Benefits of Assistive Technology User Groups for Early Childhood Education Professionals

Howard P. Parette · Julia B. Stoner

Abstract Assistive technology (AT) has the potential to increase developmental skills and provide solutions to challenges, such as behavior, attention, and communication, faced by students identified with disabilities or at risk in early childhood settings. Early childhood education professionals must have AT knowledge and competency to effectively use AT with young children and to include AT in the curriculum. Teachers share responsibility for effectively preparing *all young children* to develop important readiness and literacy skills enabling them to successfully participate in public school settings. This paper discusses the effectiveness of AT User Groups to prepare teachers to incorporate AT in the early childhood setting. User Group benefits to teachers, (i.e., increased knowledge and skills, effective use of time, collaboration, individualization of training, and onsite support) as well as distracters and strategies for involving "new" teachers are discussed. Reported child outcomes, such as increased attending, behavior, and communication are also presented.

Keywords Assistive technology ·
Professional development · Outcomes

In early childhood education settings, professional conversations about technology usage are not new phenomena (see e.g., National Association for the Education of Young Children [NAEYC] 1996; Wright and Shade 1994; U.S. Department of Education 1998). However, despite widespread acknowledgement of the need for increased technology literacy in education settings (Alliance for Childhood 2004; Clements and Sarama 2004; NAEYC 1996), it is still used relatively infrequently in early childhood settings. This issue is particularly problematic in classrooms serving young children who are at risk or have disabilities. These children exhibit problems that result in gaps between demonstrated and expected performance in various developmental areas (e.g., cognitive, communication, motor) and affect their abilities to participate effectively in functional activities (e.g., Circle Time, Snack Time, Show and Tell, Activity Centers; Parette and Peterson-Karlan, in press; Peterson-Karlan and Parette 2008). Thus, they need something to 'compensate' for the deficits they bring to these functional activities in the early childhood setting (Mistreet et al. 2005).

The Role of Assistive Technology in the Early Childhood Setting

Assistive technology (AT) is a category of technology that provides compensatory solutions to the challenges presented by these children (Judge and Parette, 1998; Parette and Peterson-Karlan) and has been shown to influence children's attainment of developmental skills (Campbell et al. 2006; Mistreet et al. 2005). The federal government has defined AT devices 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" [Individuals with Disabilities Education Improvement Act of 2004 (IDEIA 2004), 20 U.S.C. §1401 (251)]. This definition places emphasis on the 'compensatory' nature of AT, i.e., it compensates for something a

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child *cannot* functionally do or perform. IDEIA (2004) also requires that AT be 'considered' when developing individual family service plans (IFSPs) or individual education plans (IEPs) for young children, though little guidance has been provided regarding how this consideration process occurs (Mistreet et al. 2005). This becomes important given that the No Child Left Behind Act of 2001 (NCLB) has placed increasing emphasis on the participation and success of *all children*—both with and without disabilities—in the academic curriculum on entering public schools. If, in fact, AT helps young children who are at risk or who have disabilities compensate for problems they may have in participating in the curriculum and developing needed skills to be successful, it seems that early childhood education professionals would embrace AT usage enthusiastically.

To use AT with young children who are at risk or who have disabilities and include them in the curriculum, early childhood education professionals must have AT knowledge and skills (Peterson-Karlan and Parette 2008). Unfortunately, given that early childhood teachers often lack appropriate preservice preparation and professional development experiences with AT once they enter the field (Ashton 2005; Parette et al. 2006), the question arises: "How can early childhood teachers get the needed skills to use AT in their classrooms with children who are at-risk or have disabilities?"

AT User Groups: A Professional Development Approach Having Benefits for Increasing Knowledge and Skills with AT

One of the great challenges in professional development for early childhood professionals is how to most effectively develop a basic AT knowledge base. Short-term professional development activities (e.g., workshops) which are often the standard for early childhood education professionals do not produce sustained change among classroom practitioners (Gibbons et al. 1997). One recent evidence-based approach that has been reported, and which facilitates development of sustained AT skills is AT User Groups (Parette et al., in press). Basically, an AT User Group is 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 their learning with other education professionals in the community (Parette et al., in press).

Generally, these groups are conducted to allow education professionals—both teachers and support personnel—to articulate their professional development needs about AT applications and how they are implemented in the curriculum, and develop new AT skills. Skilled practitioners having higher level AT knowledge and skills conduct the sessions, and afford participants (a) direct training and guided practice in the use/operations of AT devices, (b) structured hands-on curricula application opportunities, and (c) opportunities for exploration of the AT and creation of classroom products used with children. Key components of User Groups and teacher outcomes subsequent to participation in this professional development venue have been reported (Parette et al., in press). There will also be an array of skill levels and experiences exhibited by participants, ranging from 'early adopters' (those who are quick to embrace technology and the requisite learning to develop and use new skills) to the 'late adopters (i.e., persons who are hesitant to use technology and may be slow to develop and use new AT skills; Rogers 1995). However, one of the core assumptions of User Groups is that participants have an interest in developing new AT skills and sharing their knowledge and experiences with others. What is of particular interest in examining the newly emerging evidence base regarding User Groups are the benefits realized by teachers. The remainder of this article describes teacher and child benefits that may be anticipated when User Groups are effectively implemented.

Teacher Benefits

Time to Develop New Skills

One of the most important resources for all early childhood education professionals is 'time.' Classrooms for young children are filled with activity and there is often little time to devote to learning how to use AT devices and how to implement them effectively. User Groups afford professionals an opportunity to allocate blocks of time specifically for the purpose of developing new skills. User Group sessions generally are conducted on professional development days identified or approved by the school district or sponsoring agency. They may be conducted during the regular day, after school, on weekends, or during summer breaks, and are sensitive to the schedules and availability of participating education professionals.

In developing new AT knowledge and skills centers two types of competencies are addressed. The first is *operational competence* (Light 1989). Professionals (and children) must first learn to use AT devices before they can be integrated into the curriculum. For example, software packages often have many features that a user must be

familiar with to effectively use the software. Providing time for exploration and development of operational competence is critical for effective AT integration in the curriculum. Haring et al. (1978) described four stages of learning that are applicable to AT devices and the impact of User Groups on learning. These stages include acquisition, fluency, generalization, and adaptation (see Fig. 1). Regardless of a User Group participant's degree of acceptance of technology, all individuals must develop operational competence, which requires them to learn how to use an AT device correctly, though s/he is not yet accurate or fluent in the use of the device. Accuracy in using the features of the device are of primary importance during this stage. User Groups afford participants the opportunity for direct instruction and guided practice in exploring and becoming familiar with the features of AT devices that will be used with young children. Individualization of instruction and time to practice allow most User Group participants to move through this phase relatively quickly.

Second, once User Group participants have developed some familiarity with the features of an AT device, they still need repeated opportunities to practice and develop fluency and speed. Thus, the goal of this learning stage is *functional competence*, or accuracy in using the AT device to perform specific tasks.

Third, once the education professional has become fluent and uses the AT device with ease for a specific task, s/he may still not use it in different situations or settings. For example, an education professional may use a program such as Boardmaker®—a symbol-based software program frequently used to create visual schedules—to create specific activity schedules for the classroom, but not understand how the symbols can be integrated into a Microsoft®

PowerPoint presentation or other software program. The goal of this stage is to get the education professional to use the skill in the widest possible range of settings and situations, or to accurately discriminate between the target skill and 'similar' skills. As participants in User Groups are exposed to a variety of AT devices over time, emphasis is shifted to how tools work together to create AT systems (i.e., two or more devices that work together to accomplish a purpose).

Fourth, once the education professional becomes accurate and fluent in using several AT devices in many situations, User Group activities begin to focus on modification or adaptation of the AT skills to fit novel task-demands or situations. In this stage the education professional is able to identify elements of previously learned AT skills that he or she can adapt to the new demands or situations in the classroom. For example, if a literacy activity is in progress, such as discussing a field trip to the local zoo earlier in the morning, and the education professional determines a need for a specific learning material to complement the activity by summarizing key learning points, s/he can immediately use an array of AT devices to create the necessary classroom support. This might include taking a digital photo of the students at the zoo, downloading it to the computer, embedding the class photo in a Microsoft® PowerPoint along with several Boardmaker® symbols and text related to animals or activities at the zoo, complemented by an audio recording of the professional's voice (using a microphone) reading the text on the Microsoft® PowerPoint slides. Such spontaneous creations may be accomplished relatively quickly once teachers have developed operational competence in the use of devices, and have familiarity with how these devices work in tandem with one another to create novel products to support children's learning.
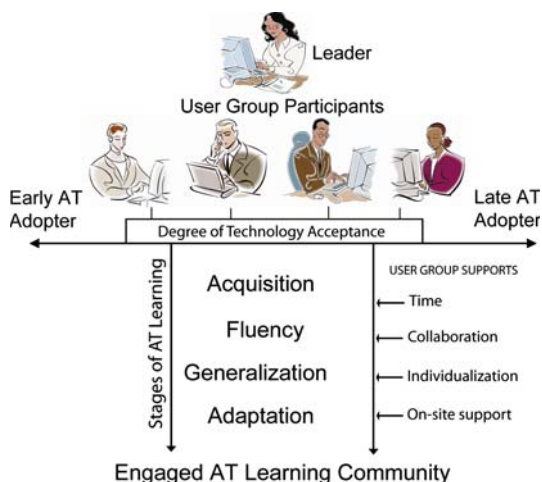
Fig. 1 Stages of learning among User Group participants and supports leading to an engaged learning community. © 2007, SEAT Center. Used with permission

Collaboration

User Groups allow education professionals the opportunity to collaborate and create engaged 'learning communities' (Retallick et al. 1999) where all professionals learn with and support one another. This may be difficult in many settings when teachers are focused primarily on the delivery of instruction and maintaining their own classrooms. They may not have time to talk with one another, share ideas, and problem solve about AT issues in classroom settings. When early childhood professionals have time together, and share a focused purpose (i.e., developing AT knowledge and skills), collaboration typically unfolds within the context of the User Group session and an engaged learning community emerges. Both teachers and aides will lend support to one another when individuals

have problems developing operational competence skills. Education professionals also have the opportunity to brainstorm how the AT devices can be integrated into the curriculum, and solve problems concerning AT use, particularly software, to create new and innovative learning materials for use with children.

Individualization

Of particular importance is the degree of individualization that occurs to support adult learning. Since more experienced persons having AT skills are involved in leading the User Groups, and given that emphasis is initially focused on developed operational competence with AT devices, individualization must be embedded in each User Group session. As noted earlier, differences will be observed in User Group settings given participants' operational competence that can range from early to later adopters, and some participants will progress quickly while others will develop skills at a slower pace. In each instance, however, varying levels of individual assistance will be required of the User Group leader/s and it is important that the *needs of each participant* be addressed as learning is taking place.

On-Site Support

Although User Group sessions are often conducted outside of the early childhood classrooms (e.g., computer labs in the school district or on college or university campuses), all learning that occurs is not immediately transferable from one setting to another (i.e., from the computer lab to the early childhood classroom). User Groups afford education professionals the opportunity to learn and practice new AT skills, but support for use of these skills must be provided in the real life setting where the skills are to be used. For example, an education professional may feel quite comfortable with features that are presented in a new software program that is introduced at the User Group session. S/he may have opportunities to practice with those features and develop some degree of operational competence. However, if that person does not use the skills immediately on return to their classroom, s/he may forget important aspects of the software features and be unable to use the software effectively until on-site guidance or hands-on support is provided.

Providing on-site support may be difficult for some education entities, though it has been successfully implemented in some early childhood education settings through partnerships with university faculty (Parette et al. 2005). Over time as participants develop greater capacity

regarding their understanding of the AT being used, questions that arise can be resolved on-site by education professionals collaborating together and relying on internal skills vs. reliance on external sources of support.

Child Benefits

While it is important to note the benefits to education professionals who participate in User Groups, it is of even greater importance to understand the impact of knowledge and skills on children in classroom settings, i.e., outcomes of practice (Campbell et al. 2006). Conversations with education professionals who have participated in User Groups have indicated three immediate benefits of their use of AT in classroom settings. These include changes in children's (a) attending behaviors, (b) understanding of and compliance with rules of appropriate behavior, and (c) abilities to communicate in the classroom setting.

Attending

One of the great benefits of introducing AT in early childhood settings is the *immediate* impact on children's attending behaviors. Attending is a prerequisite skill for most learning that occurs in early childhood education settings. The novelty of AT, particularly when it is used in tandem with available instructional technologies (i.e., those used to teach new skills, remediate children's deficiencies, or expand the curriculum; Mills and Roblyer 2006; Peterson-Karlan and Parette 2008), focuses children's attention.

For example, in the Making A Difference Using Assistive Technology (MDAT) Project (Parette et al. 2005), early childhood education professionals were provided with an array of AT devices as part of a 'toolkit' to help develop children's emergent writing skills. Included in the toolkit was a ceiling-mounted projection system and screen used for large group literacy presentations (created using Microsoft® PowerPoint, Boardmaker®, Writing with Symbols 2000, digital camera images, and other technologies). Teachers discovered immediately that use of large screen projection of activities developed using the AT toolkit resulted in an increase in attending behaviors. Once children's attention was focused on the large screen, relevant content using other AT tools could be presented to teach or expand targeted literacy skills.

Behavior

Problem behaviors among young children who are at risk or who have disabilities are often a concern of education

professionals (Mah 2006; Stormant et al. 2007). Participants in User Groups who use AT in their classrooms have reported immediate child behavior benefits when using AT products that they developed (Parette et al. 2007). A range of visual strategies have been described in the literature as being successful in supporting young children with challenging behaviors (see e.g., Center on the Social and Emotional Foundations for Early Learning 2006; Hogdon 1995). Such strategies include choice charts, first/then boards, routine activity sequences, cue cards, turn-taking charts, reminder charts, and feeling charts.

Power cards have been described as being particularly helpful with many young children with disabilities (Gagnon 2001). Power cards are visual aids to help young children to make sense of social situations, routines, the meaning of language, and the 'hidden curriculum' embedded in all environmental settings (Parette et al. 2007). Use of visual schedules prepared using Boardmaker® (Center on the Social and Emotional Foundations for Early Learning 2006) have resulted in children adhering to classroom rules, following sequences in tasks, and demonstrating appropriate social behaviors across contexts (Center on the Social and Emotional Foundations for Early Learning).

Communication

AT has repeatedly been reported to facilitate both expressive and receptive communication for young children who are at risk or who have disabilities (Hogdon 1995; Judge and Lahm 1998). More specifically, certain software applications, such as Boardmaker®, have been demonstrated to have broad utility in service settings for young children (Judge 2006). Early childhood professionals who develop AT skills using such software applications as Boardmaker®, Writing with Symbols 2000 (IBM Kidsmart Early Learning Programme 2005; Judge 2006), Clicker® 5 (Siraj-Blatchford and Siraj-Blatchford 2005), and the Intellitools suite (Judge 2006) readily make and implement a wide range of classroom activities and products that support young children's communications skills (Parette et al. 2007).

Distractors to Maximum Benefits of User Groups

When conducted effectively, and supported efficiently over time, User Groups hold great potential to develop a cadre of important AT skills among early childhood education professionals. However, real life applications of this important PD format have two distinct 'distractors' that can potentially impact the speed and efficiency of learning that takes place among professionals: (a) varying levels of participants, and (b) access to classroom and literacy materials.

In the first instance, participants will have varying levels of technology expertise and willingness to learn new skills (see Fig. 1). When both early and late adopters are in the same learning environment, the early adopters may become impatient or lose interest when the pace of the User Group sessions does not parallel their abilities to engage in new learning and preferences to move quickly through the AT acquisition and fluency stages. Conversely, many late adopters will require a slower pace of content presentation, with many opportunities for practice as they acquire the basic AT skills. This is an important issue for User Group leaders to be cognizant of, and to be prepared to address. We have found that having multiple skilled users (versus a single User Group leader) to be an important support for all participants, as it allows the varied learning styles and needs of participants to be accommodated.

A second distractor is lack of availability to classroom materials when User Groups are conducted. While many early childhood education professionals are certainly willing to learn new AT skills, they want to be able to integrate their learning *immediately* into the curriculum. Even during the operational competence learning stage when they are learning to use specific AT applications, professionals want to work on materials that they can take back to their classrooms and use with young children. One strategy to ensure that education professionals have access to all materials created during User Groups (when they are conducted outside the early childhood service setting) is to ask them to bring flash or thumb drives on which to store their created materials. Having great storage capacity, flash or thumb drives can accommodate many large files that are often created using varying AT software packages, particularly those that incorporate graphics. This also allows education professionals to bring needed files from their classroom computers that may be needed during User Group sessions when new AT devices are introduced and classroom products are created using them. Given the relatively low cost of these storage units currently, the early childhood budget might accommodate their purchase and provision to the education professionals participating in the User Group sessions. Another strategy that we have found to be helpful is to advise User Group participants in advance about what topics will be covered in scheduled sessions, and to ask them to bring any needed materials (e.g., digital camera photos of children; scanned images of children's classroom work) to the next session to ensure optimal use of time and effort.

Bringing Others into the Community

In any learning community, there will always be individuals who, for a variety of reasons, are hesitant to commit

themselves to acquiring AT skills. Lack of both preservice and inservice opportunities are major contributing factors to lack of AT knowledge and skills among practitioners (Ashton 2005; Mistreet et al. 2005; Peterson-Karlan and Parette 2008). However, we have found that when User Groups are offered and supported within early childhood education settings, even reluctant education professionals are curious about the learning community that emerges from User Groups. This curiosity can be used to lead the reluctant professional into participation by providing mentoring.

For example, when User Groups are initially offered to education professionals, only a small subset of all the education staff may initially express an interest. Vacation schedules and family obligations may conflict with targeted User Group sessions conducted during the summer months. Similarly, during the regular school year, education professionals may have choices regarding whether to participate in User Groups (e.g., having several PD opportunities to choose from) and simply opt out of participation due to interests in some other PD. There will also be some professionals who simply are not interested in learning to use AT; however, they may have attitudinal changes once they observe other professionals developing and implementing new skills with subsequent changes in child behaviors and classroom performance. In such instances, when a reluctant professional indicates interest in participating, but feels that s/he would be far behind others and thus feel self-conscious about participating, additional mentoring may be helpful. For example, one teacher who failed to participate in User Groups noted:

> Being a teacher new to the school I didn't feel like I got a lot of help in understanding what my equipment was or who funded it. And you're lost and seeing all these other teachers doing all of this other stuff and you're like 'Oh my gosh, how do you do that?'

In such instances, education professionals having more advanced AT skills should provide one-on-one training, as appropriate, when other professionals express interests in becoming part of the AT learning community. This is a critical component of 'capacity-building' within any group; several people develop more advanced AT skills and share their knowledge and products created with others, resulting in others developing more skills over time, until the education setting is truly an engaged AT learning community. Admittedly, such mentoring and training may be difficult to provide given the time constraints on early childhood education professionals in a typical day. Our experiences, however, have shown that when such important supports are provided, the capacity of the entire early childhood service setting is enhanced.

Conclusion

AT User groups have the potential to benefit teachers by increasing their knowledge and skills, offering them time to practice and produce functional products, collaborate with colleagues, and provide individualized and on-site support. Perhaps more importantly, teachers who have been trained in AT User Groups have reported significant positive child outcomes in areas of attending, behavior, and communication. More research is needed to document child outcomes using specific AT. Trainers of AT and administrators must be cognizant of the positive effect of User Groups as well as issues that may be distractors, such as varying levels of technological abilities of participants and the need to sustain competency of all staff as new staff join the faculty. This paper has reported and addressed these issues in an attempt to communicate the potential of AT User Groups.

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