

An Authoring Process for Educational Role Playing Games: From the Paper to the Web

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Abstract: Table-top Role Playing Games (RPGs) can be a powerful educational tool, but many teachers either aren't aware of that, or don't know how the game works. This problem could be alleviated with an authoring tool that facilitates the process of creating educational table-top RPG adventures and, at the same time, provide an introduction and computer-based support to this game genre. Literature on available authoring tools oriented to the creation of games in educational contexts is still scarce. Therefore, this article presents our efforts towards the design of a web authoring tool that aims at helping both teachers and students in the creation of educational table-top RPG adventures and also in the posterior use of these adventures in the classroom. The goal behind this work is to promote this genre of games and computers in education.

Keywords: Game-based learning, educational table-top RPG, authoring process, narrative-driven educational games.

1. Introduction

Game authoring tools allow teachers to feel ownership over the content they are using in the classroom, and can even make them feel more comfortable with it (Carbonaro et al., 2008). Authoring also permits that educators fit their curricula into a game, instead of fitting a game into their classes, which is usually what happens when they pick up educational games from the shelf. For the students, the game authoring process itself can be a valuable learning experience, because it allows them to express their creativity (Carbonaro et al., 2008; Resnick et al., 2009; Robertson and Nicholson, 2007) and even learn and practice computer programming skills (Resnick et al., 2009; Robertson and Nicholson, 2007).

Literature shows that most of the current game authoring tools are either focused on the programming aspects of the creation process (Resnick et al., 2009; Yatim and Masuch, 2007) or too tightly bound to a specific technology or template (Carbonaro et al., 2008; Marchiori et al., 2012; Mehm, Göbel and Steinmetz, 2012; Robertson and Nicholson, 2007; Rubegni, Sabiescu and Paolini, 2008; Wetzel, Blum and Oppermann, 2012), which ends up generating games that have to be used as they are. Of course, if the intention is that the authoring process plays the educational role, then the inflexibility of the final product is not a problem. However, many of the authoring tools we indicated earlier are, in fact, intended for teachers to create media the students will simply consume (Marchiori et al., 2012; Mehm, Göbel and Steinmetz, 2012; Rubegni, Sabiescu and Paolini, 2008; Wetzel, Blum and Oppermann, 2012).

Therefore, we propose an authoring tool that not only helps both teachers and students in the creation of their own games but also enables a collaborative experience between them in the classroom. These objectives can be achieved through table-top Role Playing Games (RPGs). This is a game genre in which the players interpret the roles of the central characters in a narrative. The table-top categorization means that the game takes place in the physical world, not in the electronic world. This means that the story, the environments and the interactions between the characters are entirely described by the players, to each other, through speech. The somewhat opposite RPG category is the computational one, in which the computer provides a graphical interface for the game setting and for the characters. Another important distinction between the two categories is that in table-top RPGs one of the players must assume the role of the Game Master (GM), who is responsible for preparing the

story's script, being its narrator and acting as the referee on the interactions between the players. In computational RPGs, the computer acts as the GM. This brings much more inflexibility since the players interact with a machine, a deterministic system, and not with a human. Therefore, the story and its outcomes are restricted to what the game designers and programmers have previously established. To the context of this work, these are the most important differentiations between the existing types of RPGs. Tychsen et al. (2005) further explain the differences between all the RPG categories.

From the previous description, it's easy to see that table-top RPGs are by definition a collaborative storytelling experience. When used as an educational tool, they can help create an encouraging learning environment, bringing students and teachers together (Hergenrader, 2011). However, for people who have never played table-top RPGs before (and even for those who have), it can be very challenging to create an RPG adventure that is fun, has a good story and is educational. To our knowledge, there's no available authoring tool that helps in this task, and this is the gap we want to address with the tool proposed in this paper. Therefore, in section 2 we present the theoretical background of our work. In section 3, we report how we went from a paper to a digital prototype of our tool. In section 4, we present our concluding remarks.

2. Background

In the educational context, authoring tools are usually directed either to the teachers or to the students. In the first case, the tool helps to create a product that the students can use to study (like slide presentations or courseware) or interact with (like games or multimedia). In the second case, the idea is usually that the authoring process in itself is educational. Literature on authoring tools that have been or are being developed for educational purposes in the last decade (Berlanga and García, 2005; Bottino and Robotti, 2007; Carbonaro et al., 2008; Kuo and Huang, 2009; Marchiori et al., 2012; Mehm, Göbel and Steinmetz, 2012; Nešic et al., 2011; Resnick et al., 2009; Robertson and Nicholson, 2007; Rubegni, Sabiescu and Paolini, 2008; Wetzel, Blum and Oppermann, 2012; Yatim and Masuch, 2007) led us to the three categories of authoring tools shown in Table 1.

Table 1: Classification of authoring tools in educational contexts.

Class	Author	Authoring Products	Teacher's Role	Student's Role
A	Teachers	Educational Games Interactive Stories Educational Multimedia	Create interactive educational contents to use in class	Interact (but not contribute) with the contents created by the teachers
B	Students	Games Interactive Stories	Supervise or guide student's works	Learn determined skills during the authoring process
C	Teachers	Learning Design Learning Objects Class Plan Courseware	Create plans and materials to support the class	Study the materials the teacher shared

This classification is quite broad, since the intention is to separate authoring tools that somehow incorporate interaction and play (Classes A and B) from the ones that aim at helping teachers to create "traditional" class materials, such as class plans, slide presentations and e-learning resources (Class C). With these categories in mind, we took a closer look at the authoring tools that fit into Classes A or B. Table 2 shows some technical and educational specifications we've encountered in these tools.

Table 2: Technical and educational specifications of authoring tools from Classes A and B.

Tool	Reference	Intended Authors	Technology Involved	Learning Goals
ScriptEase	Carbonaro et	Students	ScriptEase augments the	English students learn by

	al. (2008)		<i>Aurora Toolset</i> , making it easier to use.	designing interactive stories, thereby also exercising their creative expression.
<e-adventure>	Marchiori et al. (2012)	Teachers	<e-adventure> is a platform for the authoring of educational point-and-click adventure games.	Students interact with the narrative-driven games created by the teachers, testing previously learned concepts.
StoryTec	Mehm, Göbel and Steinmetz (2012)	Teachers	StoryTec is a tool for making narrative-driven serious/educational games.	Students play the games and interact with the contents the teacher introduced in the game.
Scratch	Resnick et al. (2009)	Students Teachers	Scratch aims at making it easy for anyone to program their own interactive stories, animations, simulations and games.	Students or teachers exercise their creative and systematic thinking, by using programming to express their ideas.
Adventure Author	Robertson and Nicholson (2007)	Students	Adventure Author is a set of educational tools that were designed on top of the commercial game <i>Neverwinter Nights 2</i> and that are used to create interactive stories.	In the game design process, students develop their creativity and meta-cognitive skills such as planning, organization and reflection.
1001Stories	Rubegni, Sabiescu and Paolini (2008)	Teachers Students	1001Stories is a tool for creating multimedia and multichannel narratives.	Teachers can create multi-media narratives for their students to watch or students can create their own narratives with teacher supervision.
Tidy City	Wetzel, Blum and Oppermann (2012)	Teachers	Tidy City is a location-based scavenger hunt game in which players solve riddles to find the treasure. The users can also add their own riddles.	The teacher can add riddles about locations or buildings for the students to solve during the treasure hunt.
GATELOCK	Yatim and Masuch (2007)	Students	GATELOCK is a game authoring tool that uses visual programming to simplify game developing for children.	By creating their own games, students develop creative thinking and programming and problem solving skills.

Each tool in Table 2 provides different resources in order to facilitate different tasks; none of which, however, address the creation of table-top RPG adventures. This is a task that is intimately related to writing compelling narratives and integrating them with gameplay elements. Although *ScriptEase*, <e-adventure>, *StoryTec*, *Adventure Author* and *1001Stories* all help making narrative-driven multimedia, they have two main drawbacks regarding our goal: first, the authoring product is an interactive multimedia, meant to be simply consumed, which means it doesn't natively allow a collaborative experience in the classroom; second, the tools don't provide a narrative structure to guide the authors, helping them to create good stories, with the exception of *StoryTec* and its scene-

based narrative structure. *Tidy City*, on the other hand, also produces a game to be consumed but that is centered on puzzles, not narratives. Finally, *Scratch* and *GATELOCK* provide a visual programming language that lowers the difficulty for writing computer programs but not necessarily creating good stories.

Therefore, there's a gap in literature for authoring tools that aid in the creation of educational, collaborative and game-based narratives. In this paper, we propose an authoring tool for making table-top RPG adventures that integrate a good story with gameplay elements. The tool is based on a framework we created, called "Beginning, Middle and End (BME)". The next subsection explains, in short, this framework and how it guided our prototyping process.

2.1 The BME Framework

"Beginning, Middle and End (BME)" is a conceptual framework that was conceived through the mix of the two frameworks proposed by McDaniel et al. (2009) and by Sharda (2007), each of which aimed at aiding in the creation of narratives for slightly different media: games (McDaniel et al., 2009) and educational multimedia (Sharda, 2007). They also had two fundamental similarities between them. First, the narrative structure both followed had three main components that could be summarized as beginning, middle and end. Second, in both frameworks that same narrative structure was recursive, that is, each beginning, middle or end component could be divided into beginning, middle and end, and so on. Despite the similarities, the frameworks from McDaniel et al. (2009) and Sharda (2007) each had their own advantages and drawbacks. To create the BME framework, we incorporated the similarities and tried to take only the strong suits from McDaniel et al. (2009) and Sharda (2007). The main disadvantage of the framework from McDaniel et al (2009) was the complexity of the structures it proposed, making them hard and impractical to use. On the other hand, it had great principles from Semiotics embedded into the framework, such as the three-act dramatic narrative structure, and the use of symbols to reinforce the message of the story. That work also adopted great practices from Participatory Design, adding flexibility to the creation process and allowing, for instance, to rearrange parts of the story as appropriate, at any time, if the author feels it will make the narrative more compelling. On the other hand, the proposal of Sharda (2007) had a very simple recursive structure, composed of problem, solution, beginning, middle and end. The disadvantage of Sharda (2007)'s framework was the repetition of "problem" and "solution" in the whole structure. We found more practical to use them only in the higher-level story, that is, in the description of its overall concept. In this same description, we also merged the beginning, middle and end structures from Sharda (2007) with the three-act structure from McDaniel et al. (2009). We called "micro stories" the recursive structures composed of objective, beginning, middle and end. "Objective" was a simplification of "Problem" and "Solution" from Sharda (2007). The result is the following high-level description of the BME framework:

- State the concept of the story in the form of a problem.
- State the high-level solution to that problem.
- Decompose the solution into three dramatic acts, Act I (Beginning), Act II (Middle), and Act III (End).
- Define the primary symbols of the story, such as characters and environments.
 - If possible, explore the relationships between the symbols.
- Inside each act, create micro stories that are stated in the form of Objective, Beginning, Middle and End.
 - As long as necessary, expand each micro story into other micro stories with the same structure.
 - Feel free to change the micro stories places, to test where they best fit.
- Whenever possible, attach to the micro story an interaction element that describes how the player(s) can interact with that scene.

These steps don't have to be followed in any specific order. This gives more freedom to the author of the story, since s/he can write down the ideas as they come up and later rearrange them as best suits the purpose of the narrative.

This framework was tested and refined through two scenarios of use. In the first, a History teacher worked closely with a researcher in order to create an educational table-top RPG adventure about Getúlio Vargas, one of Brazil's presidents. In the second scenario, a group of researchers used the BME framework to create an adventure based on the tale of Little Red Riding Hood. Both scenarios were useful not only to refine BME, making it as practical as possible, but also to create the prototype of the web tool that implements BME. In the first scenario, the use of the tool was simulated using a paper prototype (Snyder, 2003), similar to the one shown in Figure 1. Since the BME framework suffered a few changes after the test in the second scenario, some fields in the actual paper prototype were a bit different than what's shown in Figure 1, but we feel this is necessary to better reflect how the framework actually works.

Act I Act II Act III     General View of the Story Problem (What is the problem you wish to approach with this adventure? <i>Example: How did Getúlio Vargas become president?</i>) Solution (How do you intend to solve the problem you proposed? <i>Example: Explain the dichotomy between revolution and coup.</i>)	Act I Act II Act III     New Micro Story Objective: Beginning: ⊕ Micro story Interaction Character Middle: ⊕ End: ⊕
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Figure 1. BME paper prototype interfaces.

The figure to the left is the “General View” of the story, where the author defines the problem the story will approach and what will be the solution to that problem (first two steps of the BME framework). The figure to the right shows the micro story creation interface, which can be used either to insert micro stories into the acts, or to write down the acts themselves, since micro stories and acts all share the same structure. This enables the author to rearrange the micro stories whenever necessary, even transforming them into the high-level description of an act if s/he sees it fits. Both screens in Figure 1 have the same heading. The idea behind it is that, at any moment, the author has a view of the whole story through the “timeline” that shows the sequence of the acts and the micro stories between each act. The arrow in the screen to the right indicates that the new micro story is being inserted in Act I. Also, the three buttons next to the timeline give the author access, at any time, to the main components of the tool: the “General View” (dark circle), the “Characters” (stickman), and the “Interaction Elements” (dark square). Finally, the “New Micro Story” screen also shows a “plus” button next to each “Beginning”, “Middle” and “End” component. This is to enable the author to associate either a “Micro story” (following the recursive structure), an “Interaction Element” or a “Character” to that particular moment of the new micro story. These two elements will be explained further ahead.

In summary, at the end of the first scenario we had a whole adventure about Getúlio Vargas written in paper. After the second scenario, the BME framework was refined and so the next step was to digitalize the prototype and the adventure, to test the use of both in the classroom. Next section will describe how this was made.

3. From the paper to the Web: Designing with the students

The practice in the classroom had two main objectives: first, to see how much the narrative structure helps the GM during the game; second, to see how much the tool helps the players in creating and interpreting their characters. To achieve these goals, we created a series of web forms using Google Docs. The forms intended for the GM enabled us to digitalize the Getúlio Vargas adventure that was entirely on paper. We made a form for the “General View” and another for the micro stories. This way, during class the teacher and the researcher (both acted as GM during the game) could consult the high-level story and the micro stories. The forms intended for the players (students) were meant for character creation and registering the story from their character’s perspective. Figures 2 and 3 show the main interfaces used in this practice.

The screenshot shows a web browser window with a blue header bar containing the text 'BME'. Below the header is a navigation bar with back, forward, and search icons. The main content area is titled 'Story Structure'. It contains a list of acts: '+ Act I', '+ Act II', and '- Act III'. Under '- Act III', there are sections for 'Objective', 'Beginning', 'Middle', and 'End', each with a text input field. The 'Objective' field contains the text 'Illustrate why Getúlio was deposed.' The 'Beginning' field contains 'Brazilian military see government's fascism.' The 'Middle' field contains 'Interaction: military and urban elite plot against Vargas.' The 'End' field contains 'Vargas agrees to leave power.' Below these sections are three expandable micro-story sections: '+ Micro Stories' (expanded), '- Micro Stories' (collapsed), and '+ Micro Stories' (collapsed). The expanded section shows 'Micro Story 1', 'Micro Story 2', and 'Micro Story 3'.

Figure 2. The “Story Structure” interface, intended for the Game Master.

The screenshot shows a web browser window with a blue header bar containing the text 'BME'. Below the header is a navigation bar with back, forward, and search icons. The main content area is titled 'New Character'. It contains several form fields: 'Player(s) Name(s)' (text input), 'Character Name' (text input), 'Social Group' (radio buttons for 'Workers', 'Military', and 'Urban Elite'), 'Virtue' (text input with a prompt 'What's your character's main virtue? Example: intelligence, physical strength'), 'Weakness' (text input with a prompt 'What's your character's main weakness? Example: impatience, arrogance'), 'Object' (text input with a prompt 'An object of value your character always carries. Example: watch, hat, necklace.'), and 'Character History' (text input).

Figure 3. The “New Character” interface, intended for the players.

The interface in Figure 2 represents the view the GM has of the narrative structure. Through it, s/he can see the description of each one of the three acts in the form of “Objective”, “Beginning”, “Middle” and “End”. In addition, these last three components of each act also have micro stories associated to them. The micro stories share the same structure of “Objective”, “Beginning”, “Middle”

and “End”. During the practice in the classroom, the GMs used the “Story Structure” interface to guide them in the narration of the adventure to the players. It gave the teacher more confidence over what would happen next, leading him to trust not only the authoring tool but also the RPG as a teaching method.

The interface in Figure 3 represents the character creation form used by the students during the practice. Besides giving their characters a name, it was established with the teacher that the students would have also to give it a virtue, a weakness, an object of value and a social group. The three social groups in the form (Workers, Military and Urban Elite) surfaced during the creation of the adventure as the most influential ones in Getúlio Vargas’ ascension to power. The idea behind thinking of a virtue and a weakness was to help the students best interpret their characters by basing their behavior on these features. The last field of the form was meant for the players to write down the story of their characters. This was important not only to make the students reflect upon the narrative, but also to keep a record of what happened during class, which is crucial if the game is divided into more than one class. It’s also useful for the teacher to create post-game activities. For instance, in this practice, after the adventure was completed the students were asked to create a story with three scenes (Beginning, Middle and End) that answered the question “Was Getúlio Vargas the father of the poor and the mother of the rich?” The records of the adventure from different perspectives were important for the students to reflect upon the question and try to answer it using the characters and events from the adventure.

It’s important to note that the fields in the character creation interface were exclusive to the adventure about Getúlio Vargas. Therefore, the idea is that, in the actual authoring tool, the authors can establish how many fields there will be and how they will be named, so that the “New Character” form is tailored to the context of the adventure. Another important observation concerns the “Story Structure” interface. Note that, in Figure 2, in the filled out “Middle” field it is written “Interaction: (...)”. This means that the author planned that, in that moment of the adventure, there would be an interaction between characters from the Military and the Urban Elite social groups. The authoring tool predicts several types of interaction that can occur during the game. Figure 4 shows the form that allows the author to associate an interaction element with a moment of a micro story or of an act.

Figure 4. The “New Interaction Element” interface.

Figure 4 shows that, in table-top RPGs, there are two basic types of interaction: between characters or between a character and the environment. The type determines how that interaction will be judged by the GM. In Figure 4, the dashed square indicates the judgment types related to the option that was not selected (Character vs. Environment). The judgment types that have an “R” next to them are the ones that require a form of resolution, which can be, for instance, dice rolling. The general idea behind these forms of resolution is to dilute the GM’s power, adding randomness or chance to the results of the interaction, instead of only the GM’s final word. Figure 4 shows the most usual forms of

resolution found in table-top RPGs, but in the actual authoring tool, the author will be able to define new ones, as long as s/he associates it with an interaction type and a judgment type.

In the next subsection, we will present some of our impressions on the impact of the RPG in the classroom and we will discuss how the previously described practice guided the creation of a computerized authoring tool.

3.1 Discussion

The idea of the creation of an authoring process for educational table-top RPGs came after we applied, in the classroom, an adventure that was described in an RPG book. Although it was historically contextualized, there were many fantasy aspects that led the History teacher to fail to identify with the game contents. Since this can be true in many cases regarding the use of educational games in the classroom, we decided to involve the teacher in the creation of an RPG adventure. Since a teacher's time is scarce, we needed an authoring process that was easy and quick to use. After we created the BME framework and applied it to create the Getúlio Vargas adventure along with the History teacher, we were able not only to refine our framework, but also to elaborate an RPG adventure that had value to the teacher, since he was its author. In this matter, we believe two aspects are noteworthy. The first is the power of authorship. From the use of a third party adventure to the use of his own story, the teacher's behavior shifted from confused and distant, to excited and actively participant. Evidence to this was the many moments when he interpreted characters, such as Getúlio Vargas, for the students to interact with. He also seemed more confident and reassured that the game was connected with his discipline, and that it had actual educational purpose. This brings us to the second aspect we want to discuss: the contrast between fiction and reality. The Getúlio Vargas adventure had great historical precision, at the teacher's request. However, it's interesting to note that even History books present someone's opinion or point of view. Hence, they are not completely precise or free of even a hint of fantasy. Therefore, the positive aspect of authoring is that it allows people to choose the amount of fantasy they find acceptable to their work. To maintain this degree of freedom, during the creation of the adventure about Getúlio Vargas, the researcher acted only as a guide to the teacher, orienting him on how to use the BME framework. The researcher only intervened to suggest narrative or gameplay elements, such as "cinematic cuts" (fast-forward or rewind) and moments where interaction between characters would be suitable. Also, a paper version of the form in Figure 4 was used to explain to the History teacher each of the elements contained in it. The teacher opted to use just dice rolling for actions that required a resolution, given he found it more dynamic than the other options. In the actual authoring tool, there will be help documentation linked to the form, so the user can understand how to use the interaction elements in his stories. In fact, all forms will have some kind of help documentation, so the user can understand and utilize the tool.

It's also important to observe the way the authoring process affected the students. The RPG adventure created by the teacher can be seen as an incomplete screenplay, with gaps that have to be filled by the player's decisions and interactions during the game. Therefore, the students acted as co-authors of the final version of the screenplay, by deciding what their characters did and said in specific moments of the narrative. This gave them the opportunity to interact with each other, discuss, negotiate, and finally express in speech and in writing what their character's point of view in the story is.

All the activities described thus far have been guiding us in the creation of a computer system that intends to be an authoring tool for educational table-top RPG adventures. Figure 5 illustrates the main decisions the practices with the teachers and the students helped us make.

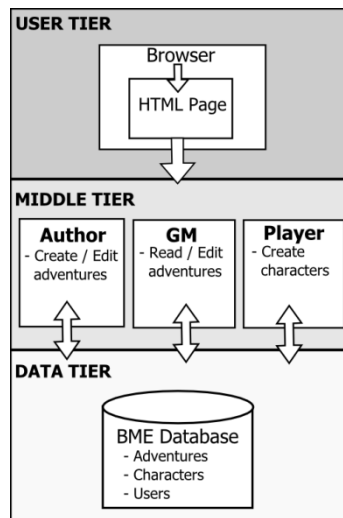


Figure 5. The architecture of the authoring tool.

In summary, we opted for the Web as system platform, since it doesn't restrict the access to specific operational systems or machine configurations. It also makes it easier to save the narratives, share them and use them with a group of players. The activities also showed us three main roles the system must attend to in different ways: author, GM and player. The authors are those who create adventures. The GM is the one who takes an adventure and plays it with other people, assuming the role of Game Master. The GM can be an author, but the other way around is not necessarily true. Given the previously noted power of authorship, it's important that the GM can edit an adventure, so that, for instance, if s/he is not its author, s/he can tailor it to his/her needs. Finally, the player is the one who interprets a character in a game in which someone else is the GM. For this reason, the GM must be able to create characters for his/her players to use.

4. Conclusion

Table-top Role Playing Games can be a powerful educational tool, but they can also be very hard to use, especially by people who have never played them. The main challenge is in creating an interesting narrative, and then integrating it with gameplay elements. To overcome this challenge and to address the gap in literature for authoring tools aimed at educational table-top RPGs, we proposed in this paper a web tool that implemented a conceptual framework we created, called "Beginning, Middle and End (BME)". Our main goal was to come up with a design that aided in the creation of educational narratives and also in their application in the classroom in the form of a collaborative storytelling game.

To achieve this objective, we first created and tested a paper prototype, used in the authoring of an adventure about President Getúlio Vargas. Later, this prototype was digitalized using Google Docs forms. The digital prototype was, then, used in the classroom to test both the Game Master's (GM) and the players' sides of the tool. This test showed that, for a teacher, the authoring tool not only brings out a sense of ownership and empowerment over the game, but also gives confidence in its use during class. For the students, the tool gave them the chance to create their own characters and register the story from their perspectives. This allowed them to practice writing skills and to reflect, after the game, about the role their characters played in the overall story. Moreover, teacher and students could reflect about the "real" history of that president era by confronting it with the narrative created and story played.

Therefore, we believe that we have achieved our primary goal. During the process of going from the paper to the web prototype, we were able to test the main features from the BME framework: the narrative structure and its integration with gameplay elements (characters and interaction). Secondary interface elements, such as the heading for navigating through the acts and the tool, were left out of the digital prototype, but that was due to matters of time and simplification. The final design still includes them. Overall, we believe the work presented in this paper represents a step

forward both in the design of narrative authoring tools and in the mixed use of games and technology in the classroom. However, it's important to note that the work presented here is mostly the design process of an authoring tool, in which the intended users of the system actively participated. We recognize, though, that an evaluation with the users is still needed, as soon as a functional version of the system is completed. It would be important to test different scenarios, ranging from teachers from different subjects to students from different age groups. Therefore, next steps in this work involve finalizing the system and making new experiments with it. For instance, we would like to place the students as the GMs, allowing them to create their own incomplete screenplays for other students to fill in with their own characters. It would be interesting to see how much fantasy they would place in their creations, especially when there is no formal student/teacher barrier between GM and players.

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