . . that gets a little old. I'm fairly good with that stuff so, sometimes we started a little too slow for me and I got a little impatient." Similarly, teachers who had less advanced technical skills sometimes felt uncomfortable. Toni described this, "I think that there's a wide variety of abilities and there's a wide variety in terms of abilities for us and for our kids. And when we're all trying to do the same thing and it was just something new, it wasn't comfortable."

Carole spoke of this at a more personal level by noting,

I felt a little . . . like 'oh, man, they're really getting something done here' and I was still back on stage one. So, I felt a little awkward or sometimes felt like my time wasn't as useful to me. You know, I saw some of the other ones [teachers] completing their projects or a whole project and I'm still back on stage one.

Teachers were keenly aware of their own shortcomings and the higher skills of some of the other participants. This concern was not expressed openly during user group activities, but emerged during the individual interviews.

Logistical concern. The third major concern teachers identified was logistics. Many teachers were producing products that required

materials housed at their school such as, card-stock, colored paper, or digital photos of their students. Teachers realized the benefit of being in the same room at the AT center with computer access for all, but desired to have materials available to complete their projects as they wanted. Jane shared her desire about this, "I think that being able to use our own computers and then all of our pictures and things are on there at our disposal."

The concerns teachers expressed concerning the user groups were a lack of time to learn a specific AT device, feelings of frustration with varying abilities in the user groups, and logistical concerns about availability of materials needed for production of a product.

Perceived Effect of AT on Teaching and Decision-Making

When teachers were asked if AT had affected their teaching and/or decision making their responses were positive. Ellen responded that AT had influenced, "Everything I do. I'm using visuals and pairing pictures with words and it just is an appropriate means of education for the level of the students that come through my door." Toni explained the effect AT has on her teaching:

I think it enhances the curriculum. I think it has been interesting to find different ways to bring it in. And when we do a unit, we stop and think Is there a good PowerPoint that goes with this or which one of us wants to make these cards so we can share, this bingo game, or whatever it is you're making.

Carole described how she automatically thinks about AT when she is teaching:

I just think that I strive for, 'How can I put it into technology?' So, I'm constantly thinking, what will make this be a bigger picture? Like when they're laughing because they see a groundhog going through a tunnel. We talk about fast and slow or I bring in all the actions. It's real life to them on the computer and the animation that comes through instead of stick figures. I think I just see an increase in their desire to participate in the activities as students.

Teri cited a personal example of how AT has increased her awareness of and ability to respond to the vocabulary needs of her students:

Like the word 'igloo'. Nobody knew what it was and a lot of typical kids know what an igloo is. So we used AT to get a picture in Boardmaker™ and used it in a Bingo game. And then I used the cards for vocabulary and big pictures with a pocket and we might say 'In winter I see . . .' and then we go through them and put them in [the pocket].

Several teachers described situations with individual students that prompted either a change in their approach with that student or the ability to create an intervention support that was appropriate for a particular student. Donna spoke of a situation that changed her expectations and approach with one student with autism spectrum disorder (ASD) due to his response to a sentence completion task that was projected onto the large screen:

Well, we had just talked to parents and asked if they heard him speak more than one word because we weren't hearing it. He came over to tell me a story and usually he doesn't, but he came this day. I was modeling for him 'Tell me what you really like'. And I couldn't get anything out of him and I was typing and it was showing on the big screen and he was watching and then I typed, 'I love . . .' and just waited. He reached for the keyboard and he typed d-i-n-o-s-a-r. Yes! The previous student's story had a picture, you know the picture popped up of a dinosaur and he saw that on the screen. So I went back and respelled it so the picture would come up and that was quite a moment with that child and then he read, he read, 'I love dinosaurs'. And he is hyper-lexic but usually he just writes, he's not verbal.

Now that Donna knows he is capable of verbalizing she says "Poor kid, he is going to be doing a lot of stories".

Another benefit of AT was the ability to immediately produce a product to respond to a specific situation. Jane spoke of a student who was exhibiting inappropriate behavior on the school bus. Since one of the user groups

had focused on social stories, their purpose and how to produce them easily, Jane was familiar with this intervention. She describes the use of AT:

After I learned how to do a social story, a problem came up with a student on the bus and within 15–20 minutes, using pictures I had taken from our memory book (digital pictures of the students at various locations in school) I could create a social story quickly. I had a child that had good days and bad days on the bus with behavior, laying down on the floor, being very disruptive and disrespectful and one day he was not allowed to ride home. He had to sit in the office until his mother came to get him. So, in that time, I came down to the classroom, put together a social story about good choices on the bus and how Miss Jones wants me to make good choices on the bus, my mom wants me to make good choices on the bus, I want to make good choices on the bus. You know things like that. And within 15 minutes I was back in the office reading it with him, show his Mom and have her read it to him at home. He was just so thrilled that he had his own story and it really clicked with him. I haven't heard of any bad days in weeks, so it's been effective.

Perceived Effect of AT on Classroom

While teachers spoke of situations where AT affected individual students they also conveyed their excitement about how AT affected their entire class during group activities. The overwhelming response was that students were more engaged when LCD computer images were projected onto the large screen. Teachers reported that students would request using AT and when the large screen was pulled down they were captivated. Ellen offers an example of the effect on her class of students with developmental delays,

I think it has helped get their attention. Assistive technology, as far as using the projection unit has been phenomenal for attending, with a power point or a game. I think it goes back to our society where television and technology is such a big part at home. But this way of having the projection unit with things that *I want* to put on there

has a direct purpose for the unit. I've got their attention and it is not just sitting mindlessly. They're doing something, they're reviewing, and we're talking about colors. So it's using something they're familiar with and motivated to use. And it is for goal purposes or my intent on their growth and thinking.

Numerous teachers thought that the attention students gave the LCD projection on the large screen was due to the immersion some students have with television, movies, or computers in their homes on a regular basis.

Perspectives of New Teachers Regarding AT in Their Classrooms

There were two teachers who were hired after the MDAT grant was in place, one was hired at the beginning of the year and had a bi-lingual classroom and one was hired mid-year to teach a class with developmental delays. The new teachers were invited but did not choose to attend the user groups. The teacher who was hired at the beginning of the academic year conveyed the reasons for non attendance to be personal, (i.e., he lived out of town, had a young daughter he had to care for, and was busy learning his new job). The first-year teacher who was hired mid-year gave no reason for non-attendance. However, she talked about her use of AT in the classroom and the benefit to her students with developmental delays. She was a recent graduate of the local university and had learned AT during her teacher education program. She described the benefit of using visuals with her students, and talked knowledgeably about the use of Boardmaker™, Writing with Symbols, and Intellitools®.

The teacher of the bi-lingual classroom described his frustration with the AT in his classroom:

You know, I've basically had to teach myself in a lot of ways how to use it. And I'm still very confused with some of the programs and I want to use it to the best of my abilities. You do what you can do. Plus, being new to the district, I've got other things that I'm trying to learn.

However, he did seek assistance from other

teachers once he saw the projects teachers in the school were making with the AT. As he noted:

There's two teachers here that I usually go to ask for help that I know have used it a lot. I will go into Ellen's room a lot and ask her help and she's pretty good about helping me and stuff. So I go in before or after school and ask them how to use it. Or if I see something they've done I'm like, 'Well how did you do that?' A lot of the stuff was in my room and I didn't know what it was and I had to be the one to ask 'What does this do?

Consequently, this new teacher did use AT, appreciated the benefit of AT with his students, and sought out assistance when he did not know a program. Yet, he did not attend the subsequent summer user groups.

Summary of Findings

Teacher responses yielded five primary categories: (a) overall perception of user groups, (b) benefits of user groups, (c) concerns regarding user groups, (d) perceived effect on teaching and decision making, and (e) perceived effect on the classroom. In addition, Table 2 summarized toolkit use with teacher explanations of how they use that piece of the AT toolkit with in their classrooms. Overall, user groups were perceived positively with teachers illustrating the positive effects of AT and user groups on themselves and their students.

Conclusion

Current education mandates present immense challenges to early childhood education professionals regarding the use of AT in classroom settings with students who are at-risk and who have developmental disabilities. Growing concerns regarding child (or user) 'outcomes' (i.e., documented data to demonstrate the effectiveness of specific AT solutions) subsequent to AT implementation in the curriculum have been noted (Assistive Technology Outcomes Measurement System, 2007; Consortium on Assistive Technology Outcomes Research, n.d.; Edyburn, 2006; Edy-

burn, Fennema-Jansen, Hariharan, & Smith, 2005; Parette & Dikter, 2006; Parette et al., 2006). Compounding the importance of documenting child outcomes is the emphasis of the No Child Left Behind Act of 2001 (P.L. 107-110) on achievement for all students—including those with disabilities. Preparation for success in public school classrooms begins in early childhood settings, and given the compensatory aspects of an AT device (i.e., it allows a child to do something he or she could not do without the device at the expected performance level; Parette, Peterson-Karlan, Wojcik, & Bardi, 2007). This places considerable responsibility on preschool education professionals to have the requisite skills to successfully be able to participate in the general education curriculum (National Early Childhood Technical Assistance Center, 2006). Since AT is required to be ‘considered’ when developing individual family service plans (IFSPs) and individual education programs [IEPs; Individuals with Disabilities Improvement Act of 2004; 20 U.S.C. 1401 § 614(B)(v)], there is an even greater obligation on the part of preschool education professionals to develop an AT knowledge base and to implement AT with children. Arguably, however, child outcomes in classroom settings are contingent upon teacher knowledge and skills regarding AT consideration and implementation.

Given the increasing emphasis on AT outcomes in educational settings, teachers have expressed support for user groups as a professional development venue to help them develop knowledge and skills to more effectively use AT in educational milieus with young children. This is particularly important given that relatively little research is available regarding the use of AT devices with this population (cf. Campbell, Milbourne, Dugan, & Wilcox, 2006; Lankshear & Knobel, 2003), even though consideration of AT is mandated by IDEIA.

Although this paper has focused on teacher outcomes subsequent to a targeted professional development experience, there is still an immense need to examine how the user group experience of these early childhood teachers impacted child outcomes in their respective classroom settings (i.e., how did the skills they acquired and used in the delivery of instruction result in specific child outcomes?).

In the MDAT project, an emphasis has been placed on emergent literacy activities using the AT toolkit. Writing samples, standardized tests, and other measures have systematically been collected on more than 300 preschool-age children served in the project, though correlational and other statistical analyses have not been conducted to understand the relationship between the amount of user training received and child outcomes. Such analyses will provide the field with a better understanding of the professional development potential of user groups.

Limitations

This study involved a small sample of teachers serving young children who are at-risk or who had developmental disabilities, and thus the findings may not be generalizable outside the educational milieu described herein. No attempt was made to examine variations in pre-service teacher training experienced by the participants, nor was an effort made to differentiate young versus older technology users. Recent studies have reported substantial differences in technology preferences and use patterns between Baby Boomers and Gen Xers (Oblinger & Oblinger, 2005; Parette, 2006; Peterson-Karlan & Parette, 2005; Parette et al., 2008). Examining the demographics of the teachers participating in this study indicate two distinct groups of professionals representing both Baby Boomers (born between 1946 and 1964) and Gen Xers (born between 1961 and 1981). Whether or not generational influences affected perceptions of user groups and AT use patterns that followed afterwards cannot be determined.

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