A Qualitative Analysis of Digital Literacy and TechREACH Program’s Curriculum Training and Implementation

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Chapter 1 Purpose of the Study

Initial strategies for promoting a digital inclusion in education, focused considerably on computer and internet access in education. Access is but one component of a much larger transition from bridging the digital divide to promoting digital inclusion, that includes knowledge, skills and effective use of digital technology and information. This paper examines improvements to digital literacy, defined as the components knowledge, skills and effective use of digital technology and information, through the TechREACH afterschool program and its adult participants. While this report does not discount or undermine the importance of access, existing literature suggest knowledge skills and effective use or digital literacy is what is actually important, especially among teachers and youth in low-income communities in Washington State.

The purpose of this research is to conduct a qualitative analysis of the TechREACH (TR) program’s curriculum training and implementation within the context of participants understanding and application of digital literacy skills. This analysis is also intended to assist the EdLab Group in understanding the following elements of the TechREACH Program.

1. How the participants of the TR program understand and apply concepts of digital literacy during the TR curriculum training and the implementation of the TR program?

2. How trained participants applied digital literacy skills acquired within the program in normal classroom curricula?

With recommendations to enhance or further develop digital literacy fluency through troubleshooting strategies and emphasizing the personal value of technology and skills acquired thru the club trainings and curriculums. This study seeks examine how the themes of troubleshooting strategies and TechREACH as a tool for developing digital literacies can provide the EdLab Group and TechREACH program managers with an understanding of digital literacy, its applications and whether elements within the program can be applied to regular classrooms settings.

Chapter 2 Literature Review

Digital Divide Background

In the last two decades digital technology has become more prevalent in the daily lives and expanded with remarkable speed across the globe. The speed of expansion and societal impacts of increasing usage and dependency on information and communication technology has raise concerns about equability in access, knowledge and skills sets required to effectively and appropriate communicate information via digital technology and within a digital environment.
During the 1990s, the “digital divide” became a concern. At a 1996 joint address in Knoxville Tennessee, then Vice President Albert Gore challenged the nation,

“to ensure that all of our teachers and students have access to modern computers and engaging educational software, training and support they need in order to help students make the most of these wonderful new technologies... to make sure that our children will never be separated by a digital divide.”

Vice President Albert Gore June 2, 2007

For many this was the first real public expression of the phenomena that had already appeared in the 1995 report by the National Telecommunications and Information Administration (NTIA) titled “Falling Through the Net”. In both the 1995 and the subsequent 1996 report, researchers examined the penetration of internet service and computer access within American households, and identified segments of American society without regular access. The “have nots” included those with low education levels, low-income, ethnic and racial minorities, youth and the elderly in rural and central urban communities (Falling Through The Net, 1995). The final report in the “falling through the net” series titled Falling Through the Net: Toward Digital Inclusion (2000) began a slight but significant shift from the original framework focused heavily on access. This report examined through survey data how and for what purposes individuals and households actually used electronic tools. In 2002, the focus shifted more dramatically with the release of “A Nation Online: How Americans Are Expanding Their Use Of The Internet.” Some scholars have argued that the subsequent reports released after 2002 have misrepresented the digital divide and provided a false impression that access is no longer a salient issues.

Schools and the Digital Technology

The federal government has played a key role in providing services to lower income communities through programs like the E-Rate discount a program within the Telecommunications Act of 1996, which is funded by the uses fees from telecommunication companies. The E-rate provides discounts of 20 percent to 90 percent for eligible telecommunications services, depending on economic need indentified by the number of students who qualify for the national school lunch program and location (urban or rural), annually that is approximately 2.25 billion available to eligible schools and libraries. (U.S. Department of Education., 2008)

Perhaps the most influential policy concerning digital technology in educations has been the Enhancing Education Through Technology (EETT) portion of Title II D in the 2001 No Child Left Behind Act. The primary goal of the policy was to improve student achievement through use of technology in elementary and secondary schools, by helping students become technology literate by the end of eight grade, through integration of technology, teacher training and curriculum development. However, funding for this program has decreased by 47% since 2005. As of 2010 congress has appropriated 100 million to the EETT program(United States Department of Education,2009)

As described above, throughout the 1990s the digital divide was framed within the context
of the education system as heavily focused on access, and measured initially by the “student to computer” or “teacher to computer” ratios within school districts. However, the disparity among those ratios has decreased as computing technologies have decreased in cost and become more readily available, through technology federal, state and private grants.

Hohlfield provides a theoretical framework of the digital divide as a three levels pyramid that includes: 1) access to hardware, software, the Internet and support for technology; 2) use of technology by teachers and student and 3) empowerment of students (Hohlfeld, Ritzhaupt, Barron, & Kemker, 2008). In this theory, the first level is where much of the early discussion about digital divide was focused. Many state and federal policies directed funding and resources into flooding schools with technology hardware and computers in an effort to decrease the larger disparity in access, commonly represented by student or teacher to computer ratios. According to Parsad & Jones (2005) the ratio of students to computer decreased from 12:1 in 1999 to 4.4:1 by 2003 (Parsad, Jones, & National Center for Education Statistics., 2005). Although these decreasing ratios were heavily praised as successfully bridging of the digital divide the impact of the digital divide was deeper than access alone, as schools and students with the hardware continued to fall behind. Problems with the actual technology also arose as technology advances required costly replacements and the absence onsite or accessible technology support.

The second level involves the frequency and purpose for which students and teachers use technology and is heavily reliant on a stable technology support system. Whether or not technical support exists to “troubleshoot” a problem is likely to determine how comfortable a teacher or student is with utilizing the technology to teach. In the absence of sound technology support, some schools have encouraged more of the tech savvy students to form clubs that provide basic technology support for teachers. These programs are prime examples of the third level of student empowerment. If public schools are perceived as the bridges to connect the haves and have nots (Attewell, 2001), then schools have a responsibility to teach those technology skills and new literacies necessary for students to succeed (Alvermann, 2002).

Rethinking the Digital Divide

Critics argue that the digital divide may have existed in the mid 1990s, but has since been resolved by decreasing cost of computing hardware and Internet services. Challenging the methodology of the “Falling through the Net” data collection, Compaine argues that focusing on household computer use and internet access biases the study to include personal computer owner and citing that 62 percent of employed Americans go online through their jobs, and 75 percent of students go online through their schools(Compaine, 2001). The author does not address the concerns for limited operational hours of public and private locations, nor is there consideration for the limitation on the protective firewalls and filters on publicly accessible computers and internet networks that restrict access to certain cites or the privacy concerns users have when accessing confidential financial and health information in public.
Warshauer's “Rethinking the Digital Divide” (Warschauer, 2003) raises two concerns with the initial concept of the digital divide. The first was the emphasis on the physical availability of computer and connectively to the exclusion of content, education, and literacy. The second concern was in the “binary societal split” between the technology haves and have-nots, instead of the gradation based on different degrees of access to information (Cisler, 2000, Washchauer). The second concern reflects a common theme throughout digital divide literature that represents the digital divide as a stagnant “binary societal split”, not dynamic. More germane to this study is the initial concern for “the exclusion of education and literacy” (Washchauer, 2000). It is the broader discussion beyond access that generated a larger discussion of digital inclusion. One of the central components of that discussion is what it means to be digitally literate, which is the focus of this study.

“If someone brings a lot of new technology in your school district and doesn’t provide staff development, the only thing that changes is your electric bill.” David Thornberg

There is considerable literature to suggest that while many schools have found ways to provide access, it is far easier to hook up computers than to make them relevant to people’s needs or to help people use them in empowering ways, that “efforts to improve people’s circumstances with technology have gone unfulfilled because the digital divide has been defined as a technical issue than as a reflection of broader social problems.” (Light, 2001) (Ba, Tally, & Tsikalas, 2002)

EdLab Group and TechREACH

Tech Reach is a program provided by the EdLab Group (formerly the Puget Sound Center for Teaching, Learning and Technology (PSCTLT)), which is a private, non-profit center with funding from federal and state governments, private foundations, corporations, and individuals. Partnerships and collaborations with business organization and educational institutions assist the EdLab Group in pursuit of their mission to “leverage the power of technology and diversity to transform teaching and learning” by providing diverse programs for students and teachers. One of the organization’s highest priorities is to identify and remove obstacles that prevent educators from integrating technology into their curricula.

The subject of this study focuses on the TechREACH program, which began in 2003 with receipt of grants from the Bill and Melinda Gates Foundation and The Seattle Foundation. Initially designed to target at-risk middle school girls in Western Washington, the program expanded in 2006 with funding from a National Science Foundation Grant to expand program services to in Western Washington as well as establishing boys and girl clubs in eastern Washington. The programs targets, low-income and at-risk middle school students are most likely to fall behind in STEM course work and least likely to be represented in STEM careers. Highly aware of the fact the 16 of the 20 fastest growing jobs through 2014 will require computer skills (Bureau of Labor Statistics, 2005) and employees who use computers at work earn 17 percent to 33 percent more than those who do not (U.S. Dept of
Commerce, 2002), this program model sought to fight trends that women, Latinos, and other minorities are the least likely to be interested in or aware of high-tech careers (Kearney, 2002).

The TechREACH program currently consists of two primary components, the Club Curriculum and Teacher Professional Development, which is facilitated through the TechREACH Club Curriculum Training.

TechREACH’s club curriculum which focus on STEM subject matter and includes hands on-activities, real life demonstrations, field trips and project based instructions, where students collaborate with each other explore ideas and solutions together. Programs topics include Digital Photography, Building Design with 3D modeling, Animation, Podcasting, Renewable Energy, Arcade Game Creation, Robotics, and more recently Science Journalism.

TechREACH focuses on building the capacity of participating teachers to support students’ STEM learning and interests through resources and strategies build into the TR curriculum training. Participants of the trainings predominately middle school, teachers and Technology site directors who have been chosen by their respective schools to deliver the program to clubs comprised of 10-15 students who meet once or twice a week after school.

Multiple Conceptions of Digital Literacy

Rapid advances in technology and widespread use of digital media and digital information necessitate that educators and students be equipped with skills, knowledge and understanding for academic and career advancement as well as civic engagement in the 21st century. Existing literature refers to these skills as digital literacy, or information technology literacy, however there exists multiple conceptions and frameworks through which researchers have chosen to define digital literacy. Despite the lack of consensus on the definition there does appear to be widespread agreement that “In the 21st century technology and education are inseparable and cultivating technology-proficient youth is a commonly shared goal” (National Academic of Engineering 2002).

What is ICT Digital Literacy?

According to the International ICT Literacy Panel, 2002 digital literacy involves “using digital technology, communications tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society” (International ICT Literacy Panel, 2002). Partnership for 21st Century Skills defines digital literacy as “Using Technology as a tool to research, organize, evaluate and communicate information, and the possession of a fundamental understanding of the ethical/legal issues that surround the access and use of information” (Partnership for 21st Century Skills, 2007).

In the research literature on digital literacy there appear to be three common conceptions of a digitally literacy represented in the Vin Diagram below: Information literacy, technology or computer literacy and Information technology literacy. The representation of
these conceptions in the Venn Diagram was intentional as IT fluency conception used in this study utilizes aspects from both Information and Computer/Technology Literacy.

**Figure 1 Multiple Conceptions of Digital Literacy**

![Venn Diagram](image)

**Information Literacy**

At the most basic level, Information Literacy represents an individual’s ability to “recognize when information is needed, have the ability to locate, evaluate, and use effectively the needed information” (American Library Association, 1989). The ACRL Institute for Information Literacy identifies six fundamental abilities that an information literate individual should possess: 1) Determine the extent of information needed; 2) Access the needed information effectively and efficiently; 3) Evaluate information and its sources critically; 4) Incorporate selected information into one’s own knowledge base; 5) Use information effectively to accomplish a specific purpose; 6) Understand the economic, legal, and social issues surrounding the use of information and access and use information ethically and legally (American Library Association, 1989). This approach to digital literacy is common among business leaders, policy makers and educators, as communicating, evaluating, and interpreting information using digital technology or within a digital environment. However, one of the major critiques of this approach is that it is difficult to operationalize and does not address the skills required to use technology devices.

Therefore without these components of measurability and skills, the literature cautioned against information literacy as an adequate definition.

**Computer/Technology Literacy**

Computer or Technology literacy is best understood as the knowledge and skills sets required for operating information technology devices such as computers, word processors, and search engines. Additional individuals who are literate in this area
recognize and understand input and output devices, networks and a host of other tools are used to gather, disseminate, present, processes and interpret information. Other scholars focus on Technology literacy as the ability to work with technology within a given discipline, or as a generalized set of IT skills necessary to perform perfunctory work in a computer rich environment (Kock, Aiken, & Sandas, 2002). Computer or Technology literacy appears the more commonly preferred definition among policymakers, business leaders and educators because computer literacy skills can be measured and tested more uniformly. However there are two significant critiques to this approach. The first is the reliance of an individual’s skills in using a particular technology hardware and software, which may dramatically change or become obsolete as technologies advance. The absence of the critical analysis and information evaluation component of information literacy is also a shortcoming of this approach.

*Fluency in Information Technology*

In this study digital literacy will be defined, in through the third conception of Information Technology Fluency. By focusing on fluency digitally literacy can be understood as the ability for an individual to utilities both the technology skills sets, in computer literacy, and the crucial analysts of information within information literacy, to effectively use digital information technology. Fluency in Information Technology, or Fitness is represented most clearly by the chart in Figure 2 on the Elements of “FITness” (National Research Council (U.S.). Committee on Information Technology Literacy., 1999)
This is conception of digital literacy the concept of troubleshooting strategies with digital technology is also a significant component. Troubleshooting as a method of problems solving whereby an individual engages in the essential elements identified under the Intellectual capabilities knowledge type of the “FITness” model including: engaging in sustained reasoning, managing complexity, testing and managing problems in fault solutions, and expecting the unexpected. In both diagrams elements of both computer/technology literacy and information literacy are encompassed under a broader view of digital literacy that enables a person to use technology more effectively, adapt information to be personally relevant and acquire future knowledge as information technology changes.

Given that existing literature has not yet reached upon a consensus conception of digital literacy, further research and analysis in this subject is necessary in order to develop a more rigorous measurable approach for determining an individual’s digital literacy. In absence of such a definition policymakers and educators must be innovative in their
approach to fostering a more digitally inclusive and digitally literate society. For the purposes of this study, digital literacy will be defined through the hybrid approach of information technology fluency, through which this study will examine the understanding and application of digital literacy concepts among the TechREACH participants.

Chapter 3 Methodology

The research methodology utilized qualitative analysis by conducting interviews and focus groups with TR club leaders, adult participants, and TR program staff to understand how participants perceive TR and digital literacy within the context of the TR program curriculum training and the programs future or past implementation.

This study included semi-structured interviews and non participant site observations with two Club Leaders. A TR club leader is defined as a middles school teacher who has received TR Club Curriculum training and hosted a TR club during the time duration of the study. Of the 8 active clubs in Washington, only two of the eight club leaders were available for interviews. Interviews and site-selections were chosen on the basis of the interviewee's availability; therefore, only two of the four interviewees were available for both the interview and site observation. The two Club Leaders were both located at middle schools in Western Washington in urban and rural communities, had at least one year experience operating a TR Club.

The study also includes a focus group, in which twelve TR Adult participants where interviewed and a participant site observation was conducted. TR Adult participants are defined as middle school teachers and site directors who participated in the Club Curriculum training in Eastern Washington. As a result of a partnership with GEARUP (Gaining Early Awareness and Readiness for Undergraduate Programs), TR Adult Participants, receive the Club curriculum training, but may not actually deliver the training to students in a TR club, in some cases TR Adult participants may train other teachers in the Club Curriculum. The absence of information on the participants prior to the Club Curriculum training prevented any pre-selection of the TR Adult participants; therefore this study is comprised of all participants who provided their written consent at the training site.

Lastly, two semi-structured interviews were conducted with TR staff members, defined as those persons working for the TechREACH program during the duration of my study

In both club site observations, club leaders were made aware of my research my request to for an interview. I was accompanied by a TR staff member on one observation, and traveled without a TR staff to my second site observation. As part of the site observation of the Club training, participants were made aware of my request to conduct a focus group and observe the club training at the beginning of the curriculum training. In all cases interview s and focus groups were conducted without TR Staff present and all participants were informed of their voluntary participation and confidentiality through a written consent form approved by the University of Washington Human Subjects Review.
The demographics of the focus group consisted of 12 TR adult participants, all from Eastern Washington. The focus group was 33% male and 66% female. When asked what school level they taught, 50% of the participants taught middle school only, while 33% taught both middle school and high school. About half of the participants survey identified as being between the ages of 20-35, 41.66 % between ages of 36- and 49, and 8% “50 and over”.

Semi-Structured interview approach was chosen to attempt to understand “the meaning people make of their experience and how it affects the way they carry out that experience. (Blumer, 1969). Additionally the semi-structure approach allows for the interviewer to deepen the discussion, to understand “behavior in context and provide access to understanding action (Seidman, 1998). In the semi-structured interview technique is the best available option for exploring the motivations that attract adult participants to the TechREACH Program, their conceptions of digital literacy, observations of student participant’s application and understanding, and most importantly their individual applications of digital literacy concepts within the context of the curriculum training and program implementation.

All interviews were recorded via digital voice recording device and transcribed. The focus group was the first interview transcribed and coded using a grounded theory approach, whereby the interview on observation data was coded into multiple categories reflecting the differing in experience of the observed phenomenon of digital literacy. These categories were grouped into two primary groups, TR Program and digital literacy. The semi-structured interviews were coded within the context of the major theme identified within the focus group. Through axial coding categories were grouped by their similarities on a chart for the two main categories interview and observation data was then organized into sub categorizes such as, the program structure, curriculum design, training, technical assistance, program purpose etc. For Digital literacy, self reported definitions of digital literacy, individual as well as perceptions of digital literacy among their peers, and students resulted in the emergence of a several themes surface within the interview data.

**Chapter 4 Results and Discussions**

The result of the coding of the transcripts on observation notes revealed two common themes that seem prevalent in each interview an both forms of site observations, these themes were Troubleshooting strategies, with a sub categories of collaborative problems solving, and TechREACH as a tool for developing digital literacy of TR adult participants and TR club leaders.

**Troubleshooting Strategies**

In observing the curriculum training, there appeared to be a direct relationship between troubleshooting strategies and those who appeared to display characteristics indicating a higher fluency in digital literacy. Some of the indicators used to characterize a higher fluency in digital literacy include familiarity with common computer programs and procedures ex loading software using internal and external drives, ease navigating the Lego MindStorm software, ability to transition between Mac and PC computers. Those with
higher fluencies appeared more willing to engage in troubleshooting strategies when their initial programming did not achieve the desired result. These participants sought out TR trainers to share ideas and alternative ways of accomplishing the same task instead of requesting assistance.

Conversely those who appeared less fluent in digital literacy had more difficulty with the initial set of the software and navigating the Lego Mindstorm software and some common computing tools, appeared more easily frustrated when engaging in troubleshooting strategies. These participants more frequently than their peers seem reach out request more personal assistance from the TR trainers when attempting to resolve the same problems or complete the same tasks. When TR trainers where not available or the participant stopped engaging in troubleshooting strategies, the participant seemed to be less engaged in the assigned task, as observed by checking email, and stepping out to making cell phone calls.

This pattern reflects the same troubleshooting patterns that were identified in a study on emerging the digital literacies of children where, researchers suggested that those who displayed higher level of troubleshooting fluency as a result of their digital literacy, had the knowledge and confidence to find solutions to their technical problems, while those with more moderate levels sought assistance from friends or peers, and the lowest level of troubleshooting fluency reached out more frequently to formal channels of support.

TR adult participants who appeared more fluent in digital literacy appeared to more willing to engage in troubleshooting strategies to resolve technical issues and achieve this task themselves or with a peer. These same participants frequently assisted others, shared with the class alternative ways of accomplishing the tasks. They rarely reached out to the instructor for assistance, but more to share ideas.

The adult participants who appeared less fluent in their digital literacy had more difficulty navigating and operating the software and configuring the robotics instructions and procedures. These participants appeared more frustrated when encountering technical and software programming problems. These participants were more reliant on the TR staff for instruction as opposes to reaching out to their more fluent peers. These participants appeared less engaged as the training continued.

Fluency in troubleshooting strategies can also be applied outside of the club curriculum, as presented by this adult participant who stated:

“I find it as is pulling back tool. If you have them in a regular classroom, then you can say remember that time when the robot didn’t work for you? How did you resolve that? Did you go back and test it? Can you go back and test the math? So I think it teaches the kids concepts that you can take into the classroom.”

TR Adult Participant

The more fluent one is in troubleshooting digital technology the more comfortable this participant felt the TechREACH program could be applied in the normal classroom setting.
Collaborative problem solving:

Collaborative problems solving was a common element in the curriculum training as well as in the clubs observed. Both TR Adult participants and Club Leaders actively engage in collaborative problems solving, when attempting troubleshooting strategies. In the trainings TR trainers presented guiding questions and encouraged individuals to group together to share programming. In the curriculum task titled "The Slowest Car" TR adult participants where presented with a challenge for creating the slowest moving car. This activity was one of the more collaborative ones in that participants worked with one another to share ideas and perquisite knowledge about gears, physics, and mathematics.

During the TR club site observation, when technical problems were encountered with the Adobe Video editing software, Club Leaders presented students with guiding questions similar to those presented to the TR adult participants by TR trainers to guide their troubleshooting strategies. In both setting providing the direct answer to the students question may have yielded a quick resolution but may not have enhanced the participant’s fluency in digital literacy.

The diversity of the program TR participants’ academic disciplines and perquisite knowledge seemed to provide highly collaborative environment. TR adult Participants and Club Leaders also recognize the benefits that arise from students working together to find solutions as noted by one who commented that:

"We saw it in digital photography. They would just learn it pick it up go to someone else who needed help... that one...help this one and it would just go on and on. It was great. Not only great for us but great because they were cooperative learning." -TR Adult Participant

The existing literature supports the recommendation for a collaborative instructor approach in both TR Training and the delivering of the curriculum as a Club Leader and additionally the flexibility build into the program curriculum enables both the TR trainers and Club Leaders the freedom an flexibility to accommodate the their and cultivate authentic technology practices in diverse audiences with varying degree of experience and perquisite knowledge. Degennaro’s case study on socio-technical cultural activities, cautions against holding "steadfastly to initial goals" and “authority as an educators”, when providing technology instruction in an afterschool setting, because it can result in "inhibiting learners form gaining the very practices they need to become more fluent in technology" (Degennaro, 2008).

Lastly in a collaborative problem solving environment TR trainers and TR club leaders, create an environment in which participants are made to feel comfortable varying degrees of digital literacy fluency. One staff member made the following comment when describing the positive experiences of the TR Club trainings:

"Making sure that your supporting the emotion and not making them feel silly for not knowing where the copy paste function is...saying we’re just going to walk you through the software...up here its kind of hidden. Make it feel like they’re not ignorant for not knowing.” -TR Staff Member
“I feel like the trainings do help support the teachers in their digital literacy. Once they’re confident then they can go out and teach the students successfully. The more training they get the more personal development like this the better. It’s a dual training role. You’re training them in that software and emotionally supporting their successes on the software, and those two things combined is really what’s important.” -TR Staff Member

This dual role as described by the TR staff member enables the participants and ultimately the students trained by those adult participants a more productive and encouraging atmosphere when engaging in troubleshooting technical problems and being more comfortable with not knowing

*TechREACH developing digital literacy capacity*

The second theme most prevalent in the interview data was TechREACH as a tool for developing the digital literacy capacity of TR adult participants and TR club leaders. Exposure to the curriculum trainings and implementing the club curriculum, seem to equip teachers with an expanded capacity to utilize new software and technologies as well as enhance their ability and awareness to support the digital technology needs and interests of students at their school.

This theme was most clearly observed in the interviews with Club Leaders and club site observations. Each Club leaders had two or more years operating the afterschool TR program and speak to their digital literacy development respect to the digital technology utilized in the program curricula or utilized in their own classrooms.

"When TR started it was learning word and doing things with the computer...now we’re science reporters...we have to research it, interview people, tape them and put together a video. So now I’ve learned how to do Adobe Premier and how to make a video." -TR Club Leader

"I just did a huge classroom project with my students and they ended up including video segments and doing a multimedia presentation, when before I would have just included a PowerPoint." -TR Club Leader

Club Leaders and Adult Participants in the focus group expressed excitement in using TR club curriculum and digital literacies developed in the training to connect and engage students on their level.

"It’s just one more tool to use as a teacher. You can use it in almost any subject, and it engages the kids big time. It connects me to the kids." -TR Adult Participant

"I think it’s really sad that we have to do these things after school and during the summer. If we did stuff like this in the classroom and the teachers could fit it into their curriculums I think we’d have a whole different dynamic in the school day." -TR Adult Participant

"That’s the world that those kids either live in now or will live in, the more I can give them experience with it the better." -TR Club Leader

It appeared clear that the TR program provided additional tool for student engagement that was also beneficial to the teachers professional development. TR Club leaders in sustainable programs indicated that they became more aware of technology needs of their students who lack regular access to computers or internet outside of school.
“Some of these kids don’t have computers at home so then they have technology, picking up new skills all the time and then they’re transferring those skills to teaching other classmates in other classes…They ask for more time from me, so that they can have access to it. So if I’m going to be in the building and the girls just want to drop by and work on the project or if they have schoolwork they need to do on the computer then they know that they can ask. And it a comfort for them”- TR Club Leader

Digital literacy capacity development is also represented in how TR Adult Participants and Club leaders are able to communicate, evaluate, read and understand text and audiovisual content via digital technology. This critical in conducting research and evaluating information presented in online media outlets. As previously identified as the information literacy component of digital literacy, in the following exchange between two TR adult participants each describes difficult in communicating to students how to use technology effectively and demonstrate awareness of the importance in effective presentation and critical evaluation of information using digital technology or within a digital media environment.

**TIM**: Yeah you know like...if you’re trying to give a speech on some topic. Well if it’s a visual ...like its art, a PowerPoint might be good or something like that. Or if it’s showing someone how to use this (robotics gear) well you may just not need the technology you just need to actually build the stuff. So I think that kids have a problem with that they sometimes try to use the technology as...

**LAURA**: All the time

**TIM**: Yeah...all the time

**LAURA**: And Along those same lines...students in my district have such a hard time they think everything online is true.

**LAURA**: They don’t have a concept of...we were writing research paper and about 10 of the kids printed off blogs to take their research from. I said...I had to use the example. Well do I know anything about medicine? No you don’t miss Laura. Alright, can I go online and blog about the how good this new drug is. Well Yes. So you’re going to use that for the research paper? Well No. But you’re going to believe all these other people you don’t know?

And its teaching them how to identify and find out is this a reliable source...is this something that I can use for research can I trust this site and those types of things and that’s a challenge

**CHRIS**: Critical Thinking skills...that goes down to critical thinking skills looking at the source of any information even a doctor, and their opinions. You still have to look at specifically what their saying within the quality of the argument. That’s absolutely vital...I totally agree with that you have to get kids to look at the information for what it’s actually saying

**LAURA**: And being able to use the PowerPoint effectively, because...

**TIM**: Or any technology ...

**LAURA**: (interjects) A lot of them will try to make the words swirl or use the word art and its so distracting that you can’t even read it and ..

**TIM**: It takes away from the point that you that you’re trying to get across you use so much technology that it waters down what they’re trying to explain or say... and to learn when to use it and when not to use it that is a hard thing...and it hard to teach.
pseudonyms where used to protect the identities of TR adult participants.

The veteran club leaders and participants who had attended more than one training expresses throughout the interviews the importance to promoting and developing digital literacy competences. Also TR program curriculums reinforcement the information literacy skills required to discern information. The adult participant stated that “they(students) think everything online is true” and proceeded to recall the following interaction with a student who wanted to use information in copied from a blog for their research.

Limitations

One of the more significant limitations of my study is the absence of a consensus definition of digital literacy. Without a standard definition, this study relied on available literature and could not adequately measure the digital literacy levels of club leaders or adult participants. The development of a detailed survey may have also been beneficial in determined more specifically whether and participant was in fact more fluent in digital literacy than another; however time and resource constraints were obstacles to including a survey in my methodology. Additional research in operationalizing digital literacy is necessary for a better understanding of the term.

The availability of TR participants and My relationship with the EdLab Group presented another limitation to my study. Significant changes to the program funding and the acquisition of additional grants TechREACH program during the duration of my study reveal a smaller number of active TR Clubs available for interviewing and site observations. Due to the timing of the study only two of the six active clubs were available both of which were in western Washington and only one training in Eastern Washington was available; therefore, this study does not represent all participants presently involved in the training and implementation of the TechREACH program.

Selection bias and any bias from my interview participants is another limitation to this study as all interviewee were selected by the TR program manager p and interview participants were made aware of my relationship with EdLab Group in the written informed consent form.

Chapter 5 Conclusion

Recommendation

Creation of an online discussion board, blog or chat room forum wherein TR Adult Participants, TR Club Leaders and TR staff can continue both the collaborative problem solving and troubleshooting strategies beyond the curriculum trainings. It may also presents clubs with more regular connections between clubs, some of which currently communicate informally through social networking sites and by calling each other. While TR does provide more formal technical support, the two club leaders indicated that they
informally contact each other when technical issues or other challenges surface program software or elements of the curriculums. By providing a forum in which participants can share challenges and potential solutions and receive feedback from their peers, demonstrating a moderate to high fluency as oppose to the more formal support channels of TechREACH. Anecdotally technical support may be one obstacle to future program sustainability, and discussion forums such as them may assist in mitigating that concern. Further research is needed in examine a cost benefit analysis for establishing an online discussion forum as well as survey of the current TR adult participants and club leaders to determine their general interest among TR participants.

Additionally building a greater emphasis on the program’s potential benefits and value to the participating teachers, can increase participants willingness to integrate elements of the program outside of the club environment. It is consistent throughout the literature that Teachers who able to find a personal value in a particular technology are more willing to spend the time and energy becoming more fluent in information technology, however what’s most important is that teachers feel confident enough with the technologies that they will share them with students (Pianfetti, 2001), who in some cases may already be knowledgeable and experienced in the same technology. As observed by TR staff member participants confidence and personal value ultimately leads to more effective implementation.

“If feel like these trainings help support the teachers in digital literacy and you hear these small successes when they get their XML code right or they learn a new software and are not scared of it anymore. They're like oh this is really cool... this is functional...it’s similar to another program... I get it. Your almost raising their digital literacy in that respect, and then once their confidence is raised then they can go out and teach kids successfully ” - TR Staff

Evidence of this exists in the Club Leaders who described how evident in the club leader who now offers Adobe Video editing as an available option for students presentation. This club leader appeared to have found value in learning new technologies and skills acquired from the use of Adobe video editing software. This recommendation should not be the main focus of the trainings, since it is the middle school students that are likely to receive the greatest benefit from the TechREACH program.

Conclusion

While this study does not present causal link or a direct correlation between the TR program and the digital literacy levels of adult program participants, interview data and site observations suggest that there does appear to be a connection between teacher’s participating in the TechREACH program and an increase in understanding and application of digital literacy concepts. While it is not presented the program’s stated goal, TR curriculum training and program implementation appears provide participants with the necessary resources and training to implement aspect of the program within their normal curricula.
References


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