

Elementary School Learner Comic-Based Digital Storytelling on Digital Safety

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Abstract: This study highlights the potential of using comic-based digital storytelling as an instructional strategy for digital safety education. Guided by the multimodal literacy theory, the study employs character analysis and biterm topic modeling to identify prevalent themes within the curated Pixton comics of 20 students. The study revealed digital footprint, netiquette, and privacy as key themes in student's comics. Comic characters represented students' self-inserts and revealed expressions of their understanding of the topics.

Introduction

Comic-based digital storytelling is becoming more widely used in the classroom to support students' understanding of the learning content and their acquired competencies in an engaging and creative way (Rutta et al., 2021). Digital safety education is a crucial topic that requires urgent instructional measures, specifically in K-12 contexts (Hartikainen et al., 2019). Elementary school learners are among the most vulnerable groups to cyber threats as they utilize digital devices and the internet at an early age (Freed et al., 2023). In this regard, there is a critical need to teach digital safety concepts to K-12 learners so that they can learn strategies for protecting themselves in digital spaces (Hollandsworth et al. 2017) and understand what it takes to be responsible online users. This study is framed by the multimodal literacy theory (Kress & Leeuwen, 2001) which explores how meaning is created through a variety of modes, such as language, images, and sound, in various forms of communication and expression. The main purpose of the study is to examine how digital comics can be used to support the understanding of digital safety concepts for elementary school students. The research questions addressed in this study are: RQ.1. How do elementary school learners reflect on digital safety topics through comic-based digital storytelling? RQ.2. How do elementary school learners experience the use of comic-based digital storytelling for reflecting on digital safety topics?

Methods

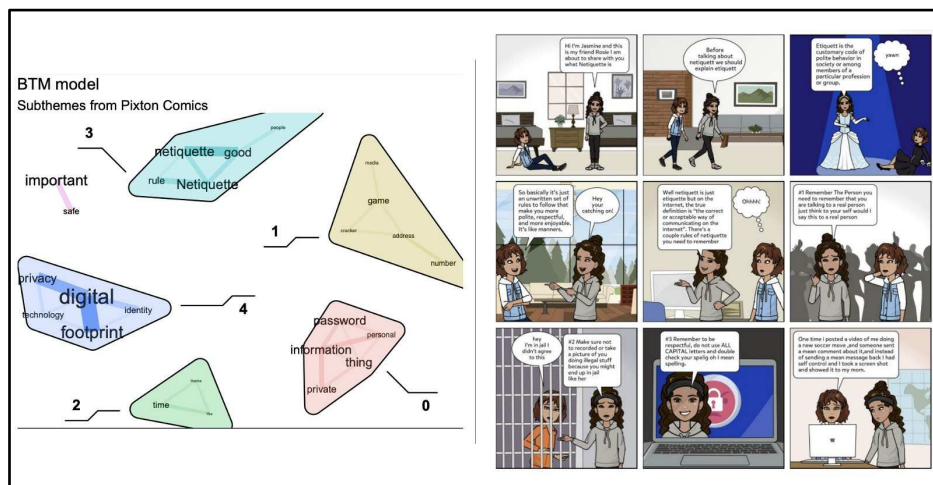
From a larger summer camp attendee group in Summer 2022, only 20 students, with parental consent, completed Pixton comics for our analysis. The average age of the camp students was 10.03 with a range from 9 to 11 years old. The students had completed third, fourth, or fifth grade. The average number of days attended during the 5-day camp was 4.86 days with a minimum of 3 days and a maximum of 5 days. Elementary students used Pixton to curate their digital safety reflections and experiences based on the topics taught during the camp which are Cyberbullying, Digital Privacy and Security, Digital Identities and Footprint, and Netiquette. In addition, the data collection tools from the camp included a post survey, which included two open-ended questions, "After participating in this camp, one thing I will change about the way I interact online is..." and "What did you enjoy most about your week at camp?" The study used character analysis and Biterm Topic Modeling (Yan et al., 2022) of speech bubbles to identify prevalent themes in the analyzed Pixton comics. Biterm Topic Modeling (BTM) is a technique for classifying and uncovering coherent topics within short texts and models the generative process of the word co-occurrence patterns (Yan et al., 2022). The package `udpipe`, which is an NLP tool, was used to cluster dependency relationships. `K`, which represents the number of topics to be extracted, was set to 5. For the second research question, we performed open coding and thematic categorization of students' responses towards Pixton comics.

Results

Students used the comics as a medium for reflecting and conceptualizing digital safety and its implications on their identities, relationships, and social environments (see Figure 1). The BTM results indicated that digital footprint, netiquette, time, and passwords were prevalent themes of students' curated comics. Furthermore, the results reveal that students' comics predominantly centered on the theme of 'games,' indicating a higher likelihood of cybersecurity risks among students in this environment. The character analysis results revealed that nine of the comics applied self-insert characters in monologue, giving insight into the student creators' expression of their

understanding of chosen topics. This includes characters inspired by real-life figures such as classmates, friends, and family members. For a total of 20 Pixton comics, six of them focused on digital identity and digital footprint, six on netiquette and responsible online behavior, four on cyberbullying, and four on digital privacy and security with one of the salient themes on password safety. A sample of a student's comic on a digital safety topic is shown (see Figure 1). The open coding of 55 student responses revealed that 22% of the students identified the comics as their most preferred project. For instance, student B responded, "I liked when we worked on our final projects and just the projects that we did earlier this week on Pixton." While responding to the prompt on one thing they would change about the way they interact online, students shared a range of viewpoints including frequent password changes, keeping information private, online stranger awareness and cultivating anti-bullying attitudes. The students expressed that the comics served as a platform for them to better understand their vulnerabilities and to think critically about strategies to stay safe.

Figure 1
Themes from (a) Biterm Modelling of Pixton Comics (b) Extracts of Students' Pixton Comics



Conclusion

Digital safety topics such as digital footprint, netiquette, and privacy are central to students' sense-making of digital safety issues. Comic-based digital storytelling supports students' higher-level thinking of these concepts and demonstrates their ability to apply them in real-life situations by making connections between old and new knowledge.

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