

Information and Digital Literacies in a Kindergarten Classroom: An I-LEARN Case Study

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Abstract This case study, part of a larger qualitative research project, involved 24 kindergarteners and their teacher in the design, development, and evaluation of a research project built around the I-LEARN model (Neuman, Learning in information-rich environments: I-LEARN and the construction of knowledge in the 21st Century. Springer, New York, 2011b). I-LEARN is a six-step learning model (Identify, Locate, Evaluate, Apply, Reflect and kNow) designed to guide research for twenty first-century learning. The objectives of the study were both to improve the digital and information literacies of the participants and to validate the I-LEARN model for use in an early childhood classroom. The findings have implications for information literacy, digital literacy, and developmentally appropriate practices.

Keywords Information literacy · Digital literacy · Urban school · Early elementary classroom

Introduction

This article describes the work that a team of researchers from a large university in the Northeast performed in partnership with teachers from the Fairmount School (a pseudonym), an underserved/low performing K-8 public school near the university. The project was designed to introduce four early childhood teachers to project-based learning, to train the teachers to use free Internet tools for structuring students' research projects, and to offer in-class support to students as they worked on individual projects. Over the 3 months of the project, research team members assisted students and teachers in kindergarten and second grade classrooms in brainstorming ideas, conducting information searches, using information to build new knowledge, and uploading students' work to digital portfolios about "What Makes Our City Special?"

The work of one class of 24 kindergarten students and their teacher, Ms. C (a pseudonym), is the focus of this paper, as this class's experience yielded the richest findings emanating from the larger study. Ms. C's developmentally appropriate approach to the I-LEARN project (described below) was exemplary, and this paper focuses on the strategies and techniques she adopted as well as the results of her students' work. Her implementation of the project suggests a creative and successful approach that might provide a pathway for other teachers interested in pursuing project-based learning guided by the I-LEARN model. The paper examines (1) how the students constructed and enacted their inquiry using I-LEARN and (2) what dimensions of digital and information literacies these young learners mastered in order to learn and communicate new knowledge.

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Review of the Literature

The I-LEARN Framework

The primary objectives of the study were to investigate how the I-LEARN model (Neuman 2008, 2011a, 2011b) could support project-based learning with an early childhood population and to understand how digital and information literacies can be taught using developmentally appropriate practices through the implementation of that model. The I-LEARN model was developed as a “teaching tool created specifically for information age learning” (Neuman 2008, p. 1) and is premised on the belief that today’s students must develop the ability to “access, evaluate, and use various kinds of information as the basis for learning” (Neuman 2011b, p. 85). Table 1, Stages in the I-LEARN Model, briefly summarizes the model’s six stages, which—taken together—describe the overall process of learning with information (Neuman 2008).

Because three of the stages describe how information is used for learning—applying the information, reflecting on the process and product of learning with information, and moving that information into one’s knowledge base—the I-LEARN model, unlike other models developed in information science, directly links the *use* of information with the *learning* process to make information a central element in how students learn (Neuman 2011a, b).

Information Literacy

Almost two decades ago, the concept of information literacy was introduced to education (AASL & AECT 1998), and an understanding of its importance has only increased and expanded since then. Most recently, the Common Core State Standards (CCSS), released in 2010, incorporated many of these earlier ideas into the *English/Language Arts Standards*, which are highly influential in today’s US schools. These *Standards*—designed to support students as young as kindergarteners—are based on six “key design considerations,” including several related specifically to information literacy: “a focus on results rather than means,” “an integrated model of literacy,” “research and

media skills blended into the Standards as a whole,” and “shared responsibility for students’ literacy development” (Common Core Standards Initiative, 2010, paras. 4–7). The CCSS thus support helping even young children develop expertise in both information and digital literacy. The *Standards’* emphasis on the research process also suggests that students must be (1) adept in analyzing information to assist them with research projects and (2) capable of using digital tools to engage meaningfully with both content and authentic, real-world audiences (Davis 2012).

The Alexandria Proclamation in particular opened the way for an examination of digital literacy as a key component of information literacy:

Information literacy lies at the core of lifelong learning. It empowers people in all walks of life to seek, evaluate, use and create information effectively to achieve their personal, social, occupational, and educational goals. It is a basic right in a digital world and promotes social inclusion of all nations (International Federation of Library Associations and Institutions 2005, para. 2).

The Proclamation’s mention of a “digital world” in the same paragraph as its definition of information literacy indicates that the students’ development of digital literacy shows a natural progression of “information literacy” itself toward the world in which these students will work out their futures. In addition, the idea of teaching students how to evaluate information in digital contexts is supported by the International Reading Association’s (2009) statement: “We must assist students to become critical consumers and informed creators of information in these new online contexts” (pg. 2).

Digital Literacy

Researchers use the term “digital literacy” in a number of ways. Bawden (2008) stresses the transactional nature of digital literacy, describing it as the ability to comprehend and create multimodal digital texts in order to communicate with others. Gillen and Barton (2010) define digital literacy as “an enabling skill allowing for a broader range of

Table 1 Stages in the I-LEARN Model

Stage	Action	Explanation
I	Identify	Choose a problem or question that can be addressed through information
L	Locate	Access information, either recorded or in the environment, through a variety of people, media, and platforms
E	Evaluate	Judge the quality and relevance of the information found
A	Apply	Use the information for a learning task
R	Reflect	Examine both the product and the process
N	kNow	Instantiate the knowledge gained so it can be used in the future

learning interactions, using a greater range of tools, which then offers the possibility of a wider range of traceable meanings to be made in society” (p. 9). Gillen and Barton expand the notion of digital literacy beyond skills or tools to posit that it conveys a kind of “social practice” that calls attention to how individuals use digital technologies to fulfill their own purposes in social, civic, personal, and learning contexts. Hsin et al. (2014) suggest that digital literacies encompass the ways children use technology as a tutor for learning new skills and concepts, as a tool for creating new learning, and as a tutee in which the children program technology themselves. These researchers also argue that the development of digital literacies in preschool and kindergarten children has been understudied.

Burnett’s (2010) review of research on the topic suggests that digital literacy is more critical now that the world in which our children live is redefining knowledge, learning, and relationships within digital environments. However, the literature demonstrates a gap in the ways that different populations engage with digital tools. Ritzhaupt et al. (2013) found that middle school students in Florida from lower SES schools were less proficient users of technology than were students in higher SES schools, even when the access to technology at both kinds of schools was similar. Neuman and Celano (2012) showed how children from neighborhoods in Philadelphia with divergent socioeconomic backgrounds used technology tools in public libraries for different purposes. The children in the higher SES neighborhoods used these tools for “information and challenging purposes” (p. 22), while the children from the lower SES neighborhoods used the available technology tools for entertainment.

As students do more and more of their research online (Purcell et al. 2010), information and digital literacy skills are becoming more critical. The researchers contend that the I-LEARN model provides a solid framework for twenty-first century learning that enables students to “habitually perform the critical reading necessary to pick carefully through the staggering amount of information available today in print and digitally” (National Governors Association Center for Best Practices, Council of Chief State School Officers 2010). Ultimately, the I-LEARN model provides a research and theory based structure that supports both teachers and students in their mastery of information and digital literacies.

Developmentally Appropriate Practice and I-LEARN

One goal of this research project was to investigate the use of the I-LEARN model in an early childhood setting. Children in kindergarten may share developmental characteristics, but they still vary widely within behavioral norms (Tomlinson 2009), primarily because they bring to

school a range of knowledge, skills, and experiences. Gullo and Hughes (2011) state that kindergarten was originally designed as a “place where children become familiar with the social expectations of formal schooling and where basic academic and group skills are introduced” (p. 324) and note that today’s kindergarten curricula are more narrowly focused on academic skill development. Seeing this trend, The National Association for the Education of Young Children (NAEYC) (2009) has challenged educators to use developmentally appropriate practices when working with early childhood populations. Such practices need to be based on a solid understanding of how children develop in general and must include an exploration of the strengths and needs of individual children. Developmentally appropriate curricula include opportunities for children to experience social, emotional, physical, and cognitive growth and for teachers to incorporate a wide range of experiences, equipment, and materials that engage the whole child. Teachers who use developmentally appropriate practice also recognize that development and learning are influenced by sociocultural contexts (NAEYC n.d.).

Technology and media provide important resources that early childhood educators can use to enhance children’s development and achievement of learning outcomes. A joint position statement by NAEYC and the Fred Rogers Center for Early Learning and Children’s Media at St. Vincent College (2012) notes that the “appropriate use of technology and media can support and extend traditional materials in valuable ways” (p. 7). In addition, these organizations cite that effective use of technology “give[s] the child control [and] provide[s] adaptive scaffolds to ease the accomplishment of tasks” (p. 6). Clearly, it is important for teachers to select appropriate resources for the classroom and to make judgments about planning and implementing the use of technology and media with young learners. Teachers must both guide students on how to use technology and offer opportunities for them to explore, engage, and learn.

Because young children are often developmentally ready to expand their skills in personal responsibility, self-direction, and logical thinking (NAEYC 2014), teachers of young children should create integrated curricula that allow for student initiative and choice (Copple and Bredekamp 2008). The I-LEARN model supports this viewpoint because it encourages learners to pose their own questions and seek their own information. Further, I-LEARN is consistent with NAEYC’s constructivist approach, supporting young children’s learning “through interactions with adults and other children” (NAEYC 2009, p. 14). Participating in I-LEARN investigations allows students to work with their teachers, their peers, and members of their home and school communities to read, write, and talk about topics that have meaning for them.

Methods

Site

During the period of the study, the university had a formal partnership with the Fairmount School, with the partnership providing professional development opportunities for teachers and a university funded administrative position during the year that this research was conducted. At that time, the school had approximately 375 students and 17 classroom teachers. According to school district reports, more than 90% of the students were African American and more than 95% were classified as economically disadvantaged.

Participants

The 24 kindergarten children who participated in the project described here included 11 males and 13 females. Approximately 90% of these children were African American. Ms. C is a European American female who had 5 years of teaching experience at the time of the study.

Data Collection

The data set for this study included the transcript of the exit interview with Ms. C and her three colleagues as well as paper and digital documents created by Ms. C and her students. This paper is based on data that include Ms. C's remarks during the teachers' exit interview, drafts of her students' I-LEARN planning sheets, their digital portfolios, her completed I-LEARN rubric for each student, and the completed exit interview sheets she designed to guide her final interviews with her students.

Teacher Recruitment and Professional Development

The research team requested permission to recruit kindergarten, first, and second grade teachers to participate in the I-LEARN project. Ms. C was one of four teachers who volunteered to be a part of the study and participated in professional development meetings and an exit interview.

Prior to the implementation of the I-LEARN project, three professional development sessions provided both the research team and the Fairmount teachers an opportunity to build shared knowledge and ownership around the strengths and needs of teachers and their students. The teachers were also introduced to the specific stages of the I-LEARN model and to general digital and information literacy skills. At the first session, the researchers introduced and discussed the model, and the teachers proposed "What Makes Our City Special?" as the topic of the children's investigations because it would fit into the required social

studies curriculum. The teachers also adapted the original I-LEARN assessment rubric, a generic tool rather than one targeted for any specific audience, and decided to revise it to reflect developmentally appropriate expectations for their young learners (Fig. 1, K-2 I-LEARN rubric developed by Ms. C and colleagues).

At the second professional development session the research team demonstrated two free and easily accessible digital portfolio platforms they suggested for use with the projects: Little Bird Tales (<http://www.littlebirdtales.com>) and Weebly (education.weebly.com). At the third session, the researchers and the teachers worked together to set up the platform chosen by each teacher; for Ms. C, this was Little Bird Tales. Two of the researchers also offered in-classroom support to Ms. C's students during the implementation of the I-LEARN project. This support included assisting students in drawing pictures and writing drafts on landscaped primary story paper and searching for information about their topics on the class's computers.

Little Bird Tales is a free, cloud based software app designed to give "educators and students a truly interactive experience with options like listening to verbal instructions, voice recording/verbal response, drawing, importing images, and writing using a keyboard" (Tales 2014, para. 2). Using a simple step-by-step process either online or on a handheld device, users make slides that result in multimedia stories, or "tales."

Data Analysis

Research Design

This research employed case study methodology to address a "how" question in a complex, real life context (Yin 1994). It was structured as a single case, explanatory study. Multiple data sources allowed for triangulation and provided construct validity.

Interview Data

Data analysis was conducted as both an individual and a group process. The research team developed a set of initial codes, which were used to analyze the transcript of the exit interview. Each researcher independently coded the interview transcript, and then the team met and reviewed the transcript together in order to develop consensus on the codes and the analytic process. The group coding sessions uncovered new lenses and resulted in an expanded set of codes, which were used to structure the group's re-analysis of the interview transcript. The original and revised coding schemes are presented in Table 2, Code Set.

Because information and digital literacy were the focus of the research, data related to those two categories were

Fig. 1 K-2 I-LEARN rubric developed by Ms. C and colleagues

	3	2	1
Identify Question	Writes a question related to the topic about which the student cares. This question can be answered with information.	Writes a question about which the student cares. This question can be answered with information.	Writes a question.
Locate information	Searches for and finds more than one source of information to answer the question.	Searches for and finds one source of information to answer the question.	Searches for and finds information that does not answer the question.
Evaluate information	Recognizes which information is best based on reliability of the source, timeliness and relevance to the question.	Recognizes which information is best based on reliability of the source, timeliness OR relevance to the question.	Does not recognize which information is best.
Apply information	Writes an answer to the question that is original and clear.	Writes an answer to the question that is original.	Writes an answer to the question.
Reflection	Checks over the research, the answers and the process. Creates a quality, complete product.	Attempts to check over the research, the answers Or the process. Creates a completed product.	Does not create a complete product.

Table 2 Code Set

Code Name	Description
Design	The teachers' creation of projects, lessons, assessments, and selection of technology platforms related to the I-LEARN project
Implement	The teachers' strategies for completing the project and the students' strategies for completing the project
Evaluate	The teachers' strategies for evaluating the project
Stages of the I-LEARN Model	Identify, locate, evaluate, apply, reflect, and kNow
Project-based learning	Description of projects related to student generated inquiry in response to a question or a topic resulting in a product or performance
Information literacy	Ability to access, evaluate, and use information
Digital literacy	Ways to use technology to read, write, locate, and share
Rubric	The teachers used I-LEARN as a pedagogical tool and not just an evaluative tool
Context	Background and/or unanticipated benefits of the project
Library	The use of the school library to support the I-LEARN project
Non-project based learning	The projects that the teachers designed in the past for their students (not related to I-LEARN)

extracted and compiled into separate documents, which were analyzed in more depth to yield the findings.

Paper Document and Digital Portfolio Analysis

The research team analyzed the students' handwritten drafts, the teacher's notes on the students' self assessments, and the students' scores from the rubric (see Fig. 1, K-2 I-LEARN rubric developed by Ms. C and colleagues).

The team created a case study database (Yin 1994) using an Excel spreadsheet with categories that reflected specific components of each student's written drafts and Ms. C's handwritten notes from her interviews with the students. The database supported a content analysis of the following categories:

- Brainstorming-identifying a topic
- Identifying sources

- Draft of what student learned
- Interview question 1: Favorite part of project
- Interview question 2: Like best/worst
- Interview question 3: Favorite source; why is it a good way to learn about our city?
- Rubric score
- Little Bird Tale (LBT) oral info
- LBT student-created pictures
- LBT clipart/JPEGs

Findings

Analysis of the data indicated that Ms. C had developed her own highly effective approach to the assignment and adjusted her implementation of I-LEARN's stages to meet her students' particular needs. She noted that I-LEARN was a tool that enhanced her own as well as her students' understanding of the research process. The rubric scores, the students' written and digital artifacts, and Ms. C's notes also showed that the kindergarteners were able to build new information and digital knowledge through the project and enjoyed learning a variety of ways to acquire information.

Interview data analysis revealed that Ms. C clearly demonstrated a sensitivity to developmentally appropriate practices. She did not start merely by stating the topic of "What Makes My City Special?" but instead drew upon students' backgrounds and understanding of something more personal and local - their immediate community. As she explained:

We started with a community helper theme, and it was not just famous [people] *per se*, but about [the City]. I just took as the topic, "My community is special. [The City] is special," and expanded out from what do I consider to be my community, my neighborhood, my home, my school, and what other parts of [the City] are included in the [City] community, because a lot of the kids don't even realize necessarily that they live in [the City].

Ms. C began the project by having whole-class discussions about people and places in the community surrounding the school in an effort to connect the concept of communities to the students' prior knowledge. Then she located appropriate books about cities and towns that she read aloud to the class, helping the children connect these texts to their own experiences and interests about the City:

[I tried to] find as much literature as I could to do for read alouds... things just about general towns, and then would say, "Well, how does it work in our town? How do they collect the garbage in our town? How do our schools look? How are they different from

these schools? Who are the helpers in our community? What are the special things in our community?" From there, each student had to think of his or her own what is it that makes [the City] special? I chose the question for them, and they answered that using a variety of sources from there.

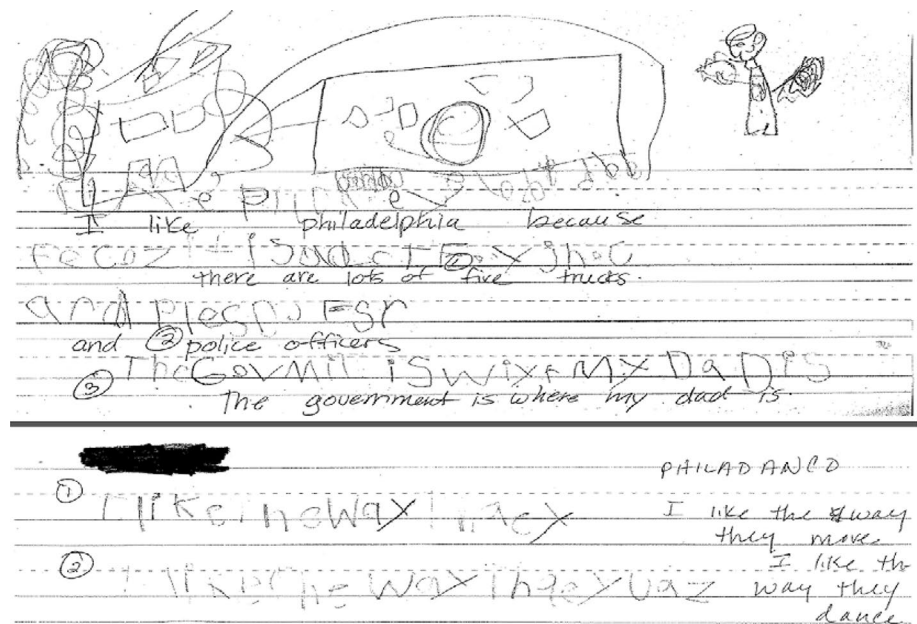
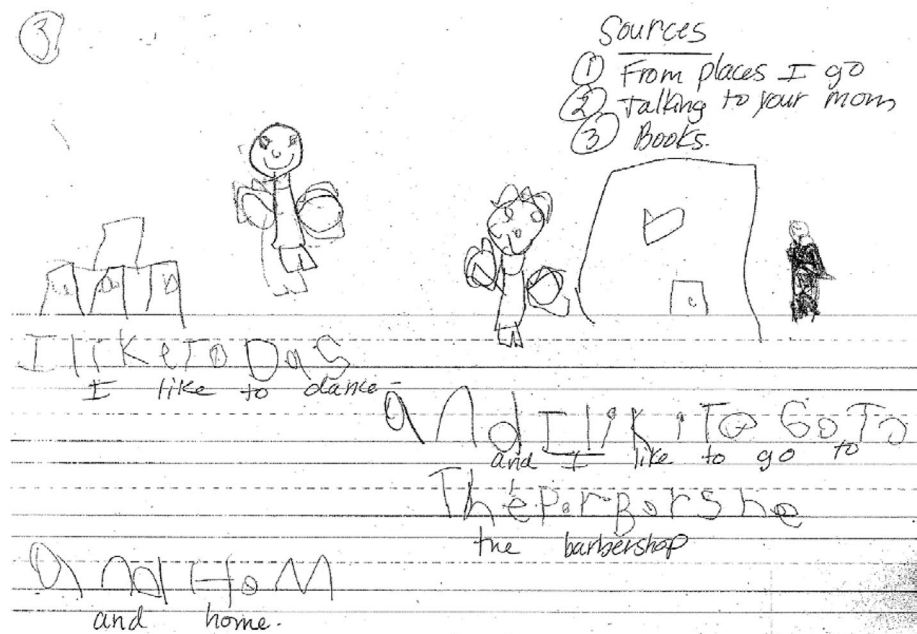
Ms. C explained the concept of "sources" and introduced a variety of "sources" that students could use to find information. She provided books and guest speakers as sources of information, and she helped the students come to the insight that their families are also important sources of information about the City.

After building her students' knowledge about communities, the City, and the nature and use of sources, Ms. C initiated several activities captured in the "Identify" and "Locate" stages of the I-LEARN model. First, she asked the students to draft written pieces about "What Makes the City Special?" Each draft included pictures and writing about topics the student wanted to investigate. Next, she asked them to identify three sources of information. Students who identified the "computer" as a potential information source worked with one of the researchers to find, select, and record information. Figure 2, Jacob's written draft of his topic, shows Jacob's identification of topics, while Fig. 3, Jacob's list of possible sources, shows his identification of possible sources of information about these topics.

Following the "Apply" stage of the I-LEARN model, students "applied" the new information they learned to create drafts of their digital portfolios. After the children had completed their drafts, Ms. C gave them a specific structure for organizing their "tales." She also helped them record their digital stories—asking each student to explain what he or she had learned and to identify the sources used. Jacob chose to include two topics, the dance company Philadanco and fire trucks, from his brainstorming activity. He also included a slide about police officers. Figure 4, Jacob's cover page, shows the cover page for his final project, and Fig. 5, Jacob's sources, shows the sources he used.

The "Reflect" stage of the I-LEARN model asks students to reflect on the process of finding and using information and on the product of their work. For this stage, Ms. C developed a self-assessment tool consisting of three questions: (1) What was your favorite part of the City project? (2) What part do you think you did the best? The worst? (3) What is your favorite source that you used? Why is it a good way to learn about the City? During individual interviews, she helped each student answer the questions and recorded the answers. These assessment sheets became an important part of the data analyzed for the study.

The overall process that Ms. C developed and implemented offered a balance of both teacher-directed and student-led learning activities, as suggested by NAEYC's

Fig. 2 Jacob's written draft of topic**Fig. 3** Jacob's list of possible sources

Developmentally Appropriate Practices (2009). Ms. C's role in the project included building background knowledge students needed to make their project topics meaningful and guiding the students to work independently on aspects of the project for which they had the skills to be successful (i.e., developing written drafts about project ideas). She also introduced a new digital technology program to them by first creating her own tale, which included pictures of her family and of the different places they had visited in the City and a list of the sources she

had used. After showing "Ms. C's City Story" to her students, she had each student develop an original tale using a similar process and structure. Ms. C gave enough guidance to enable her students to understand what they needed to include in their individual tales, but she did not set any limits on the type of artwork they could use (student work, clip art, photos from websites); the topics they could talk about in relation to the City; or the sources they identified.



Fig. 4 Jacob's cover page

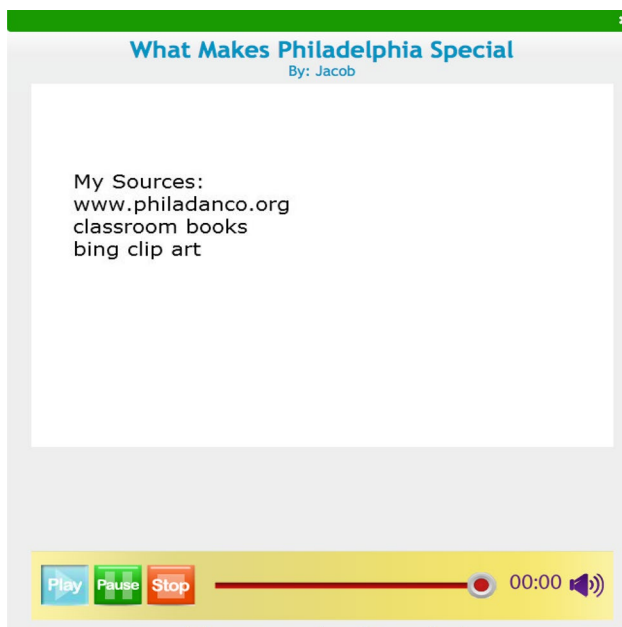


Fig. 5 Jacob's sources

Students' Reflections About Information and Digital Literacies

The I-LEARN project in Ms. C's class was constructed as project-based learning in which the children were guided to ask relevant questions about their community. The idea of

"community" was allowed to be as simple or as complex as each learner wanted it to be, reflecting Ms. C's understanding of the wide range of cognitive and experiential differences in her kindergarten classroom. For example, when *identifying* topics for researching "What Makes the City Special?" the children generated 27 unique ideas. The topics repeated most frequently were "pizza" (seven mentions) and "barbershop," "police," and "zoo" (six mentions), as shown in Table 3, Possible topics from brainstorming assignment. The table also shows that the children's topics were divided into three themes: community helpers, places to eat, and locations in the City.

The concept of a source was discussed as part of the investigation process, and the students were asked to locate sources on their own. They were able to identify a wide range of sources, and they evaluated these according to their ease of use and their perceived usefulness in uncovering new information. In their handwritten drafts, the 5- and 6-year olds brainstormed 31 different sources that they could use to locate information for this project. While obvious information sources such as "books" were identified eight times and computers or websites were mentioned three times, the children also identified people, especially family, and their own experiences as sources of information. In their final digital portfolios, the students identified three sources (presumably as instructed by Ms. C) that they actually used to locate information. The total list of sources mentioned in their Little Bird Tales (approximately ten) was much shorter compared to a previous list generated from their brainstorming drafts, but the sources reflect developmentally appropriate ways of knowing, as kindergarten children generally have a concrete view of the world and rely on adults to scaffold their understanding of what is going on around them. Kindergarteners are only beginning

Table 3 Possible topics from brainstorming assignment

Community helpers	Places to eat	Locations in the city
Barbershop (6)	Pizza (7)	Zoo (6)
Police officers (6)	Restaurant (4)	My house (5)
Firefighters (3)	Ice cream truck (2)	Tall buildings (2)
Doctor (2)		Stores
Bank (2)		Toys R US©
Post office		Downtown
Hair store		Parks
Government		Bridge
People		School
Laundromat		Schoolyard
		North [City]
		Dance
		Children's Museum
		Train

to understand how information can be acquired through more traditional sources such as books and websites.

At the conclusion of the project, Ms. C interviewed each child as part of a self-assessment. When she asked “Why was [your favorite source] a good way to learn about the City?” not every child was able to answer—which is to be expected in a diverse group of kindergarteners. Some students who did not offer specific responses described their preferred sources as being “a good way to learn” because they were easy to use, addressed their needs, or had personal relevance. Alex shared that he liked “using the computer because the computer goes faster than looking other places.” Olivia chose as her favorite source “the books we read [that] tell us stories about where we live and the people who live there.” Mark explained why he thought that personal experiences could be a good information source: “Going to the park [because] you can see and look around.” Interestingly, of the 16 students who were able to identify their favorite information sources and explain why these were helpful, only two students selected people—even though people were the most frequently cited sources in their tales.

Discussion

Ms. C found the I-LEARN model to be a valuable tool for introducing research to her young learners. During the exit interview, she described I-LEARN as “a model for processing information and to help guide students in the research process. Instead of doing something because they are being told to do something, they are doing something based on a process where they are making decisions.”

Information Literacy and I-LEARN

Ms. C’s experience showed how her understanding of both information and digital literacies and her use of developmentally appropriate practice had an impact on the degree to which her students were able to engage successfully with the stages of the I-LEARN model. For example, she talked about the usefulness of the model itself in helping young learners participate actively in inquiry-based learning:

We often don’t, at a young age, do a project that requires multiple steps like that, or that lets them have so much input from the outset... as far as what is the question that they would like to answer, and where would they like to find their information. That was something new for them, and that’s really useful in the model.

Students were most successful in engaging with the first four stages of the model—*Identify*, *Locate*, *Evaluate*,

and *Apply*—and Ms. C’s conceptualization of information sources in ways that were broad and developmentally appropriate for 5- and 6-year olds clearly contributed to this success. She explained how her students came to understand how and why learners need to locate and evaluate information sources:

Also, I think something that worked well is they have a much better understanding of what sources are and why you need sources. Knowing that not everything just is because Ms. C said so or because we read it in a book, but that your grandpa, who lived here or lived in North [City] and then moved here, is a source... because he may have seen that mural that we looked at on Google Images himself, and he used to live near it and have a memory about when they put it up.

The digital portfolios showed that her students were able to apply what they learned to generate new understandings of what makes their city special, engaging in the “Apply” stage of the I-LEARN model in ways that were developmentally appropriate for kindergarten students. Some students simply listed what they now knew about a number of topics related to their city, while others were able to identify a single topic and offer a set of facts that demonstrated an advanced ability to focus and organize information.

Digital Literacy and I-LEARN

The teachers who participated in the project did not originally have access to computers for instruction. For this research project, the team installed desktop computers in each classroom and connected them to the Internet. Ms. C acknowledged that her kindergarteners needed the help of their teacher and two of the researchers to use the classroom computers successfully:

I think one of the things that worked well was [your] coming in and helping the kids out with doing their computer research—because we really did want this to have a strong technology component. However, it was a challenge to have the kids do research independently online. ... having an adult to guide them through that was very helpful.

Ms. C indicated that one of the main benefits of using Little Bird Tales was the students’ sense of ownership of their digital portfolios. In describing how she knew the I-LEARN project was successful, she shared: “The kids were very happy with the finished product, and they were, most of them, able to be pretty articulate in their self-assessment. They really enjoyed seeing each other’s ‘tales’ and kept asking to see them over and over again. We knew they were popular.” The creation of these digital portfolios reflected the students’ performance

according to Bawden's (2008) transactional definition of digital literacy, as the children created multimodal digital texts that became a valuable way to communicate with their classmates.

Ms. C exhibited effective use of technology as described by NAEYC and the Fred Rogers Center for Early Learning and Children's Media at Saint Vincent College (2012) in how she implemented Little Bird Tales with her students. She chose a digital platform that was developmentally appropriate—that is, designed in a way that supported her students' readiness to engage with the program. Second, she clearly had the digital and technology skills to scaffold and present the program to her students in a way that suited their developmental abilities. Third, she did not present Little Bird Tales as a replacement for instruction or learning but used it to support learning and the district curricula for social studies. Ms. C used Little Bird Tales not only to capture what students learned but also to offer students an “engaging and empowering” experience with technology through the various art and voice recording applications of the program. She turned the platform into an activity center so students could view and listen to each other's “tales” after the project had ended.

Ms. C designed the I-LEARN project to ensure that her students used their emergent digital literacy skills for “information and challenging purposes” (Neuman and Celano 2012, p. 22). Although these children might not have been experienced in information literacy and in the use of digital tools, this beginning foray into inquiry learning in a digital environment may have set the stage for their development of more sophisticated levels of digital literacy in the future.

Limitations

The sample size for the overall study was small, including only four teachers and 51 students; the sample size for this case study was even smaller: one teacher and 24 kindergarten students. While our analysis suggests that Ms. C's own strengths in the areas of digital and information literacy as well as in developmentally appropriate practice had a positive impact on student outcomes, no formal measures were used to assess her skills or to establish whether there was a correlation between her background/knowledge in information literacy and her students' outcomes. Future studies of I-LEARN implementations should include a larger number of teachers and students, specific measures of teachers' pedagogical content knowledge as it relates to digital and information literacies, and focus groups in which the students can discuss their experience working with the model.

Conclusion

The findings from Ms. C's classroom suggest that, through I-LEARN, even young children can understand “how knowledge is organized [and] how to find information,” which are the building blocks of becoming information literate (ALA 1989, para. 3). The students were able to identify appropriate inquiry topics and to locate sources that could help them learn more about these topics. By allowing each child to use the I-LEARN model in ways that met his or her developmental needs, Ms. C demonstrated that our youngest students—even those who attend public schools in low-income areas—can become active participants in the information-rich digital world in which they will spend not only their school years but their lives.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent The Drexel University Institutional Review Board approved this research. Informed consent was obtained from all individual participants included in the study.

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