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Technology User Groups and Early Childhood Education: A Preliminary Study

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Abstract This article presents a preliminary examination of the potential of Technology User Groups as a professional development venue for early childhood education professionals in developing operational and functional competence in using hardware and software components of a Technology toolkit. Technology user groups are composed of varying numbers of participants having an interest in technology, and are led by one or more skilled facilitators who meet with participants across time to help them acquire and demonstrate new technology skill sets. A series of these groups were conducted with seven early education professionals serving young preschool children who were at risk or who had disabilities. The impact of these technology user groups was examined using self-reports subsequent to individual participation. Specific data were collected regarding the types of technologies that had been used, and the types of classroom instructional products that had been created and implemented in classrooms using the technologies. A discussion of the value of technology user groups is presented.

Keywords Instructional technology · Assistive technology · Technology integration · Professional development · User groups

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Introduction

Although the presence of technology in many early childhood classrooms in the U.S. may not yet be present, or minimal, there is growing use of an array of technologies with young children in education settings. The prevalence and importance of technology in the lives of young children has been increasingly echoed in the field of early childhood education (cf. Parette et al. 2010; Parette & Blum, in press; Peurling 2012; Schomberg and Donohue 2012). After several years of reexamining its position on the role of technology in early childhood settings, the national association for the education of young children (NAEYC) and the Fred Rogers Center (2012) recently stated that early childhood education professionals should be able to effectively use, integrate, and evaluate technology in developmentally appropriate ways in classroom settings.

As Parette et al. (2010) observed, early childhood education professionals may be 'missing the boat' if the wide array of 21st century developmentally appropriate technologies are not integrated into today's classrooms. This includes both instructional technology (IT) and assistive technology (AT). Instructional technologies are those classroom tools that support increased instructional (a) effectiveness (i.e. helping the young child do things in a better way); (b) efficiency (i.e. helping the child do things faster or of better quality); and (c) appeal (i.e. better engaging the child in learning; Newby et al. 2006). AT is "any tool that helps a child with a disability do things he or she could not do without the tool at some expected level of performance" (Parette et al. 2007a, p. 22). Both types of technologies are critical to support children's participation in planned classroom activities in today's classrooms (Parette & Blum, in press), though the challenge of how to

best develop needed knowledge and skills among practitioners to integrate them in the curriculum remains an issue for the field.

To address this expectation, the National Association for the Education of Young Children and Fred Rogers Center (2012) recommended that early childhood educators need "training, professional development opportunities, and examples of successful practice" to develop the technology and media knowledge, skills, and experience needed to meet the expectations set forth in this statement. As a result of both trends in best practice (NAEYC and Fred Rogers Center 2012; Parette & Blum, in press; Parette et al. 2010; Peurling 2012; Sadao and Robinson 2011) and federal mandate (Individuals with Disabilities Education Improvement Act of 2004 [IDEIA 2004]), early childhood education professionals increasingly are being encouraged to use IT and AT with young children who are at risk or who have disabilities. AT, in particular, is a potentially powerful adjunct in facilitating a child's active engagement with both the physical environment and his/her social environment (Kling et al. 2010). As such, AT offers the potential for young children to more effectively explore, learn, and play, allowing previously unavailable learning opportunities to emerge. When used in planned IT-supported classroom activities, it enables children to access carefully designed and technology-supported activities connected to learning standards and objectives (Parette & Blum, in press).

For education professionals to use both IT and AT effectively with young children with disabilities in classroom settings, those teachers must first (a) develop a basic *understanding* of technology and its potential contributions to education (b) demonstrate some proficiency in *using* AT to create classroom instructional supports, and then (c) actually *create and implement* instructional activities and products using the technology. In doing this, practitioners must acquire both *operational competence* (i.e. familiarity with the basic features of a particular technology; Light 1989), and *functional competence* (i.e. the ability to use the particular technology to create specific classroom products; Parette, Peterson-Karlan, & Blum, in press; Parette and Stoner 2008).

Historically, knowledge and skills related to IT and AT have not received extensive coverage in early childhood teacher preparation (Judge 2006; Judge and Parette 1998). Indeed, early childhood education professionals often report a near-complete lack of preservice training in the use of AT (e.g. Bausch and Hasselbring 2004), and only recently has IT integration in preservice curricula been formally addressed (Parette & Blum, in press). Most programs rely on a single course, or a module within a course in the undergraduate curriculum, to develop technology skills (Gronseth et al. 2010). Unfortunately, as Parette, Blum, and Quesenberry (in press) have noted, these skills are typically not integrated across the preservice curriculum, resulting in many early childhood education professionals having little or no understanding of how to use technology to support the curriculum once they enter the teaching profession. For many of these teachers, such skills may often be acquired only *after* they have begun working with young children in classroom settings (Parette, Blum, & Quesenberry, in press).

The need for high quality, coordinated, and targeted technology professional development for early childhood educators has long been recognized (Bowman et al. 2001; Chen and Chang 2006; Darling-Hammond et al. 2002; Helterbran and Finnemore 2004; Lesar 1998). Since so many potentially powerful technologies are available to early childhood education professionals, the need to develop operational and functional competence in using these tools is becoming ever more important. One particularly promising approach to enhance technology skills is to provide ongoing professional development activities for early childhood educators after an initial training experience has been provided (Fullan 2002). These follow-up sessions offer invaluable opportunities to develop and refine IT and AT skills (Joyce and Showers 2002), and take such forms as workshops, summer institutes (Keengwe fand Onchwari 2009), and webinars (e.g. Schomberg and Donohue 2012).

Professional Development Through Technology User Groups

Unfortunately, such commonly provided short-term professional development activities as teacher workshops may not produce significant and sustained change among classroom practitioners (Gibbons et al. 1997). Recently, a promising alternative structure for developing lasting IT and AT skill sets among education professionals has emerged in the form of *Technology User Groups* (Parette et al. 2007b, 2009; Parette and Stoner 2008). A technology user group is defined as a group of early childhood education professionals who (a) have a shared interest in IT and AT (b) are committed to developing new skill sets about an array of IT and AT devices and integrating them into planned classroom activities (c) are supported for participating in the technology user group, and (d) share their learning with other early childhood education professionals (Parette et al. 2007b). Technology User Group sessions generally are led by one or more practitioners having advanced technology skill sets, and are conducted across multiple dates. These ongoing sessions allow participants to (a) develop and practice new technology skills (b) ask questions relevant to the use of technology applications specific to their students and curriculum, and (c) share their learning and products with others.

Technology User Groups provide participants with the opportunity to develop and refine IT and AT skills and to share new ideas in the context of a learning community. Participants in Technology User Groups usually collaborate with one another both during and outside of the formal sessions that are conducted. (More detailed discussions of the design and benefits of technology user groups may be found in Parette et al. 2007b, 2009). The success of Technology User Groups in developing and maintaining technology skills in teachers has been reported in several research projects (e.g. National Center for Technology Innovation and Center for Implementing Technology in Education 2006; Parette et al. 2005–2008).

However, to date relatively little is known about the impact of these technology user groups on the subsequent professional use of IT and AT by participants *after* this professional development has been completed. That is, after concluding a planned series of technology user groups sessions targeting IT and AT, what do the participants then go on to *do* with the technology? If the goal of IT and AT professional development is to increase the implementation of these technologies in classroom settings (Zabala and Carl 2005), it is imperative that specific education professional outcomes be documented.

This preliminary study sought to better understand how Technology User Groups impact operational and functional skills in IT and AT in early childhood teachers, with specific emphasis on examining the degree to which participation in a Technology User Group results in early childhood professionals developing and implementing technology-supported products in their work. We were especially interested in learning which types of technology were being used most often, and for what purposes.

Method

Participants

The participants in this study were seven early childhood educators who worked in a self-contained preschool building in a moderate sized public school district in the Midwest. Three teachers taught in classrooms serving at-risk children identified as at risk, while the remaining four taught in special needs classrooms. Five teachers had bachelor's degrees while two held master's degrees. All teachers held state teaching certificates.

This preschool program was participating in the *making a difference using assistive technology* (MDAT) project (Parette et al. 2005–2008) funded by the Illinois Children's Healthcare Foundation. The purpose of this three-year grant was to examine the impact of AT on emergent literacy skills among children who were at risk or who had disabilities. All seven participating teachers reported having had no prior experience in using technology in their respective classrooms.

Technology Toolkits

As part of the MDAT project, each of the classrooms at the preschool was provided with a Technology Toolkit (Edyburn 2000; Lahm and Case 2003; National Center for Technology Innovation and Center for Implementing Technology in Education 2006; Puckett 2004; Sadao and Robinson 2011). The hardware and software components of the Technology Toolkit were selected primarily on the basis of their perceived potential use in creating classroom instructional products.

Hardware provided in each of these Technology Toolkits included a (a) Dell™ personal computer and keyboard (b) microphone (c) scanner, and (d) digital camera. Software in each Technology Toolkit included (a) the *Intellitools® Classroom Suite* (Cambium Learning, n.d.); (b) *Boardmaker™ with Speaking Dynamically Pro®* (Mayer-Johnson 2006); and (c) *Writing with Symbols 2000* (Widget Software Ltd. 2007). Each of these components in the Technology Toolkit was selected based on an examination of the literature and teacher classroom 'best practices' applications, universal design for learning (UDL) principles (Center for Applied Special Technology, n.d.), and for its potential utility in helping develop emergent literacy skills in planned activities with young children.

Teachers additionally had access to the Microsoft® Office Suite (Microsoft® 2008), including *PowerPoint®*, which was provided by the school district and installed on each of the Dell computers. Each participant also was provided with a (a) Bluetooth® keyboard, (b) wireless mouse, (c) ceiling-mounted liquid crystal display (LCD) projection system, and (d) wall-mounted screen.

User Group Professional Development

Each of the seven participants participated in a series of Technology User Groups designed to help him or her use the Technology Toolkit contents. Four Illinois State University faculty members who taught AT coursework conducted the Technology User Groups. One faculty member served as primary leader of the group sessions, while the other faculty members served to provide one-on-one support in trouble-shooting operational use of different features of particular technology tools, and assist in participants' development of instructional materials.

Four Technology User Group sessions were conducted over the summer, with another four sessions offered the following fall. The teachers were provided with stipends of $250 if they attended six out of the eight 2 h sessions. All seven participants attended at least six of the eight sessions.

Best practice in planning for effective Technology User Groups includes assuring that each session is flexible enough to afford participants an opportunity to articulate their learning needs and interests, and to have those addressed (Parette et al. 2007b). To this end, each Technology User Group session had a different set of professional emphases designed to respond to the unique needs and preferences of its specific participants. To accomplish this, the first of the eight Technology User Group sessions opened with a scaffolded dialogue that included completing a goal sheet from participants regarding their classroom needs, preferences, and the specific types of knowledge and skills they hoped to acquire about the Technology Toolkit and its classroom applications.

This preliminary needs assessment for subsequent sessions was followed by a preview of the targeted training that would be provided to the group in that initial session. To further support learning in the Technology Group User sessions, the session leaders prepared a CD relevant to the content of that particular session and provided it to participants in advance. These CDs included (a) listings of relevant Web resources; (b) basic and supplemental information provided via such formats as Microsoft® *PowerPoint*® files, PDF files, and multimedia productions; and (c) other supports as relevant to that session's focus. Each Technology User Group session focused on direct training in the use of each of the Technology Toolkit hardware and software components to develop familiarity with and functional competence in using the tools, with special emphasis on the creation of emergent literacy products for classroom applications.

Use Survey

Six months after the last Technology User Group session was conducted, all seven teachers were asked to complete an online survey form targeting their use of the Technology Toolkit since the date of the initial Technology User Group sessions. The questions developed for the survey form were designed to (a) determine the degree to which teachers were *using the technologies* that had been provided to them in their Technology Toolkits (b) identify the *types of classroom activities* in which the Toolkit technologies were being used, and (c) ascertain the teachers' *perceptions of ease of use* of the Toolkit technologies. The survey form used check boxes and drop down menus to facilitate ease of response. Minimal inputting of text information was required.

More specifically, we examined respondents' reported usages of the following hardware and software components that were included in the Technology Toolkits:

- microphone
- scanner
- digital camera
- *Intellitools® Classroom Suite*
- *Boardmaker™*
- *Speaking Dynamically Pro®*
- *Writing with Symbols 2000*
- *PowerPoint®*

These components were targeted in the survey because each potentially can be used to generate classroom activities and/or instructional products. In addition, we identified five primary types of educational activities and products commonly generated by teachers, and sought to learn from the respondents which technologies had been used to develop which of these types of products.

- Instructional Presentations (teacher-developed instructional activities)
- Visual Schedules (a series of pictures that communicate steps or sequences in an activity)
- *Intellitools®* Activities (a multimedia authoring technology to develop instructional activities)
- Choice-Making Activities (classroom products or activities created which afford children an opportunity to make choices and establish autonomy and self-direction)
- Additional Classroom Activities (any other instructional support materials that teachers used in their classroom programming for individual or group activities)

The potential contributions of each of the components of the Technology Toolkit in generating each of these five types of outcomes had been covered extensively in the Technology User Group sessions.

In the survey, respondents were asked to identify for each of these five educational activities the specific types of Toolkit technologies used to create the activities (e.g. 'What tools did you use to create the Instructional Presentations? Check ALL that apply.)

- *PowerPoint®*
- *Writing with Symbols*
- *Boardmaker™*
- *Intellitools® Classroom Suite*
- *Speaking Dynamically Pro®*
- Digital camera
- Scanner
- Microphone

We also sought to identify respondents' perceptions regarding how *easy* each of the Toolkit technologies was to use. This was done through a question on the survey in which teachers were asked to rate each of the Technology Toolkit hardware and software components on a five point Likert-type scale ranging from '1' (very easy to use) to '5' (very difficult to use).

Finally, we sought to learn more about the frequency and nature of use of the ceiling-mounted liquid crystal display (LCD) projection systems that were included in each Technology Toolkit. Participants were to respond to two questions on this: (a) "How often do you use the projector?" ('1–3 times daily;' 'daily;' 'once a week;' 'once a month'); and (b) "For what purpose(s) do you use the projector?" ('story telling,' 'teaching concepts,' 'game,' 'specific literacy activity,' 'other').

Results

Frequency and Types of Use of the Technology Toolkit Technologies

The respondents reported that many of the hardware and software components included in the Technology Toolkit were widely used in a variety of classroom activities (see Table 1). For example, all seven teachers reported that they had used Microsoft® *PowerPoint*® for developing instructional presentations, with another two respondents noting that they also used *PowerPoint*® for additional classroom materials. *Writing with Symbols 2000* also enjoyed generalized use throughout a variety of educational activities. Teachers reported using this software in developing instructional presentations, visual schedules, *Intellitools*® activities, and choice-making activities. *Boardmaker*™ also experienced generalized use, reported by several teachers as contributing to the development of instructional presentations, visual schedules, choice-making activities, and additional classroom activities.

The digital camera was also used frequently. Teachers reported using the camera in developing instructional presentations, visual schedules, choice-making activities, and additional classroom activities.

Other Technology Toolkit technology components were used less often. *Speaking Dynamically Pro*® was reported to have been used in an instructional presentation, in a visual schedule, in a choice-making activity, and in an additional classroom activity. However, each of these implementations was reported only once. The microphone was used by three teachers in developing instructional presentations, while the scanner was reported by one teacher as having been used. The *Intellitools*® *Classroom Suite* was reported by three respondents to have been used in doing *Intellitools* activities, with no other usage noted.

Ease of Use of the Components of the Technology Toolkit

The results of the 'Ease of Use' portions of the survey are displayed in Table 2. In general, the digital camera, Microsoft® *PowerPoint*® and *Writing with Symbols 2000* were reported as the easiest to use by the seven respondents. All seven teachers evaluated these three tools as 'Very Easy' or 'Easy.' *Boardmaker*™ was also seen as 'Very Easy' or 'Easy' by six of the seven.

Frequency and Types of Use of the LCD Projector

Large screen projection technologies, including interactive whiteboards (e.g. SMART™ Technologies 2012) and LCD projection systems have been reportedly to be effective in teaching various literacy skills to children (cf. Blum & Parette, in press; Blum et al. 2008; Mechling et al. 2007, 2008). Since teachers participating in this study were provided with an LCD projection system and screen, we were curious about the frequency and types of use of these large screen technologies.

Four teachers reported using the ceiling mounted projector daily, while the remaining three noted usage one to three times a week. Regarding purposes of LCD use, all seven teachers reported using it for 'teaching concepts,' six teachers reported use for 'specific literacy activities,' five

Table 1 Use of tools reported by teachers by technology user group activities ($n = 7$)

Tools used	Instructional presentations	Visual schedules	*Intellitools* activities *n* Mentions (%)	Choice-making activities	Additional classroom activities
PowerPoint™	7 (100)	0 (0)	0 (0)	0 (0)	1 (14.3)
Writing with Symbols 2000	2 (28.6)	3 (42.8)	1 (14.3)	1 (14.3)	6 (85.7)
Boardmaker™	5 (71.4)	6 (85.7)	0 (0)	3 (42.8)	5 (71.4)
Digital camera	4 (57.1)	4 (57.1)	0 (0)	4 (57.1)	6 (85.7)
Scanner	1 (14.3)	0 (0)	0 (0)	0 (0)	0 (0)
Microphone	3 (42.9)	0 (0)	0 (0)	0 (0)	0 (0)
Intellitools® Classroom Suite	0 (0)	0 (0)	1 (14.3)	0 (0)	0 (0)
Speaking Dynamically Pro®	1 (14.3)	1 (14.3)	0 (0)	1 (14.3)	1 (14.3)
Intellitools Activity Exchange[a]	–	–	3 (42.8)	–	–

[a] Item included in only one survey question

Table 2 Ease of tool use reported by teachers in developing classroom activities ($n = 7$)

Tools	Responses											
	Very easy		Easy		Neutral		Difficult		Very difficult		Not applicable	
	N	%	*N*	%	*N*	%	*N*	%	*N*	%	*N*	%
Digital camera	5	71.4	2	28.6	0	0	0	0	0	0	0	0
Microsoft® *Powerpoint*™	2	28.6	3	42.9	0	0	2	28.6	0	0	0	0
Writing with Symbols 2000	3	42.9	4	57.1	0	0	0	0	0	0	0	0
Boardmaker™	2	28.6	4	57.1	1	14.3	0	0	0	0	0	0
Scanner	2	28.6	1	14.3	3	42.9	0	0	0	0	1	14.3
Microphone	1	14.3	1	14.3	4	57.1	0	0	0	0	1	14.3
Intellitools® Classroom Suite	1	14.3	1	14.3	2	28.6	1	14.3	2	28.6	0	0
Speaking Dynamically Pro™	1	14.3	1	14.3	1	14.3	0	0	0	0	4	57.1

noted use for 'games,' and two noted use for 'other activities' (i.e. "to review photos and movies of field trips and special activities" and "to display student photos").

Discussion

Too often the outcomes of professional development activities for teachers are not assessed in any substantive way, impairing greater understanding of how such experiences impact subsequent professional practice. Given continuing calls for outcomes-based IT and AT service delivery nationally (e.g. Parette & Blum, in press; Parette et al. 2006; Parette et al. 2007a), more productive evaluations of the effectiveness of professional development structures, including Technology User Groups, is vital.

Professional development activities designed to develop greater instructional competencies in early childhood education professionals must address a fundamental question: "Does this professional development activity make a *difference*?" More specifically, does the professional development advance the knowledge and skills of the participants? If so, in what ways? Once the specific types and amounts of new knowledge and skills the early childhood education professionals have acquired as the result of a professional development activity are documented, schools can then move on to ascertain the degree to which these professional changes impact student learning.

This preliminary study provides support for Technology User Groups as a professional development venue for early childhood education professionals in developing specific technology knowledge and skills as implemented in early childhood classroom settings. These participants reported their professional behavioral repertoires were significantly expanded with the inclusion of a variety of newly acquired technology-based competencies. These Technology User Group participants further reported that they frequently used several of the Technology Toolkit components. This outcome is especially significant in that the participants all began this process reporting *no prior experience* in using technology in their classrooms. We concluded that the seven teachers' participation in the Technology User Group sessions facilitated their subsequent implementation of a variety of technologies in a diverse set of classroom and instructional implementations.

Previous reports have noted that Technology User Groups contain unique structural features that can contribute to growth in the knowledge and skills of teachers (e.g. Parette and Stoner 2008). Specifically, Technology User Groups (a) provide time to practice newly developed skills; (b) facilitate collaboration among professionals who ultimately become a 'learning community;' (c) enable individualization of professional development experiences for participants; and (d) allow for on-site support in natural educational settings (i.e. the classrooms where instruction occurs). Such benefits have been reported to contribute to successful teacher professional development in (a) providing technology supports for struggling school-age writers (Peterson-Karlan et al. 2006); and (b) the use of Microsoft® *PowerPoint*®, LCD systems, and implementing direct instruction to teach emergent literacy skills in preschool settings Parette et al. (2009a, 2009b).

Understanding the impact that professional development activities targeting technology may have on subsequent early childhood education professional practice is especially important given that extensive use of technology to support student learning is still not widely practiced in early childhood education (Schomberg and Donohue 2012). Research regarding the impact of technology-oriented professional development, particularly for teachers of young children who are at risk or have disabilities, remains limited (Campbell et al. 2006; Mistrett et al. 2005).

In this preliminary study, Microsoft® *PowerPoint*®, *Writing with Symbols 2000, Boardmaker*, and the digital

camera were reported to be the most frequently used Technology Toolkit components (see Table 1), while the *Intellitools® Classroom Suite, Speaking Dynamically Pro®*, microphone, and scanner were less frequently used for creating instructional supports. As Judge (2006) observed, Microsoft® *PowerPoint®*, *Writing with Symbols 2000,* and *Boardmaker* have proven to be to be particularly useful in early childhood settings.

Given its utility as well as its widespread availability, it is not surprising that all seven teachers reported that they used Microsoft® *PowerPoint®* for developing instructional presentations, with another two respondents noting that they also used *PowerPoint®* for additional classroom materials. *PowerPoint*™ is noted as a 'readily available' technology for use in early childhood classroom settings (Blum and Watts 2008; Parette et al. 2010; Parette & Blum, in press), with an extensive array of established classroom applications (Roblyer 2006).

Both Microsoft® *PowerPoint®* (Blum et al. 2008; Parette et al. 2008, 2009b) and the use of digital cameras in classroom settings (Blagojevic and Sprague 2008; Blagojevic and Thomas 2008; Schiller and Tillett 2004) have received extensive support in the early childhood literature; in accordance with these findings, the use of each of these Technology Toolkit components was covered extensively early on in the progression of Technology User Groups. As a result, the teachers had repeated opportunities to use and develop comfort with these tools.

It may be that as the teachers developed knowledge and skills regarding use of a particular technology (e.g. Microsoft® *PowerPoint®*), they came to prefer to continue practicing with this new technology across subsequent Technology User Group sessions and in their classrooms. If so, it is possible that this preference may have inadvertently inhibited their subsequent receptiveness to the introduction of new technology skill sets (i.e. *Intellitools® Classroom Suite* and *Speaking Dynamically Pro®*), as these technology novices may have felt they were already learning as much as they could. This may be especially true if the teachers saw the immediate applicability of the Technology Toolkit components covered early in the Technology User Group sessions in creating common and useful classroom instructional supports, such as visual schedules.

In contrast to such software as *PowerPoint*™, the *Intellitools® Classroom Suite* and *Speaking Dynamically Pro®* software are *authoring packages*, requiring considerably more intensive professional development for knowledge and skills to be acquired and used effectively in classroom settings. In the eight provided Technology User Group training sessions, these two software programs were not introduced until the latter sessions. As a result, teachers did not have as much opportunity for developing knowledge and skills regarding their use.

Similarly, specific targeting of the use of the microphone and the scanner in developing instructional content and activities for the classroom was not extensively covered in the Technology User Group sessions. Rather, coverage of this hardware typically occurred in the context of other topics (e.g. developing Choice-making activities, *PowerPoint®* presentations, or Visual Schedules). When specific interest in these applications was expressed, participants were provided with one-on-one training.

It is certainly possible that greater and more explicit coverage of these technologies in the Technology User Group sessions would have resulted in more extensive implementation of them in the classrooms. Absent specific focus on the use of any technology tool contained in the teachers' Toolkits, many technology novices such as those in the present study may conclude that these tools are simply too difficult to learn to use, with the effort not worth the possible (but yet unknown) benefits. In the absence of targeted professional development (as exemplified by these Technology User Group sessions), simply providing early childhood education professionals with these tools is unlikely to result in their being implemented in classrooms.

It seems reasonable to speculate that those educational technologies that would be used most frequently by early childhood education professionals are those that are both (a) effective in generating successful educational products and (b) relatively easy to use. In this preliminary study, the technologies reported by most respondents as easy to use (the digital camera, Microsoft® *PowerPoint®* and *Writing with Symbols 2000*) were also reported to be used most frequently. Such a pragmatic finding concerning the perceived "user friendliness" of technology for early childhood education professionals has potentially significant implications for software and hardware developers targeting this market.

The small group of teachers in this study potentially limits generalization of the findings to other groups of early childhood education professionals. In addition, we did not differentiate between younger versus older teachers. Age differences have been identified as significant predictors of technology preferences and use patterns (Peterson-Karlan and Parette 2008). It would be interesting in future investigations to identify potential age-technology use relationships in early childhood educators. In addition, potential concerns with Technology User Groups do exist. These include (a) frustration with varying skill levels of participants, and (b) logistics of accessing all the materials needed to create a particular instructional product (e.g. materials being at school that were not accessible in the Technology User Group setting, and vice versa). Finally, it is well-recognized that technology equity and access issues continue to exist across early childhood education settings nationally. While young children's exposure to technology continues to

increase (Blanchard and Moore 2010; National Association for the Education of Young Children and Fred Rogers Center 2012; Parette, Blum, & Quesenberry, in press), there may always be a 'divide' between varying groups with regard to the availability of technology. Families and education settings having fewer resources may frequently have limited access to computers and other important technologies that are being used with increasing frequency in many early childhood classrooms (National Association for the Education of Young Children and Fred Rogers Center 2012). Such access issues remain a concern, although over time, costs for many new technologies will decline as greater volume in sales is realized by manufacturers. But such reductions in costs may only partially contribute to increased technology availability in early childhood settings. Family preferences and demands for its availability, may also contribute substantively to reducing the technology divide in today's 21st century classrooms.

Despite these concerns, this preliminary study provides initial support for the potential of Technology User Groups as a particularly promising form of professional development to help early childhood education professionals in implementing several technology applications in their classrooms. Subsequent investigations might examine other hardware or software technologies as components in alternative Technology Toolkits.

A variety of technologies has become inextricably integrated into the professional lives of most professionals (Blum & Parette, in press). Early childhood education professionals are no exception. It is critical that these teachers develop functional and operational competencies with an array of technologies to better support the learning of young children (Mistrett et al. 2005). Once teacher core competencies with specific technology applications have been well-established and documented, emphasis should be shifted to examining the impact of technologies on children's learning.

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