Digital Storytelling: Self-Efficacy and Digital Literacy

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Abstract: This paper is about an exploratory research project that engages college students in using digital storytelling as one of the approaches to build their e-portfolio through reflection and self-assessment of the learning process. Participants (N = 20) are from a mid-western American university. The study examines the potential of digital storytelling employed in higher education settings, and explores how digital storytelling can be used as an effective communication tool for facilitating reflective practice based on constructivist principles. It asks questions about whether digital storytelling can enhance self-efficacy and in what way it can improve digital literacy skills of students in a teacher preparation program. Suggested impact on education includes: balancing traditional methods and new teaching approaches; finding new ways of creating educational portfolio; enhancing language literacy, visual literacy, and media literacy; and meeting higher educational technology standards.

Theoretical Framework

Storytelling has been important to individuals since the early days of civilization, and personal stories serve many of the same functions in the modern time as they did in the early days. In education, storytelling remains a way to teach subtle points and make elusive abstractions concrete (Roe, Alfred & Smith, 1998). Two researchers even envisioned a possible connection between storytelling and how our brains work. In his "Tell Me a Story," Roger Schank (1990) proposed that the core of intelligence is accessing specific concrete narrative stories. Jerome Bruner, on the other hand, posed that our brains are wired in narrative stories, that without narrative storytelling skills "we could never endure the conflicts and contradictions that social life generates" (Bruner, 1990, p. 97). Interestingly, while these researchers were highlighting the importance of storytelling in the fields of artificial intelligence, psychology and learning theory, digital storytelling merged since the early 1990s as a result of the advancement of newer technologies.

The rapid development of multimedia and hypermedia technologies has opened up new avenues for making stories on computers and computer networks. As with any art form, digital storytelling continues to evolve to accommodate new technologies, purposes, and creative visions (Ohler, 2006). With latest developments of computers, multimedia systems and the Internet, images, sounds, animations, and video clips can be brought together with texts, providing a platform for a wide range of story formats combining language literacy, visual literacy, and media literacy.

Digital storytelling, according to Alan Davis, is "a form of short narrative, usually a personal narrative told in the first person, presented as a short movie for display on a television or computer monitor or projected onto a screen" (2004, p. 1). A leading figure in the development of digital storytelling is Joe Lambert. The emergence of this approach is described in his book "Digital Storytelling: Capturing Lives, Creating Community" (Lambert, 2002). Lambert and his associates has offered numerous workshop since the mid 1990s, focusing on helping people tell their own stories and embracing emerging technologies for creating the stories. Creating digital stories offers a great opportunity to engage learners in media literacy and in learning about how the media influence our perceptions of the world (Goodman, 2003; Tyner, 1998).

Digital storytelling attracts educators for a combination of reasons. One motivation relates to learning and cognition. Dual-coding theory (Paivio, 1986) and Cognitive theory of multimedia learning (Mayer & Moreno, 2002) suggest that learners possess both visual and verbal information processing systems. Auditory and textual information are processes in the verbal system, and images are processed in the visual system. Educators and their

students are attracted to the multimedia teaching and learning method of digital storytelling because it can address learning through both systems. On the other hand, the purpose of education, as John Dewey defined, should be the freeing of individual capacity in a progressive growth directed to social aims (Dewey, 1916, p. 98). To this end, Vygotsky (1978) stressed the importance of an education built around shared experiences to create a common language, and common understanding.

Methodology and Implementation

This exploratory research project approaches the question and potential of digital storytelling in higher education settings. The purpose is to develop and use a new instruction approach based upon the above-discussed theoretical framework. The project aims to help undergraduate students (teacher candidates) integrate multimedia technology into education, learning how to use appropriate technological tools to create digital stories, reflecting on their understanding and perspectives in the education they received in the United States. Furthermore, through the compilation of their own digital stories, the participants learn to address professional issues as teacher candidates. This research project also examines how technology can be effectively used to enhance language literacy, visual literacy, and media literacy, relating to the National Educational Technology Standards for students. The following research questions were explored:

Does digital storytelling enhance students' self-efficacy?

Does digital storytelling improve students' knowledge and use of multimedia technology tools?

Does digital storytelling enhancing language literacy, visual literacy, and media literacy?

Does digital storytelling help balance traditional methods and new teaching approaches with technology?

How does digital storytelling help college students in teacher education programs meet up-to-date educational technology standards?

The implementation of the project occurs during two regular semesters. Participants (N = 20) are voluntary students in the teacher preparation program from a mid-western American university. Participants are asked to address professional issues, understanding, and beliefs as future teachers, and are encouraged to use digital story telling as a way to record their thoughts on the process and improvement of teaching. Guidance has been given to the participants in steps of brainstorming, transcript drafting and revision, digital story drafting and revision, digital story boarding and editing, and digital story publishing, etc. A total of 6 workshops are offered, once a month for six months, 3 to 5 hours for each workshop focusing on different steps of digital story composition. The designed workshop schedule is displayed in Table 1.

Table 1: Workshop Schedule and Plan

Workshop #	Duration	Workshop Focus
1	3 Hours	Project overview Examples of types of portfolios Review of narrative storytelling in traditional format Storyboarding techniques Questionnaire Technology equipment access and use
2	3 Hours	Reflections Brainstorming Concept mapping Getting to know available software and hardware Personal choice of applications Technological training
3	4 Hours	Transcript drafting Transcript revision with group discussions Work session on digitizing information Training of video and audio applications Digital storytelling boarding
4	5 Hours	Putting images / pictures together for digital storytelling Matching multimedia materials with transcripts Digital storytelling boarding and editing

5	5 Hours	Work sessions for digital storytelling revision Multimedia materials editing Finalizing digital story contents Starting recording voiceover
6	5 Hours	Work sessions on digital storytelling final editing Finalizing sound tracks Publishing digital storytelling
Extra	2 Hours	Presentation of digital storytelling projects Feedbacks from audience Questionnaire

A mixed design of quantitative and qualitative methods is used for data collection and analyses. Pre- and post- questionnaires/surveys are developed to collect data on students' knowledge and skills in the areas of educational foundations, teacher education, and technology usage. Research data collection also includes: records of project processes, online discussions, artifacts of student work, and interviews with students. The following technologies are used: computers (both Mac and PC systems), scanners, digital cameras, digital video cameras, external hard drives, headsets with microphones, and software programs including Premier, iMovie, iPhoto, iTunes, Adobe Photoshop Deluxe, Microsoft Word, Microsoft PowerPoint, Inspiration, etc, that are available in the computer lab.

Results and Discussion

In this brief paper, the following discussions will focus on the results of questionnaire scores, students' written answers to certain questions, and examples of student work. A more detailed analysis and discussions about the processes of digital storytelling construction, online discussions, artifacts of student work, and interviews with students will be carried out on a separate paper. The pre- and post-questionnaire used in this research include the same point-check questions but different questions for written answers. The following tables display the overall student perspectives, based on calculated means and percentile, on each category examined in the questionnaires, with scoring systems explained at the bottom of each table. Means of both pre- and post-questionnaires are included and compared in each table. Table 2 shows the overall student perspective on "Education Knowledge Base," Table 3 on "General Technology Skills," Table 4 on "Educational Technology Integration" and Table 5 on "Multimedia Applications."

Table 2: Comparison of Overall Student Perspective on Education Knowledge Base

Specific Areas of Interest	Pre-Questionnaire		Post-Questionnaire	
	Mean	Percent	Mean	Percent
Narrative storytelling	2.20	55%	3.30	83%
Different types of portfolios	2.10	53%	3.10	78%
Construction of an educational portfolio in a traditional format	2.30	58%	2.80	70%
Critical reflection	2.10	53%	3.20	80%
NETS standards	1.70	43%	2.00	50%
INSTAC standards	1.50	38%	2.20	55%
Digital storytelling	1.70	43%	3.60	90%
Authentic voice	1.70	43%	3.50	88%
Average	1.91	48%	2.96	74%
Students rate their understanding of each area in education knowledge base on a 4 point scale: 1 = None; 2 = Little; 3 = Moderate; and 4 = Extensive.				

Table 3: Comparison of Overall Student Perspective on General Technology Skills

Specific Skills	Pre-Questionnaire		Post-Questionnaire	
	Mean	Percent	Mean	Percent
Search for information on the Internet or World Wide Web	3.80	76%	4.80	96%
Use email	4.30	86%	4.90	98%
Transfer files from computer to computer	2.90	58%	4.00	80%

	3.70	74%	4.50	90%
Transfer files via email	3.70	74%	4.50	90%
Upload/download files to/from a server	3.30	66%	3.70	74%
Use computer to make presentation	3.40	68%	4.30	86%
Ability to use PC/Windows computers	4.40	88%	4.50	90%
Ability to use Mac computers	2.00	40%	3.60	72%
Average	3.48	70%	4.29	86%

Students rate their general and basic technology skills on a 5 point scale:
1 = Inadequate; 2 = Little; 3 = Adequate; 4 = Substantial; and 5 = Extensive.

Table 4: Comparison of Overall Student Perspective on Educational Technology Integration

	Pre-Questionnaire		Post-Questionnaire	
Specific Areas of Integration	Mean	Percent	Mean	Percent
Use technological resources in learning activities	2.90	58%	4.00	80%
Evaluate technological resources or software applications	1.80	36%	3.00	60%
Use technological resources to support learning activities for individuals	2.30	46%	3.80	76%
Use technological resources to support learning activities for groups	2.50	50%	3.90	78%
Use technology in varied ways to assess students learning	2.20	44%	3.70	74%
Readiness to prepare school students to use technology ethically	2.60	52%	3.90	78%
Readiness to prepare school students to use technology legally	2.40	48%	3.80	76%
Facilitate lifelong learning through use of technology for myself and others	2.70	54%	4.10	82%
Average	2.43	49%	3.78	76%

Students rate their experiences on educational technology integration on a 5 point scale:
1 = Inadequate; 2 = Little; 3 = Adequate; 4 = Substantial; and 5 = Extensive.

Table 5: Comparison of Overall Student Perspective on Multimedia Applications

	Pre-Questionnaire		Post-Questionnaire	
Specific Ability	Mean	Percent	Mean	Percent
Ability to use scanners	2.70	68%	3.40	85%
Ability to use digital cameras	2.70	68%	3.40	85%
Ability to use video cameras	3.00	75%	3.50	88%
Ability to use images on computer	3.00	75%	3.70	93%
Ability to use audio on computer	1.80	45%	2.80	70%
Ability to use video on computer	1.90	48%	3.00	75%
Ability to create or modify images on computer	2.40	60%	3.20	80%
Ability to create or modify audio clips on computer	1.70	43%	2.80	70%
Ability to create or modify video clips on computer	1.60	40%	2.80	70%
Average	2.31	58%	3.18	79%

Students rate their specific ability in using multimedia on a 4 point scale of: 1 = Can Not Do It; 2 = Can Do It with some Assistance; 3 = Can Do It Independently; and 4 = Can Teach Others How to Do It.

As shown in all tables, participants have gained knowledge and improved skills in all areas of investigation throughout the digital storytelling project. For "education knowledge base" (see Table 2), students have an average growth of 26% for all specified areas (average pre-project mean = 1.91 and post-project mean = 2.96, on a 4 point scale). The improvement is particularly strong in the areas of "authentic voice" (pre-project mean = 1.70 and post-project mean = 3.50, a growth of 45%); "digital storytelling" (pre-project mean = 1.70 and post-project mean = 3.60, a growth of 47%); "narrative storytelling" (pre-project mean = 2.20 and post-project mean = 3.30, a growth of 28%); and "critical reflection" (pre-project mean = 2.10 and post-project mean = 3.20, a growth of 27%). Students also made great progress in knowledge and skills about "educational technology integration" and "multimedia applications" through the digital storytelling project. For "educational technology integration" (see Table 4), students perceived their progress particularly in the areas of using technological resources to support learning activities for "individuals" (pre-project mean = 2.30 and post-project mean = 3.80, a growth of 30% on a 5 point

scale) and "groups" (pre-project mean = 2.50 and post-project mean = 3.90, a growth of 28%); for ""using technology in varied ways to assess students learning" (pre-project mean = 2.20 and post-project mean = 3.70, a growth of 30%); and for "readiness to prepare school students to use technology legally" (pre-project mean = 2.40 and post-project mean = 3.80, a growth of 32%). In terms of media literacy, the scores show that students improved their ability in all specific areas identified in the questionnaire (an average improvement of 21%, see Table 5). Their ability appears to be strengthened in creating or modify "images" (pre-project mean = 2.40 and post-project mean = 3.20, a growth of 20%, on a 4 point scale); "audio" (pre-project mean = 1.70 and post-project mean = 2.80, a growth of 27%): and "video clips or movies" (pre-project mean = 1.60 and post-project mean = 3.80, a growth of 30%).

The impact of digital storytelling was also examined by asking participants questions, such as: "In what way did digital storytelling address your future as a teacher?" Here are some of the answers from students: "It opened my eyes to a technology option." "Digital storytelling helped me to grasp a better understanding of technology… Technology gives us excellent opportunities to express ourselves. Digital storytelling also made me look deeper at myself to remind me of why I want/need to teach." "I feel more confident that I have somewhat of a secret key to share with my faculty and future students." "It helped me to focus on who I am, and what I will do to support students." "I feel more confident using technology, and I can see the endless possibilities that are out there, in terms of integrating technology into my lesson and activity plans for my students." "It will be helpful in our job interview process…"

A Case of Digital Storytelling Project

Mary Smith, a teacher candidate planning on taking her field placements, participated in the project because she had a great interest in technology in education. She made a plan to tell the story of what she has learned about teaching from the teacher preparation program. "This is something I'll not only use myself, but also something I would use in the classroom," she said. Through the project, she is able to show creativity and her technical skills, provide her educational background and do it all in a way that is unique and compelling. Mary did her story about 3 minutes in length. Her story boarding goes as follows, with multimedia materials described in the parenthesis:

Our world is rapidly changing. Technology has made globalization a reality. (Picture- spinning earth)
It is influencing how children learn. (Picture-needed: for instance, children learning while using technology)
As a teacher I must continually acquire and develop skills to support students. Lifelong learning is an important quality to be a great teacher. (Picture of me in classroom at the university)
The science of learning in the 21st century and best practice have proven that students learn best when they are actively engaged in meaningful and stimulating lessons. (Pictures: group of students showing off poster of their project)
As a teacher, I must be a knowledgeable facilitator to engage my students in: digital age literacy (Picture- children at Smartboard), inventive thinking (Need Picture), effective communication (Need Picture), and high productivity in order to prepare them for today's world (Picture -group photo).
If I were to paint for you a picture of my classroom, you would see children working collaboratively as a community-of-learners environment. (1st grade hugging photo)
With instruction focusing on the specific needs of my students through whole group (Picture- Reviewing math facts with large group), small group (Photo w/ math manipulative), and individualized instruction (Teacher w/ child at computer).
You would see a classroom where a child's interests, learning preferences and readiness to learn are taken into consideration. (Need several photos – music, art, reading, etc.)
In my constructivist classroom children will learn by recreating and reinventing content. (Picture: kids in spacesuit)
Active, hands-on, concrete experiences are the most powerful and natural forms of learning. (Picture: science photo)
More importantly, the way children view me as their teacher is critical to my success. (Scanned picture of letters, with students voices reading)
(POWERFUL ENDING…) My passions are learning, and naturally sharing what I have learned with others. For me, learning how to teach has been an amazing journey. To witness a child learn and grow is a privilege, to learn from them is gift. My name is Mary and I am a wonderful teacher. (Images & text)

In her story script, Mary revealed her understanding of the issues related to today's classrooms, and stressed the challenges in teaching and learning in a changing world of technologies. She also shared her thoughts on issues related to language, visual, and media literacies, with reflections on strategies and methods used in the teaching and learning processes. When asked about the question: "How might you use digital storytelling as a future teacher?" Mary answered: "Through this process I couldn't help but think of the many ways I will use it this in my classroom. I believe that the digital story can be used with every subject. Digital storytelling is a powerful way to give each child ownership of their story, presentation, or retelling of events. The learning that happens through the process is extremely valuable. To be a great teacher, you need to be a great storyteller. I will use the digital story to introduce topics in the classroom, and to record our year in the classroom…" (Mary's story can be viewed at: <http://www2.oakland.edu/oakland/ouportal/index.asp?item=6059&name=Digital+Storytelling+Home+Page&site=125>)

In conclusion, the following objectives were carefully examined and accomplished by this exploratory research project: Increase the teacher candidate's employability potential; Provide an opportunity for teacher candidates to create a student-centered electronic documentation system of deep learning for developing self-concept and presentation to multiple audiences – peers, instructors, employers, etc.; Improve and expand the communication skills of the teacher candidate; Assist the teacher candidate in capturing their personal assessment of how the standards of effective teaching as defined in INSTAC were met; Engage students in a reflective process of their growth and development as future teachers, in preparation of becoming a reflective practitioner; Assist school districts in understanding the value of accessing the e-portfolio of the teacher candidate; Develop the teacher candidate's knowledge and demonstration of 21st Century skills, and NETS standards; and provide the opportunity for a research study on student learning, engagement, collaboration and employability through the development of digital storytelling.

Conclusion

Digital storytelling is a multifaceted technology tool and its diverse applications in teaching and learning are being newly discovered. As digital story enters the academic mainstream, this technique has shown great promise (Ohler, 2006). This paper explores new questions and potential of digital storytelling in higher education, particularly in teacher education. The results of the study add to the understanding of digital storytelling as an effective approach in teacher preparation programs, and as an useful tool in the enhancement of teaching and learning new literacies in today's technology enriched environments. Suggested impact on education includes: Balancing traditional methods and new teaching approaches; Finding new ways of creating educational portfolio; Enhancing language literacy, visual literacy, and media literacy; and meeting higher educational technology standards for teacher candidates.

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