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# Digital storytelling in health education: an example for the role of vegetables in children's diet

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## Abstract

This paper describes an educational narrative based approach for the learning of nutrition and food safety concepts by preprimary, primary and secondary educational level. Ten essential topics about Food Safety and Nutrition for children and adolescents have been identified which were employed by 10 groups of educational digital stories. The design of the aforementioned digital stories takes advantage of the Ed-W model which is presented in this paper, while an example of a specific digital story referring to the essential role of vegetables in children's diet is also demonstrated. Finally, possible ways of use of the digital story in the classroom are discussed.

**Keywords:** digital storytelling, education, food safety, nutrition

## Introduction

Storytelling is possibly one of the oldest and traditional literary forms known to mankind. In many societies, the history and cultural heritage has been preserved through storytelling (Stein, 1982). Great examples of storytelling from the Ancient Greek history are Homer's epics – the Iliad and the Odyssey.

Nowadays, storytelling evolved and Digital storytelling has become the digital development of it. Digital storytelling differs from the traditional storytelling in terms of the users' role. In fact, users are being viewed both as listeners and as people who have the potential to interact and shape the story (Dörner et al., 2002). It also enables computer users to become creative storytellers through the traditional processes of selecting a topic, carrying out some research, writing a script, and finally, developing a compelling story. Next this material is being combined with various types of multimedia, including computer-based graphics, recorded audio, computer-generated text, video clips, and music so that it can be played on a computer, uploaded on a web site, or burned on a DVD (Robin, 2008). On the whole, digital storytelling, by taking advantage of the advancements in technology and instructional design, seems to be a promising transformative technology-supported approach for enhancing learning, encompassing subject matter content acquisition, and development of critical thinking skills, motivation and information literacy (Yang & Wu, 2012).

Digital storytelling is an adjustable educational tool that has the potential to fit in most purposes while it could be also used in the majority of disciplines (Signes, 2008). Furthermore, both teachers and learners could take advantage of this effective tool. On one hand, teachers have the opportunity to create their own digital stories in order students to be engaged in the content; moreover discussion could be facilitated about the specific matter, thus, abstract or conceptual content could become more understandable. In fact, a captivating digital story could be used as a "hook" in order students' attention to be captured and their interest in exploring new ideas to be promoted (Robin, 2008). On the

other hand, from the learners' perspective, an interesting approach is that, apart from users of the digital story, students could be also developers of their own stories. By doing this, students could develop various types of literacy, such as: information, visual, technology, and media literacy. Actually, by enabling students to be involved in the design and creation of a digital narrative as well as to present their own digital stories, students have the potential to augment an integrated group of literacy skills, including: Research, Writing, Organization, Technology, Presentation, Interpersonal, Problem-Solving and Assessment Skills (Robin, 2006).

The educational use of digital storytelling could lead to certain advantages that support effective learning, namely: (a) the variation provided compared with the traditional methods, (b) the personalization of the learning experience, (c) the fact that the explanation or the practicing of certain topics become more compelling supported by an interesting story, (d) the opportunity to create real life situations in an easy and cheap way, (e) the students' engagement, and (f) the reinforcement of active learning (van Gils, 2005).

Taking the aforementioned issues into account, it seems that digital storytelling approach supports the interaction between students and teachers while it also enables students to construct their own stories. In addition, reflection, project-based learning and active learning are also promoted while technology is meaningfully being integrated in this context. The aforementioned characteristics are aligned with the social and constructivist views of learning (Jonassen, 1999; Vygotsky, 1980), where knowledge is not directly transmitted, but it is actively being built up by learners, who are based on their experiences and interact with their environment or culture. Thereby, knowledge construction can be promoted within constructive, collaborative, conversational, reflective, contextualized, complex, intentional and active contexts (Jonassen, 1994).

Digital storytelling has been used to supplement the learning of various subjects included in the curriculum, such as language, civics, mathematics, and computer science (Sadik, 2008). Based on the above, this article proposes a narrative approach on "Food Safety and Nutrition Education". It is realized within the context of the "EduForHealth" European Project.

Ten (10) essential topics were initially selected - according to the literature of food safety and nutrition - for pre-primary, primary and secondary education level. Based on these essential topics, a game-based approach as well as a narrative approach using digital stories were suggested in order students: (a) to be aware of their misconceptions and inappropriate behavior regarding nutrition, health and food safety and receive appropriate feedback, and (b) to acquire basic knowledge about nutrition, health and food safety, and verify conclusions previously presented by textbooks and teachers.

To this end, this paper suggests the design of educational digital stories about the said essential topics, to support pre-primary, primary and secondary education pupils and students in terms of nutrition and food safety awareness. In the following sections the design of educational digital stories will be explored; in section 2 the significance of food education will be discussed while in section 3 a modeling methodology (the Ed-W methodology; Kordaki, 2014) used for the design of the digital stories will be described, followed by the presentation of an example of a digital story about the role of vegetables and fruits in children's daily diet. In section 5 four instructional approaches related to the use of the digital story in the classroom are discussed. Finally, the paper ends with a summary and future research plans.

## Food safety and nutrition and the “EduForHealth” project

It is noteworthy mentioning that healthy nutrition is vital to good health and disease prevention, and it is also essential for healthy growth and development of children and adolescents. A deeply understanding of children's eating behavior will allow developing effective education in order to positively influence it. In this sense, according to Social Cognitive Theory, the dietary intake is influenced by behavioral, personal and environmental factors, which operate in an interactive manner as reciprocal determinants of each other (Rosen et al., 2012). Another approach of nutrition education is related to food labeling while a lot of data are focused on actual outbreaks and estimated incidences of food borne illness (Haapala & Probart, 2004).

Taking into account the aforementioned issues, the “EduForHealth” Project attempts to address the education for nutrition and health from the scientific, pedagogical and legislative perspective, taking also into account the age of children, the classroom level, the psychosomatic development of students as well as the national and local particularities. As far as teachers are concerned, they could be trained to better expand the current educational step by deploying an integrated approach; through the exploitation of traditional and web-based materials, as well as by the adoption of modern teaching approaches, such as game based learning and digital storytelling. Thus, in the context of this project, teaching and specific learning materials were designed. To this end, ten essential topics of Nutrition and Food Safety have been selected as appropriate for pupils' and students' healthy nutrition education at the pre-, primary and secondary educational level.

Based on these ten essential topics, appropriate digital stories - illustrating the problems and the consequences of inappropriate behaviors and knowledge on the heroes' health - were designed and could be integrated in the teaching process. By observing the assigned digital stories, each student could potentially be in the same position with the hero of the story at hand, and suffer by the consequences of her/his inappropriate knowledge and behavior. Hence, changes on student's behavior and knowledge might be expected. In the next section, the design framework of the designed digital stories will be discussed.

### The design of digital stories: the Ed-W model

The design of the aforementioned educational digital stories was based on a modeling methodology, named Ed-W model (Kordaki, 2014).

This methodology employs three certain models, namely:

1. the model of the subject matter, related to the basic concepts of the learning subject in question combined with the basic tasks that are appropriate for the students,
2. the learner's model, containing the students' non-scientific conceptions about the said learning concepts defined before, and
3. the learning model, containing the appropriate learning strategy through storytelling, based on social and constructivist views of learning, focusing on the acknowledgement and exploitation of students' misconceptions as tools for learning (Vygotsky, 1980; Jonassen, 1999). The *Ed-W learning model* is a 5-step digital story boarding strategy for the learning of a specific matter which, at the same time, probes the students' non scientific conceptions.

These five (5) steps are briefly listed below:

1. the hero confronts a troublesome situation where she/he has to apply the knowledge of the subject matter in question,

2. the situation is being aggravating, due to actions based on the hero's non scientific conceptions described in the learners' model,
3. the situation is improved because of external, uncontrollable factors,
4. the situation becomes frightful because the hero continues to act in the previously mentioned way, and
5. the hero is forced to reflect on her/his thoughts and practices, and makes appropriate corrections. Then, all problems are finally resolved.

To clarify the aforementioned methodology, an example of a storyboard designed by exploiting the aforementioned model, related to one of the selected essential topics of Food Safety and Nutrition, will be discussed.

### *An example of a storyboard for the learning of the vegetables' role in children's diet*

- Step 1 - Definition of the subject matter model and of the student model;

Definition of the subject matter model: The model of the subject matter considers the nutritional value of vegetables and fruits.

Definition of the student model: Young students get difficulties to comprehend the fact that fruits and vegetables are essential in their daily diet. So, it is a common phenomenon for kids and adolescents to overlook that importance. Young people believe that fruits and vegetables taste bad, refuse even to taste them while they prefer to eat junk food, sweets and cookies. These difficulties should be investigated in order to be surpassed by appropriately using the digital story.

- Step 2 - Definition of the learning aims of the digital story;

Students through this digital story are supported to overcome their misconceptions about the consumption of vegetables and fruits. Specifically, this digital story aims to support students to: (a) learn the nutritional value of vegetables and fruits, and (b) encourage students to try to eat fruits and vegetables.

- Step 3 - Creation of the storyboard using the Ed-W model;

In this step the storyboard of the digital story was designed based on the Ed-W model.

### **Implementation of the ED-W model**

- 1st edge of W

John, the hero of the story refuses to eat his fruits because they are not delicious. So he prefers eating cookies and sweets (see fig. 1, frame 1). This is the stimulus that leads in the beginning of the story. Due to his refusal to eat vegetables and fruits, John has problems with his intestine and his stomach.

- 2nd edge of W

John's problems are getting worse - his stomachache insists and he can't go to the toilet regularly - while he is also obliged to take medicine in order to be relieved (see fig. 1, frame 2). In order, John to be convinced and change his mind, his mother tries to convince him and to change his perspective about vegetables and fruits by also using relative books and magazines. So John has the opportunity to be informed about the nutritional value of vegetables and fruits, as well as their essential role in people's diet. However, based on his personal perspective about vegetables and fruits, he insists on his beliefs (see fig. 1, frame 3).

- 3rd edge of W

John is really happy because he continues eating sweets and cookies for breakfast and at school. Sometimes, when his mother is at the kitchen he can eat even more cookies without her noticing him (see fig. 1, frame 4).

- 4th edge of W

Unfortunately, having eaten plenty of junk food, he feels a really bad stomachache. His problems are being worse, as he throws up the eaten food. The doctor is coming and after he examined John, he informed him that the cause of his problems was malnutrition. He actually got sick because of lack of vitamins (see fig. 1, frame5-frame 7).

- 5th edge of W

Now, John seems to be affected by his setbacks and tries to reflect and revise his perspectives about the role of fruits and vegetables in his diet. He remembers his doctor's and his best friend's words and he wishes he could be the best basket ball player like his best friend is. This is a turning point for John. He realizes that vegetables, fruits and other healthy food, like porridge, should be an essential part of his daily diet in order to get the complete advantage of the nutrients and the necessary fiber that his body needs (see fig. 1, frame 8 & frame 9). The story ends when John is finally convinced about the nutritional value of fruits and vegetables and asks his mother to prepare vegetables and fruits for his daily nutrition. He also realizes that he can be the winner because by eating fruits and vegetables he becomes more powerful, too (see fig. 1, frame 10).

In the following section, four possible ways of integration of the aforementioned digital story in Health Education classrooms -by teachers- are briefly discussed (Kordaki et al., 2015).

### **Ways of use the digital story in the classroom**

The aforementioned educational digital story could be used in the Health Education classrooms by employing four different teaching approaches, namely, case-based, narrative-based, scenario-based and problem-based (Andrews et al., 2009). This instructional activity, in all of the aforementioned approaches, could start with students watching the digital story while they could also take brief notes for the basic points of the story.

**Case-based Method:** Students are supported to concentrate on the digital story, as external observers, and they are asked to create proper insights and conclusions. So, teachers could pose questions to take answers about the problems occurred in the digital story. Possible questions could be the following: What are the basic points of the story? What are the heroes' problems? What are the main causes of the problems occurred? What are the useful conclusions you have drawn? Can you write an overview of the story? Students could also work in groups, try to formulate questions and give right answers, and finally discuss the conclusions they came to. In fact, this educational story could potentially aid students to create a mental model about specific learning subjects based on the curricular content as well as students' misconceptions.

**Narrative-based Method:** Students are supported to conceptualize the events occurred during the story, to identify the non well-working assumptions, attitudes and beliefs that influence the comprehension of the case, and to draw in authentic ways proper conclusions. Teachers could ask students to try to be in the heroes' position and feel as they were. They could also ask them to describe their emotions when they watched the digital story. Moreover, they could ask students to identify the heroes' wrong decisions that caused the occurred problems as well as the heroes' emotions during the story. Students could be also encouraged to play a role-playing game based on the story they watched and try to express

their emotions during the role-play. Apart from role-play, students could try to create a poster or a poem/song based on the story they watched and present them in the classroom. Scenario-based Method: Students are asked to create alternative solution paths that fit to the problem that occurred in the story by combining the comprehension of the learning content, their prior-knowledge and their own experiences, and finally to create a new story based on the problem of the digital story at hand.

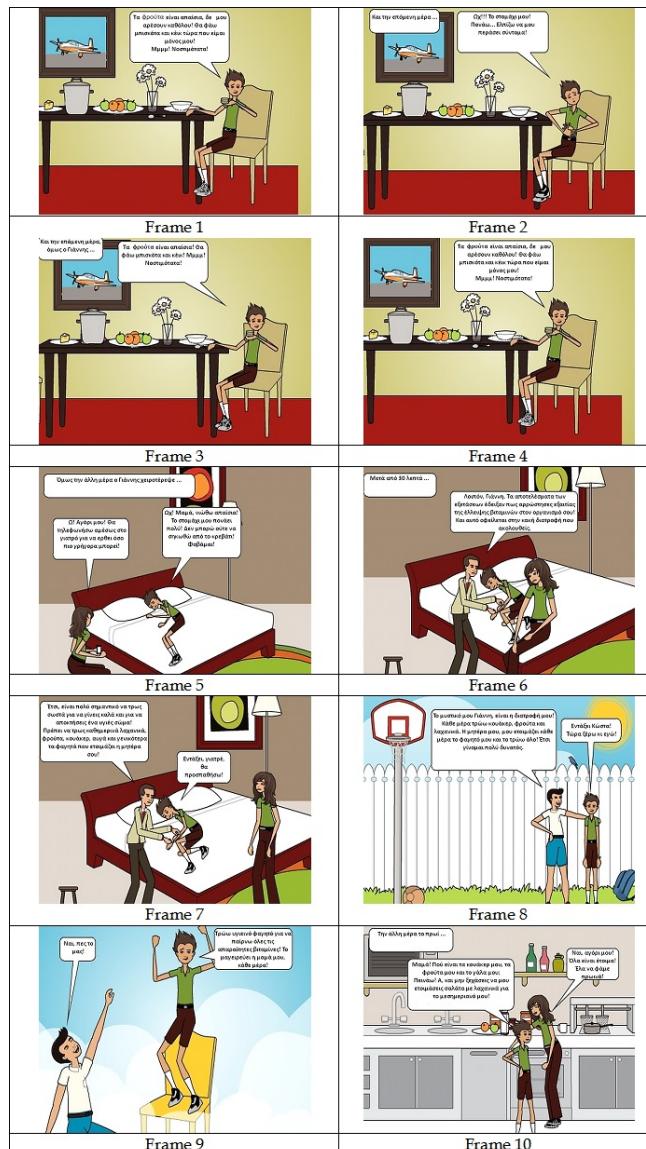


Figure 1. Scenes from the digital story "John and malnutrition"

Possible scenarios that could be suggested from the students are the following: 1<sup>st</sup> scenario-John's mother persuades him to rethink and change his nutritional habits. 2<sup>nd</sup> scenario-John insists on his nutritional habits despite his health problems. 3<sup>rd</sup> scenario-John's best friend, Kostas, nutritional habits are very healthy. Kostas invites John to stay at his cottage for two weeks. During this instructional activity, teachers could act as facilitators in order students to give themselves appropriate answers and to suggest appropriate solution-paths by using specific parameters.

**Problem-based Method:** Students are supported to explore, explain, and combine theory with practice in order to suggest viable solutions of the problem described in the digital story at hand. Teachers could either provide students a concrete problem - a boy that rejects eating vegetables and fruits and prefers eating sweets and cookies, or they could present students only a part of the digital story. In a second phase, students could be asked - either individually or in groups - to create their own stories that could suit to the problem at hand, based on their knowledge about the specific learning subject and their experiences, too. Students could finally present the new stories they created, watch the whole initial digital story, and, in the end discuss, the various points of view occurred and form useful conclusions. During this instructional activity teachers could determine whether students have comprehended the learning subject in question and could also identify the students' misconceptions about the specific learning subject.

## Discussion and conclusion

This paper presents a narrative approach in nutrition and food safety education. Ten essential topics about Food Safety and Nutrition for school children have been suggested by experts that were handled by 10 groups of educational digital stories.

The Ed-W model (Kordaki, 2014) has been employed for the design of the said stories. The Ed-W model is devoted to the design of educational digital stories taking into consideration modern learning theories and focusing on the acknowledgement and exploitation of students' misconceptions as tools for learning. These digital stories could be used as supplemental instructional tools for the learning of basic topics about nutrition, health and food safety. The implementation of the aforementioned model is illustrated through an example of a digital story about the nutritional value of vegetables and fruits. Teachers and students could employ the Ed-W model in order to create their own educational digital stories. On one hand, teachers have the opportunity to create stories focused on the basic concepts of the learning subject as well as the students' difficulties and misconceptions. Through specific steps they could approach the learning subject in question in order to design an interesting educational story. On the other hand, students could be also designers of their stories as they could use this model for the design of a story; thus, they could create educational stories either concentrated in a specific learning subject or in the context of a multidisciplinary project (e.g. digital stories in computer science and health education).

Four possible ways of use of the digital story at hand were also discussed. The suggested ways are case-based, narrative-based, scenario-based, and problem-based. The digital story at hand illustrates a specific problem combined with the consequences of the hero's behavior and students are encouraged through four different approaches to draw their own conclusions after personal reflection. It is noteworthy mentioning that the ED-W model could be adopted by the students either in scenario-based or problem-based method where students are prompted to create new stories. In both cases, students could have the opportunity to participate in an active learning activity through structured tasks (ED-W

steps 1-3) and they could become designers of educational artifacts that could be also used by their peers.

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