

STORYBOARD TOOLS FOR UNIVERSITY AND EDUCATION RESEARCH PROJECTS

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Abstract

This paper is focused on the presentation of storyboard and storytelling open-source online tools, for its application in the university context and in the education research projects. The main aim of this paper is to provide an open source tool to support (i) university teachers, using storyboard tools as a novel educational resource to include in their master and practice classes, allowing them to structure concepts or explain methodologies through images that have attached short descriptions; (ii) university students, as future industrial engineers, employing storyboard tools for structuring the decision-making process, by taking into account all the actors that are affected in the decision process; (iii) education research projects, adopting storyboard as a tool to aid the creative writing through matching creative images with keywords to capture the essence of the research project.

Keywords: Storyboard, storytelling, research projects, university teachers, university students, decision-making, master class, comic strips, creative writing.

1 INTRODUCTION

Since the beginning a desire to communicate visually has been a natural part of human behaviour [1]. The story of visual communication begins in a cave, painting wild animals, hands and figures on walls, as a desire to communicate. Is this a beginning of storytelling, with unlimited possibilities. Egyptians perfected this kind of visual storytelling 24,000 years later with hieroglyphics that tell pharaohs' entire life stories [9]. From cave painting to novels to movies, stories have been always present in the human race [2]. Even though the methods and tools used for storytelling have changed, the desire to tell and hear stories has remained unchanged, and still greatly impacts the way we look at life.

Storyboards are visual organizers, typically a series of illustrations, displayed in sequence of wireframes, for the purpose of previsualising a video, web-based training, or interactive media sequence [3]. The initial foundations of storyboards are infographic techniques for Film, TV and Animation. Infographic is the application of computing to design and animation.

In [3] it is described the history of storyboarding. A brief summary is presented afterwards: storyboarding was developed at the Walt Disney Studio during the early 1930s, with creating the idea of drawing scenes on separate sheets of paper and pinning them up on a bulletin board to tell a story in sequence, thus creating the first storyboard [4]. As a thirst for knowledge, one of the first live action films to be completely storyboarded was *Gone with the Wind*.

The goal of storyboarding is to get ideas down on paper and communicate effectively to all members of the team and end users, providing a tangible focus for discussion. The advantages of storyboards are that they are not costly, understandable, easy to make and provides the end users an early picture of the system.

Storyboards, most popularly used in the TV and film industries [5] tell stories and depict events through pictures [6]. Conveying large amounts of information, showing orders of events, and being easy to understand are all reasons that storyboards do not only belong in the TV and film industries. Storyboards use a visual language that can be followed and understood, including words, screenshot directions and descriptions, the pictures are to be universally understood [7]. Storyboards most often include portrayals of time, include people and emotions, include text, and have a certain amount of detail included [5].

More recently the term storyboard has been used in the fields of web development, software development and also in learning and education [3].

According to [7] technology classes are digital storytelling, where the students use their creativity to design their storyboards. Storyboarding in education can be used for more than writing and videos in

the world. In this regard, it can be used to arrange a series of Power Point slides, transparencies, or a series of computer screens [8]. Some examples of using storyboards in the education and learning area are proposed in [7]: series of events to memory for history class, help to visualize biological processes in life science, or create patterns to remember computer programming steps in technology, all by drawing and adding text to the storyboard.

The motivation of this paper is to provide a set of storyboard and storytelling open-source online tools, for its application in the education and research context. Three are the identified potential users for the storyboard and storytelling tools:

- the university teachers: using storyboard tools as a novel educational resource to include in their master and practice classes, allowing them to structure concepts or explain methodologies through images that have attached short descriptions;
- the university students: as future industrial engineers, employing storyboard tools for structuring the decision-making process, by taking into account all the actors that are affected in the decision process;
- the researchers, carrying out educational/research projects and preparing proposals for granting educational/research projects: adopting storyboard as a tool to aid the creative writing through matching creative images with keywords to capture the essence of the research project.

In the light of this, the paper is organised as follows: section 2 a set of storyboard and storytelling tools are identified and analysed, by considering relevant characteristics; section 3 describes a use case of one of the proposed storyboard and storytelling tools; section 4 discusses the results obtained through the paper and presents the conclusions of the work carried out.

2 STORYBOARD AND STORYTELLING TOOLS

From a practical point of view, teaching with storyboards can help instructors to quickly convey complex ideas to their students – often much faster than writing or even speaking. Instead of writing only words, students, teachers and researchers can also incorporate drawings to help them see in a clearer way the ideas. Storyboarding can support in writing a paper, doing an oral presentation, or outlining a story [8].

Motivating students to make their own storyboards and then utilizing technology to bring them to life, is a key question in education. In this regard, many classrooms are teaching students digital storytelling skills that are likely to become increasingly important over time [8].

In the light of this, this section proposes and describes a set of storyboard open-source online tools that are considered interesting for the university application (students and teachers) and for the education research projects use (researchers).

★ **Australian Centre for Moving Image (ACMI) Generator [10]**

ACMI Generator is a creative studio space where you can explore storyboarding concepts further with the Storyboard Generator. Choose a script and create a storyboard, and build your own storyboard using background location photographs. Save and share your storyboard video with friends. Remember to register with Generator first if you would like to save your storyboard.

★ **Boards [11]**

Boards is a web-based tool for making perfect storyboards quickly and easily. So you can focus on the important stuff. Draw directly into your frames with the drawing tool to make your storyboarding process simpler. Share Storyboards with people online. Or download them as PDFs. Printer morphs into a mouse. A finger drops in from the top and clicks the mouse.

★ **Bubblr [12]**

Bubblr is a community where people can create comic-strips (photonovels) using photos from flickr, just taking a sequence of pictures where you can add bubbles and create a story. All stories are saved in the archive (<http://www.pimpampum.net/bubblr/archive.php>).

✦ **Comic Master [13]**

Comic Master allows you to create your own short graphic novel. With Comic Master you can decide how you want the page or your graphic novel to look, add backgrounds, choose characters and props to appear in your scenes, add dialogue and captions, and much more. The steps to create the storyboard are described in the online tool: 1. Choose a standard page template, or build your own layout. Click 'Done' once you are happy with the layout. 2. 'Zoom In' to a frame, move around, and get going creating your story. 3. From the backgrounds palette 'drag and drop' a background into your frame. 4. Select the background and shrink or enlarge it with the handles at the corners and edges. You can even rotate the image if you want. 5. Add characters to your scenes by dragging them from the characters palette. Do the same with props. 6. Add special effects to a scene to create impact. 7. You can add dialogue and captions to each scene. Drag a speech bubble or caption to a frame, resize, even flip-it. 8. Re-order the elements in your scene by selecting one and using the 'reorder' buttons 'Move Object Back' and 'Bring Object Forward'. 9. Save your work with the 'Disc' button. You will need to create a log-in ID and password. 10. Print out your page with the 'Printer' button. 11. Add/delete a new page with the 'New Page/'delete' button.

✦ **MakeBeliefsComix [14]**

MakeBeliefsComix.com creator Bill Zimmerman has made it his life's work to create books, newspaper features and educational resources that help people of all ages find their writer's voice and express their deepest thoughts and feelings. Many users of MakeBeliefsComix.com have asked for more help in their writing. In response, the site offers a number of his pioneering writing prompts to help students communicate their ideas. You can add other characters, colored backgrounds, objects, and panel prompts to keep your viewers interested. When you are done, you can print or email your comic.

✦ **PicLits [15]**

PicLits is a creative writing site that stores images with selected keywords in order to inspire you. The object is to put the right words in the right place and the right order to capture the essence, story, and meaning of the picture. It uses a drag and drop functionality to create storyboards and capture pictures and key words. Choose any image to create your PicLit—a photo plus words—by clicking on it from the carousel at the top of the home page or using the image featured on the home page. You can speed up the carousel by holding your mouse over the arrows at either end. If you would like to see all the carousel images at once, you can click on the "See 30 more photos..." link on the right side of the carousel. If you need some extra inspiration for creating your PicLit, you can use the Drag-n-Drop customized keywords underneath the photo, kind of like refrigerator magnets. If you would like more freedom with the creation of your PicLit, you can click on the Freestyle button to access the same picture with a text box where you can type anything you choose.

✦ **Slidestory [16]**

Slidestory allows you to combine picture slideshows with voice narration. Each picture in a slideshow has an accompanying voice narrated mp3 audio file, optional tags, and text caption. Download the Windows Publisher client program and start creating presentations in a matter of minutes (Windows restart required). You will need your username and password in order to connect to the server via the Slidestory Publisher.

✦ **Storybird [17]**

Inspire your students to write better and read often. While making, sharing, and reading stories on Storybird is free, printing them or downloading them have various fees that are clearly explained with each option. Professional artwork jumpstarts student creativity, quickly drawing them into the writing process and scaffolding their progress. Simple tools keeps them on track; social feedback keeps them going. Onboard students with or without email, issue challenges, review and share work, and build a beautiful class library. All in a private setting that collects NO data from you or your students. Storybird is free for educators. In fact, we pay you. Run a class or school Fundraiser and get 30% of the proceeds. It doesn't get better. Learn more here. Storybird lets anyone make visual stories in seconds. Storybird curates artwork from illustrators and animators around the world and inspire writers of any age to turn those images into fresh stories. It's a simple idea that has attracted millions of writers, readers, and artists to our platform. Families and friends, teachers and students, and amateurs and professionals have created more than 5 million stories—making Storybird one of the world's largest storytelling communities

★ **Storyboard That [18]**

Create storyboards without a storyboard artist. Filmmaker, teachers, students, businesses all use Storyboard That, easy online storyboard & comic creator. Storyboard engages students with digital storytelling in the classroom. Foster Presentation Skills and Inspire Creativity. Featuring an intuitive drag and drop interface and an image rich library, Storyboard makes it easy to create storyboards that your students. During your 14-Day free trial, teachers, researchers and students will have full access to all the classroom features. Unlimited Storyboards with up to 100 cells. Personal Teacher Dashboard. Support for Google Sign On. Safe, Secure, and Private. Storyboard takes privacy very seriously. FERPA and COPPA Compliant. By default, all storyboards are private and encrypted. Storyboard That is iPad & Android Friendly. As an HTML 5 website, Storyboard can be accessed on a computer or tablet device. Login from either a computer or a tablet. Storyboard Creator automatically adapts to your device. No Flash required.

Characteristics such as (i) video supported, moving images; (ii) comic strips; (iii) photos or images, collages; (iv) social platforms blogs, documents connection; (v) degree of personalization, free database images and materials; (vi) music supported; (vii) easy to use; (viii) printable version; (ix) maps connection; (x) manuals and examples; are considered to select one storyboard tool. In the light of this, Storyboard That open online tool is selected for this paper in order to provide an example of a practical work.

3 PRACTICAL APPLICATIONS

In this section a practical application with the identified storyboard tool Storyboard That [17] is described. Highlighting the easiness of use, the usability and the utility of the identified storyboard and open-source online tool.

Storyboard That allows creating your own characters using a web interface and also doesn't require any hand-sketching to get started. You can create storyboards for free but they will be publicly available. Subscriptions start at \$15 per month.

Storyboard That has an intuitive drag-and-drop interface.

Steps to follow for creating a storyboard in Storyboard That tool:

- 1 Select the scene you would like to add. Storyboard That has hundreds of scenes organized in categories like around town, home, school, offices, and even about historical. With drag-and-drop you can put your scene in the square of the storytelling. The scene automatically fills the entire cell, and this means no fussing with lining up edges.
- 2 Add a character. Storyboard That has hundreds of characters to choose from. The characters can be customised in order to better represent the persons that are involved in the process or history that you want to tell. The colour selector allows having many options for the person characteristics.
- 3 Pose the character. Storyboard That offers quick poses like speaking, angry, walking, and various others, or for more detail posing you can go on edit pose and manipulate the character more in depth. In the Storyboard That character poser, you can change lots of things, forehead you can tilt from left to right. For the expression you can choose a set of eyes and mouth that shows the emotion you want. For arms, choose the arms to hold an item or show a particular pose. For legs, you can choose legs for standing walking, sitting or even nervousness. Hovering your mouse over the poses in the menu will give you some great use suggestions.
- 4 Include props and images. Prop and images can be easily searched for and found using Storyboard That search bar. There are tens of thousands of images to search for so that you can find the perfect item. Enter the word of the props or images you want to include in the search bar and select one that fits with the storyboard you are building, from the given options. You can click and drag it into the scene, and change the size and orientation by using the transform box and flip tool.
- 5 Add text. To do this, you can click on the text labels tab and select either the free form text tool or a word bubble. After pulling it into the scene you can see that you now have the option to type, change the font and text size. Play around with this options to get the right feel for your story board.

- 6 Complete your storyboard by dragging and dropping scenes and characters that will tell your story. For the competition you can copy the characters (instead of having to find them again in the character directory). You can add additional characters in the background to get the cell a nice full feeling.
- 7 Upload images. If you want to add custom graphics you can click the upload button bringing you to your computer where you can select an image to upload to your storyboard. Storyboard That supports jpegs, PNG's gifs and bitmaps. Once the image is uploaded it will show up in the image scene of uploaded files and you can grab it and place it on the place you want in your scene
- 8 Save the storyboard. You click Save button, a save dialog will pop up and you can add your storyboards title and description. And then you have it. A completed storyboard saved to your account.

Two practical applications have been performed in order to test StoryboardThat tool: (i) research project, and (ii) students practical classes.

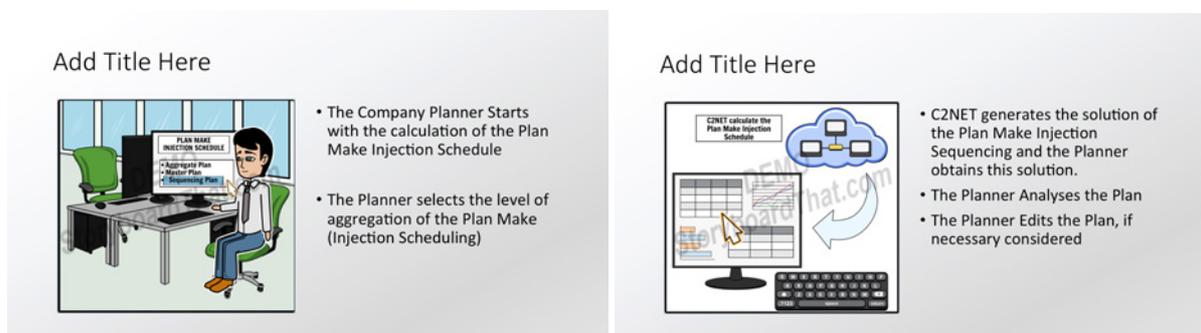
3.1 H2020 European Project C2NET

With the aim of testing the StoryboardThat, the researchers of the Research Centre on Production Management and Engineering (acronym in Spanish, CIGIP), of the Universitat Politècnica de València (UPV), have used the identified storyboard tool in the context of the H2020 European Project: Cloud Collaborative Manufacturing Networks (C2NET) [19]. In order to introduce the reader, C2NET objective is based on the creation of cloud tools to support optimization of manufacturing networks composed mainly of SMEs and their logistic assets through demand management, production and supply plans, considering the Collaborative Network perspective. Interested readers can access the work of Andres et al. [20], in which an overview of the project, as well as the objectives, and a summary of the results is presented. C2NET project has the purpose to connect the Industrial, the Research and the Development perspectives. To this regard, four industrial Pilots are considered in the project, belonging to different industrial sectors (automotive, dermo-cosmetics, metalworking SMEs and OEM production of hydraulic and lubrication systems).

StoryboardThat has been used in one of the project tasks, in which the validation scenarios are defined. The authors of this paper were concretely involved in the automotive Pilot, and storyboards were used in the initial definition of the validation scenarios, to be performed along the project for the implementation of the C2NET results.

The use of storyboard technique has allowed the researchers of C2NET to simplify the way in which to explain, to the industrial partners, the steps to be performed for validating the results of C2NET project. Industrial partners are less familiarised with ICT and technical terms; thus, StoryboardThat has enabled the representation, through images and text, of all the steps to carry out by the industries when performing the validation scenarios defined.

An example of the results obtained is shown in the Figure 1.



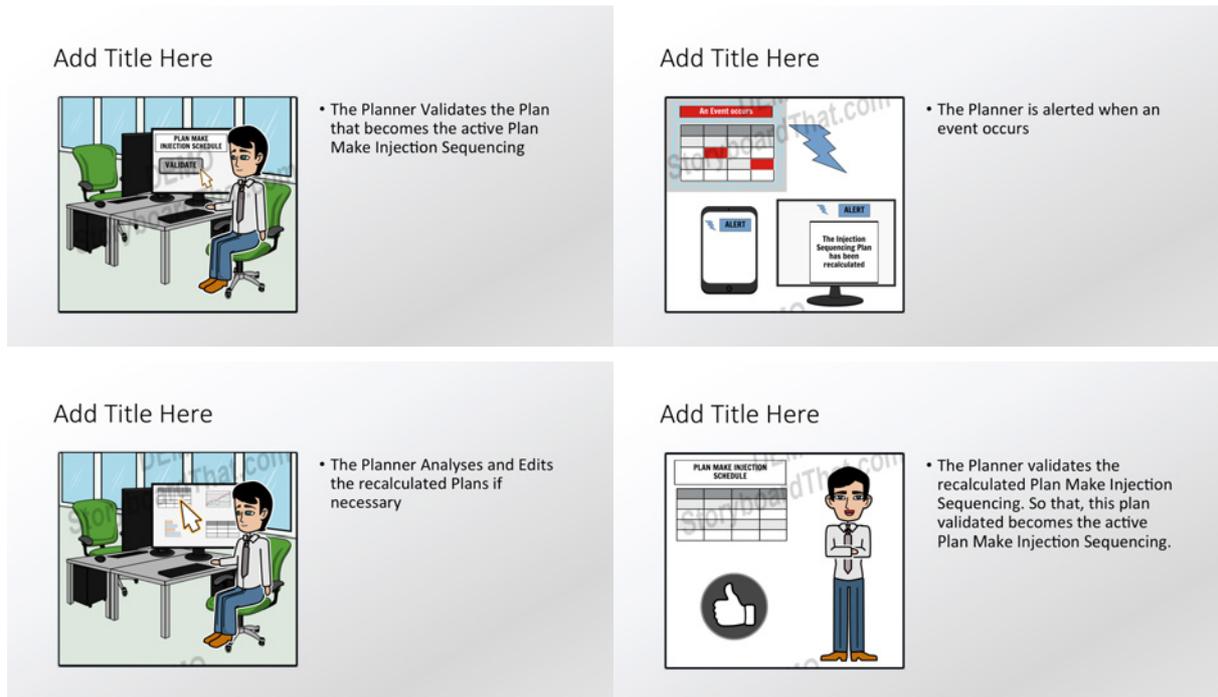


Figure 1. Example of StoryBoard That tool: Guideline for the automotive validation scenario (use of C2NET results for Company Planners).

3.2 Practical lesson for University Students

An example of a storyboard has also been applied in the practical classes of the Industrial Engineering Degree, in the Universitat Politècnica de València (UPV). The practical lesson was devoted use the Storyboard That tool so that the students can model the use of a specific tool. The main aim of the storyboard drawn by the students is to perform a guideline of the use of a specific tool, to support decision makers of a company. The tool, for which the guideline is performed, is an optimisation software that allows the Company Planner to compute some of the plans carried out in the production plant. The specific plan for this example is the Injection Schedule Plan.

The proposed activity serves the students to realise about the difficultness of explaining the utilisation of a complex tool. The use of storyboards has allowed the students to design a guideline with images and text to support company planners with the utilisation of complex optimisation tools. Through this practical lesson, the students have perceived the easiness of use of the proposed tool and the importance of simplifying the ideas when communicating complicated concepts to different types of audience, in this case company planners.

The UPV, where the practical use case is tested, is currently involved in the project of incorporating transversal competences into the curriculum of graduates. For the student, this represents an opportunity to acquire transversal competences and to accredit their training in such competences. While for the UPV, it can be an added value in the improvement of the titles, national and international accreditations. Thirteen are the competences identified in the UPV: Comprehension and integration; Application and practical thinking; Analysis and problem solving; Innovation, creativity and entrepreneurship; Design and project; Teamwork and leadership; Ethical, environmental and professional responsibility; Effective communication; Critical thinking; Planning and time management; Permanent learning; Knowledge of contemporary problems; and Specific instruments.

With this practical lesson, an the use of Storyboard That tool, the transversal competences worked by the students are [21]:

- Understanding and Integration: Understanding means "to perceive and have a clear idea of what is said, done or happens or to discover the deep meaning of something". To demonstrate that something has been understood, the person identifies and retrieves the information and explains it in his own words, interpreting and integrating the ideas from his own perspective.
- Effective Communication: Communicating effectively means having the ability to convey knowledge and express ideas and arguments in a clear, rigorous and convincing manner, either

orally or in writing, using the appropriate resources appropriately and adapting to the circumstances and the type of audience.

- Application and Practical Thought: The student, in real life, needs to be prepared to deal with situations in which it is not enough to apply recipes or formulas and in which the decisions or solutions that are proposed must be argued and accommodated to the available resources. In this sense, this competence develops the way of thinking directed to the action, that allows to adapt to new situations, to make decisions and, consequently, to ACT.

4 CONCLUSIONS

This work developed in the present paper, focuses on proposing a set of tools to create storyboards in the context of university students, teachers and researchers. In this paper, a study of the most relevant tools for storyboards creation is presented, considering some the most valuable characteristics for students and researchers. A brief description of each of the identified tools is proposed with the main aim of showing their strengths, for each of the three identified contexts: (i) teachers, (ii) students and (iii) researchers. Accordingly, storyboard tools will be used as a support tools for the master classes, decision-making processes, in different areas of the industrial engineering, and creative writing of education research projects. To this regard the three involved actors will benefit from an online and open-source tools for working in the education context and will be supported by the images with short text explanations to develop their classwork and research work. Two concrete use cases of application are presented in the paper, in the scope of students and researchers, applying storyboards in the context of the H2020 European Project: Cloud Collaborative Manufacturing Networks (C2NET). The use cases have allowed showing the easiness of use of the StoryboardThat tool and the potential advantages of using it for reducing the complexity when communicating difficult to understand issues.

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