

Students' Perceptions of Digital Storytelling in Higher Education

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Abstract

Digital storytelling has been applied to higher education to teach hard and soft skills. Studies in health sciences show the benefit from hearing directly from patients sharing their lived experiences. In collaboration with a traumatic brain injury (TBI) survivor and his family, this paper documents higher education students providing feedback about 6 digital stories introduced into a graduate certificate program. This project examined whether students can improve their understanding of TBI through these digital stories while increasing their soft skills, such as empathy. In total, 37 students provided feedback. All students reported that the digital stories improved their understanding of TBI. The majority of students (89%) also rated the emotional quality of the digital stories as Extremely Good or Very Good. A qualitative analysis of students' responses revealed the following themes: Perspective-Taking, Knowledge Gained and Suggestions for Improvement. Implications are discussed for schema and whole brain learning.

Keywords: Digital Storytelling; Traumatic Brain Injury; Lived Experience; Family-Centered Approach; Higher Education

Introduction

Storytelling is used in higher education to bridge the gap between theory and practice. One form of storytelling at this academic level involves guest speakers who may be asked by course instructors to share their experiences in the field. Individuals with lived experience, particularly in the health sciences, may also be invited as guest speakers as well as recent graduates (Zou, Sun, Hallowell, Luo, Lee, & Ge, 2019). However, incorporating guest speakers into the curriculum, whether it be in-person or virtually, can often be speaker-centered (Li & Guo, 2015). That is, there is little opportunity for students to interact with guest speakers, except when a question and answer period is offered. Furthermore, disruptions to education from COVID-19, have led many educators to search for permanent ways to bring these stories into their classroom to ensure continuity with their curriculum year over year.

With the introduction of low cost multifunctional digital devices, such as phones taking high quality videos, digital storytelling has become increasingly popular. Digital storytelling uses computer-based tools to tell stories which are known as digital stories, tend to be typically 2 to 10 minutes in length (University of Houston, 2021), and are told using "first-person video-narratives created by combining recorded voice, still and moving images and music or other sound" (Ivala, Gachago, Condry, & Chigona, 2014, p. 218). Digital stories are often created by individuals who are not media experts (Matthews-DeNatale, 2008), and they can be made using the digital cameras and video editing software available at most higher education institutions (Panopto, 2020). Importantly, the accessibility afforded by modern relatively low cost equipment and software, has allowed students the ability to create digital stories in settings where they can receive the scaffolding needed to advance their digital literacy skills. In such settings students can learn from more competent individuals who gradually

reduce their support over time as each student increases their understanding of the process (Vygotsky, 1978). Despite the fact that students can create digital stories at home using their personal devices, higher education settings offer students the ability to develop knowledge and confidence while working with faculty and peers. Digital stories can range in topic from individuals sharing their lived experience to describing a historical event (University of Houston, 2021). Thus, digital stories can serve to entertain their audience as well as to educate.

The ease in which digital stories can be created and the social media platforms where stories can be shared have allowed digital storytelling to reach audiences around the world. There are even guidelines to maximize the effectiveness of digital storytelling. For example, digital stories should have a clear purpose as to why they are being told and should answer questions about a topic (Lambert, 2002). Emotional content as well as images and sounds can also be brought into the story to capture an audience's attention (Lambert, 2002). However, consideration of one's audience is needed as too many images or sounds may lead to an audience being distracted and in turn, not understanding a digital story's purpose (Lambert, 2002). Digital stories can serve as teaching and learning tools in higher education with educators using similar guidelines when developing content for their lectures. For example, adding emotional content to a lecture may help to make that lecture memorable for students, but too much emotion and not enough course content may lead to students missing the point of that lecture. Placing too much value on how information is delivered over the information itself can lead to what Peter Catalanotto calls "edutainment" (American University, 2020). Overall, it seems that careful consideration of the guidelines is needed when incorporating digital storytelling into higher education curricula.

Digital storytelling has shown particular promise at the higher education level within the health sciences. For example, D'Alessandro, Lewis, and D'Alessandro (2004) examined the impact of a pediatric digital storytelling system on third year medical students. Specifically, eight digital stories were created by patients who explained their clinical problem in their own words (D'Alessandro et al., 2004). Medical students then rated these digital stories in terms of their quality and learning impact (D'Alessandro et al., 2004). The majority of students reported the digital stories were clearly written (92%) (D'Alessandro et al., 2004). They also reported that they would remember the case based on the digital story presented (91%) and they felt prepared to evaluate a patient with a similar clinical problem in the future (96%) (D'Alessandro et al., 2004). These results show how digital storytelling can promote recall and in turn, provide students with the self-efficacy needed to apply their clinical skills.

In another study, Price, Strodman, Brough, Lonn, and Luo (2015) fourth-year nursing students created their own digital stories. Specifically, students were asked to create a 5-minute digital story that had to involve their professional or personal experience with palliative and end of life care. All of the digital stories were subsequently shared with the whole class, and the students participated in a focus group and completed a survey about their learning experiences. Price et al. (2015) found the majority of students featured a story about a family member or personal friend, and they concluded: "Students identified that they were able to relate to the shared stories and that bonding of classmates occurred. Students indicated that the 'real' stories grabbed their attention versus case studies that may be hypothetical or linear" (p. 68). Furthermore, in the survey on a rating scale of 1 to 5 with 5 being "strongly agree", students gave highest ratings to digital storytelling promoting "new

insights” and helping them “apply this content to my practice” (p. 69). Overall, the research literature suggests that digital storytelling has two potential applications: firstly, educators create digital stories that are shared with students; and, secondly, students themselves create digital stories that are shared with their peers. In both of these cases, digital storytelling can lead to opportunities for collaboration and sharing that might not otherwise occur through other forms of storytelling.

Consequently, it is not only hard skills that are developed in digital storytelling, but also the soft skills important for good interpersonal communication. In the context of this study, hard skills relate to theoretical knowledge such as understanding the terminology used in health care settings, while soft skills involve social skills and impact the ability of health care professionals to communicate with patients (Indeed, 2021). Success in the workplace depends on a combination of these skills (Indeed, 2021). In a study by Fenton (2014), a young woman named Maya was interested in speaking to a cohort of nursing students about her lived experience with leukemia (Fenton, 2014). Digital storytelling was used to transform Maya’s lived experience into a permanent teaching resource while allowing students to reflect on their learning (Fenton, 2014). The results revealed that Maya’s digital story allowed students to gain valuable perspective-taking about the experience of cancer through a patient and a health care lens (Fenton, 2014). Learning about Maya’s first-hand experience also stirred up emotions among students about Maya’s treatment by health care professionals including nursing staff (Fenton, 2014). Therefore, this study shows how digital storytelling can foster empathy and in turn, allow students to reflect on how they might behave in certain clinical situations as health care professionals.

Despite the positive applications of digital storytelling, some research has reported no impact on learning at the higher education level. For example, Bruno et al. (2012) found that when it came to measuring the impact of students' attitudes toward uninsured patients in the United States, digital stories had limited impact on attitudes towards care. The authors believe their results may reflect a ceiling effect, such that students were already concerned about the welfare of these patients and so the digital stories did little to sway their attitudes (Bruno et al., 2012). This research suggests there are limits to how much impact digital storytelling can have on the development of hard and soft skills, such as medical proficiency and perspective-taking ability. Also, there might be critical periods, such as the start of an academic program that represent optimal times in which to measure the impact of this teaching and learning tool in higher education.

The Current Study

All authors of this study teach into a graduate certificate, Brain Disorders Management, which is offered in the School of Health and Community Studies at Mohawk College in Hamilton, Canada. In 2019, a graduate of this program named John¹ inquired about opportunities to contribute to the curriculum given his lived experience with a traumatic brain injury (TBI). In 2009, John sustained a TBI following a motorcycle accident which sent him to a hospital specializing in trauma care. Following discharge, John underwent years of rehabilitation therapy and eventually was able to recover the majority of his functioning. Since his accident, John has been able to attend higher education and is involved in public speaking opportunities about his lived experience.

The first author spoke to John about developing a permanent teaching and learning resource about TBI through the use of digital storytelling. Digital

storytelling is an active area of interest given that Mohawk College recently built the Digital Creativity Centre to support faculty and students (Johnston, 2019). This centre is located at its largest campus and provides access to soundproof recording booths and video editing software. Digital storytelling also aligns with Mohawk College's strategic plan that includes opportunities for students to practice their skills through simulated learning (Mohawk College, 2021). In fact, all faculty staff members have the opportunity to apply for internal funding each year to allow them to test new teaching and learning strategies, including those that relate to simulated learning.

For the 2019/2020 funding cycle, the first author received an IDEAWORKS Catalyst Fund, which provided \$12,000 CDN internal funding for the project, "Digital Storytelling: Traumatic Brain Injury Through a Lived Experience Lens". TBI involves a sudden trauma to the head that causes damage to the brain, ranging from mild to severe (Centers for Disease Control and Prevention, 2021). It is estimated that each year, approximately 2.5 million individuals have TBIs, with about 50,000 resulting in death and over 80,000 experiencing a permanent disability (Centers for Disease Control and Prevention, 2014). Given the prevalence of TBI, there is a need to train skilled workers to support these survivors and their families. Digital storytelling has been used for therapeutic purposes with clients with TBI (D'Cruz, Douglas, & Serry, 2019), however, research is needed to understand how digital stories may contribute to employment readiness. That is, whether the digital stories in the words of TBI survivors may prepare students to support these individuals as part of their career. This research is critical as not all of the applications of digital storytelling at the higher education level have yielded positive results.

The purpose of the current study is to educate students about TBI using digital stories told by John and his family. By taking a first-hand approach, students will engage in simulated learning with their feedback used to understand how digital storytelling can be implemented into the classroom. The current study will examine the following questions:

- 1) Can digital storytelling increase knowledge about TBI at the higher education level?
- 2) Can digital storytelling impact soft skills, such as empathy towards TBI survivors and their family?

Design and Methods

Participants

Students in the graduate certificate program, Brain Disorders Management at Mohawk College in Hamilton, Canada were selected to provide feedback about the digital storytelling curriculum. This program is offered in the School of Health and Community Studies, with students completing a degree or diploma in Health or Social Sciences prior to starting this graduate certificate. Before funding was released, the first author was required to contact the Research Ethics Board (REB) at Mohawk College to determine if the project, funded through the category "Scholarship of Teaching and Learning", required ethics approval. After consultation with the REB Committee, it was deemed the project aligned with quality improvement instead of being a research study (Henderson, 2019). Quality improvement aims to enhance internal processes while a research study is focused on generating new knowledge that can be generalized to the larger population (Fraser Health, 2014).

The Brain Disorders Management program accepted its first cohort in September 2017. This program is the first of its kind in the province of Ontario, Canada and makes use of varied teaching and learning tools including lectures, guest speakers, patient simulations and field trips. In the winter semester, students complete the course "Impact on Family Relationships" which takes a seminar approach to understanding how caring for a loved one with a brain disorder can impact family dynamics. Over 14 weeks, the students discuss peer-reviewed journal articles that feature the experiences of immediate and extended family members. Students learn about a range of topics including compassion fatigue, grief and stigma as well as how to encourage effective coping and resiliency. The digital stories therefore added breadth and depth to the current curriculum about family's experiences while building on what students learned about TBI from their previous semester of coursework.

In Brain Disorders Management, students complete two semesters of coursework before starting a field placement that involves 336 hours of practical experience. Many of these students go on to support clients with TBI, ranging from mild to severe in nature, and at various points of their health care journey. The settings students might be hired include hospitals, private clinics, schools and non-profit organizations, with the purpose of supporting the cognitive and the physical rehabilitation of clients as part of a multi-disciplinary team. The Brain Disorders Management program is meant to build on previous academic and work experience, while providing students with hands-on experience in the field.

Out of 48 students, 37 participated in this project with background and demographic information summarized in Table 1.

Table 1. Background and Demographic Information

Sample Characteristics	
Age	M = 25.1 years
Gender ²	Males = 5; Females = 31; Non-binary = 1
Level of Previous Schooling	4-Year Degree = 33; 2-Year Diploma = 4
Previous Academic Program	Biology; Cognitive Science of Language; Early Childhood Education; Health Science; Human Behaviour; Kinesiology; Psychology; Social Service Worker; Sociology
Rating of Prior TBI Knowledge	Expert = 2; Proficient = 11; Moderate = 22; Limited = 1; None = 1
Primary Source of TBI Knowledge	Professional = 7; Personal = 4; Current Program Coursework = 14; Other Coursework = 12

Apparatus

The IDEAWORKS Catalyst Fund takes a peer learning approach where students and/or alumni are included in funded projects. Therefore, a graduate from Broadcasting-Television and Communications Media was hired as a videographer based on his previous experience with digital storytelling. John was also hired as a content expert whose lived experience informed our digital stories. All employees worked with Human Resources staff to determine their rate of pay and weekly schedules based on the 1-year funding available for this project. Given the focus on families for our project, John's immediate family members were invited by the first author to contribute to our project. Three family members agreed and received a stipend to create a family-centered digital story. Finally, to support the data collection and analysis, 3 students within the Brain Disorders Management program served as research assistants for this project.

John and his family members prepared scripts to prioritize the information they wanted to share as part of their digital story. Given the focus of this project on the challenges associated with caring for someone with a TBI, John produced a total of 5 scripts, each featuring a different challenge. These challenges were identified based on conversations with the first author and John as well as with the first and second author to add depth and breadth to the curriculum. The challenges featured in John's digital stories involved: communication; sensory processing; learning routines; stress management; and emotion regulation. For each challenge, John provided an overview of what life was like before his TBI and how his TBI affected this aspect of his functioning.

With respect to John's family, all members collaborated to create one script. One family member involved in his direct care focused on her memory of John's accident, such as where she was when she received the phone call notifying her that he was in the hospital. She also talked about misplaced anger that John felt immediately after his accident, such that she became the target of this emotion despite being his primary caregiver. The two other family members contributing to the digital story were not directly involved in John's care, but still provided a unique lens about TBI. One family member explained how difficult it was to find out that John didn't remember anything about their childhood. She described how she created a scrapbook with photographs to help John to eventually recall these memories. The other family member involved in our project spoke about how she was an infant when John had his accident and so what she knows about his injury is based on what others have told her. One story she was told was how John, despite not remembering any names or faces of individuals from his immediate family, remembered her name and asked about her when he was in the hospital.

John and his family members were encouraged to review their script before filming, but not to memorize it in order to retain the authenticity of their lived experience. All filming occurred in a soundproof booth at the Digital Creativity Centre that was set up with a stool against a grey backdrop, together with a video camera and microphone set up at the front of the room. All participants were videotaped separately, with the videographer having a copy of the script so he could provide prompts if the train of thought was lost (e.g., Tell me more about...). All videorecording took place over a 2-day period, with the editing of content requiring several weeks as part of an iterative process between the first author and videographer. Using Adobe Premiere Pro and Adobe After Effects, the raw video footage was edited so that any talking by the videographer was removed (e.g., instructions, prompts, etc.). The raw footage was also edited for instances where individuals went off script. However, this only happened on a few occasions given each person's familiarity and willingness to discuss their experiences. Natural breaks in speech and other idiosyncrasies were not edited to preserve the authenticity of each speaker.

Using the guidelines for digital storytelling (Lambert, 2002), the videographer incorporated text, sounds and images to transform the video into a digital story. For John's digital stories, each video began with a clear title that identified the challenge to be discussed, which provided structure to student learning. Furthermore, photographs taken throughout John's recovery were placed at relevant points in his story to add an emotional quality to his digital videos. These images included his motorcycle, brain scans and family seated at his bedside. Finally, stock images were also used to visually recreate the scenarios that John described in his digital stories. For example, John explained in the challenge related to sensory processing how he was overwhelmed by the sights and sounds after visiting a casino. John was learning what his tolerance

was following his accident, and remembered that even the pattern on the carpet at the casino threw him into a dizzy spell. Therefore, stock images of a patterned carpet and other sights common in a casino, such as slot machines and people standing around a roulette table, were provided in this digital story.

For the family-centered digital story, different principles of digital storytelling were applied than in the lived experience digital stories. For example, questions appeared on the screen as a way to organize the video into smaller parts as well as help students understand the information that was to be shared by each family member. Music also played softly in the background of this digital story, which provided a serious and reflective quality.

In total, 6 digital stories were produced, with closed-captioning added to all videos for accessibility purposes. The videos involving John ranged between 4 and 6 minutes while the video involving family members was 10 minutes in duration. All edited videos were uploaded to a secure channel on YouTube, with John and his family having access to the final digital stories.

Procedure

Students undertaking the Impact on Family Relationships course were informed by the first author about the opportunity to provide feedback about a digital storytelling project. Specifically, in their syllabus, this opportunity was listed as part of their regular class in the last week of the semester. This point in the semester was selected so that students had the opportunity to learn about the family-centered approach emphasized in this course and thereby, reflect on this semester and their previous semester of learning. A week before the digital stories were introduced, students were reminded about this opportunity on MyCanvas, which is the learning management system for their course.

On the day the digital stories were introduced, the first author provided an overview of the quality improvement project. Specifically, students were told that the Brain Disorders Management program was interested in incorporating digital storytelling into its curriculum and needed feedback from its students. Students were also told that their feedback would help to inform the curriculum for future cohorts. Finally, students were told not to include their name on any forms associated with the project as the first author was interested in the overarching themes about their experience.

All videos were loaded onto the classroom computer, which was connected to a projector. As a class, students watched John's digital stories first and in the following order of challenges: communication; sensory processing; learning routines; stress management; and emotion regulation. To encourage students to reflect on their learning, the first author facilitated a discussion period after each video that lasted about 5 minutes. Students watched the family-centered digital story last, with the discussion occurring for about 10 minutes. In total, the curriculum was delivered in about 1.5 hours, which allowed approximately 30 minutes for students to provide feedback about their learning experience. At this time, the research assistants handed out a questionnaire for students to complete, which involved 12 questions. This questionnaire was adapted from another questionnaire created to examine students' perceptions of a virtual reality tool (DePape, Barnes, Marsden, & Pawliw-Levac, 2020). Similar to this project, the original questionnaire was designed for quality improvement purposes in a higher education setting. The questionnaire used in the current project allowed students' perceptions about the TBI curriculum to be examined along with the collection of background and demographic information. The questionnaire collected quantitative and qualitative data that allowed for

investigator and methodological triangulation, which are explained later in this paper.

Results

Quantitative Data

There were 7 questions that collected quantitative responses. Due to missing data, 2 students were excluded from analysis reducing the sample size to 35.

Using a 5-point scale, 5 being "Extremely Good" and 1 being "Extremely Poor", students rated the effectiveness of the TBI curriculum with their responses summarized in Table 2.

Table 2. Students' Ratings of the TBI Curriculum (n = 35)

Measure	Number of Responses (Percentage)
Emotion Invoked by Digital Stories	Extremely Good = 16 (46%) Very Good = 15 (43%) Satisfactory = 4 (11%) Very Poor = 0 Extremely Poor = 0
Script Quality of John's Videos	Extremely Good = 17 (49%) Very Good = 15 (43%) Satisfactory = 3 (8%) Very Poor = 0 Extremely Poor = 0
Script Quality of Family Video	Extremely Good = 18 (51%) Very Good = 15 (43%) Satisfactory = 2 (6%) Very Poor = 0 Extremely Poor = 0

In-Class Discussion	Extremely Good = 8 (23%) Very Good = 21 (60%) Satisfactory = 6 (17%) Very Poor = 0 Extremely Poor = 0
Preparation to Support TBI Survivors	Extremely Good = 24 (69%) Very Good = 9 (26%) Satisfactory = 2 (5%) Very Poor = 0 Extremely Poor = 0
Overall Learning Experience	Extremely Good = 19 (54%) Very Good = 15 (43%) Satisfactory = 1 (3%) Very Poor = 0 Extremely Poor = 0
Curriculum Contributed to General Understanding of TBI	Yes = 35 (100%) No = 0

Qualitative Data

There were 5 open-ended questions that collected qualitative responses in our questionnaire. Three questions asked students to describe their general learning experiences as well as likes and dislikes with the curriculum. Two questions asked students to provide 3 words that came to mind when they thought about TBI or about their learning experiences with this curriculum. Key themes in the data were identified using thematic analysis, which was guided by the phases outlined in Braun and Clarke (2006). These phases are: (1) familiarize yourself with the data; (2) create codes for the data; (3) search themes; (4) review and refine themes; (5) finalize and label themes; and (6) write and disseminate findings. All themes were identified inductively with the data read and coded without any preconceptions. That is, themes were generated from the

data themselves and not guided by a theoretical framework or prior information that was known to those involved in the data analysis. Themes were repeatedly reviewed and refined to ensure coherent patterns within and across the data. The research assistants worked collaboratively to code the data and resolved any discrepancies through discussion as part of an iterative process. The first author audited the analytic process and provided a final check on the categorization and thematization of data. Together, the research assistants and the first author achieved investigator triangulation by ensuring agreement of the coded data and in turn, the validity of the themes identified (Guion, 2002). Three themes emerged: Perspective-Taking; Knowledge Gained; and Suggestions for Improvement. Representative quotations by theme are provided in Table 3.

Table 3. Representative Quotations by Theme

Theme 1: Perspective-Taking

Quote #1: "Learning about the experience/perspective from someone with a TBI and their families. I think it's important for helping people to understand TBIs better" (Participant #17).

Quote #2: "Hearing about the lived experiences from both the survivor and his family" (Participant #9).

Quote #3: "Hearing about [John]'s experience and what he went through. We learned about the brain and TBIs but it was interesting to see a real life experience about it" (Participant #18).

Quote #4: "Now I understand what a TBI is like" (Participant #11).

Theme 2: Knowledge Gained

Quote #1: "I enjoyed learning in more depth about TBIs, how they are acquired and how to assist people with TBI. It was interesting to learn the ways to spot a TBI and how to communicate with people who have TBIs" (Participant #12).

Quote #2: "I enjoyed learning about the different ways one can recover. How difficult it can be and the emotions involved" (Participant #15).

Quote #3: "Information was provided in many forms for me to understand" (Participant #25).

Quote #4: "I learned a lot about the lived experience of individuals with TBI and the importance of having a good support network" (Participant #5).

Theme 3: Suggestions for Improvement

Quote #1: "Would have liked some time for small group discussion" (Participant #16).

Quote #2: "Wasn't much class discussion; more biological talk would have been a plus" (Participant #30).

Quote #3: "I would say that least I enjoyed was the time limit" (Participant #34).

Quote #4: "Think everything was great" (Participant #8).

Perspective-Taking. This theme captured how a lived experience lens through digital storytelling allowed students to gain new insights about TBI. One student explained: "Hearing [John] speak of his own recovery had a much deeper impact than 'textbook' learning" (Participant #31). Many students described how the first-hand accounts helped them to appreciate different points of view as described in the following: "It helped me understand how families can react to a loved one with a TBI and how helpful they can be" (Participant #15) and "I loved hearing about [John]'s lived experience. It is incredible to see how far he has come with his recovery" (Participant #5). Students also appreciated the authenticity of the digital stories, particularly John telling his story in his own words as described by one student: "I like the way [John] described his condition like no others can" (Participant #34). For other students, they appreciated the honesty and openness displayed by family members: "I loved hearing the family's experience with adjusting to 'the new [John]'" (Participant #6).

When asked what words came to mind when thinking about TBI, students were most likely to report descriptors that had a negative quality, such as "life-changing", "debilitating", "loss" and "trauma". These descriptors were consistent with the negative quality of the emotions that many students reported including "sadness", "exhausting", "hopeless" and "frustration". Other students took a clinical approach and reported areas of functioning that were impacted by TBI such as "memory" and "learning", while yet others provided words that aligned with how the TBI may have occurred, such as "sports" and "accidents". Finally,

some students described TBI as being “invisible” and took a strength-based approach by reporting words, such as “brave”, “survivor” and “recovery”. An interesting observation was that, while some students only used words that were perceived as negative about TBI such as “tragic and hopeless”, other students used positive and negative words together, such as “recovery and stigmatizing”.

Knowledge Gained. All students overwhelmingly reported the learning benefits of the digital stories. In some cases they described how the digital stories exposed them to new information about TBI: “It provided me with a lot of new information that I had previously not experienced” (Participants #2). Other students reported how the digital stories added to what they already knew about TBI. One student explained: “I had good knowledge but this program really put it into perspective in a practical, hands-on way” (Participant #12), and others reported how the digital stories addressed perceived gaps in their knowledge: “It increased my knowledge especially around the emotional outbursts” (Participant #24). More broadly, some students reflected on how this information may be relevant to their career including: “It gave a new perspective of [the] everyday challenges to consider and ways to help” (Participant #16) and “I already had an understanding of TBI but this curriculum taught valuable skills I can take with me into the workforce” (Participant #33). Finally, some students described how the digital stories made learning memorable and permanent. One student explained: “[Digital storytelling] (e)xpands my learning on brain injuries and how serious they are. Watching someone who has had a TBI adds a deeper understanding of the topic” (Participant #37).

When students were asked what words they would use to describe their learning experience with this curriculum, all words were overwhelming positive. Most students focused on the educational value of the digital stories by using

words, such as: "informative", "thought-provoking" and "helpful". Other students reported words that represented how the digital stories made them feel including: "inspiring", "emotional", "empowering", "raw" and "eye-opening". Finally, some students used words that described their participation and involvement with the curriculum, such as: "interactive", "inclusive" and "sharing".

Suggestions for Improvement. The last theme captured the dislikes and recommendations provided by students about the curriculum. The majority of responses for this theme centered around the use of time, particularly with the in-class discussion period following each digital story. Many students wanted more time to discuss the digital stories either as a class or in small groups. One student explained: "More class involvement is always appreciated" (Participant #29). Some students also wanted the discussion period moved as described in the following: "I would rather more discussion at the end instead of throughout" (Participant #14). Some students also wanted more time to cover additional content about TBI that was not included in the curriculum or was not covered in the amount of detail that students wanted. For example, some students explained: "Maybe I wish more anatomy/biology was taught?" (Participant #32) and "Talk about the services available for TBI?" (Participant #18). While the majority of students did provide constructive feedback, some students were pleased with their overall learning and did not have any recommendations: "I enjoyed all of it honestly" (Participant #12).

Discussion

The purpose of the current study was to educate students about the challenges associated with TBI through the use of digital stories told from a lived experience and family-centered perspectives. Specifically, the following questions were examined:

- 1) Can digital storytelling increase knowledge about TBI at the higher education level?
- 2) Can digital storytelling impact soft skills, such as empathy towards TBI survivors and their family?

Regarding the first research question, both the quantitative and qualitative results confirmed that digital storytelling was able to increase knowledge about TBI, which supports our first question. Furthermore, this conclusion is supported by methodological triangulation where similar findings are independently reached through the use of qualitative and quantitative methods (Guion, 2002).

More specifically, the quantitative results showed how the students were pleased with the quality and the emotion invoked from the digital stories as well as the ability of these stories to prepare them for their chosen career. Finally, for all quantitative questions where students rated the curriculum using a 5-point scale: Extremely Good ("5") and Very Good ("4") were used most frequently; Satisfactory ("3") was used infrequently; and Very Poor ("2") or Extremely Poor ("1") were never used. These quantitative results are consistent with the findings of D'Alessandro et al. (2004), and suggest, at least at a preliminary level, students perceived the digital storytelling as adding value to their learning.

The qualitative theme Knowledge Gained also supported that digital storytelling was able to increase knowledge about TBI. That is, students reported learning new information from the digital stories as well as using the stories to consolidate previous information they knew about the topic. This point about consolidation is interesting given that perceived gains in learning were reported by students, despite introducing the digital stories later in the semester. Our

students had already completed one semester of coursework, which provided a foundation about TBI and were near completion of their second semester where they were learning about the experiences of families. Nevertheless, digital stories may be unique in the way that no two lived experiences are exactly the same and as such, there will always be an opportunity for students to learn. This point relates to the research by Price et al. (2015) who found that the dynamic quality of digital stories was able to capture students' attention more than traditional teaching tools such as case studies. Therefore, digital stories that feature lived experience might affect student learning by shaping our "schemas" about a subject matter (Sternberg & Sternberg, 2012, p. 248). Sternberg and Sternberg (2012) describe schemas as mental frameworks that represent knowledge and have implications for how we encode, store and retrieve new information. A schema serves as a starting point for information, which can be updated as individuals are exposed to new information about that topic (e.g., digital stories). In our study, this updating of schemas was captured with students talking about how the digital stories added more depth to their understanding than would have been obtained from purely textbook learning. Thus, digital stories should not replace textbook learning but can serve as a tool that helps students to add additional dimensions to their existing knowledge; dimensions that may be critical to remove unknown biases which could, in turn, impact thinking and behavior towards others in the future. In a study involving an assistive technology course, higher education students were exposed to a digital story featuring Mellany, an electric wheelchair user, who showed how a campus apartment advertised as accessible was, in fact, unsuitable (Skouge & Rao, 2009). As Mellany's digital story provided a tour of the apartment, students learned the following:

The small space made it impossible for her to access her desk in her wheelchair. The shower was also unusable, with a faucet too high for her to reach...[The] most disconcerting discovery was that in the event of fire, she would be unable to exit the apartment as the door was too heavy and unwieldy for Mellany to manage from her electric wheelchair (Skouge & Rao, 2009, p. 56).

In essence, Skouge and Rao's (2009) findings showed that digital storytelling encouraged students to update their schemas about accessible housing as well as disability involving the use of an electric wheelchair. As the digital story showed evidence that the apartment was not accessible, it revealed the bias towards conceptualizing accessibility as not involving individuals who use an electric wheelchair.

The second research question concerned the impact of digital storytelling on soft skills such as empathy, and, in this context, the first theme of our qualitative data (i.e. perspective-taking) showed how students were able to take different points of view on the topic of TBI, whether it be from John's personal experiences or from that of his family members. Here, students explained how only John and his family members were suited to tell this story as it is their own story. Zaki (2019) has described three different forms of the skill: empathic concern i.e. caring about others; cognitive empathy i.e. thinking about the mental state of others; and affective empathy i.e. sharing emotional experiences. Hence, appreciating different points of view is a cornerstone of empathy, and, in our study, digital stories showed the potential to promote each of the forms of empathy described by Zaki (2019) i.e. the stories invoked strong emotion (empathic concern) that encouraged a deeper appreciation of TBI (cognitive empathy) while allowing students to relate to John, his family and even their classmates (affective empathy).

In addition to empathy, perspective-taking can promote higher order thinking which involves moving beyond rote memorization to skills such as analysis, synthesis and evaluation (The Learning Center, 2021). Higher order thinking is valued in higher education (Watson, 2019) and increasingly valued by employers as a means of workplace success (Griesel & Parker, 2009). In higher education, higher order thinking is seen as a way to achieve deep learning and, although there is debate about how best to foster these skills, research by Ivala et al. (2014) showed that digital storytelling promoted both attributes. Similarly, the qualitative data of our study showed how the emotional quality of the digital stories allowed students to engage in deep learning. Craik and Lockhart's (1972) levels of processing framework suggests that the deeper information is processed then the longer a memory trace will last.

Additionally, our own qualitative data showed how some students were able to hold seemingly contradictory descriptions about TBI e.g. "recovery and stigmatization". While this word usage shows the complexity of a condition like TBI, it also suggests how students are able to understand how this condition may change during an individual's health care journey. Thus an individual with TBI who was stigmatized can push ahead towards a recovery, while others may continue to be stigmatized post recovery. This word usage highlights both the dynamic and complex process of TBI, and the higher order thinking promoted by digital stories where the subject matter is not learned rote.

While the quantitative and qualitative results directly address the two research questions, the descriptive statistics we collected indicated the types of learners that might benefit from digital storytelling. Based on the participants' background information, almost all students completing the questionnaire claimed some prior knowledge of TBI. The majority of students (72%) gained

this background knowledge from previous academic experience such as previous coursework undertaken during the Brain Disorders Management program or schooling completed before commencing the program. Moreover, in some instances (31%), students had personal or professional experience with the topic. Some students reported they had cared for a family member with TBI while others had supported clients as part of their work in a hospital or private clinic. When asked to rate their prior knowledge using a 5-point scale, with "5" being an Expert and "1" being None, the majority of students identified themselves as a "3" i.e. Moderate (59%) or "4" i.e. Proficient (30%). Not surprisingly, students who had a combination of academic and either professional or personal experience were most likely to rate themselves higher on the scale. Hence, students appeared to be rating themselves accurately. It was interesting to note that only a few students used the extreme ends of the scale to describe themselves as either an expert (5%) or having no knowledge of TBI (3%). Irrespective of the basis for why students provided these ratings, the results indicate students' potential growth mindset (Dweck, 2006). Despite prior knowledge, it seems that students were open to learning more about the lived experience of TBI and perceived digital storytelling as an opportunity to do so. Hence, these data indicate that digital stories might most benefit students who have an open mindset and, possibly, some prior experience of the topic. However, further study is needed with larger samples of participants and in other settings to fully determine how growth mindset and prior experience may affect students' perceptions of digital stories.

In terms of the application of digital stories into higher education, our third qualitative theme, Areas of Improvement, provided constructive feedback. First, students were clear about wanting to have more time devoted to the digital stories within the curriculum, and especially for class discussion. In our project,

the full class time of 2 hours was allotted to the digital storytelling curriculum. Based on student responses, however, extra time would have been preferred to allow more fulsome discussions to occur. Second, students also wanted some small group discussion which might take the form of *think-pair-share* exercises involving students thinking individually before pairing up with a partner to discuss the topic (University of Toronto, 2021). Overall, it seems that think-pair-share sessions after each digital story, together with a final full class discussion to debrief all digital stories, might have been preferred. Such an approach might have helped students to better reflect on their learning while providing more time to interact with their peers and exchange ideas about the subject matter.

Finally, in terms of implications for teaching and learning, digital stories have the ability to effectively convey information and promote long-term memory formation (Eck, 2006). The human brain is naturally attuned to information communicated through stories, and, through digital storytelling, listeners saw and heard meaningful content reflected through human experience. The emotion of John's traumatic event and the impact on his family provided an opportunity for students to connect emotionally, and potentially personally, to that experience. In this context it was pertinent that the students described the digital stories as "emotional" and "raw" because recent neuroimaging studies have shown that long lasting learning is facilitated when brain areas important for emotion and cognitive functions are engaged. Research has shown that the presence of emotion in learning effectively modulates selective attention and engages multiple brain areas (Tyng et al, 2017) including the amygdala, which is important for assessing emotional salience, the prefrontal cortex, which is important for sophisticated cognitive processing, and the hippocampus, which is integral to learning and memory. Combined, these brain areas work to support

learning through memory encoding and retention in a significantly effective way (Tyng et al., 2017).

Similarly, educators can also resonate with information that they can relate to, and which challenges them to think about how students are reflected in their own curricula. Similar to the looking glass self, where perceptions are based on how others see us (Cooley, 1902), digital stories have the ability to reflect images involving ideal students:

An essential aspect of digital storytelling resides in the power of example — the power, that is, to project images of exemplary individuals who can influence other people and make a difference in their lives. We believe that human beings can be profoundly influenced by presenting themselves and others, within familiar contexts, as models of inclusion and self-determination (Skouge & Rao, 2009, p. 54).

All of the above have implications for Universal Design for Learning (UDL). UDL is a framework supported by empirical data, which guides the design of curriculum that is accessible to all learners (Meyer et al., 2014). The three fundamental principles of UDL are: engagement; representation; and action & expression (Meyer et al., 2014). Engagement accesses the affective networks of the brain, that supports the *why* of learning (Meyer et al., 2014). It motivates learners and stimulates their interest by showing the relevance of the content being taught. Representation engages brain areas that recognize the *what* of learning (Meyer et al., 2014). Through presenting the content using different approaches, learners can access the information in ways that are most meaningful to them. Lastly, action & expression stimulates the brain areas involved on the *how* of learning. It allows students to express what they know in different ways (Meyer et al., 2014). Overall, it can be seen that digital storytelling fits the UDL

framework well because stories that share human experiences have the ability to emotionally engage learners, can complement other methods of teaching including traditional lectures, and they allow for learner reflection.

Limitations

Our study has several limitations. Firstly, it was conceived as a quality improvement initiative and, as such, the results may not generalize to the wider student population. Our study also involved convenience sampling of participants from students in the Brain Disorders Management program at a single institution. These participants may be atypical compared to those involved in other research studies. They were predominately female, had an average age of 25 years old and had prior training at higher education level. Furthermore, our study did not directly measure TBI knowledge or soft skills, such as empathy. Instead we relied on self-report from a questionnaire completed by students.

More research is therefore needed to understand how learning is impacted by digital stories and, in turn, how long these effects might last. More specifically, our digital stories featured challenges related to TBI as they focused on the immediate effects of John's accident on his functioning and how he and this family were supported. Additional digital stories featuring other survivors of TBI could be created that highlight challenges as well as successes following TBI. Such a digital story library could be used within a UDL program to build students' knowledge and practice of ways of supporting clients with TBI and their families.

Conclusion

This study examined whether digital stories could increase knowledge about TBI through impacting soft skills such as empathy. Our quantitative and

qualitative analysis showed, at a preliminary level, that digital stories have value in a higher education classroom; they have the potential to increase knowledge about a topic. Furthermore, digital stories about lived experiences are more memorable for students because of their emotional qualities. With more higher education institutions having access to digital cameras and video editing software, digital storytelling has the ability to engage students in new ways. Digital stories also offer a way to make curriculum permanent because they can be viewed and discussed by subsequent student cohorts in class or virtually.

Notes

¹ The name "John" was given to preserve privacy and confidentiality in accordance with the Personal Health Information Protection Act, which governs the disclosure of personal health information in Ontario, Canada.

² The item about gender on our questionnaire was asked using a textbox format so that students were not restricted by binary categories (Spiel, Haimson, & Lottridge, 2019). The majority of students wrote "male" or "female" with one student writing "queer".

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References

American University (2020). *What Is Edutainment? Tips for Mixing Education and Entertainment in the Classroom*. Retrieved from <https://soeonline.american.edu/blog/what-is-edutainment> (Accessed: September 17, 2021)

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–109. doi: 10.1191/1478088706qp0630a

Bruno, R., Andrews, A., Garvey, B., Huntoon, K., Mazumder, R., Olson, J., et al. (2012). Videotaped patient stories: impact on medical students' attitudes regarding healthcare for the uninsured and underinsured. *PLoS One*, 7(12), 1-5. doi: 10.1371/journal.pone.0051827

Centers for Disease Control and Prevention. (2014). *Report to Congress on Traumatic Brain Injury in the United States: Epidemiology and Rehabilitation*. National Center for Injury Prevention and Control; Division of Unintentional Injury Prevention. Atlanta, GA.

Centers for Disease Control and Prevention (2021). *Get the Facts About TBI*. Retrieved from https://www.cdc.gov/traumaticbraininjury/get_the_facts.html (Accessed: September 15, 2021)

Cooley, C. H. (1902). *Human Nature and the Social Order*. New York: Scribner's.

Craik, F. I. M. & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behaviour*, 11, 671-684.

D'Alessandro, D. M., Lewis, T. E., & D'Alessandro, M. P. (2004). A pediatric digital storytelling system for third year medical students: The Virtual Pediatric Patients. *BMC Medical Education*, 4(10). doi:10.1186/1472-6920-4-10

D'Cruz, K., Douglas, J., & Serry, T. (2019). Narrative storytelling as both an advocacy tool and a therapeutic process: Perspectives of adult storytellers with acquired brain injury. *Neuropsychological Rehabilitation*, 30(8), 1409-1429. doi: 10.1080/09602011.2019.1586733

DePape, A., Barnes, M., Marsden, E., & Pawliw-Levac, M. (2020). Students' experience with a virtual reality tool: Brain Stories. *Innovative Practice in Higher Education*, 4(1), 78-107 (Online). Retrieved from <http://journals.staffs.ac.uk/index.php/ipihe/article/view/198/304> (Accessed: January 13, 2022)

Dweck, C. S. (2006). *Mindset: The New Psychology of Success*. New York: Random House.

Eck, J. (2006). *An Analysis of the Effectiveness of Storytelling with Adult Learners in Supervisory Management*. Master's Thesis. University of Wisconsin-Stout. Retrieved from <https://www2.uwstout.edu/content/lib/thesis/2006/2006eckj.pdf> (Accessed: September 15, 2021)

Fenton, G. (2014). Involving a young person in the development of a digital resource in nurse education. *Nurse Education in Practice*, 14(1), 49-54. doi: 10.1016/j.nepr.2013.04.014

Fraser Health (2014). *Differentiation of Research, Quality Improvement and Program Evaluation*. Retrieved from https://www.fraserhealth.ca/-/media/Project/FraserHealth/FraserHealth/Health-Professionals/Research-and-Evaluation-Services/20171010_research_QI_program_evaluation_differentiation.pdf?la=en&hash=1D8B4F96533B7196C56DA6AFC7E3B21CEEEA5E79 (Accessed: June 27, 2018)

Griesel, H., & Parker, B. (2009). *Graduate Attributes: A Baseline Study on South African Graduates from the Perspective of Employers*. Pretoria: South African Qualification Authority and Higher Education South Africa.

Guion, L. A. (2002). *Triangulation: Establishing the Validity of Qualitative Studies*. Institute of Food and Agricultural Sciences, Publication FCS6014. Retrieved from <https://sites.duke.edu/niou/files/2014/07/W13-Guion-2002-Triangulation-Establishing-the-Validity-of-Qualitative-Research.pdf> (Accessed: January 13, 2022)

Henderson, K. (2019). Email message to Anne-Marie DePape 26th June.

Indeed (2021). *Hard Skills vs. Soft Skills*. Retrieved from <https://ca.indeed.com/career-advice/resumes-cover-letters/hard-skills> (Accessed: January 18, 2022)

Ivala, E., Gachago, D., Condry, J., & Chigona, A. (2014). Digital storytelling and reflection in higher education: A case of pre-service student teachers and their lecturers at a university of technology. *Journal of Education and Training Studies*, 2(1), 217-227. doi: 10.11114/jets.v2i1.286

Johnston (2019). *Mohawk College's Digital Creativity Centre: Discover, Create, Experience*. Retrieved from <https://open-shelf.ca/190201-ocula-mohawk-dcc/> (Accessed: September 15, 2021)

Lambert, J. (2002). *Digital Storytelling: Capturing Lives, Creating Community*. Berkeley, CA: Digital Diner Press.

Li, L. & Guo, R. (2015). *A Student-Centered Guest Lecturing: A Constructivism Approach to Promote Student Engagement*. Faculty Publications, DigitalCommons@Kennesaw State University. Retrieved from <https://digitalcommons.kennesaw.edu/facpubs/3608> (Accessed September 14, 2021)

Matthews-DeNatale, G. (2008). *Digital Storytelling—Tips and Resources*. Retrieved from <http://eds-courses.ucsd.edu/eds204/su12/ELI08167B.pdf> (Accessed: September 16, 2021)

Meyer, A., Rose, D. H., & Gordon, D. T. (2014). *Universal Design for Learning: Theory and Practice*. Wakefield, MA: CAST Professional Publishing.

Mohawk College (2021). *Strategic Plan*. Retrieved from <https://www.mohawkcollege.ca/about-mohawk/leadership-and-administration/mission-vision-and-values/strategic-plan> (Accessed: September 15, 2021)

Panopto (2020). *How Are Universities Using Video On Campus?* Retrieved from <https://www.panopto.com/blog/how-are-universities-using-video-on-campus/> (Accessed: September 17, 2021)

Price, D. M., Strodman, L., Brough, E., Lonn, S., & Luo, A. (2015). Digital storytelling: An innovative technological approach to nursing education. *Nurse Educator*, 40(2), 66-70. doi: 10.1097/NNE.0000000000000094

Skouge, J. R., & Rao, K. (2009). Digital storytelling in teacher education: Creating transformations through narrative. *Educational Perspectives*, 42(1), 54-60.

Spiel, K., Haimson, O., & Lottridge, D. (2019). How to do better with gender on surveys: A guide to HCI researchers. *Interactions*, 26(4), 62-65.

Sternberg, R. J. & Sternberg, K. (2012). *Cognitive Psychology*. Belmont, CA: Cengage Learning.

The Learning Center (2021). *Higher Order Thinking: Bloom's Taxonomy*. Retrieved from <https://learningcenter.unc.edu/tips-and-tools/higher-order-thinking/> (Accessed: September 16, 2021)

Tyng, C. M., Amin, H. U., Saad, M. N., & Malik, A. S. (2017). The influences of emotion on learning and memory. *Frontiers in Psychology*, 8, article 1454. doi: 10.3389/fpsyg.2017.01454

University of Houston (2021). *What is Digital Storytelling?* Retrieved from <https://digitalstorytelling.coe.uh.edu/page.cfm?id=27&cid=27> (Accessed: September 15, 2021)

University of Toronto. (2021). *Think-Pair-Share*. Retrieved from <https://teaching.utoronto.ca/teaching-support/active-learning-pedagogies/active-learning-adapting-techniques/think-pair-share/> (Accessed: September 17, 2021).

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press.

Watson, S. (2019). *Higher-Order Thinking Skills (HOTS) in Education*. Retrieved from <https://www.thoughtco.com/higher-order-thinking-skills-hots-education-3111297> (Accessed: September 16, 2021)

Zaki, J. (2019). *The War for Kindness: Building Empathy in a Fractured World*. New York, NY: Crown Publishing.

Zou, P., Sun, W., Hallowell, S. G., Luo, Y., Lee, C., & Ge, L. (2019). Use of guest speakers in nursing education: An integrative review of multidisciplinary literature. *Advances in Medical Education and Practice*, 10(1), 175-189. doi: 10.2147/AMEP.S196456