Storytelling as a Strategy for Integrating Technologies into the Curriculum: an Empirical Study with Post-Graduate Teachers

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Abstract. Digital Storytelling (DS) is a creative combination of images and sound that allows the production of pedagogical resources with high potential for teaching and learning. Recent research shows that teachers’ familiarity, confidence and skills in integrating technology into the curriculum are dependent on education programs that provide technology-rich experiences throughout all aspects of the training. Aware of this reality and responsible for preparing digitally wise teachers, a DS activity was implemented with a group of post graduate teachers who attended a program on Educational Technology. For one semester teachers studied the theory of visual learning, prepared still images and created digital stories for classroom use. In this paper, we describe the training experience, present and reflect on teachers’ feedback and conclude arguing that DS are powerful tools to use in the field of technology and teacher education because it allows teachers’ to mobilize their multiples knowledge on curricular contents, pedagogy and technology (TPACK).

1. INTRODUCTION

The importance of the curricular integration of ICT’s is a recurrent subject regarding the European and Portuguese educational policies. To this purpose, the International Society for Technology in Education (ISTE) published, in June of 2008, a report which presents the new National Educational Technology Standards (NETS-T, 2008) destined to teachers. In the referred document, new recommendations are made, directed to teachers in a sense to render them responsible for their role as creators of pedagogic experiences that involve the use of technologies for learning and teaching. In Portugal, the implementation of the Technological Plan for Education since 2007 allowed most public schools to be equipped with computers with wireless internet access, multimedia projectors and interactive whiteboards. However, the greatest futile assumption was that making technologies available to educators would automatically result in their implementation in the classrooms (Piano, 2008). According to Coutinho (2008), it is essential to prepare technological proficient teachers that are able to provide the learning opportunities that facilitate students’ use of technology to construct knowledge and to communicate in the networked world we live in”. This goal guided the development of a project whose main objective consisted in the integration of 2.0 technologies in teacher education programs both at pre service and in service levels. Blogs, wikis, podcasts, social bookmarking and Google Sites were used with different groups of teachers and for varied pedagogical goals; results show teachers developed technological and pedagogical skills while producing digital artifacts or designing classroom learning strategies (Coutinho & Bottentuit Junior, 2009).

The study we present in this paper intends to be a forward step in the above quoted project: a group of in-service teachers who attended a post graduate program on Digital Images in Education used digital storytelling as a method to create curricular resources to use in classrooms settings. We believed that through the process of creating digital stories using still images and a narrated soundtrack, teachers could develop technological and communicational skills and develop positive attitudes towards the integration of ICT into the curriculum.

2. DIGITAL STORYTELLING

Digital stories are short multimedia tales that engender emotion and learning (Salpeter, 2005). In a broad sense, a digital story consists in a series of still images or short videos that are combined with a narrated soundtrack to tell a story (Bull & Kadjer, 2004); they can be used to inform, to instruct, to motivate, to demonstrate or communicate a personal narrative (Robin, 2008). A variety of subjects can be used in digital stories: in fact, as stated in The Educational Uses of Digital Storytelling (2008, online) “the topics that are used in Digital Storytelling range from personal tales to the recounting of historical events,
from exploring life in one's own community to the search for life in other corners of the universe, and literally, everything in between.”

According to Porter (2006, p. 28) “For students to be effective communicators in the 21st century, they need to be sophisticated in expressing ideas with multiple communication technologies, not just the written word”. In today’s classroom the written or spoken word is still the dominant speech but we know that the language of the future is multichannel and multi-sensorial: Web sites, digital movies, video blogging, images, podcasts. However, young people use emerging technologies in their personal lives and so the educational policies and the schools have the responsibility to broken up the “digital divide” between the students – digital natives - and the teachers – digital immigrants (Prensky, 2001).

As an instructional tool, teachers’ can use previously prepared DS as a multimedia resource to present new contents or to generate a classroom debate, but they can even give the students the task of creating their own digital stories, either individually or in a team. DS places technology in the hands of the student and stimulates the searching for information skills and creativity: “Digital storytelling allows students to use multimedia tools in a sophisticated fashion while capturing the joy of creating and sharing their stories” (Porter, 2006, p. 28).

According to Robin (2008, p. 224), “This creative work provides students with a strong foundation in what many educators have began calling 21st century Literacy, Digital Age Literacy or 21st Century Skills.”. According to the same five different skills are developed in the process of creating Digital Stories:

“Digital literacy: the ability to communicate with an ever-expanding community to discuss issues, gather information, and seek help;
Global literacy: the capacity to read, interpret, respond, and contextualize messages from a global perspective
Technology literacy: the ability to use computers and other technology to improve learning, productivity, and performance;
Visual literacy: the ability to understand, produce, and communicate through visual images;
Information literacy: the ability to find, evaluate, and synthesize information.”

As teacher educators for more than 15 years we know that if we want teachers to use technologies in the classroom to create innovative learning strategies we have to invest in training programs that enhance hands-on activities with the technologies and the exploration of different strategies to integrate them in teaching practices (Coutinho, 2009). According to Judge, Pucket and Cabuk (2004, apud Robin, 2008, p. 222), “Teacher familiarity, confidence and skill in choosing software and integrating technology into the curriculum are dependent on teacher training and time for self-directed exploration and learning”. Digital storytelling allow the creation of innovative learning experiences, supported and extended by the application of user contributed content Web 2.0 technologies, empowering teachers’ abilities to communicate and integrate technologies into the curriculum.

3. A FRAMEWORK: TPACK

Koehler & Mishra (2008), consider that the well succeeded integration of technologies in the classroom context demands from the teacher a set of competences at three levels: scientific/contents, pedagogic and technologic.

For that purpose the authors developed a theoretical model which they named TPCK or TPACK and that, in the opinion of innumerable more current authors, should function as a referential for those who develop training courses for teachers, in particular at the continuous training level, for an effective professional development of teachers. Such as the authors, we considered that the professional development of teachers at the ITC competences domain is common to all other curricular areas, but should show concern with the specificity of each group or disciplinary area, contemplating its singularity. That is, it is not about giving teachers a standardized technological training and focusing on the tools domain/knowledge in itself, but on a modular training put in context and linked to what is the teacher’s pedagogic activity and to the age level of the students with who he works with (Costa et al., 2008).

The TPACK model considers that a complete and advantageous integration of technologies in the teachers’ practices depends on the relation of balance that the teacher is able to establish between the scientific knowledge and the domain of contents in that, more or less, specific area of training (C), the pedagogic knowledge (P) at the level of a competence anchored in learning theories and in techniques and didactic-pedagogic methodologies and the technological knowledge (T) he possesses, that is, its domain concerning the tools and other, increasingly available, technological artifacts which he uses (check figure 1).
FIGURE 1 – TPACK Model

The dynamic articulation between these three components, represented in their intersection point (TPCK) is, therefore, essential so that it is possible to reach the level of highly competent teacher which is, more often, required for a school adapted to the society of knowledge. In the same way that TPACK is the knowledge which results from the competences that the teacher has at the scientific, pedagogic and technologic level, he understands and integrates, in a certain way, three particular aspects of that knowledge, which are represented in the scheme, by three other intersections:

- PCK (Pedagogical Content Knowledge): as to do with the way to teach a certain curricular content
- TCK (Technological Content Knowledge): to know how to select and use technologies adequate to a certain curricular content
- TPC (Technological Pedagogical Knowledge): how to integrate technologies in the teaching and learning process

All and each of this knowledge forms are molded by a myriad of contextual factors such as culture, the teachers training and the school organization itself (Harris & Hofer, 2009). Therefore, the TPACK use, in practical terms, is a complex process which is not easily applied, learned or taught. However, and in the measure in which it is a form of professional development, it takes place throughout time, fruit of the teacher’s professional experience and, in that sense, many authors study forms of helping teachers to build and use TPACK. Koehler & Mirsha (2008) tested a learning-by-design collaborative model with teachers and specialists, for curricular units planning, verifying the TPACK construction, but in very diverse forms. Mirsha & Koehler (2006) defend an approach centered on contents, in which technologies support teaching strategies molded by trainers for trainees. Niess (2005) and Dawson (2006) suggest that TPACK can be developed when technologies are the focus of reflexive investigation-action strategies by teachers undergoing training. Coutinho & Bottentuit Junior (2009) tested the development of TPACK in teachers that used Web 2.0 tools as a learning strategy in a training program. Like Pierson (2008) we believe that an environment favorable to the construction of that important professional knowledge, should involve teachers in the development of learning strategies which involve ICT’s, in an interaction process with the trainer and the peers, in which the teacher is given time to reflect on the pedagogical and technological decisions he made in order to use ICT in critical, creative and responsible ways in classroom context.

Digital Storytelling helps teachers to build and use TPACK in practical terms (Robin, 2008). To create DS teachers have to mobilize scientific, pedagogic and technological knowledge on a particular curricular unit. If they work in groups they get involved in a collaborative learning by doing process that enhance discussion and reflection among peers mediated by the instructor. The learning experience we present in this paper is an example and a contribution to develop TPACK in a teacher education program.

4. METHOD

The descriptive survey (Babbie, 1997) we present in this paper was developed in the second semester of school year 2008/09 and enrolled a group of 22 teachers who attended a program on Digital Images in Education (DIE) as part of a post-graduate program in Educational Technology. DIE is a 3 hours/week face to face program that aims to improve teachers’ visual literacy preparing them to create and use digital images in the curriculum. During eight weeks, teachers: a) studied theoretical issues concerning the production, transmission, and perception of verbo-iconic messages; b) created an

- 3797 -
individual Fotolog with original photos manipulated using PhotoShop Software; c) used Movie Maker software to produce a visual track; d) recorded podcast episodes using Audacity software to create an audio track mixing voice and background sound. The final task involved the creation, in small groups, of an original Digital Story on a chosen topic of the K-12 curriculum to be presented and discussed in the classroom for final assessment.

In order to evaluate the importance of the Digital Storytelling learning experience, a final electronic questionnaire was sent via email to all course participants. It consisted of a mix of closed and open-ended questions evaluating five dimensions:

1. Personal data (dichotomy/multiple choice): gender, age, time in the profession, teaching area.
2. Acknowledgement and previous experience on DS (dichotomy Y/N)
3. The potentials of DS for teaching and learning (open-ended)
4. The impact of DS in the training program (dichotomy; open-ended)
5. DS and the development of the 21st Century Skills (Likert Scale, 4 points, Very Important, Important, Some Importance, Not Important)

Quantitative data were analyzed using SPSS 13.0 software. Open ended questions were analyzed using categorical content analysis techniques (Bardin, 2004). 17 participants fulfilled the final online questionnaire. 58.8% were male and 41.2% were female. As to age, the average age was 34, the youngest participant had 25 years old and the eldest 52. Except for 3 that were not teaching at the moment, all worked at local schools (grades 5th to 12th), and teach different curricular areas from Mathematics to Science, Foreign Languages, Music Education and Arts. The concept of Digital Storytelling was new for most participants (65%); however, 3 respondents said they had created a personal DS to present to family and friends (1), to create video-clips for cultural events (1), and to create an educational resource for a Science class on the topic Healthy Food (1).

6. RESULTS

6.1 Digital Storytelling in teaching and learning

In order to infer the potentials of DS for teaching and learning, teachers were asked to write a comment on a Bernard Robin (2008, p.220 ) quotation: “Digital Storytelling is a technology that is well-positioned to take advantage of user-contributed content and to help teachers overcome some of the obstacles to productively using technology in the classroom”. Do you agree with the statement (or not)? Justify your answer presenting all arguments you consider relevant”.

Exploratory content analysis techniques were applied to extract meaning from written answers given by teachers (Bardin, 2004). A set of ten categories emerged from data, and were organized around two types of arguments: advantages of using DS (8 categories) and disadvantages (2 categories). The eight advantages that emerged from data supporting the importance of DS for teaching and learning are, in decreasing number of quotations given by teachers:

1) New methodologies in the classroom;
2) New competencies;
3) More interest in the learning process;
4) DS enhance the integration of ICT into the curriculum;
5) More motivation;
6) More creativity;
7) Images facilitate understanding of complex contents;
8) DS promote communication.

As to disadvantages two categories were driven from written answers:

1) The need for more teacher education and training;
2) It takes time for students to create DS.

Table 1 presents the evidences obtained for each of the categories considered on the analysis.
New methodologies

- The resistance of some students to learn has to do with the use of traditional methods in the classroom (T1).
- Teaching is more and more a challenge and so to explore new tools that increase meaningful learning is important and useful (T2).
- Education is one of the subjects that benefits more from the arrival of the new Web 2.0 tools (T5).
- DS are one of the many strategies that can be used in the classroom to promote learning (T11).
- DS are easy to create and students can participate in the process (T11).
- (DS) enable a more captivating introduction to curricular topics (T6).

New Competencies

- We can look at DS as instruments to develop new competencies: artistic, cultural, communication, new behaviors (T5).
- DS enhance a new way to explore learners previous knowledge and skills (T6).
- DS are a pedagogical tool to work different skills (T13).
- Creating DS students develop multiple competencies (T14).
- DS allow different relations with knowledge (T16).
- Students are more interveners in the process (T17).

Advantages

<table>
<thead>
<tr>
<th>Categories</th>
<th>Nº</th>
<th>Evidences</th>
</tr>
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<tbody>
<tr>
<td>Integration of technologies</td>
<td>4</td>
<td>The process of creating DS demands the use a myriad of technological devices: sound mixing, the search and treatment of images, the creation of the written script according to the communication channel we need to use (T17).</td>
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<tr>
<td></td>
<td></td>
<td>DS demand the manipulation of technological learning environments that combine images, sounds, movement, communication with imagination and creativity (T10).</td>
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<td></td>
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<td>In my point of view DS are very attractive to students, because they demand the use of different technologies in the curriculum (T11).</td>
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<td></td>
<td></td>
<td>DS allow the use ICT in the curriculum in a fruitful and contextualized way (T12).</td>
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<tr>
<td>More interest in learning</td>
<td>5</td>
<td>The technologies in the classroom can facilitate the learning process and increase of interest in curricular topics (T1).</td>
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<td></td>
<td></td>
<td>All resources that value learning and facilitate student comprehension are welcome (T2).</td>
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<td></td>
<td></td>
<td>DS bring new frameworks to teaching and learning, they can be powerful tools to stimulate learning (T5).</td>
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<td></td>
<td></td>
<td>DS involve students in the process of learning (T13).</td>
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<td></td>
<td></td>
<td>Classes become more interesting (T15).</td>
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<tr>
<td>More motivation</td>
<td>4</td>
<td>DS can be very useful tools to motivate students (T5).</td>
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<tr>
<td></td>
<td></td>
<td>They are excellent tools to motivate learners (T6).</td>
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<td></td>
<td></td>
<td>The use of technologies always motivate students (T7).</td>
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<td></td>
<td></td>
<td>To search images that are adequate to the written message is much more motivating than just written tasks (T15).</td>
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<tr>
<td>More creativity</td>
<td>3</td>
<td>DS is a privilege to take into account individual contributions and stimulate the creativity of learners (T3).</td>
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<td></td>
<td></td>
<td>DS allow more participation and creativity (T14).</td>
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<td></td>
<td></td>
<td>With DS teachers can create a more creative and critical learning environment (T16).</td>
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<tr>
<td>Images facilitate understanding of contents</td>
<td>2</td>
<td>DS help visualization of concepts, physical phenomenon (T5).</td>
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<tr>
<td></td>
<td></td>
<td>Words can’t show what images reveal at a second (T4).</td>
</tr>
<tr>
<td>DS promotes communication in the classroom</td>
<td>2</td>
<td>I would say that DS are a new way to communicate in the classroom (T5).</td>
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<td></td>
<td></td>
<td>DS is a new tool to explore classroom interactions (T9).</td>
</tr>
<tr>
<td>The need for more teacher education and training</td>
<td>3</td>
<td>It is crucial to train teachers to explore these new tools otherwise they will be useless (T5).</td>
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<tr>
<td></td>
<td></td>
<td>The major difficulties associated with the use of DS in the classroom are the lack of trained teachers and the need for more equipment in the schools (T12).</td>
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<td></td>
<td></td>
<td>(…) teachers need training (T8).</td>
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<tr>
<td></td>
<td></td>
<td>More teacher education is urgent (T15).</td>
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<tr>
<td>It takes time for students to create DS</td>
<td>2</td>
<td>The creation of DS consumes much time (T15).</td>
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<tr>
<td></td>
<td></td>
<td>I’m afraid it is an activity that takes much time to implement (T7).</td>
</tr>
</tbody>
</table>

Table 1

6.2 Digital Storytelling in teacher education program

The next questionnaire item questioned teachers: To create a DS was important for your professional development? At what levels?
All teachers agreed that to create a DS as part of the education program was an added value to his/her professional development. All pointed out different views on the impact of the experience on their education program, but: a) the opportunity to create digital resources, b) that are useful for classroom use, c) using different technologies, and d) the discovery of the power of images to communicate were the most significant arguments sustaining the value of the implementation of TPACK in the training program:

It was important to develop new competencies in the creation of more innovative pedagogical learning tools (T1)

It helped to reflect on the potential of the images and sound to explore the contents one intends to transmit (T2)

Specially on what concerns to creativity (T3)

We created a pedagogical resource that can be used with different students of different ages (T4)

It made us be students again, what make us aware of the difficulties our students will have (T7)

We created an artifact to use in the classroom (T8)

Yes, particularly because it showed the importance of the use images to educate (T10)

Yes, I had the opportunity to explore concepts, tools, techniques and imagination! (T12)

It helped me to choose images in a more selective way (T14)

It allowed me to work and present curricular contents on a different manner, besides creating pedagogical strategies that are more interesting and engaging for students (T15)

6.3 Digital Storytelling and the development of the 21st Century Skills

To answer this questionnaire item, teachers had to attribute to each of the five literacy presented a score (Very Important, Important, Some Importance, No Importance) according to the degree of importance they attributed to creation of DS by students. Graph 1, presents results.

![Graph 1](image)

We could verify that all five 21st skills are positively related to the activity of creating DS in the classroom. However, Visual Literacy (14 teachers scored Visual Literacy VI and 4 I) and Digital Literacy (11 scored VI and 6 I) are seen as the most important for the group of respondents. In fact, when learning is mediated by technologies it has many advantages when we compare it to traditional classroom methods that are based on the written or spoken word for learning and communicate (Porter, 2006). Through the act of building Digital Stories, students use multimedia tools and learn to communicate using different formats and media. However, as Porter argues: “Using technology is more than being able to master technical skills. From beginning to end, choices of images, music, sound, video, fonts, and titles styles should be intentional (...) An illuminated design is when all elements dance together to create a memorable, effective communication that is more than the sum of its parts based on author and purpose”.

In our opinion, the creation of DS by students is a powerful tool to develop the digital wisdom Prensky (2009) considers to be the main factor of success in the 21st century: the capacity to use the technologies as extensions of our human natural capacities because the more powerful the digital
7. CONCLUDING REMARKS

When we decided to use DS in a teacher education program as a strategy to engage and motivate teachers to integrate the technologies into the curriculum we had no idea on the impact of the learning activity. However, as a final balance of the experience we verified that: a) five excellent digital stories were built and published on the Web (e.g. http://www.youtube.com/jcferreira122#play/all/favorites-all/0/FExkxj-blWw); b) all participant teachers considered the creation of DS an added value to their ICT professional development; c) all agreed that DS were powerful tools to mobilize the skills 21st century citizens are expected to have: “information literacy, visual literacy, being creative and using the newest communication technologies that are available.” (Dogan & Robin, 2009, p. 633).

Teacher educators should never undervalue the capacities teachers have to renovate their teaching practices particularly when it regards the integration of the technologies into the curriculum. In our case, it was grateful to infer from teachers words and expressions the personal satisfaction of someone whose digital competencies were almost null before attending the training program like the one we present in this paper, but, at the end, feel that nothing will be as it was before: all teachers developed positive feelings towards technologies and show a firm intention to try new experiences with DS in the classroom. The concept of TPACK (Mishra & Koehler, 2008) according to which the scientific, pedagogical and technological competencies must mix and criss-cross with each other, should be connected with the needs of the teachers that want to pursue their professional development in the integration of ICT into the classroom and use the technologies as partners in the educational process and as tools that promote meaningful learning experiences. We conclude arguing that DS are powerful tools to use in the field of technology and teacher education because it allows teachers’ to mobilize their multiples knowledge on curricular contents, pedagogy and technology (TPACK).

ACKNOWLEDGMENTS

This paper presentation was financed by CIED, Universidade do Minho, Braga, Portugal.

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