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Facilitate the design of Role Learning Games: the RLG Kit

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Abstract—This article presents a design kit for Role Learning Games (RLG) as multiplayer and multi-role learning games. They use some concepts of Role-Playing Games (RPG). Indeed, RPG are growing in education, but teachers rarely have the tools to design one themselves. Based on a RLG model, a design kit was created: the RLG Kit. Following Design-Based Research, we submitted the kit to teachers through three qualitative experiments to assess its usability. We wanted to know if users understood how to use each element of the kit, if they succeeded in creating a RLG scenario with the kit and thus to improve it.

Index Terms—role-playing game, scenario, game design, multiplayer, learning game

I. INTRODUCTION

In a constantly changing world, where each person must take on different roles throughout their career with a consequent social dimension, the importance of forming citizens able to adapt and cooperate is growing. Serious games have already shown their interest in understanding real situations, in particular for joint work and the co-construction of knowledge [1]. It therefore seems relevant to ask how to build serious multiplayer multi-role games and how to encourage their construction by teachers who recommend their use. Many difficulties in designing serious games exist [2] and to these we can add the non-trivial one of the multiplayer aspect. Indeed, as shown by Wendel [3], multiplayer Learning Games (LG) must meet the constraints of single-player games, but also integrate the challenges related to multiplayer and the design of LG. The collaborative aspect for the players must also be taken into account in this type of LG and the frameworks to help in the design of games including this seem limited [4]. Finally, the complexity increases further if we consider distinct roles interacting simultaneously within multiplayer LG. Indeed, as pointed out by Wesselow [5], the diversity of objectives and applications for each role leads to game design on a case-by-case basis.

We define a Role Learning Game (RLG) as a multiplayer and multi-role learning game. They use some concepts of Role-Playing Games. The main principle of RLG is to synchronize the players actions to achieve their quests thanks to the interactions with other players. Thus, our problematic is to facilitate the design of RLG by teachers, and more precisely their scenario. Furthermore, as noted by Dörner [6], having

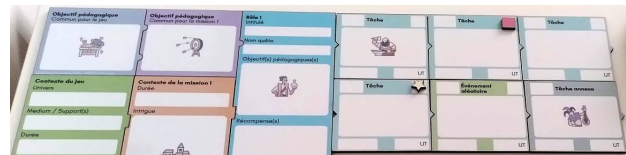


Fig. 1. Puzzle pieces of the RLG Kit

tangible tools for the ideation phase helps with inspiration for the game design. We assume that a tangible tool in the form of a rewritable puzzle could help teachers in the design of RLG. To tackle this assumption, after designing a model and a tool, we conducted three experiments with teachers of different levels and various disciplines. These experiments used the RLG design kit we conceived (See Fig.1). In this paper, we will first detail our contribution and present the method used to set up the experiments. Then, we will discuss the results and analyze them before concluding.

II. CONTRIBUTION & METHOD

We designed a model and we reified it in the form of a puzzle, the RLG Kit¹, to make it more usable to our target audience: teachers of secondary, high school and higher education, as well as instructional designers who can accompany them in their project. The kit, based on the RLG Model, comes in the form of puzzle pieces. Each tile has its own function and reflects one or more stages of a defined procedure. A guide in the form of a booklet and an example sheet accompany this kit to provide explanations on the elements to include on each tile.

We conducted three experiments in order to verify our hypothesis: an ideation tool in the form of a rewritable puzzle would facilitate the design of RLG. These three experiments were conducted with teachers of different levels, for different disciplines. The first and the third experiments took place in one session. The second experiment was divided into two sessions. All the sessions were guided by the Design Based Research and followed the THEDRE method [7]. We collected qualitative data thanks to audio and video recordings during the sessions to perform a thematic analysis [8]. At the end of

¹RLG Model and kit: <https://bit.ly/3GMQgEB>, accessed 04/17/2023

the experiments, the testers completed the SUS questionnaire [9] to assess the usability of the kit. To check whether this tool was understandable and sufficient, we decided to conduct the sessions with teachers who are non-experts of LG design ($N = 23$)². Their main goal was to succeed in designing a RLG scenario with the tool. For this, design times varied depending on the availability of testers, ranging from one to four hours. The first experiment was followed by an individual interview, the others were focus groups to compare the different points of view.

Testers: The 23 testers work in different schools, and teach various subjects. At the beginning of the experiments, they answered a few questions to know if they already created pure fun games or Learning Games. About half of the participants have already created at least one game, pedagogical or not. Concerning the third experimentation, the testers were divided into five groups of three teachers. Each group contained at least two different fields.

Material: the common material for these experiments was one RLG design kit for each teachers' group as described in part II.

Experimental conditions: to collect qualitative data, we recorded the audio of the sessions. To identify the interactions between the testers, the second and the third experiments were also filmed. A consent form and the SUS form was filled by all participants. The three experiments took place: at the home of the first tester, in a classroom for middle school teachers, and in a conference room for the engineering teachers.

Questions to solve: the experiments aimed to answer these questions: 1) Do users understand how to use each element of the kit? 2) Do the testers manage to create a RLG scenario with this kit? 3) Are there any improvements to be made to the kit?

Organization of sessions: the experiment with Middle School teachers was carried out in two sessions since they only have the duration of their lunch break (one hour) to be able to work on this project. The latter involves a dozen teachers. The first session brought together the leader team and the second session included three more teachers to progress on the roles corresponding to other disciplines. The other two experiments took place in one session. The duration of the sessions lasted from one to four hours.

III. RESULTS

a) First experimentation: **Getting started:** The user handed the kit from the very first minutes. After briefly looking at the first few pages of the guide, the teacher 1 (T1) understood which tiles to use first and could start filling in the boxes with its content. The kit seemed to be very useful for ordering the tasks between the roles, for identifying the number of time units between the common tasks, if the action times were equivalent for the two roles and for comparing the tasks to be performed.

Difficulties: a few comprehension questions were asked, rather on the vocabulary (distinction between “mission” and “quest”) or to check his understanding of the content to write on the tiles. However, T1 only got the vocabulary wrong once and then used all the terminology associated with the kit without error. The presence of the leader of the experiment induced T1 to favor comprehension questions (13 times) rather than to consult the guide and the example available (twice).

Result: T1 handled the kit alone and was able to organize the puzzle pieces thanks to the proposed example sheet. By the end of the four hours of design, T1 had a clear idea of what his game was going to look like and was able to move on to the design phase of the game assets.

The game with the students: the game was played with two groups of eight students and went as planned. However, some adjustments are to be expected. Indeed, during the course in class, we were able to observe that the tasks of one role (scientist) were faster to carry out than for the other role (investigator), which resulted in a waiting time for the “scientists”. T1 has therefore planned to give more side tasks to the “scientists” so that they can occupy themselves while waiting for the “investigators” to be available. The teacher and the students expressed the wish to renew the experience as soon as possible.

b) Second experiment: **First session:** as with the first experiment, the guide was helpful in knowing which tiles to start with. Then, the teachers quickly understood how they worked. The example sheet was also useful to visualize the nesting of the tiles. Once the first tiles on the context were filled in, a long discussion followed on the tasks to be carried out for each role and a more precise definition of the overall scenario to integrate all the disciplines. The game, asymmetrical (the materials and media available for each role are different), aims to revise the certificate for third-grade students. All the teachers involved were not present (there was a lack of referents for the sciences). Those presents had to focus on their own parts and tried to plan a part for their colleagues. During this session, to better visualize the temporal representation of the actions of each role and to create tasks with the right temporalities, T3 drew a diagram to visualize this. We will see in part IV how this can be adapted to the kit. This meeting helped to define the main lines of the project.

Second session: following the presentation of the kit to the new teachers by the leader of the experiment, T4 presented the work done previously to T6, T7 and T8 (absent during the first session). For this, he relied on the tiles filled in the previous time. The three new members were quickly integrated and they became proactive in the project. T4, who had asked several comprehension questions and had made several vocabulary errors during the first session, did not make any more during this session and was able to guide the newcomers, advising them of the tiles to meet their needs.

c) Third experiment: The five groups succeeded in designing a RLG scenario³ thanks to the kit during the hour.

²Detail of the sessions: <https://bit.ly/3KV6cpB>, accessed 04/20/2023

³Scenarios created: <https://bit.ly/3A7jnid>, accessed 04/17/2023

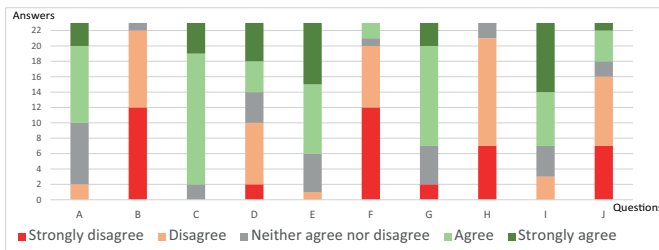


Fig. 2. Results of the SUS form

Their aim, contrary to the other experiments, was not to design a scenario that they would actually implement during their course. They tried to combine the fields of the different teachers in their group and to design a scenario together (transversal approach). Every group contained at least one person who already created a (learning) game and they were quickly inspired to find a subject for their game, so they were autonomous during the conception. As they were five simultaneous groups, they asked few questions and used several times the example and the guide provided to help them. All the groups could not reach the last stages of the guide, but they intended to do it if they had more time.

d) *Overview:* regarding the results (See Fig. 2), the average score of SUS form is 75/100 for the 23 teachers. These results indicate that the system tested is usable. This is therefore quite satisfactory, even if we are considering improvements which we will discuss below.

IV. ANALYSIS AND DISCUSSIONS

Following the results of the experiments, several tracks for improving the kit are considered.

First, to better visualize the time taken by each task of each role, we will create two and three times longer “Tasks” tiles. This will allow to have a better visualization of the duration of the tasks in parallel for each role. Then, “characters” tokens will be added, these tokens could be placed on the tasks where they would intervene and a tile next to it would allow to fill in information on this character. This option was devised following the first and third experiments. Finally, a group of the third experiment expressed the need to write down the game rules. As no tile of the kit allowed this, this is going to be part of the next expansion. As well as the possibility to define time as rounds instead of TU, and the addition of resources and attributes that can be prerequisites to undertake a task. The questions addressed by these experiments were:

1) Do users understand how to use each element of the kit? The experiments carried out tend to show that users quickly understand how to use the kit. Users had no trouble being guided by the tiles. A few comprehension questions were asked to the experiment leader, but the answers could have been found in the guide or the example sheet.

2) Do the testers manage to create a RLG scenario with this kit? The first and the third experiments showed that all the teachers succeeded in creating a RLG scenario with this kit. Concerning the second experiment, the scenario is built over

several weeks. Indeed, since it involves a dozen of teachers in limited time slots, it can only be built gradually, but it is planned to be completed using this kit.

3) Are there any improvements to be made to the kit? As a result of these experiments, there is no essential element missing from the kit, however, as mentioned above, several ideas will be added in an expansion to improve the kit.

V. CONCLUSION

To conclude, we propose a design kit of RLG based on a previously tested model. The results are very satisfactory and one of the experiments was able to be extended to the implementation of a current RLG with high school students. The students and the teacher are delighted and want to reproduce the experience as soon as possible, with a few adjustments to perfect the game. The second experiment is in progress and aims to lead to a game in the next few months. The third experiment inspired a few teachers and they want to use the kit in their school. All the testers quickly took in hand the kit and understood how it worked. These experiments revealed that the tool in the form of a rewritable puzzle seems to help teachers in designing RLG scenarios and that it was possible to make RLG with the kit. These experiments also gave us ways to further guide novice teachers in game design. These first experiments allow to make a new evaluation of the model underlying the kit. To go further in its evaluation, it would be interesting to build a tool to lead experiments on a larger scale. Thus, we are transposing this tool to digital format to validate the design model for multiplayer multi-role learning games. The implementation of this tool has already started. We wish to recover the traces of the testers and thus allow a broader evaluation of the model and the associated tools. The final objective of this tool is to export a file that can be imported into a game engine that would generate RLG in the form of 3D video games.

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