

A Support Tool for Training in Writing Animation Movie Scripts

Panadda Jaiboonlue

*Department of Animation, Game and Digital Media, Faculty of Science and Technology,
Bansomdejchaopraya Rajabhat University*

Corresponding author: panadda.ja@bsru.ac.th

Received April 3, 2023 ■ Revised October 4, 2023 ■ Accepted October 9, 2023 ■ Published December 28, 2023

Abstract

This research aims to design and develop an animation scriptwriting support tool with an ontology as a knowledge base and to study the effectiveness of the tool in improving students' animation scriptwriting skills. In design and development, a schema of the crafted ontology stores the knowledge related to principles of animation script writing, and it is utilized to support students in understanding abstractedness of relations within script schemes. In this study, the experimental population and chosen samples were 33 undergraduate students from the entire class of 45 students of the Animation and Digital Media Program at Bansomdejchaopraya Rajabhat University by a simple random sampling method. The research instruments include the developed training supporting tool, a form for evaluating an effectiveness of the tool, and a form for evaluating a usage suitability of the tool. The evaluation forms were calculated with the Item-Objective Congruence (IOC) index and revealed indicator scores in a range of 0.67 to 1.00. Mean and standard deviation were used for data analysis.

Results of this research indicates that the developed tool a good result in terms of effectiveness ($M = 4.10, SD = 0.43$) and is evaluated for a usage suitability for a high suitability ($M = 4.33, SD = 0.54$). The evaluators found the design of the supporting tool impressive as it helps to exemplify complex principles within writing script schemes and leads students to acquire the necessary knowledge and skills by fostering a conducive learning environment by partitioning these components into distinct and coherent sections and encouraging thoughtful reflection of students' own results. Furthermore, the results of using the tool for assisting students in developing animation scriptwriting skills showed significant improvements in learners, as 34% of students displayed greater awareness of the mandatory structure in a scriptwriting.

Keywords: scripts writing, animation script components, awareness of though, learning supporting tool

Introduction

An animation movie is one of the creative (Redvall, 2009) media mediums that can engage viewers with stories. Since animation movies are more visually captivating and reaching to more imaginary possibilities for a cheaper cost, demand on animation movie has gradually increased. Nowadays, most animations are created with computer-generated imagery (CGI) to make still figures appearing as moving images (Røssaak, 2006). Among the producing processes of animation, scriptwriting is a crucial part. The purpose of scriptwriting is to create the main concept and theme of an animation movie. It provides a predetermined look at what is a core idea and what scenes are required to match the overall message a creator aiming to portray (Ladopoulou & Dimitriadis, 2022). It helps to organize the ideas and examine logical connection within a story that will determine the quality of the final product.

In learning of developing animation in classrooms, scriptwriting is one of the hardest topics for students to comprehend since it requires creativity along with

theoretical understanding of necessary components of scripts and how to convince viewers. Unlike story for live-action movie, being an animation movie does not include the cost of expensive and dangerous scene settings such as location cost, actor cost, risky explosive objects and talking animals; thus, it is essential to make benefit of this advantage. With several aspects to consider in writing animation scripts (Wright, 2013), students as novice animation creators commonly make mistakes such as an incomplete idea, an insensible connection in story, and not making a good use of being animation. In most cases, to correct the mistakes, instructors need to point them out from the written scripts and give a direction on how to improve them. However, as abstract as story components are, it is not easy for instructors and students to clearly share the same vision, and this obstructs the students' improvement.

Using information technology tools in education can greatly enhance the learning experience for both students and teachers. Information technology tools in education refers to software or a computer-based

service that supports learning of specific knowledge and skill. The tools enable students and teachers to collaborate on project in real-time and remote collaboration, especially in the covid-19 pandemic time (Torres Martín et al., 2021, p. 582). Computer-based tools have the potential to make learning more engaging and interactive to capture students' attention and foster active participation (Faridah et al., 2020). The tools also generate data that can provide valuable insights into student performance, progress, and areas of improvement. These data can inform instructional strategies, identify learning gaps, and support evidence-based decision-making for educators, allowing for more targeted interventions and personalized support to further enhance personalized learning and adaptive learning approach. Furthermore, while there may be upfront costs involved in developing and implementing computer-based tools, they can be more cost-effective than traditional educational resources in the long run. Digital tools can be easily updated, shared, and accessed by multiple users in which reduces the need for physical materials and repetitive purchases of learning resources.

In this work, we develop a digital tool to help students to conceptualize components in their animation scripts into explicit objects. With the use of an ontology, conceptualized components are connected following script theory (Demorest & Alexander, 1992). This will help both students to recheck their idea and instructors to point out the mistakes. Moreover, the students will become more aware of necessary script elements and train their story composing for improvement.

■ Literature Review and Background

1. Basic Theory in Animation Scriptwriting

Fundamentally, a script for an animation is similar to a screenplay of other medias including movies and theater plays as they share common elements (Scott, 2003). An animation script is a form of literary as it is intended to be interpreted by other such as producer, graphic designer, illustrator, and voice actor. Therefore, an animation script is not an end-product that audiences can directly enjoy. Apparently, an animation script is written using technical jargon and tight, spare prose when describing stage directions.

Marx (2007) Unlike a novel or short story, an animation script focuses on describing the literal, visual aspects of the story, rather than on the internal thoughts of its characters (Lombardo & Pizzo, 2014). Hence, the aim of scriptwriting is to evoke thoughts and emotions through subtext, action, and symbolism.

The general scriptwriting theory is an approach to organize the structure, goals and techniques of writing a script in a systematic fashion. Ladopoulou and Dimitriadis (2022) The common and widely used structure of a script is a 'three act structure'. Khalili (2018) The three acts include a setup (first act), a confrontation (second act) and a resolution (third act). Ratio of the acts is 25:50:25 percent for setup act, confrontation act, and resolution act, respectively.

■ The setup act is to establish and to introduce the main characters, their relationships to other characters, and the world and its setting. In the later of first act, an inciting incident, known as the first plot point, is launched to raise a dramatic question that will be answered in a later act for the climax.

■ The confrontation act features the main characters and their attempt to resolve the problem from the first turning point. In this act, character development is introduced with the aid of other characters.

■ The resolution act gives the resolution of the story. In this act, climax is mentioned as a sequence of the story are brought to the most intense point and an answer to the given dramatic question.

Besides the common 'three act structure', four or five acts are also proposed, but they are more complex and not suitable for novice script writers. Hence, this work focuses on gathering concepts related to the 'three act structure'.

For elements in an animation script, this depends on the respective act. However, the common elements are such as characters and their characteristics, locations of the stage, time of the scene, and major incidents of the story. These elements should not be in conflict to prevent a mazy viewpoint, and they should be carefully designed to logically relate to one another. The quality of a script is normally assessed by scriptwriting rubric (Gutierrez, 2014).

2. Writing Supporting System

To assist on education, several researchers developed a tool on supporting writing learning. They design a tool with the environment to help students

and instructors on improving writing expertise. We survey writing supporting systems and found the information given in Table 1.

Table 1
Related Work on Supporting Tool for Improving a Writing Skill

Tool	Correction	Suggestion	Environment	Criteria	Collaborative
Eagle (Takhom et al., 2011)	Grammar	Error Location, Error Type	1. Teacher hints the error location 2. Students consider error type and correct them	Error Type Structure based on “mistake” or “missing” type	Yes
SWAN (Kinnunen et al., 2012)	Content	Rewriting Sentence	1. Apply NLP Parser to understand sentence structure 2. Highlight color to represent Fluidity	Fluidity (Connect, Inverted Topic, Out-of-Sync, Disconnected)	No
ArgRewrite (Zhang et al., 2016)	Content/ Grammar	Rewriting Sentence which labeled type	1. Give statistics of document composition 2. Students reconsider the suggested sentence	Revision Type: Text based/Surface based type	No
TBeW (Na Chai et al., 2017)	Content/ Thinkingg	Writing Sentence which Content Type and Relational Sentence	1. Write Sentence 2. Connect Sentence Declare Sentence Rational	Assist learner to understand their own thinking	Yes
TBeR (Na Chai et al., 2019)	Analyze/ Thinking	Reading good academic articles	1. Reading Sentence 2. Analyzing logical content Analyzing relations between content	Assist learner to understand author's thinking systematically	Yes

In a summary, Takhom et al. (2011) Eagle is a tool for learning English as a foreign language for Thai students. It aims to improve understanding of English grammar with a collaboration between teachers and students. The tool allows teacher users to point out mistakes in written essays by assigning types of error for students to realize the mistake as well as keeping a log of editions made by students. Kinnunen et al. (2012) SWAN is an assisting tool for writing scientific English content by providing an interface to guide the separation of content into required sections. The tool aims to help novice writers to understand purposes and relevant information of each section. Zhang et al. (2016) ArgRewrite

is a tool for learning writing skills. It provides grammatical structure and vocabulary checking assistance to label errors in an English written sentence. It allows users to rewrite based on found errors by aiming to change writing behavior for the better. Na Chai et al. (2017) TBeW and Na Chai et al. (2019) TBeR is a framework that allows user to write and read content regardless of language used to understand the intention of content. This will help users to train their cognitive skills to think about thinking (metacognitive skill). The framework focuses on the awareness of how to represent the idea correctly in writing and how to determine the strategy to represent the thought of author in reading.

From the review, we found that the tools can be categorized into two types. The first type is a tool that allows students to learn how to write while the tool provides supportive functions to assist on learning. The second type is a tool providing an environment for students to collaborate with peers for sharing opinions and written content to inspire each other and learn from other's examples. The key concepts of these supporting tools are to let students become aware of their own mistakes and improve from it by getting instructor comments or realizing them from examples. These tools thus assist students to learn more effectively than traditional lectures. Furthermore, most of the tools

are online-based applications and can be accessed flexibly via a personal computer, smart phones, and tablets. The tools hence help to promote learning from anywhere-anytime and life-long learning.

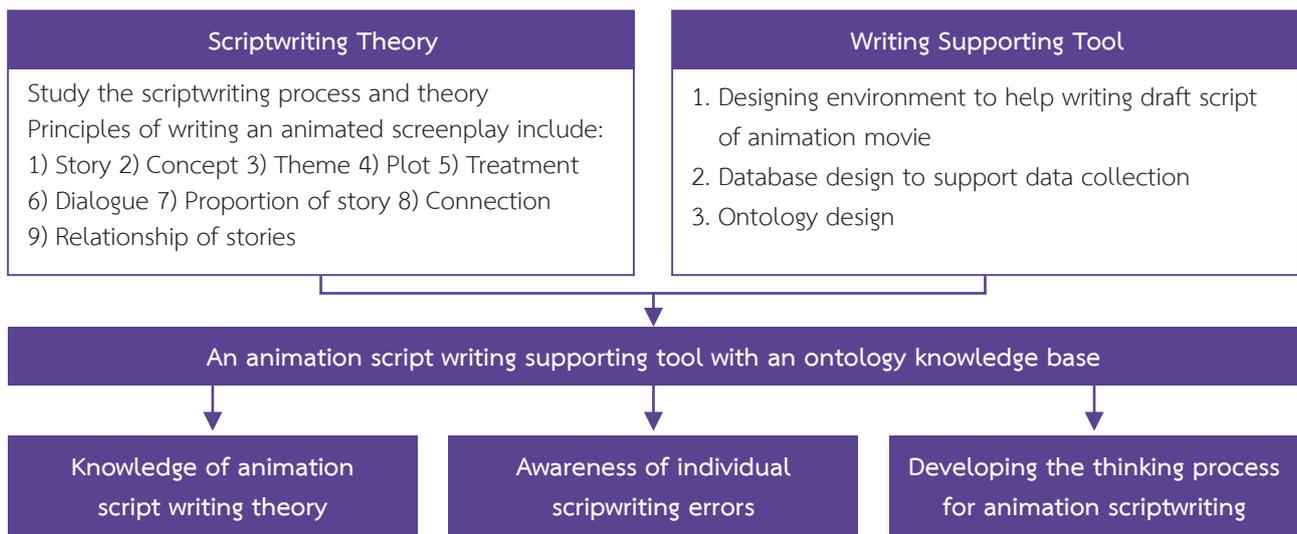
■ Objectives

1. To design and develop an animation scriptwriting supporting tool with an ontology knowledge base
2. To study the effectiveness of the tool in improving students' animation scriptwriting support skill

■ Conceptual Framework

Figure 1

Conceptual Framework



■ Methodology

Population and Sample

Population are 45 Thai undergraduate students who studied in a course of principles of animation and directing animation of Animation and Digital Media Program, Bansomdejchaopraya Rajabhat University. The 33 students were chosen at simple random sampling from a total of 45 students to participate.

Research Instrument

From this research, a research Instrument used to efficiency of the developed system by

1. Performance evaluation form of animation scriptwriting supporting tool: The researcher examined and synthesized concepts, theories, documents, and relevant research from both national and international

sources, accessible through both print and electronic media. This was undertaken to gather information about the process of writing animated scripts. Subsequently, the evaluation was conducted by 3 experts with a specialization in scriptwriting for animations. The performance of the evaluation form for the animation scriptwriting supporting tool was assessed using the Item-Objective Congruence (IOC), which ranged from 0.67 to 1.00. The criterion used for this assessment was set at 0.50 and above. The results indicate a good level of appropriateness ($M = 4.10$, $SD = 0.43$).

2. Assessment form of animation scriptwriting supporting tool: Evaluated by 5 experts. The assessment form for animation scriptwriting supporting tool was assessed using the item-objective congruence (IOC),

which ranged from 0.67 to 1.00. The criterion used for this assessment was set at 0.50 and above. The results indicate a high level of appropriateness ($M = 4.33$, $SD = 0.54$).

Analysis and Design

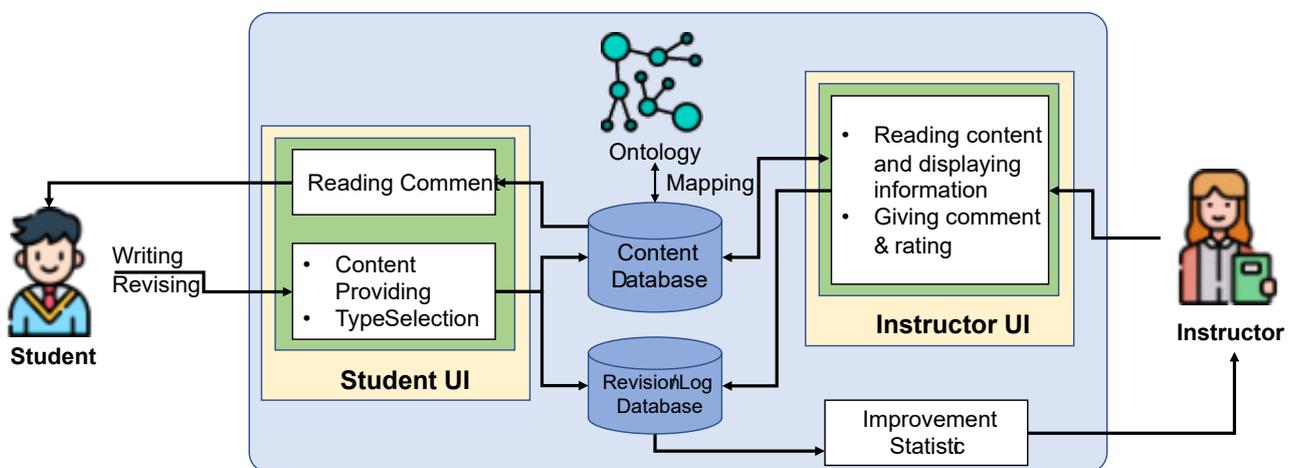
1. Design and development of the animation scriptwriting supporting tool

In this work, we design a tool to help in the task of animation scriptwriting for students (WriterDuet,

2022). The tool allows students to describe the components in an animation script into distinguished objects and assigns relationships among them freely. The tool applies the existing ontology called animation script ontology to control the semantic meaning of the script components. An overview of the tool is shown in Figure 2.

Figure 2

An Overview of the Proposed Tool



Based on the illustrated overview, the core components of the tool are the ontology, the database to store conceptualized objects of an animation script, and user interface for users to provide and retrieve script information. The tool is designed for 2 user roles as students and instructors. The students are to provide the idea of the animation story in details in the provided user interface while the instructors play a role to explore the given information to detect issues regarding theoretical details of scriptwriting and give comments for students to correct the mistakes.

Table 2

Details of the Applied Ontology and its Classes

Component Name	Type	Definition	Sub Items	Properties
Script	Class	A main division of a script following structural theory	First_Act Second_Act Third_Act	OP: has_incident [Event] OP: has_setting [Setting]

1.1 Ontology as a knowledge base

The chosen ontology (Vrandečić, 2009) consists of ontological concepts about animation script components and relations among them. The core concepts are listed in Table 2. For properties shown in the table, OP indicates an object property, and DP refers to a data property. The ontology component types include a class and a property. The components must be named differently.

Table 2
(continued)

Component Name	Type	Definition	Sub Items	Properties
Character	Class	a live form in an animation	Main Character Mob Character	DP: has_name {string} OP: has_characteristic [Characteristic] OP: has_family-relation to [Character] OP: has_relation_to [Character]
Setting	Class	Place, Time, Condition, and Environment of a story	World_Type Time_Setting Location_Setting Specified_Setting	- None
Event	Class	a noteworthy happening in a story		OP: involved_character [character] DP: located_in {string} OP: caused_by_prior_event [Event]
has_family-relation_to	Property	Familial relationship among character	is_parent_of is_sibling_of	- None
has_relation_to	Property	Relationship among character	is_friend_of is_lover_of ...	- None

As an ontology provides the knowledge regarding of animation script components, we gain a privilege of ontology benefits including ontology axioms to describe how concepts are related and connected semantically. However, we selected some part of knowledge from the ontology that matches the focus of this work. In this work, we focus on the

common paradigm of animation scripts which consists of 3 acts according to the knowledge from the applied ontology as illustrated in Figure 3. The 3 acts are a phase of the story, while there are specific events that exist for a certain purpose in each phase. In summary, there are 7 essential components shown in Table 3 (Jaiboonlue & Na Chai, 2023).

Figure 3
Components in 3-act Script Paradigm

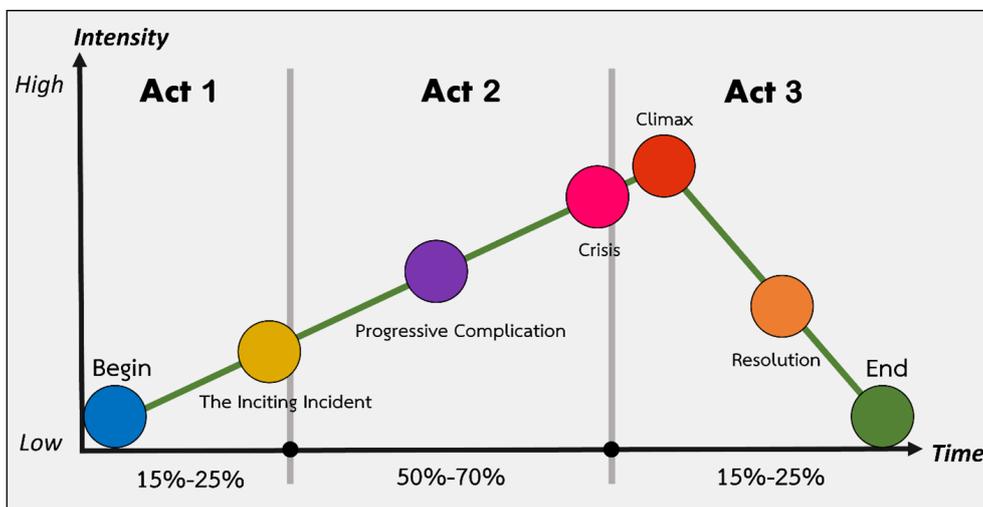


Table 3
Animation Script Components and Their Specification

Script component	Description
Act 1	Introduction of the story including location setting, main characters, and specific conditions of the created story
<ul style="list-style-type: none"> ■ Begin ■ The inciting incident 	<p>The starting of the story</p> <p>An event that stimulates the story</p>
Act 2	Provision of details of problems and solutions
<ul style="list-style-type: none"> ■ Progressive Complication ■ Crisis 	<p>An event that increases more issues in the story</p> <p>An event that leads to the critical issue</p>
Act 3	Solving issue and Conclusion
<ul style="list-style-type: none"> ■ Climax ■ Solution ■ End 	<p>The most intensive decisive moment of the story</p> <p>An event that solves the issues</p> <p>Conclusion of the story</p>

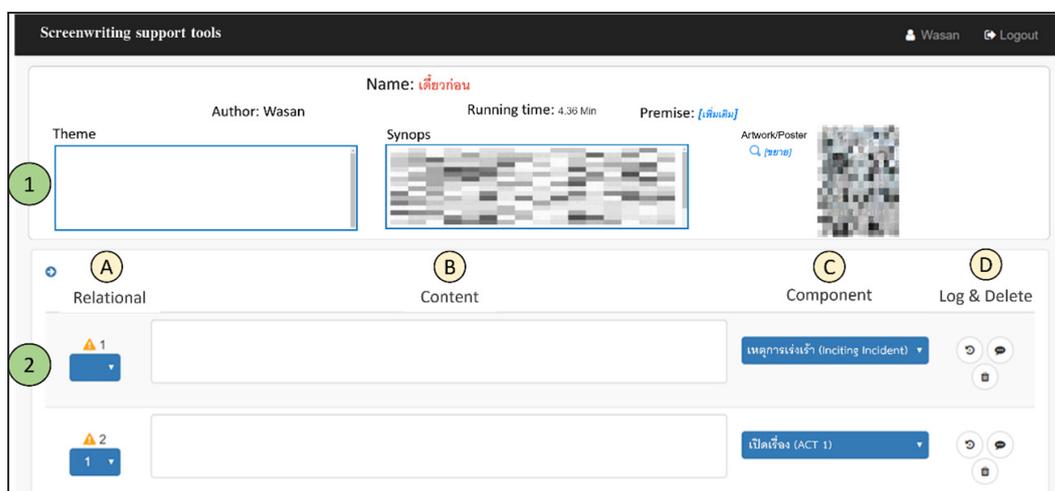
As shown in Figure 3, the acts are in sequence; hence, the relation of the acts are important to relay the story, especially for students who are yet excel in composing story. Furthermore, another important aspect in this study is the appropriateness of using the benefit of being animation movie. Thus, aside for the completeness of the script details based on components, the soundness of each components part and aspect of animation appropriateness are also considered as essential in this work.

1.2 User interface

Taking into consideration the aspects discussed above, we have developed a user interface

(UI) that enables students to input details into their scripts. This information encompasses the title, story theme, character particulars, setting, and script components. The UI allocates distinct slots for each category of components, ensuring that each piece of information is presented as discrete and discernible entities. This approach aids students in identifying potential shortcomings in their ideas while utilizing the tool, as well as fostering a deeper understanding of their thought processes. An illustrative depiction of the UI capturing script components can be observed in Figure 4.

Figure 4
Screen Captured UI of the Tool for Providing Script Components



From the screen-captured UI, the (1) part is where students provide a theme of a script with additional information including summary and image (optional). The (2) part is where students give script details including the content (B) of each part and assigning the script component (C) to indicate the type of the given content of each slot roll. The list of components for selection follows the information given in Table 3. Students are also asked to assign relationship (A) of each content. Last, students can reach an instructor's comment from (D).

The information given in each slot is collected in a database and able to be retrieved for self-corrected and examined by instructors. For the instructor role, the tool provides a space for com-

menting on each component, and the comments are shown to users to reflect on mistakes.

According to the design, instructors can examine the completeness of script components, soundness of each component, and appropriateness of being animation movie. For details, description of each examining is given in Table 4. From the criteria, instructors can realize that what mistakes students make and provide a comment sufficient for students to correct them accordingly. Moreover, the collected information of scripts is stored in a database which can be used further in understanding the issue in teaching material or finding what needs to be focused for different groups of students.

Table 4
Details of Examining Aspects in Using the Tool

Examining aspect	Criteria
Completeness of script components	Checking if an animation script is completed according to theory of 7 components
Soundness of each component	Checking if each component is correct to its description or not
Appropriateness of being animation movie	Checking overall story that it takes benefit of being animation into account or not

2. Study the effectiveness of the tool in improving students' animation scriptwriting support skill

To study the effectiveness of the participants using the proposed tool, there are 5 expert evaluators

who evaluate the given information independently. For the evaluators, evaluation measurement metric of information was as given in Table 5.

Table 5
Evaluation Measurement Metric for Each Aspect

Aspect	Measurement
Completeness of script components	Range of 1 to 7 according to existing components in the given information from students
Soundness of each component (7 components)	1 to 5 where 1 is lowest and 5 is highest (subjective to evaluators)
Appropriateness of being animation movie	yes or no

From 5 expert evaluators, the voting method was used to finalize the evaluation for aspect of completeness of script components, and appropriateness of being animation movie. For soundness of each

component, the mode score was used to represent the final score of each of 7 elements. Following this, the tool will be utilized with a group of 33 participants to assess its effectiveness in enhancing students' skills

in supporting animation scriptwriting. Additionally, this phase will involve collecting study outcomes.

Data Collection

This research is conducted under research ethic in human number BSRU-REC 6311007 as follows. Participants in this experiment were 45 students who studied in a course of principles of animation and directing animation. The 33 students were chosen by simple random sampling from a total of 45 students to participate. All participants took the same lecture on the course at the same time about writing animation script for 24 learning hours prior to the experiment. The participants were asked to write 2 animation scripts using the tool. For each script, there were 2 rounds for providing information. Each round allotted for 3 hours per round, and there were 7-day interval time from previous round. For each script information providing, the first round was an initial round where the participants provided the script information by themselves, and 3 instructors as evaluators examined the information and provided feedback to students. The second round was a reflected round which was for students to correct the mistakes following the comment and allowed to edit the script components by their free will. For a total of 4 rounds, we give notations as follows:

- Initial round of first script (I-1)
- Reflected round of first script (R-1)
- Initial round of second script (I-2)
- Reflected round of first script (R-2)

After experiment, participants are asked to provide impression on using the tool in a text expression as feedback.

Results

1. Evaluation Results

The evaluation results of the aspect of completeness of script components, soundness of each component, and appropriateness of being animation movie are given in Table 6, Table 7, and Table 8, respectively.

From the results, we found that students show noticeable improvement after using the tool, especially on aspect of completeness. By comparing results of I-1 and I-2, the result of all aspects indicate that students realized the mistakes in their prior attempts and stably improved the score. For the aspect of soundness of component, the score of students were separated into 3 groups based on total score where score group of 29-35 indicated students who did at least 4 points in average in all components. The results showed that the number of students who were in this group was increased in ‘reflected round’ comparing to its own initial round. Furthermore, the number of students in higher point group were increased when comparing between first script and second script. The results of the aspect of appropriateness of being animation also showed improvement.

Table 6

Evaluation Results of the Aspect of Completeness of Script Components Based on Rounds

Number of missing components	I-1	R-1	I-2	R-2
Missing 2 or more	2	0	0	0
Missing 1	9	0	0	0
No-missing	22	33	33	33

Table 7
Evaluation Results of the Aspect of Soundness of Component Based on Rounds

Act	Score	I-1	R-1	I-2	R-2	
Act 1	Begin	1-5	3	4	3	4
	The Inciting Incident	1-5	2	3	3	4
Act 2	Progressive Complication	1-5	2	3	3	4
	Crisis	1-5	0	3	3	3
Act 3	Climax	1-5	2	3	3	4
	Resolution	1-5	2	4	3	4
	End	1-5	2	4	3	4
Total score (0-35 points)	Overall	0-21	30	0	15	0
		22-28	3	25	16	18
		29-35	0	8	2	15

Table 8
Evaluation Results of the Aspect of Appropriateness of Being Animation Based on Rounds

Number of appropriate scripts	I-1	R-1	I-2	R-2
Yes	23	33	31	33
No	10	0	2	0

From the experimental results, we can conclude that the tool helps students to improve their understanding and scope their thoughts/idea on script details. Thus, we aim to see how much students improved. We thus compare the score of

the same students from the initial test (I) and reflect (R). By analyzing, we found the improvement rate of students in writing the first script and second script via the proposed tool as shown in Figure 5 and 6 respectively.

Figure 5
Score Improvement of First Written Script

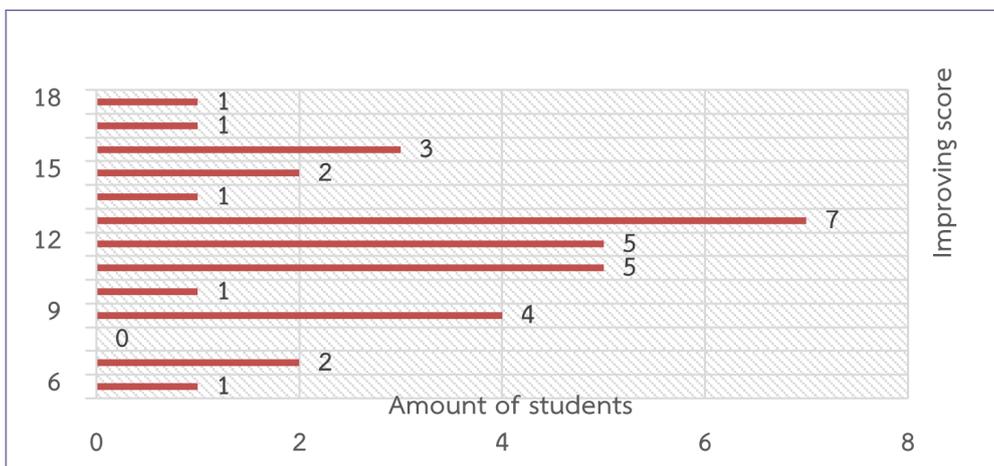
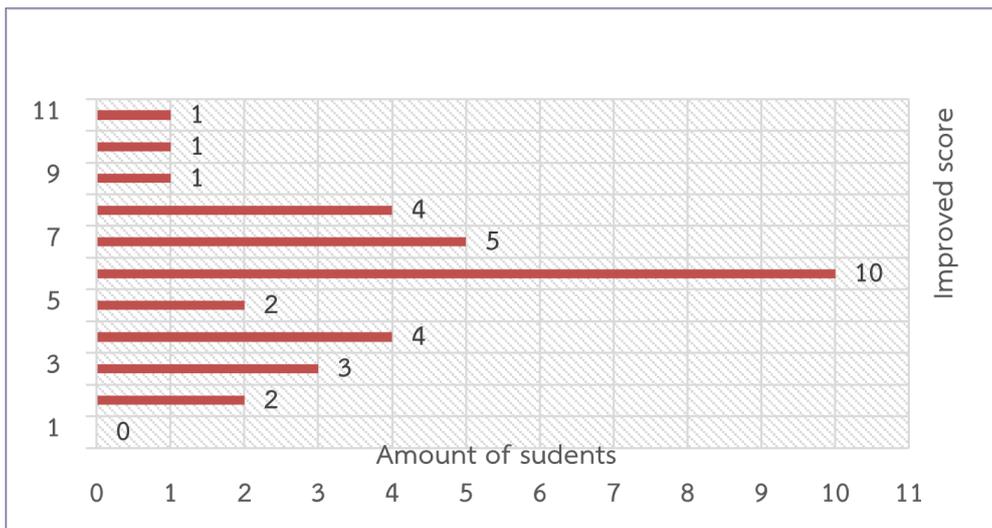


Figure 6
Score Improvement of Second Written Script



The progress of students depicted in Figures 5 and 6 demonstrates that all students exhibited improvement from the initial round to the reflection round in both the first and second scripts. However, the extent of improvement varied on an individual basis. In the first script, the majority of students (27 in total) attained enhanced scores ranging from 9 to 13. Notably, these students primarily belonged to the 0-21 score range initially but progressed to the mid score range (22-28) and even the high score range (29-35) after the reflective exercise. The most significant improvement observed in the first script was an increase of 18 points. Comparatively, the improvement in scores for the second script was generally less pronounced, likely due to the fact that the initial scores in the second script were notably higher than those in the first script.

Regarding prevalent errors, the experimental findings indicate that the majority of omitted elements pertained to Act 2, specifically the 'Crisis' and 'Progressive Complication' components. Notably, the tool facilitated a clear understanding of the necessary components, leading to a lack of recurrence in missing these elements during subsequent rounds. Traditionally, addressing this concern in conventional lectures proves challenging due to the intricacy of pinpointing such omissions. Consequently, these results underscore the tool's potential in assisting students to comprehend the fundamental requisites of scriptwriting.

2. Feedback Result

The feedback from participants is collected and can be categorized into 4 aspects. First, 20 participants (60.60%) mentioned that the tool helps to provide an immersive environment, allowing them to stay focus more on training their scriptwriting. Second, 15 participants (45.45%) pointed out that the tool gives collaborative feeling as they can interact with and feel closer to other students and teacher while using the tool. Third, 14 participants (42.42%) show their positive impression on using technology in education as they feel ensured and prepared for the digital age and future careers. Last, 5 participants (15.15%) mentioned on flexibility in terms of time, location, and learning pace. As the tool allows for self-paced learning, asynchronous interactions, and the ability to revisit content when needed, participants realize flexibility that allows them for continuous learning beyond traditional classroom settings.

Discussion

From experiment, the animation scriptwriting tool shows its potential to help students learning on necessary concepts of the 3-act screenplay paradigm. According to screenwriting theory (Khalili,2018), a 3-act screenplay paradigm consists of 7 elements along with the proportions of the entire story. By designing the tool based on this theory, students can learn the elements that are the relation between each other act, and the proportions of screenwriting. The tool asks

students to identify all the elements and proportions designed to demonstrate their understanding of screenwriting. By explicitly displaying the mandatory components, students show improvement on all aspects including completeness, soundness, and appropriateness. With the use of ontology, elements of the 3-act screenplay paradigm are conceptualized into tangible concepts and help students to grasp abstract concepts by providing concrete representations and relationships between concepts. Hence, their thoughts become clearer for meaningful connections in memory, making concepts more memorable and retrievable as recognizable examples.

In comparison to other existing tools for improving writing such as Eagle (Takhom et al., 2011) and ArgRewrite (Zhang et al., 2016), the proposed tool focuses on training of realizing abstract concepts to understand completeness, soundness, and appropriateness in a task of screenplay writing instead of finding errors in their output. The aforementioned tools relying on learners to make mistakes and improve by realizing their mistakes. However, the proposed tool provides a controlled environment that subtly indicates mandatory elements and relations among them. Both approaches as learning from mistakes and learning objectively to necessary elements are effective in training. In details, learning objectively approach is more suitable for novice learners as they are relatively new to the subject while learning by mistakes approach is more tuned towards intermediate-level learners to improve from their common mistakes.

For advantages of the proposed tool, we can notice the following features. By clearly showing what is needed, students gain an example of complete elements by their choice, making the tool becoming personalized learning. As students can also see the output of their friends via the tool, they are likely to engage in discussion which promotes active engagement, critical thinking, and the exchange of ideas among them. Furthermore, the tool received positive feedback on flexibility that allows them for continuous learning beyond traditional classroom. This allows students to experiment, manipulate variables, and observe outcomes in a controlled environment. This activity promotes engagement in creativity and deepens understanding by providing hands-on experiences and immediate feedback.

■ Conclusion

This study introduces a tool designed to enhance the learning process of animation scriptwriting. By creating an environment that establishes precise prerequisites for script components based on relevant theories, students gain a comprehensive understanding of the essential elements required for crafting a coherent and complete script. The tool facilitates a systematic approach for students to conceptualize and structure script narratives, breaking down ideas into distinct segments and establishing connections between them. Instructors can then individually evaluate these segments to identify errors, offer feedback, and guide students in rectifying and reflecting upon their challenges. This approach aids students in internalizing proper design principles by learning from instances of errors, thus reducing the likelihood of recurrent mistakes.

The outcomes of the experimentation reveal notable advancements across various focal points, encompassing the comprehensiveness of script components, the robustness of individual elements, and the suitability for an animated film. Evidently, all students exhibited incremental enhancements, as evidenced by the average evaluation scores of the second script surpassing those of the first script. Furthermore, the issue of omitting crucial components experienced a marked enhancement, with 34% of participants who initially erred due to unfamiliarity with the subject not repeating the same mistakes upon utilizing the tool.

In the future, we plan to include more paradigms for scriptwriting such as five-act structure and eight-sequence structure to cover more types of an animation movie. Moreover, we plan to develop more computer-based tools to assist on training of strategic thinking for students to improve their skill in developing a well-crafted and engaging story by making deliberate choices about the narrative elements and the overall direction of the story. Furthermore, the function for giving comments to other screenplays will be developed for students to discuss the output scripts within the tool to incorporate the training of critical thinking for analyzing, evaluating, and interpreting information to make reasoned judgments and decisions.

Recommendations and Suggestions

Although implementing computer-based tools for education requires significant financial investment for hardware, software, and ongoing maintenance, incorporating computer-based tools in education which offers numerous benefits and advantages is recommended. The tools provide interactive and dynamic learning experiences that can enhance learning outcomes. They offer opportunities for active engagement, personalized learning, and immediate feedback, which can lead to improved comprehension, retention, and application of knowledge. Furthermore, students have different learning preferences and styles, and computer-based tools can offer a range of modalities, including visual, auditory, and kinesthetic elements which make learners more engaging with content in ways that align with their preferable learning styles to cater to the diverse needs of students and promotes inclusive education.

References

- Demorest, A. P., & Alexander, I. E. (1992). Affective scripts as organizers of personal experience. *Journal of Personality*, 60(3), 645-663. <https://doi.org/10.1111/j.1467-6494.1992.tb00924.x>
- Faridah, I., Sari, F. R., Wahyuningsih, T., Oganda, F. P., & Rahardja, U. (2020, October 23-24). *Effect digital learning on student motivation during Covid-19* [Paper presentation]. The 8th International Conference on Cyber and IT Service Management (CITSM), Pangkal, Indonesia. <https://ieeexplore.ieee.org/document/9268843>
- Gutierrez, P. (2014). *The power of scriptwriting!: Teaching essential writing skills through podcasts, graphic novels, movies, and more*. Teachers College Press.
- Jaiboonlue, P., & Na Chai, W. (2023). A design of an ontology for animation scripts writing towards the learning of necessary elements and relationship among them. *Journal of Information Science*, 41(1), 66-85. <https://doi.org/10.14456/jiskku.2023.4>
- Khalili, S. (2018). Analysing the advantages of Aristotle's two-act structure in comparison with Syd Field's three-act structure in short comedic animation scriptwriting. *Journal of Screenwriting*, 9(3), 265-277. https://doi.org/10.1386/josc.9.3.265_1
- Kinnunen, T., Leisma, H., Machunik, M., Kakkonen, T., & Lebrun, J. L. (2012, April). *SWAN-scientific writing AssistaNt. a tool for helping scholars to write reader-friendly manuscripts* [Conference session]. The 13th Conference of the European Chapter of the Association for Computational Linguistics (EACL 2012), Avignon, France. <http://dx.doi.org/10.13140/2.1.3284.4808>
- Ladopoulos, G., & Dimitriadis, G. (2022). *The female perspective: Stereotypes vs. realism in film character Portrayal and development* [Diploma Thesis, Aristotle University of Thessaloniki]. IKEE/ Aristotle University of Thessaloniki – Library. <http://ikee.lib.auth.gr/record/341787>
- Lombardo, V., & Pizzo, A. (2014, November 3-6). *Ontology-based visualization of characters' intentions* [Paper presentation]. 7th International Conference on Interactive Digital Storytelling (ICIDS 2014), Singapore, Singapore. http://dx.doi.org/10.1007/978-3-319-12337-0_18
- Marx, C. (2007). *Writing for animation, comics, and games*. CRC Press. <https://www.sciencedirect.com/book/9780240805825/writing-for-animation-comics-and-games>
- Na Chai, W., Ruangrajitpakorn, T., & Supnithi, T. (2017, December 4-8). *A tool for data acquisition of thinking processes through writing* [Paper presentation]. The 25th International Conference on Computers in Education (ICCE 2017), Christchurch, New Zealand. https://www.researchgate.net/publication/376808252_A_Tool_for_Data_Acquisition_of_Thinking_Processes_through_Writing
- Na Chai, W., Ruangrajitpakorn, T., & Supnithi, T. (2019, December 2-6). *A tool for learning of cognitive process by analysis from exemplar documents* [Paper presentation]. The 27th International Conference on Computers in Education (ICCE 2019), Kenting, Taiwan. https://www.researchgate.net/publication/369659210_A_Tool_for_Learning_of_Cognitive_Process_by_Analysis_from_Exemplar_Documents
- Redvall, E. N. (2009). Scriptwriting as a creative, collaborative learning process of problem finding and problem solving. *MedieKultur: Journal of Media and Communication Research*, 25(46), 34-55. <http://dx.doi.org/10.7146/mediekultur.v25i46.1342>
- Røssaak, E. (2006). *Figures of sensation: Between still and moving images*. Amsterdam University Press. <https://www.jstor.org/stable/pdf/j.ct46n09s.23.pdf>
- Scott, J. (2003). *How to write for animation*. The Overlook Press. <https://books.google.co.th/books?id=mRKEDwAAQBAJ&lpg=PP6&dq=How%20to%20write%20for%20animation&lr&hl=th&pg=PP6#v=onepage&q=How%20to%20write%20for%20animation&f=false>
- Takhom, A., Trakul Taweekoon, K., Chotimongkol, A., Porkaew, P., Na-Thalang, S. S., & Supnithi, T. (2011, November-December 28-2). *EAGLE: An error tAGger for learners of English* [Paper presentation]. The 19th International Conference on Computers in Education (ICCE 2011), Chiang Mai, Thailand. https://www.researchgate.net/profile/Ananlada-Chotimongkol/publication/267805289_EAGLE_an_Error_tAGger_for_Learners_of_English/links/54b7e1200cf2c27adc474cce/EAGLE-an-Error-tAGger-for-Learners-of-English.pdf
- Torres Martín, C., Acal, C., El Homrani, M., & Mingorance Estrada, Á. C. (2021). Impact on the virtual learning environment due to COVID-19. *International Journal of Educational Technology in Higher Education*, 13(2), 582. <https://doi.org/10.3390/su13020582>
- Vrandečić, D. (2009). *Ontology evaluation*. Springer. https://link.springer.com/chapter/10.1007/978-3-540-92673-3_13
- Wright, J. A. (2013). *Animation writing and development: From script development to pitch*. Focal Press. https://theswissbay.ch/pdf/Gentoomen%20Library/Animation/Animation_Writing_Development_Script_Pitch.pdf
- WriterDuet. (2022, January 5). *Effortless screenwriting*. WriterDuet. <https://www.writerduet.com>
- Zhang, F., Hwa, R., Litman, D., & Hashemi, H. B. (2016, June 12-17). *Argrewrite: A web-based revision assistant for argumentative writings* [Paper presentation]. The 15th Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL HLT 2016), San Diego California, USA. <http://dx.doi.org/10.18653/v1/N16-3008>