

## Modelling Learner-Generated Comic Production: An Initial Design

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**Abstract:** There is an emerging interest in using comics as a digital storytelling medium where learner's knowledge and ideas on various subjects are synthesized in a form of sequential art. However, research that explicitly associates the methods and elements in digital storytelling and educational comic development is scarce. Therefore, this study discusses the concepts, domain and process that leads to the formulation of learner-generated comic production model. The study begins with rationalization of a production model for learner-generated comic. Then, the general approaches for designing and developing the proposed model are elaborated. Finally, the model components are identified and an initial model of learner-generated comic production is proposed.

**Key words:** Comics, educational comics, digital storytelling, learner-generated content, elements, model

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### INTRODUCTION

Rapid advances in multimedia authoring tools have revolutionized education through learner-generated content. It is an educational approach based on empowering students to produce their own contents (Torres and Guerrero, 2013) such as Digital Storytelling (DST). As a fast accumulating practice in education, DST is also defined as a technology application that takes advantage of user-directed content and help instructors use technology productively in their classes (Robin, 2008). Literally, the gist of comic production commonly emphasizes more on the art of storytelling through a multi-panel of pictures (Upson and Hall, 2013). In comics, storytelling takes its place in a form of words and artwork (Gerde and Foster, 2008).

These characterizations imply that the production of digital comic also belongs to DST practice, since this visual narrative can be designed using computer-based tools. Plus, story is regularly regarded as an essential feature in comics (Gerde and Foster, 2008; Caldwell, 2012). Thus, Learner-Generated Comic (LGC) production refers to a DST approach that produces digital educational comic as the primary learner-generated content.

Despite educational function of creative production lies both in learning to write multimodal texts and understanding the complexity of the design process

(Peppler and Kafai, 2007) there is a shortcoming of research that explicitly associates the theoretical concepts from DST models and educational comic. For instance, educational comic production must be well-grounded based on the overall foundation of sequential art and graphic narrative history (comic), script (story) and pedagogy (learning) (Kane, 2013). Equivalently, (Keller and Oechslein, 2013) also strongly established educational comics into visual (comic), narrative (story) and knowledge (learning) dimension.

However, to the best of the researcher's knowledge, investigation of literature discloses that current DST models and LGC classroom practices were varying in adopting comic, story and learning elements and showed lack of cohesions among each other. In addition, current educational comic model (Gerde and Foster, 2008) is intended for development of LGC with the collaboration between educators and comic practitioners instead of learners.

Therefore, this study proposes LGC production model that serves as a systematic approach that includes the fundamental components for learners to design and develop digital educational comics. This is because design requires a representation framework that confines the essence of the concepts which support design processes (Gero, 1990). Graphical models are among the tools to visualize conceptual models (Sargent, 1986) where

the component's function, structure and behaviour are illustrated in diagrammatic representation (Coyne *et al.*, 1987). Hence, the link between comic, story and learning domain to systematic process is discussed and presented, using a standard figurative representation of the LGC production. In sum, the potential of educational comic should not be dismissed (Azman *et al.*, 2015). Hence, the underlying premise of this research is a systematic production model based on elements of storytelling and learning when combined with an understanding of digital comic development principles can contribute to the planning, implementation and evaluation of learning session that enhance student's educational experience.

### MATERIALS AND METHODS

Adapting design science research methodology (Hevner, 2007), the suggestion and development phase refer to the process of constructing the research artefact which is the LGC production model. Hence, several approaches from conceptual model development lifecycle were adopted prior to proposing LGC production model.

Based on this method, content collection was mostly carried out through comparative studies. Significantly as a document-driven approach of designing models (Jede and Teuteberg, 2016), the comparative analysis combined semi-formal languages with co-occurrences. This means this study firstly defined the vocabulary used for abstracting the components for LGC production model before creating a linkage between elements extracted from literature.

LGC production model is defined as the application of a systematic approach that includes the process and techniques for learners to produce digital educational comics. This definition strongly denoted that the proposed conceptual model should be a simple and task focused (Johnson and Henderson, 2011). Hence, this study decided that LGC production model components are consisted of phases, tasks, flow and activities as shown in Table 1.

Phases are distinct general stages of the model that can be performed in order while tasks can be described as constituent parts of the model that contribute to each phase. On the other hand, flow in the model defines the way and manner of progress from one phase, tasks or activity to another. Activities in the model are specific steps or processes that are suggested to be conducted during the LGC production. All these model components are combined and made up as the LGC production model.

Table 1: Approaches embarked on prior to proposing the LGC production model

Components	Content-collection approaches
Phases	Comparative study of LGC classroom practices
Tasks	Comparative study of DST Models and frameworks
	Comparative study of professional's creative process
Flow	Comparative study of LGC classroom practices
	User participation
Activities	User participation
	Expert consultation

### RESULTS AND DISCUSSION

**Design and development:** In general, production of digital content is structured into three main stages; pre-production, production and post-production (Musburger and Kindem, 2009). In order to conceptualize the generic phases of LGC production model, 11 selected works on LGC classroom practices by scholars were compared by classifying and grouping processes by with commonalities. From the comparative study of DST Models, seven general phases mapped into appropriate production stage were identified. They are context setup, narrative brainstorming, scriptwriting, storyboarding, composing, publishing and assessment.

To continue constructing LGC production model on the established root of comic, story and learning, a line by line analysis through 10 existing DST Model and framework's illustration, snapshot and elaboration was conducted. Provided that none of the DST Models and frameworks were exclusively designed for comic production, only the story and learning elements were recorded. Next, to obtain the tasks for storyboarding and Composing phases, several interviews among professional comic artist reported in scholarly literature were analyzed. This is because key factors to making successful comic academic programs would be the input of comics creators and professionals (Williams *et al.*, 2014). Scrutinizing the comic development process from the interviews, visual storytelling elements and techniques for efficacious and successful comic production were extracted.

As a result, the comparative analysis of DST Models and frameworks along with documented interviews prompted the aim of the tasks for proposed phases in LGC production model (Table 2).

To acquire the activities and flow between the tasks in LGC production an expert consultation and participatory design session with users involving 30 undergraduate students were conducted. The aim of this user-centered design approach was to gather the procedure the students went through in producing LGC.

Table 2: Proposed tasks based on story, learning elements in DST models and professional's comic development process

Phases/Tasks	Aim
<b>Context setup</b>	
Purpose	Generating idea based on the given topic and clarify the educational goal of the DST project
Scope	Determine the audience, duration of the digital story and required tools
<b>Narrative brain storming</b>	
Knowledge	Research, reflect, select and plan the presentation of educational content in the digital story
Storyline	Develop story elements such as structure, plot and setting
Character	Decide the voice or point of view of the digital story
<b>Script writing</b>	
Basic script	Polish the script by describing scenes precisely according to the story draft
Comic panel	Estimate how many panels fit into single pages and which dialogue or action occur in every panel
<b>Storyboarding</b>	
Layout	Sketch out the comic narrative by experimenting on flow, focus, tone and continuity
Text	Position words suitably and optimally
<b>Composing</b>	
Pictorial	Produce the comic by controlling clarity, mood and intensity of the pictorials and text
Lettering	Apply comic typography and balloons for fitting impact
<b>Publishing</b>	
Modes	Gather the digital resources and publish digitally
Medium	Use accessible technology to launch the digital story
<b>Assessment</b>	
Learning	Evaluate the educational outcome of the DST project
Entertainment	Assess the emotional impact of the digital story



Fig. 1: Participatory design session with end users

In the session, the students were instructed to develop their own digital educational comic related to web programming topics (Fig. 1). After their completed LGC were submitted, a formal discussion was conducted to reflect their experiences in LGC production. The students were required to critically reflect the process that effectively assisted them to produce decent LGC by responding to reflection topics. Examples of student's responses from reflection session.

**Idea generation:**

- Brainstorming
- List down ideas/concepts/story flow of comic
- Choose the best story

**Scripting:**

- Write down dialogues for each scenes
- Make corrections to dialogues

**Login bitstrips:**

- Register our group in bitstrips for school

**Create characters:**

- Make a new avatar for our group
- Create as much characters required for comic
- Name the characters

**Create scenes:**

- Select relevant layouts and inserts suitable scenes for the comic
- Add objects in the scenes
- Delete unwanted objects

**Make comic:**

- Insert developed characters into the scenes
- Adjust character's facial expressions based on story flow of comic
- Add dialogues to characters
- Brainstorming
- Discuss to get an idea
- Storyboard
- Make a storyline
- Study about HTML and client side scripting sketch
- Sketch the character
- Development
- Build the comic

Meanwhile, the experts were asked to provide their opinions on the keywords used in the initial design of LGC production model. This semi-formal discussion

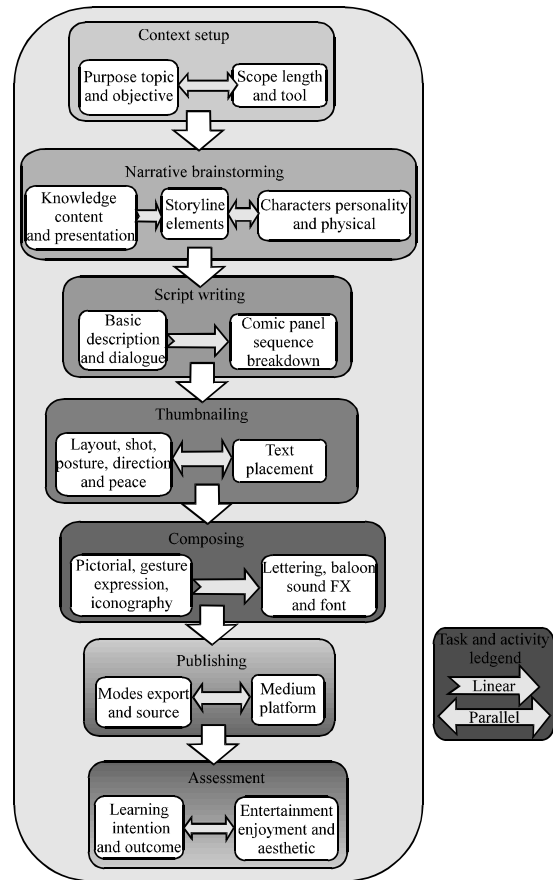
**Table 3: LGC production tasks and activities from participatory design session**

Phases/Tasks	Activities
<b>Context setup</b>	
Purpose	Clarify what is the general topic of the LGC such as PHP programming, planets or acid and base Identify the actionable educational objective of the LGC whether to summarize, interpreted, argue or more
Scope	Determine the required comic length which may consist of panels or pages select and familiarize with the digital tools used in LGC development
<b>Narrative brain storming</b>	
Knowledge	Choose relevant or important educational content from the topic to be included in the LGC. Based on the objective, plan how the content will be organized, structured and presented in the narrative
Storyline	Draft the narrative to frame the content using story elements
Character	Decide a character personality which would interestingly drive the story. Design the physical appearance of the character in the LGC
<b>Script writing</b>	
Basic	Visualize the story with description that portray every scene such as action, location and time. Write the character's dialogue
Comic	Break down the script into pages and sequenced panels
<b>Thumbnailing</b>	
Layout	Sketch the panel's camera shot, character posture, direction and pace based on the comic script
Text	Indicate the placement of words in the comic
<b>Composing</b>	
Pictorial	Construct the comic with character's gesture, expression and visual iconography
Lettering	Exploit the words with font, balloon, sound effect's shapes and sizes
<b>Publishing</b>	
Modes	Export comic into standard readable format. Preserve the source files for reuse or modifications
Medium	Assign the digital platform for the comic to be published
<b>Assessment</b>	
Learning	Define if the LGC has met it's objective as intended. Evaluate the LGC's outcome based on content accuracy and usefulness
Entertainment	Rate the enjoyability of the LGC. Rank the LGC's aesthetics

involved two practitioners who have more than 10 years of experience in comic industry. The most important standpoint was the storyboarding task should be replaced as “thumbnailing” as it is a more standard term used in comic production. According to the experts, the value of educational comics rely on how successful they are in exceeding its intention and the outcome that impacted the audience. However, to keep the audience’s interest, the educational comic should also be enjoyable and aesthetically appealing. Other activity components were further put forward by the experts according to the best practices in comic production.

Built upon expert’s recommendation and student’s feedback from the reflection session, the following activities were aligned into the LGC production tasks (Table 3).

From the participatory design session, the flow of the tasks in LGC production was also recognized. Based on comparative study of LGC classroom practices, DST models, frameworks, documented interviews, expert consultation and user participation this study had formulated the overall components of LGC production model categorized into phases, tasks and activities. As a whole, the proposed LGC production model was visualized and shows in Fig. 2. As previously explained, the proposed model represents the fundamental components for learners to systematically design and develop digital educational comics.



**Fig. 2: Initial design of LGC production model**

## CONCLUSION

This study has addressed the issue of how LGC production model can support the implementation of DST with educational comic as a learner-generated content classroom practice. In this study, theories and evidence from literature were synthesized in order to propose a practical model of DST that can be applied to LGC projects. The aim was not to replace existing theories or frameworks but to draw on them in order to present a systematic guideline that would be of value for learners to construct digital educational comics. Upcoming work will report on validation of the proposed model through expert reviews.

## ACKNOWLEDGEMENTS

A large amount of thanks owed to every personnel in Universiti Utara Malaysia and Universiti Teknikal Malaysia Melaka who supported this study. This research is proudly funded by the Malaysian MOE under FRGS grant.

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