

Storytelling Design for Collaborative Learning based on the Hero's Journey

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Abstract

Collaborative learning is an educational method that focuses on exchanging opinions between students and incubating self-directed problem-solving ability. However, developing content for collaborative learning has progressed slowly in the educational environment because most research on educational content has been restricted to theoretical studies and the methods for organizing student groups. More expansive research is required to develop methods for vitalizing collaboration between students and for supporting communicating between groups in order to induce collaborative learning.

The present study aims to design a collaborative learning content by apply the storytelling technique, and to suggest and implement the method for individuals by increasing the concentration on collaborative activity. Therefore, we analyze and apply The Hero's Journey, which has been the archetype of hero stories. Each individual follows a journey that contains sequences such as becoming a hero, gaining guidance from a wise mentor, cooperating with an assistant, defeating an antagonist's conspiracy, overcoming ordeals and finally achieving the learning purpose.

Keywords: *Collaborative Learning, Storytelling, Hero's Journey, Content, Narrative Model*

1. Introduction

Various studies have been conducted on methods to assist education and increase the learning effect, such as the collaborative learning system, which is comprised of knowledge on individual cooperation and which aims to solve certain problems with educational purpose. With its many advantages, the collaborative learning system has been continuously researched in the educational field.

Continuous attempts have been made to fuse collaborative learning and computer application for progressing education. Computer-supported collaborative learning (CSCL) has evolved through interaction between education and computer technology. It has grown from artificial intelligence to collaboration support, from individuals to interacting groups, from mental representations to interactional meaning-making and from quantitative comparisons to micro-case studies. CSCL researchers form a community of inquiry that is actively constructing new ways to collaborate in the design, analysis and implementation of computer support for collaborative learning [1]. In this trend, one study about collaborative learning created a software tool and used it for group decision support system (GDSS) [2]. Another study defined computer-mediated communication (CMC) and implemented a spatially and temporally independent platform. The solution can define a group in a many-to-many relationship. Using the solution, the study was improved by removing the inconvenience in the

collaborative learning environment that used social interaction [3]. Another study implemented the collaborative learning system in the Internet for each individual to share their knowledge [4].

However, most of the existing studies focused on the methodology of organizing the individual's group or the solution for education. These studies have not determined how individuals cooperate with others or promote cooperation if individuals are organized into groups. Therefore, further study is required on how each individual can concentrate more on collaboration.

This study is focused on the individuals' interest in the learning content by concentrating on collaboration with others and increasing the learning effect. The study design consists of the basic system for accord story to content. In the case of story, 'The Hero's Journey' is applied in many storytelling contents. 'The Hero's Journey' is a historical story model from ancient mythology. It has been used in various contents such as novels, movies and games to ensure the consumer's interest and improve immersion. In this study, we'll design a story that is used in the learning content by using 'The Hero's Journey' that is qualified story model in many story to improve the individual's learning effect

2. Related Works

2.1. Digital Storytelling

Digital storytelling is storytelling that uses digital technology in the media environment or as a form of expression. Digital storytelling can be divided into entertainment storytelling and information storytelling. Entertainment storytelling includes digital movie, animation, game, broadcasting, music, and publishing. These contents do not constitute ordinary necessity but are accepted as a fictional descriptive format that contributes to the amusement industry.

On the other hand, information storytelling is based on information that is arranged, edited and designed like digital advertisement and E-learning content. Information storytelling creates a non-fictional story based on real world's information. The conveyance of information is the basic purpose of information storytelling, which necessitates research about consumer's cognitive models. Information should be designed so that the consumer can consider the information context and connect it for learning about information, rather than merely delivering an unknown topic. This context can be divided into personal context, sociocultural context, and empirical context [5]. Because all processes of learning and recognition are composed of a continuous combination of context, it deserves the earnest consideration of context when deciding the content target.

Digital storytelling has emerged over the last few years as a powerful teaching and learning tool that engages both teachers and their students. In digital storytelling, storytellers tell the story through the traditional processes of selecting a topic, conducting some research, writing a script and developing an interesting story. This material is then 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. Multimedia-rich digital stories can serve as an anticipatory set or hook to capture the attention of students and increase their interest in exploring new ideas [6]. Furthermore, storytelling is the preferred sense-making currency of human relationships among internal and external stakeholders in organizations. People engage in a dynamic process of incremental refinement of their stories of new events, as well as on-going reinterpretations of culturally sacred story lines [7].

2.2. Collaborative Learning and Interactive Storytelling

Collaborative learning is a situation in which several individuals learn or try to learn something together [8] and offers the benefits of providing a better understanding, facilitating pool knowledge and experience, enabling helpful feedback, stimulating thinking, and generating new perspectives. In addition, it provides various social and emotional benefits [9]. Recent studies have proposed various approaches to collaborative learning. However, most have focused on how social groups can be constructed [4, 10, 11]. Although social grouping plays an important role in the acquisition and sharing of collective intelligence, the question of how collaboration between individuals can be facilitated and strengthened remains an important issue in the context of collaborative learning. In this regard, the present study proposes content requirements for designing and developing content in this context.

Storytelling is unique in that it delivers information and knowledge while keeping receivers interested and impressed. This is why it has been drawing much attention as a new teaching strategy that makes teaching more effective. Many researchers have long emphasized the element of story as an essential learning tool since it can encapsulate information, knowledge and context into one compact package [12]. Storytelling conveys meaning through a series of specific events, and this is exactly how students spontaneously acquire knowledge through specific situation and context if storytelling is applied to learning. A story is driven by a world comprised of objects and characters, such as protagonist and antagonist, and by events that construct a plot. Such basic elements of a story deliver complex knowledge with ease while stimulating curiosity and interest. Such story-driven curiosity and interest facilitate collaboration among students while immersing them more in learning [13].

Unlike the traditional storytelling that narrates a story through a linear structure of beginning-middle-end led by a writer, the interactive storytelling that focuses on the interactive aspect promoted by the digital media follows a non-linear structure, through which a story can be narrated in many different directions depending on choices made by users. Such interactive storytelling has been applied to computer games that take a story in many different directions through interactions exchanged among users so as to maximize immersion and interest. In this context, this study proposes the design of interactive storytelling for collaborative learning.

2.3. The Hero's Journey

The narrative structure used in storytelling has long been studied. One of many structures used in storytelling is the five phases defined by Gustav Freytag. He divided every story into Exposition, Rising Action, Climax, Falling Action and Conclusion [14].

Other studies have sought the archetype of many creative stories. In 1949, Joseph Campbell announced the story's process and sequence to create the hero in his seminal book *The Hero with a Thousand Faces* [15]. He described systematization for analyzing the character's pattern, purpose of story and many supporting roles that assist or hinder the attainment of the purpose. These are composed of the 17-step Monomyth, which has strongly influenced all subsequent research on storytelling. Many researchers have tried to simplify Monomyth's 17 steps for ease of use.

Phil Cousineau introduced his 8-step journey in his book *The Hero's Journey* [16]. David Adams also introduced another 8-step journey is *Mythology : The Voyage of the Hero* [17]. Christopher Vogler introduced his 12-step The Hero's Journey in *The Writer's Journey* [18]. Table 1 presents all steps and defined names in these four studies.

Table 1. Narrative Models for Hero's Storytelling

No.	Campbell	Cousineau	Adams	Vogler
1	The Call to Adventure	The Call to Adventure	Miraculous conception and birth	The Ordinary World
2	Refusal of the Call	The Road of Trials	Initiation of the hero-child	The Call to Adventure
3	Supernatural Aid	The Vision Quest	Withdrawal from family or community	Refusal of the Call
4	Crossing The Threshold	The Meeting with the Goddess	Trial and Quest	Meeting with the Mentor
5	Belly of The Whale	The Boon	Death	Crossing the Threshold
6	The Road of Trials	The Magic Flight	Descent into the underworld	Tests, Allies and Enemies
7	The Meeting With the Goddess	The Return Threshold	Resurrection and rebirth	Approach
8	Woman as Temptress	The Master of Two Worlds	Ascension, apotheosis, and atonement	The Ordeal
9	Atonement with the Father			The Reward
10	Apotheosis			The Road Back
11	The Ultimate Boon			The Resurrection
12	Refusal of the Return			Return with the Elixir
13	The Magic Flight			
14	Rescue from Without			
15	The Crossing of the Return Threshold			
16	Master of Two Worlds			
17	Freedom to Live			

These four studies all have some common aspects. The hero initially listens to a particular call, then ventures into an unknown, nondaily world from the known, daily world, where he carries out the purpose by calling on an assistant and antagonist. Finally, the hero returns to the known world with a reward. These can be schematized as shown in Figure 1. The terminology in Figure 1 is taken from Vogler's 12-step model.

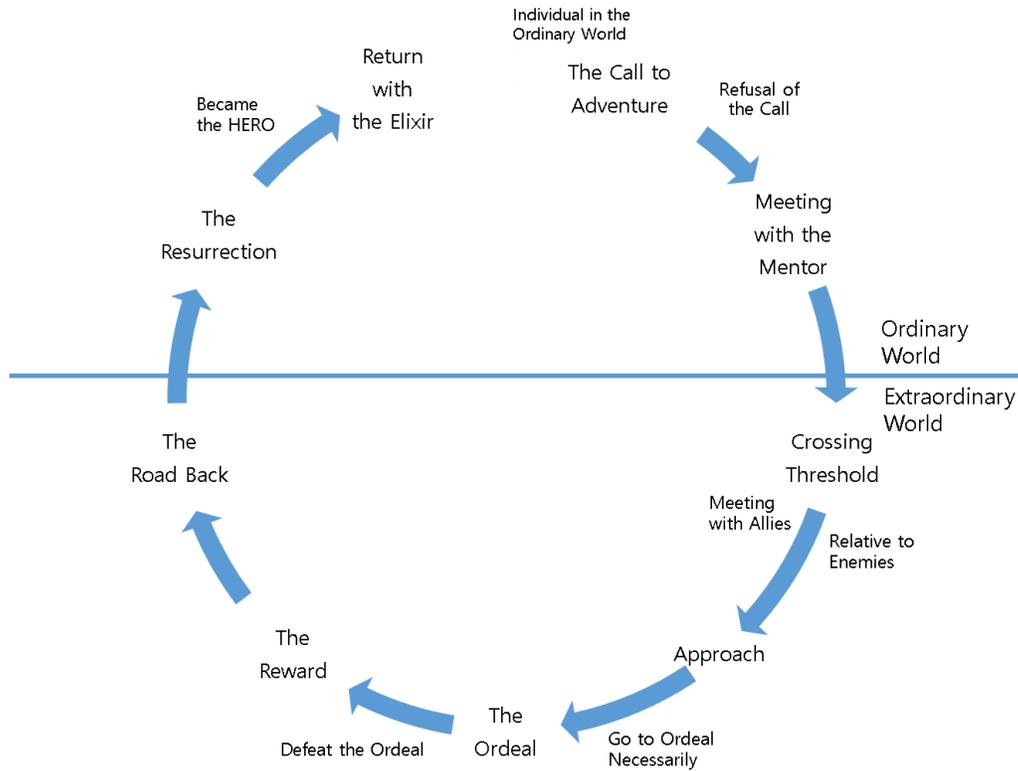


Figure 1. Common 12 Steps of the Hero's Journey

This systematized process is motivated by various creative contents such as movie, novel and game. Consumers are motivated by being immersed in the hero's journey, feeling a strong desire to proceed to the next step and consistently playing the content. This study is focused on this characteristic. To design the collaborative learning content, The Hero's Journey is used to qualify the many stories that motivate individuals.

3. Storytelling Design for Collaborative Learning

3.1. Storytelling Design based on the Hero's Journey

In this study, a collaborative learning content is created based on storytelling using The Hero's Journey. The final study goal is to ensure that the participating individuals become more absorbed in learning and receive an effective education. For this goal, the storytelling learning content will be designed based on Christopher Vogler's 12-step The Hero's Journey. Table 2 presents the storytelling model based on the Hero's Journey.

Table 2. The 12 Steps of the Storytelling Model

Step	Campbell's Hero's Journey	Individual's Journey In Study
1	The Ordinary World	Classroom or place for collaborative learning
2	The Call to Adventure	Encounters to learning contents and its system

3	Refusal of the Call	Failing control content
4	Meeting with the Mentor	Receive help from teacher or advice from system
5	Crossing the Threshold	Passing tutorial and ready to play content
6	Tests, Allies and Enemies	Making group with another individuals, and develop content to overcome many negatives.
7	Approach	Using limited resource for develop content
8	The Ordeal	Drying up resource and can't develop content
9	The Reward	Give remain resource to another group and take reward that resupply scarce resource.
10	The Road Back	Developing content again if content is not complete.
11	The Resurrection	Test of knowledge in learning content
12	Return with the Elixir	Harvest content's reward

The learning content is comprised of a 12-step process based on The Hero's Journal. This section describes each step and its concept.

Step 1. The Ordinary World: Every journey should have a start. In *The Hero with a Thousand Faces*, Joseph Campbell states that - "A hero ventures forth from the world of common day into a region of supernatural wonder".

In this study, the Ordinary World can be represented by in the real world as a place for learning, where each individual can question themselves or other individuals about the learning activity that he/she should perform until the next step of the Call to Adventure. This is an important step because each individual can meditate on the present that learning has begun, even though the calling has not yet arrived. Individuals should realize the content's death and his life have the same value when developing content. Individuals should take an active, not passive, part in each step.

Step 2. The Call to Adventure: If the hero settles for the ordinary world and its common days, his/her great epic poem will not be written. For the story to progress satisfactorily, the hero must follow the calling for ventures and advance toward the region of supernatural wonder. So the story writer considers a literary device for Call to Adventure.

Since the learning content is different than entertainment, setting the literary device on content is not easy. But, all learning has the purpose of delivering knowledge to individuals. So the content's device is applied to the acquisition of knowledge. Each individual receives a calling to the learning process and becomes a hero to learn knowledge in the content. After the calling, individuals should perform a new learning form that is an unfamiliar content, not traditional and familiar.

Step 3. Refusal of the Call: In many literary cases, the hero is a common person who is not predicted to become a hero. So many heroes have panic about the extraordinary situation. In addition, the Call forces a dangerous venture. Due to the terrible hazards, the hero will

naturally hesitate or reject the calling. Even if the hero gains sufficient courage and accedes to the calling, he/she will encounter extraordinary hardship and may fail. Anyway, the hero falls short of the call's expectations and refuses to answer the call so the journey ceases in many cases.

Because content is a new type of learning, individuals can experience repulsion or discomfort. Even in the absence of any such feeling, content is a virtual world unlike the real world and thus has its own handling method. Individuals can fail to handle the content and the learning process ceases.

Step 4. Meeting with the Mentor: If the hero refuses the call forever, the story ceases. So a role is needed to train the hero to take a step forward. This role gives advice and help to the hero. Many story writers set the role of a mentor for these reasons. Using the mentor's teaching, the hero can step forward and the story can be continued.

In the learning content, the role of mentor can be performed by the manager of learning or expert system that provides advice to individuals in the content system. The mentor should provide advice of handling method or works to achieve the learning purpose. Individuals who gain advice can develop the learning content. This mentor should be kept until the end of learning to provide advice at any time and in any situation.

Step 5. Crossing the Threshold: The hero can accept the call to adventure with help from the mentor. And the hero finishes preparing for the adventure. But before starting the adventure, the hero must demonstrate the ability to carry out the adventure. Many stories set a threshold for confirming the ability of the hero to cross it. This situation shows the hero entering an extraordinary world.

In the learning content, a threshold should be set in the form of tutorial content. A tutorial is provided to each individual to notify the content's final purpose and introduce the necessary action to achieve the purpose. By clearing the tutorial, each individual demonstrates their ability to develop content and start regular learning.

Step 6. Tests, Allies and Enemies: Finally, the hero enters the extraordinary world. In this world, the hero encounters endless tests. The hero should strive to achieve the purpose, but some heroes do not want to do so. An antagonist plots against the hero to prevent the attainment of the purpose. If the hero wants to achieve the purpose, he/she should defeat the antagonist, but that is difficult because the antagonist's tricky scheme is aimed at the hero's weakness. However, other beings exist who can help the hero. They cooperate with the hero to defy the antagonist. Using the assistant's advice and ability, the hero can advance toward the purpose easily. Of course, this situation contains much content.

These are key ideas to design the learning content. Each individual should pass a test based on knowledge and learn it. The antagonist changes the content context unfavorably for the hero to create an environment with various tests. Assistance cannot change the context favorably because it is not necessary on individuals learning. However, assistance can provide advice based on information obtained by analyzing the context. Each individual understands the present content context using the assistant's advice and passes the test based on the context that is modified by the antagonist until the learning purpose is achieved. Of course, another individual can take the role of assistant. One individual can make a group and invite others for cooperation. For collaborative learning, the content strongly recommends that individuals make a group.

Step 7. Approach: The hero will grow in the nondaily world by experiencing several tests and approach the core part of the journey. But as the hero approaches the purpose, danger gradually arises. This danger raises a sense of crisis and the reader will be immersed in this unavoidable tension until the ordeal is met.

In setting the progress for raising this danger, the learning content has resources for developing content as an opportunity cost. Individuals have a dilemma that they must use the resource and consume it if they want to develop content but once the resource is exhausted, they will no longer be able to develop content. Individuals should develop content, but in doing so they will exhaust the resource. But if the individual decides to save the resource, they will not be able to develop the content.

Step 8. The Ordeal: Finally, the hero encounters an ordeal that is terrible, burdensome and scary. The hero must overcome it to achieve the final goal, or the journey will end in vain and death. So, the hero finds a method to overcome the ordeal and achieve the purpose before everything is lost.

Individuals who develop content will meet a situation of resource exhaustion that is terrible, burdensome and scary. Individuals can't develop the content and don't achieve the learning purpose. But individuals should develop the content and pass the test as soon as possible because antagonist module in content change content context for destroy the individuals and the learning purpose. The individual should find a method to overcome this situation. And the system should set suitable methods beforehand. For example, resupply resources to individuals or make a quest based on knowledge related to the learning and provide the necessary resources to achieve it. Above all things, this content for collaborative learning will introduce to an exchange resource method between groups. To induce the group to give surplus resources to and receive lacking resources from another group, each individual should learn about the other group's resource condition.

Step 9. The Reward: In finding the method and overcoming the ordeal, the hero is awarded a reward. This reward can vary. Sometimes, the reward will be treasure of unlimited value, lost knowledge or absolute power. Above all, self-realization of the hero is an excellent reward.

Reward of the learning content is knowledge about learning. Individuals overcome various tests and ordeals. They are designed to obtain knowledge by overcoming them. In addition, individuals can receive resources from the system or another group.

Step 10. The Road Back: Finally, the hero overcomes the ordeal and receives various material and/or spiritual rewards. Now, the hero should choose whether to stay in the extraordinary world or return to the ordinary world. Of course, the hero chooses to return in many stories. But what if the hero has not achieved the purpose of the journey? In this case, the hero stays and stands against another ordeal until the final purpose is achieved.

The learning content is the same. Individuals should develop content until they achieve the learning purpose. They should pass various tests that are created for absorbing knowledge. If individuals stop learning before achieving the purpose, they will not learn everything about the content.

Step 11. The Resurrection: The hero experiences ordeals and is transformed into a true hero. Many story writers use a literary device like evidence of resurrection to the hero, strong demand for sacrifice or notify a sign of the hero to the world for the hero be resurrected anew.

This may appear as the last ordeal, so some heroes refuse this step. But the hero eventually passes it and attains the status of a hero.

Individuals achieve the learning purpose eventually. At that point, individuals should pass a final test to demonstrate their mastery of the content. After this certification, individuals attain the necessary knowledge.

Step 12. Return with the Elixir: Finally, the hero returns to the ordinary world. In this triumphal celebration, the hero possesses an elixir in many stories. In some stories, the ‘elixir’ has a literal meaning. But in other stories, the ‘elixir’ is merely a figure of speech, with various meanings such as money, fame, power, love, peace, happiness, success, health and knowledge, all of which have common ground. ‘Elixir’ is a literary device for the hero to approach great enlightenment.

In the learning content, the return indicates that the learning process is completed. Individuals obtain knowledge and intelligence as an elixir from developing the learning content.

3.2. System Overview

The system to materialize The Hero’s Journey is designed in two parts: content management and communication. Content management involves taking charge of understanding the content’s present status and changing it. Communication involves taking charge of the interface for connecting individuals and the system and communicating between groups. An overview of the modules is illustrated in Figure 2.

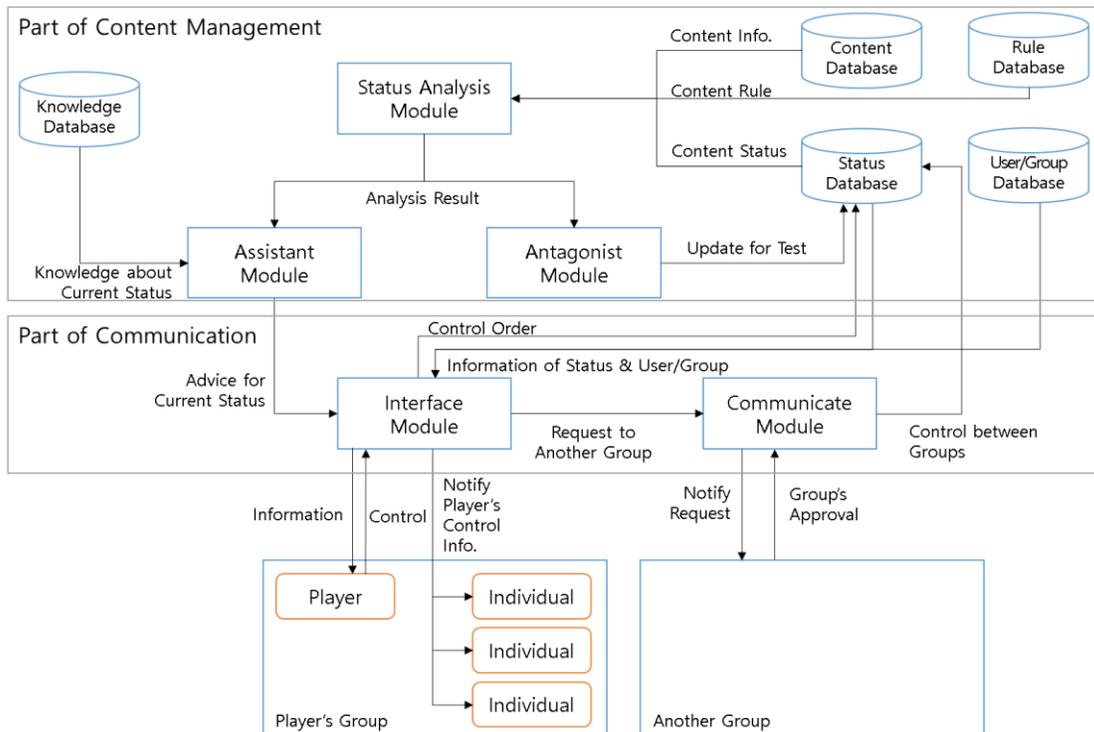


Figure 2. System Overview for Collaborative Learning Content

3.2.1. Part of Content Management: This part is made up of five databases and three modules. With the content database as the center, the status database is used to save the content's progressing state and rule database is used to save the content's rule. In isolation from these three databases, a knowledge database is used to save the knowledge needed by individuals for learning and a user/group database is used to save the user information and attach it to the group.

The key point here is understanding and analyzing the content's present status per group. This part should act as an assistant that provides information and advice to individuals based on the analysis result. In this situation, individuals can acquire knowledge based on the status. Alternatively, the part should act as an antagonist that changes the content status based on the content's rule. Because the status changes in succession, individuals encounter endless tests that they should pass to achieve the learning purpose. Three modules are used to realize these feature.

The status analysis module analyzes the content's current state per each group. The module collects data from databases and understands the content's status. The module uses the content's basic information, rules and statuses per each group and generates status information from them. Finally, the module sends information to the assistant module and the antagonist module to perform the role themselves.

The assistant module acts as a mentor or ally as mentioned in section 3.1. The module advises individuals based on information obtained from the status analysis module. This advice warns individuals about dangerous elements that can have a bad influence on the learning purpose. Also, the advice gives solutions concerning the element so that the individual can solve the problem as soon as possible.

The antagonist module acts as an enemy. The module changes the content status based on information obtained from the status analysis module. In changing the status, the module should refer to the content rule because individuals can learn something from this rule. The module is designed to interact antagonistically with individuals so that every change will disturb the individual achieve learning purpose. These changes are built to test the individuals and they should clear this test. In this progress, individuals can learn the content.

3.2.2. Part of Communication: Even though the content status and set assistant and antagonist are analyzed, they must be fully understood by individuals. If not, learning will be not progress. The part's first role is to communicate the system to the individual via an interface. Through the interface module, individuals can check advice from the assistant module and change the module from the antagonist module. Then individuals control the interface to develop content using resource and change the content status. The module is designed to notify the others in the group if an individual changes the status. They can learn from the notification the reason for the individual control interface.

If the resource is exhausted, individuals should resupply the lacking resource to develop content in succession. To provide a method for resource resupply, the part has a second role as a communicating messenger between groups. Through the communicate module, the group that lacks the resource can exchange its own surplus resource with another group's resource that is needed by the first group. For such an exchange, an individual should check whether another group's resource includes the necessary resource and decide if any exchange will be successful. In this process, the exchange request should be agreed upon by all group members. Unanimity is an important element for exchanging because the resource has common ownership. Furthermore, an individual can learn about other member's opinion during the decision-making discussion process. If the group decides to exchange the resource, the group sends a request to another group using the communicate module. The other group that

receives the request should decide whether to agree or not. When deciding on consent, all group members should agree. If consent is given, the resources will be exchanged immediately.

4. Implementation

For implementation, the content is defined as follows.

- The learning content's final purpose is to grow the tree and harvest the fruit.
- The content contains four resources that should be used by individuals to grow the tree until it bears fruit.
- The management requirements are moisture in the soil, nutrition supply, insect occurrences, and branch counting.

The development environment is set for implementation based on the web server. Using OS is Microsoft Windows (Ver. 8.1 Enterprise), web container is Apache Tomcat (Version 7.0) and software language is PHP (Version 5.4.0).

4.1. Implement Condition

When using the resource, individuals should inject an adequate amount. The antagonist module in the system changes the state for individuals to inject consistently until they achieve the learning purpose. The content contains the following resources.

- The first resource is water. Excessive or insufficient input will have a bad influence on the rate of growth. Individuals should keep a suitable quantity of water for growth.
- The second resource is fertilizer. The input amount can have a bad influence such as water.
- The third resource is pesticide. A lot of harmful insects cause tree disease, so individuals should take preventive measures against them. But when used excessively, bugs can't pollinate, so the tree can't bear fruit.
- The fourth resource is pruning tools. Branches are increasing when the tree is growing. A lot of branches require nutrients for fruit, so pruning is needed. But if the pruning is too severe, the tree can't conduct photosynthesis.

Resources are consumed endlessly. The exhaustion of resources prevents individuals from growing the tree and from achieving their learning purpose. Therefore, individuals should secure a supply of the necessary resources. The system is already constructed as a method for resource exchange, so the content can use this method. Each part of the content has different prerequisites that define the renewal status. The antagonist module in the system changes the status as referred by the prerequisites. Then individuals should use a different amount of resources per group. For example, one group has a prerequisite that the evaporation speed is faster than another group so it needs more water resource. But, this group has another prerequisite that the insects' propagation speed is lower than another so it needs little pesticide. This group's lack resource is water and surplus resource is pesticide. Group members must find another group with the opposite resource situation and that therefore needs to exchange these resources. Hence, they can exchange resources easily [19].

4.2. Implementation Result

The implementation result on the web page is presented in Figure 3.

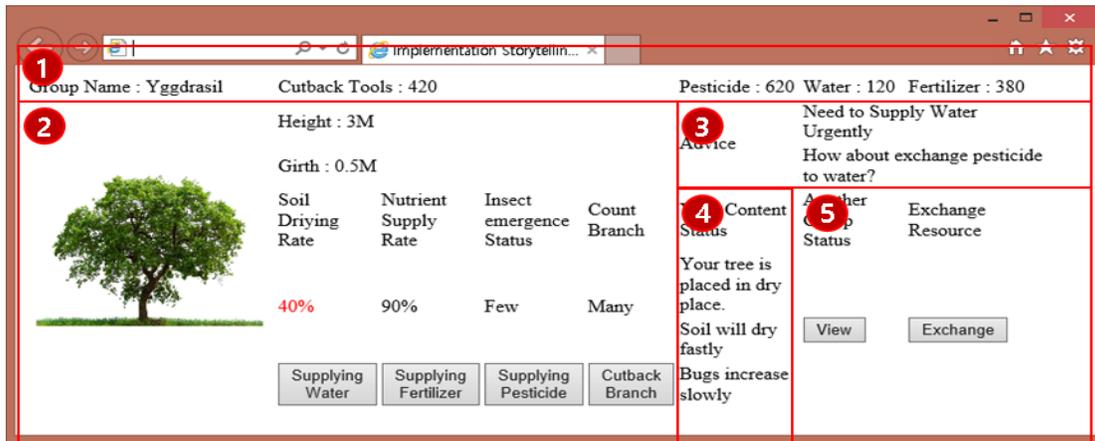


Figure 3. Screen Shot of Content Implementation

This page consists of five parts. The individuals control these parts to develop the content via cooperation. These five parts are explained as follows.

1. Resource Information: Show the amount of remaining resource.
2. Tree Status: Show the current tree status. A suitable tree image is shown on the left. Print the four management requirements status and button for control.
3. System Advice: Show the advice received from the system.
4. Content Prerequisites: Show the content's prerequisites.
5. Intergroup Cooperation: Check the other group's status or resource exchange history.

5. Conclusion

To design a system to increase student interest in and concentration on learning, and in the absence of sufficient appropriate research in the existing literature, the present study has applied the 12 steps of The Hero's Journey toward the development of collaborative learning content. For content application, The Hero's Journey is redefined as learning participation in the individual's journey. The designed system overview contains two parts for collaborative learning.

Even if the system is successfully implemented, there is no intuitive user interface for the learning content. Therefore, further research specializing on collaborative learning is necessary to develop such an interface.

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