

# Digital Storytelling In Mathematical Teaching For Higher Education

**Geeta Arora**

<sup>1</sup>*Department of Mathematics, Lovely Professional University, Punjab, India*

**Abstract:** *Teaching mathematics is a challenge for a teacher, mathematics being considered as a difficult stream of science to be taught in an interesting way. Storytelling is a very popular tool that has been well developed and investigated by the researchers to get its impact on students. The objective of this project is to present an innovative proposal to teach mathematics through digital storytelling in higher education. This proposal is based on the heuristic design of emergent models about the value of storytelling in the construction of mathematical concepts. The intention of this proposal is to use digital storytelling as a tool to introduce mathematical concepts at the university level.*

## **The transition from school to college: a complex process**

The transition of students from school to college is a major challenge faced by many students worldwide (Brinkworth, et al. 2009). Students often get themselves ill-prepared for academic and social challenges of college, which increase their risk of failure or drop out from college (Raths 2009).

As discussed by Long et al. the prime reason for poor performance of first year college students include the teaching pedagogy or less interaction with faculty and the concern about changed academic environment (Long, et al. 2006).

## **Factors that influence a successful transition**

One of the main determinants of student success in college is their ability to assimilate into the academic culture, including their expectations and motivations align closely with the prevailing norms of the academic community (Borden and Evenbeck 2007).

The successful transition is not due solely to academic ability, but also depends on the ability to make a rapid adjustment to a learning environment that requires greater autonomy and individual responsibility than students expect upon commencement (Brinkworth, et al. 2009). Investigations relating to the transition from high school to college have suggested several strategies to facilitate this transition.

## **Suggestions on how to avoid failure at university**

To navigate a successful pathway in the university culture, freshmen may require different levels of support from the university, family and peers (Crisp, et al. 2009). In particular, it is important to realize and recognize that a minority of students are vulnerable to withdrawal or failure and at the same time, develop some measures to support their learning and thus, help them get more out of your college experience (Round 2005).

Brinkworth et al. point to propose measures to support students in their transition to college, in particular, they propose to consider that flexible teaching and learning strategies are vital to promoting a climate of inclusion (Brinkworth, et al. 2009). These strategies should count a

feedback and teacher availability. In other words, a greater focus on first-year pedagogical practices at universities could be what would help students develop the academic skills sought by universities that could contribute to the success and retention of first-year students (Jansen and van der Meer 2012).

As a suggestion to guide first-year students in college, Borden and Evenbeck suggested the involvement of academic staff is required not only in teaching their specific modules, but in providing professional development and contexts outside the classroom with significant interactions between academic staff and students (Borden and Evenbeck 2007).

In general, understanding the needs and desires, as well as the motivation of first-year students, is the cornerstone for students not to fail in the university and, on the contrary, to remain in it (Rizkallah and Seitz 2017).

### **Importance of storytelling**

Stories are the reality of our lives and the concept of storytelling is well established. Each one of us has heard stories since our childhood and gained a lot of understanding and insight through the medium of stories. Stories are the medium to share the experiences and are helpful in learning difficult concepts very easily (Prins, Avraamidou and Geodhart 2017). Stories are the pleasurable medium to communicate with others involving their imaginations in a relaxing way. The concept of storytelling relates to the listener experience without dealing directly with the situation.

Various researchers from different backgrounds have discussed the importance of storytelling that includes health professionals (Green 2006), educators (Rotmann, Goodchild and Mourik 2015), psychologist (Hardy and Summer 2014) and historians (Moezzia, Janda and Rotmann 2017) etc., The easiness of delivering stories can help teachers in making a difference in their way of teaching. This tool can result in critical thinking development of student with their involvement in learning of new concept by medium of a story. The concept of storytelling is usually adapted to teach kids but also hold its impact when concept is delivered to the university level students by mode of storytelling (Baim 2015, Mukherjee 2014) that could be either face-to-face teaching or online teaching mode.

The objective of this proposal is to promote the art of digital storytelling to teach mathematics in higher education (HE). This concept can lead to effective learning process with the use of distinct ideas and strategies to convey the concept to the intended audience with a crisp goal. This may lead to an enjoyable and imaginative way to learn the difficult concepts with an ease that lead to a lifelong learning.

As discussed by McDrury and Alterio (McDrury and Alterio 2003), the concept of storytelling has been proven to be important and impactful for undergraduate and postgraduate students. Jenkins (Jenkin 2011) in his work has described digital storytelling (DST) as a development of story with tool of media to deliver the content in form of an 8–10 minute video with emphasis on following a proper path for the educators.

### **Digital storytelling in mathematics**

Mathematics is a subject of prime importance but is treated as a tough subject to learn and assimilate. Performance of students in mathematics is one of the major concerns of the higher education institutes. Many studies have been conducted to investigate the factors affecting performance of first year students in higher education. One of the major factors related to poor performance in mathematics is math anxiety (Yusof, Razak and Wahid 2014) that can be overcome by improving teaching and learning process. A lot of work has been reported in the literature as an effective way of teaching mathematics in higher education. Many of the

popular emerging trends to teach mathematics includes: flipped classroom, active learning, case-based learning, inquiry-based learning, project-based learning, and activity-based learning (She, et al. 2017).

Digital storytelling (DST) is one of the emerging tools to teach mathematics in classroom, which is described as competence-based methodology by Albano and Pierri (Albano and Pierri 2017). Authors in their study presented a prototype of DST concept in mathematics with discussion about implementation of model to improve mathematical literacy among students and discussed about the constraints and limitations of such a model from students' perceptions. In recent years, the concept of DST is used for engaging students using music, narrations and video clips. Many universities worldwide are designing programs of storytelling to support this pedagogy. Various educational websites are uploading their contents to integrate storytelling with education. One of the website, supported by University of Houston College of Education serves as a useful resource to engage and motivate educators towards this pedagogy (Robin 2008b).

DST has been investigated as a learning tool for students and pedagogy for educators (Haven 2000). Integrating technology in classroom teaching by DST not only results in improved overall academic achievements but also develop creating thinking with artistic skills (Yuksel, et al. 2011).

The prime focus of this work is to develop digital stories related to the important concepts in mathematics to make students' interest and to reduce the problems that students are facing during their transition from school to college education.

### **How digital storytelling impart skills to students?**

As highlighted by Tolisano digital storytelling is not about the tools, creating media, telling a story and transfer of knowledge but is about the skills, creating meaning, contributing and amplification of knowledge in a presentable way (Tolisano 2015). Although DST can be created for students, but students can also be involved to create their own education stories related to a topic (Benmayor 2008). It will boost their knowledge and understanding of concepts leading to their overall development, thus creating this process interactive in nature. This activity could be used to promote engagement and reflection of student in a themed topic (Robin 2008a). In his work, author discussed that the creation of digital stories not only enhance skills of the student but also lead to digital, global, technology, visual and information literacy to the student.

As an initiative in the field of digital storytelling, center for digital storytelling, California [<https://www.storycenter.org/press/>] is working in promoting digital storytelling through workshops and collaborations. In 2015, this organization becomes famous as StoryCenter and is working with people all over the world to provide training in creating digital stories. Through their work, they are working for educators, health and human services agencies, business professionals, and artists.

Many researchers have explained the importance of DST in higher education with analysis on using digital stories for reflection. DST is also used for the student induction program for soothing transition into HE programme (Jenkins and Lonsdale 2008).

Özpinar et al. (Özpinar, Gökçe and Yenmez 2017) establishes the importance of digital storytelling in mathematics by highlighting that reframing the abstract concept of mathematics as stories and associating them with the real life activities make learning enjoyable and is the best alternative of traditional teaching methodologies.

## The future of higher education in India

Through a contextual analysis and a series of in-depth interviews with leaders of higher education, academics and lawmakers from India, Heslop presents a report on the vision of opinions on the future of higher education in India and areas of possible collaboration (Heslop 2014). Author points out that the skills needed for the future include analytical thinking, problem solving, critical thinking, collaborative work, innovation, creativity and Information and Communication Technologies (ICT) skills. However, the interviewees in the study by Heslop point out that there is little awareness of the importance of these skills and little capacity to teach them. There are practically no opportunities for collaborative work, creativity or solving real-life problems. In addition, the evaluation is based on rote learning and the transmission of information. Teachers, therefore, teach for the examination and student learning is usually limited and theoretical.

Thus, there is an urgent need to balance quality with diversity and equity in higher education in India, for the sake of relevance (Srivastava 2010). The regular updating of the teaching-learning tools and the workforce is a necessity. Both teachers and students must look beyond the classroom, the competence and the integral education (Alva and Hans 2013).

In 2014, DST as pedagogy is discussed by Gangan with emphasis upon the challenges faced by educators and students in the classroom using this approach (Gangan 2014). Author also examines the work reported in DTS as an effective technology tool blended with learning. As stated by Chaman, in a country like India, along with technological advancement, achievement in mathematics is of paramount importance (Chaman 2014).

## Bibliography

- Albano, G, and A J Pierri. "Digital storytelling in mathematics: a competence-based methodology." *Ambient Intell Human Comput* 8, no. 301 (2017): <https://doi.org/10.1007/s12652-016-0398-8>.
- Alva, A, and V B Hans. "Higher Education in India – Opportunities, Changes and Challenges." *Available at SSRN* (<http://dx.doi.org/10.2139/ssrn.2203706>), 2013: 12.
- Baim, S A. "Digital Storytelling: Conveying the Essence of a Face-to-Face Lecture in an Online Learning Environment." *The Journal of Effective Teaching* 15, no. 1 (2015): 47-58.
- Benmayor, R. "Digital storytelling as a signature pedagogy for the new humanities." *Arts and Humanities in Higher Education* 7, no. 2 (2008): 188-204.
- Borden, V M, and S E Evenbeck. "Changing the minds of new college students." *Tertiary Education and Management* 13, no. 2 (2007): 153-167.
- Brinkworth, R, B McCann, Matthews, and C Nordstr. "First year expectations and experiences: Student and teacher perspectives." *Higher Education* 58, no. 2 (2009): 157-173.
- Chaman, M J. *Factors influencing mathematics achievement of secondary school students in India (Doctoral dissertation)*. Australia.: University of Tasmania, 2014.
- Crisp, G, E Palmer, D Turnbull, and T Nettelbeck. "First year student expectations: Results from a university wide student survey." *Journal of University Teaching and Learning Practice* 6, no. 1 (2009): 11-26.
- Gangan, N. "Blending Creativity and Technology: Digital Storytelling in Education." *International Journal of Science and Research* 3, no. 10 (2014): 1787-1790.
- Green, M C. "Narratives and cancer communication." *J Commun* 56, no. Suppl 1 (2006): S163-S183.

- Hardy, P., and T. Summer. *Cultivating compassion: How digital storytelling is transforming healthcare*. Sussex, UK: Kingsham Press, 2014.
- Mukherjee, R., Lawes, G., & Nadgorny, B. (2014). Enhancement of high dielectric permittivity in CaCu<sub>3</sub>Ti<sub>4</sub>O<sub>12</sub>/RuO<sub>2</sub> composites in the vicinity of the percolation threshold. *Applied Physics Letters*, *105*(7), 072901.
- Haven, K. *Super Simple Storytelling: A Can-Do Guide for Every Classroom, Every Day*. Teacher Idea Press: A Division of Libraries Unlimited, Inc, Englewood, 2000.
- Heslop, L. *Understanding India: The future of higher education and opportunities for international cooperation*. British Council., 2014.
- Jansen, E P, and J van der Meer. "Ready for university? A cross-national study of students' perceived preparedness for university." *The Australian Educational Researcher* *39*, no. 1 (2012): 1-16.
- Jenkin, M. "Digital storytelling: guide for educators." *Learning, Media and Technology* *36*, no. 2 (2011): 207-209.
- Jenkins, M, and J Lonsdale. "Podcasts and students' storytelling." In *Podcasting for learning in universities*, by G Salmon and P Edirisingha. McGraw Hill, 2008.
- Long, M, F Ferrier, Heagney, and M Stay. *Stay, play or give it away? Students continuing, changing or leaving university study in their first year*. Melbourne: Centre for the Economics of Education and Training: Monash University, 2006.
- McDrury, J, and M Alterio. *Learning through storytelling in higher education : Using reflection & experience to improve learning*. Palmerston North New Zealand: The Dunmore Press, Kogan Page, 2003.
- Moezzia, M, K B. Janda, and S Rotmann. "Using stories, narratives, and storytelling in energy and climate change research." *Energy Research & Social Science(Elsevier)* *31* (2017): 1-10.
- Özpinar, I, S Gökçe, and A. A. Yenmez. "Effects of Digital Storytelling in Mathematics Instruction on Academic Achievement and Examination of Teacher-Student Opinions on the Process." *Journal of Education and Training Studies* *5*, no. 10 (2017).
- Prins, R, L Avraamidou, and M Geodhart. "Tell me a Story: the use of narrative as a learning tool for natural selection." *Educational Media International* *54*, no. 1 (2017): 20-33.
- Raths, D. "Making it through the first year." *Campus Technology* ( Retrieved from <http://campustechnology.com/Articles/2009/07/01/Portals.aspx?p=1>) *22* (2009): 32-34.
- Rizkallah, E. G., and V Seitz. "Understanding Student Motivation: A Key to Retention in Higher Education." *Scientific Annals of Economics and Business* *64*, no. 1 (2017): 45-57.
- Robin, B R. "Digital storytelling: a powerful technology tool for the 21st century classroom." *Theory Pract* *47* (2008a): 220-228.
- Robin, B R. *The effective uses of digital storytelling as a teaching and learning tool. Handbook of research on teaching literacy through the communicative and visual arts*. New York: Lawrence Erlbaum Associates, 2008b.
- Rotmann, S, B Goodchild, and R Mourik. *Once upon a time... how to tell a good energy efficiency story that sticks, Proceedings of the ECEEE Summer Study on Energy Efficiency*. European Council for an Energy-Efficient Economy, 2015.
- Round, A. "A Survey of Student Attitudes." University of Northumbria, UK., 2005.
- She, C Ni, M an Bhaird, Ní F Eabhna, and A O'SHEA. "Students' and lecturers' views on mathematics resources." *Teaching Mathematics and Its Applications* *36* (2017): 183-199.
- Srivastava, M. "Higher Education System: Emerging Issues and Trends." *Social Science Gazetteer* *5*, no. 2 (2010): 83-90.

- Tolisano, S R. *Digital storytelling: What it is... and... what it is not*. Web log comment, Retrieved from <http://langwitches.org/blog/2015/08/18/digital-storytelling-what-it-is-and-what-it-is-not>, 2015.
- Yuksel, Pelin, B Robin, and S McNeil. "Educational uses of digital storytelling all around the world." *Society for Information Technology & Teacher Education International Conference*, 2011: 1.
- Yusof, Y, M R Razak, and S N S Wahid. "Math anxiety among students in higher education level." *Procedia - Social and Behavioral Sciences* 123 (2014): 232 – 237.