Towards in Situ Measurement of Affective Variables During Playing Educational LARPs: A Pilot Study

Cyril Brom[1], Viktor Dobrovolný[2] and Edita Bromová[1,3]
[1]Faculty of Mathematics and Physics, Charles University in Prague, Czech Republic
[2]Faculty of Arts, Charles University in Prague, Czech Republic
[3]Film and TV School, Academy of Performing Arts in Prague, Czech Republic
brom@ksvi.mff.cuni.cz
viktor.dobrovolny@gmail.com
edita@email.cz

Abstract: Live action role playing games can be used for educational purposes (edu-LARPs), but information about their learning effectiveness is limited. To our knowledge, even quantitative instruments for in situ measuring (i.e. during playing the game) of affective constructs, for instance flow or generalized positive and negative affect in edu-LARPs, are lacking. Existing instruments cannot be applied straightforwardly due to several reasons; most notably, because they are not gamified. Administering a non-gamified inventory in the game can influence/interrupt the states it is supposed to measure. The research aim of our new project is to investigate acquisition of mental models of mechanical devices learnt within an edu-LARP and correlate the quality of the acquired mental model with in situ flow and generalized positive/negative affect (planned N ~ 10 groups x 10 participants). So far, we have conducted three pilots (N = 10, 12, 13) for which we developed a new method for assessing these constructs by in-game questionnaires (and tested the LARP's plot, a sci-fi space opera). The results so far are promising in that we are able to administer the respective questionnaires in situ without adverse effects of the measurement process on these states; as reported by participants in post hoc focus groups. Our method can be probably used in other edu-LARPs provided certain requirements on the LARP's plot are met. Another result is that some components of flow (such as fluency/sense of control) seem to be influenced by role playing but others (such as absorption or time alteration) not so. This indicates that the notion of flow as a unitary construct may not be applicable in LARP contexts.

Keywords: educational life action role playing, edu-LARP, mental model, flow; positive affect, learning

1. Introduction

In our research, we investigate the question whether educational life action role playing games (edu-LARPs) can facilitate learning of mental models; that is, acquisition of complex knowledge about mechanisms and processes. It is supposed that LARPs can be used for educational purposes (e.g., Gjedde, 2014), but information about their actual learning effectiveness is surprisingly scarce and it comes mainly from neighbouring research fields. For instance, role-playing activities are effective in reducing student racial prejudice (McGregor, 1993), weeks-long experiential learning courses have positive effects on leadership, self-concept and academic and interpersonal outcomes (Hattie & al., 1997), and educational computer games can facilitate complex knowledge learning (e.g., Wouters et al., 2013). However, we are unaware of a quantitative study investigating directly acquisition of mental models in edu-LARPs.

Our hypothesis, stemming from the field of emotional design in multimedia learning, is that positive affect and flow, experienced by LARP's participants, may boost effectivity of mental models learning (cf. Um et al., 2012), compared to an emotionally neutral condition. To investigate this hypothesis, we designed a 2-hour long edu-LARP, in which a 15-min long learning experience is integrally embedded in the middle. We devised an appropriate knowledge test and also attempted to develop flow/affectivity instruments, but in the latter endeavour, we encountered a problem, which is in the scope of this paper.

Validated instruments for measuring flow and generalized affect exist, such as Flow Short Scale (FSS) (Rheinberg, Vollmeyer, & Engeser, 2003) and PANAS (Watson, Clark, & Tellegen, 1988), respectively. However, from our previous research on computerized educational simulations, we know that participants' flow and generalized affect can differ in different parts of an hours-long intervention (unpublished data). Therefore, in the present LARP study, we need to administer the flow/affectivity instruments in situ (i.e. *during* the LARP immediately after the learning period) rather than post hoc. There are two problems with this: a) administering an inventory during the game can disrupt the states it measures, b) participants are playing a role in the game and their answers in the in-game inventory can differ based on the perspective taken (the player vs. the player's role). The problem would be even more pronounced if presence/immersion inventories (e.g., Jennett et al., 2008) are adopted, because these force the participant to alternate between the two perspectives during completing the

inventory (which may further influence flow and affectivity). It was therefore needed to devise a special procedure for administering the inventories.

The goal of this paper is to introduce our edu-LARP (Section 2), present how we managed to measure flow and generalized affect in situ (Sections 3, 4) and highlight one additional issue with measuring flow in LARPs (Section 4).

2. Intervention

After running three pilots with young adult participants (N = 10, 12, 13; M_{age} = 30±5.5), we agreed on the following LARP plot, a sci-fi space opera: In the midst of a journey on a generation spaceship, which is supposed to reach its destination after a thousand years, astronomers discover a previously unknown habitable planet only a couple of years of travel away. The crew leaders decide not to guide the ship toward the new planet; arguing that this would deplete all fuel reserves. They also state that the planet is likely a worse bet than the original target. A riot inserts technical school students (the players) right in the middle of the events. Led by their teacher (the game master), they have to master a device for controlling correction motors and negotiate the ship's final destination. Two equally strong groups of players (pro vs. against the turn toward the new planet) compete for access to the device and eventually either change or do not change the ship's route.

The game lasts about 2 hours and takes place in a faculty building in six rooms/corridors about 600 m^2 large in total. The plot is designed so that all players have to learn how to operate the device in order to win the game (their learning outcomes will be compared to outcomes of participants learning how the device works in a non-LARP context). We intentionally teach the players a fictitious device to avoid issues with high prior knowledge.

The experiment schedule is depicted on Figure 1.

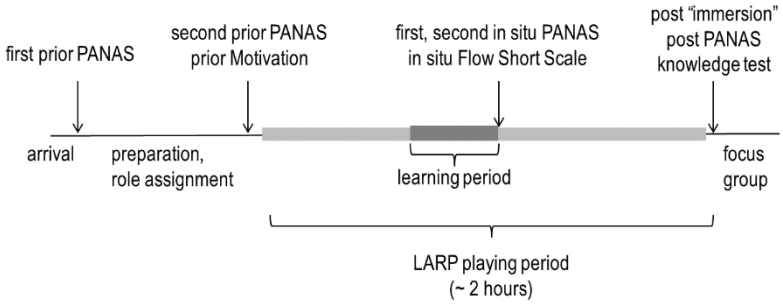

Figure 1: Experiment schedule

3. Inventories

We administer two PANASes prior to the intervention (after the arrival and after the role introduction) along with a prior motivation questionnaire. We also administer the PANAS and a derivation of an "immersion in games" questionnaire (Jennett et al., 2008) post hoc, along with a knowledge test.

Most notably, we administer two gamified PANASes and one FSS in situ, immediately after the participants has learnt how to operate the device (Figure 1). The procedure for administering these three in situ questionnaires is as follows:

- Before the game, we stress the participants that they will receive three gamified questionnaires during the game, and that they should answer questions therein *from the player perspective* (and not from the role perspective).
- Immediately before the learning period, the teacher tells the students – in the game – that they are supposed to fill in a regular survey (after the learning part) which will be used by the spaceship's management to assess quality of his teaching (i.e., gamifing the inventory). This is to make the players see the questionnaires as part of the game.
- Immediately after the learning part, the teacher administers the questionnaires (that take about 5 min to complete in total). The time instructions for PANASes is "assess your emotional states before/right after the learning", and it is "during the last 30 min" for the FSS.

4. Results

The exact PANAS/FSS scores are irrelevant for present purposes because we also worked on the story plot (which improved during the pilots). For present purposes, the key finding is that the majority of participants (> 80%) reported in post hoc focus groups no problems with filling in of the in situ questionnaires from the player perspective. They also reported no adverse effects of the measurements on their affective/flow states. This indicates that the procedure described in Section 3 works reasonably well.

However, we noticed comparatively lower scores from two FSS questions: "I know exactly what I have to do." and "I feel that I have everything under control." (4.18±1.38 [±SD] vs. 5.33±1.44 for the remaining questions; on a 7-point Likert scale). This is actually not surprising because at that moment of the game, players (and their roles) indeed could not know exactly what to do and it was in fact vital that players did not feel that everything was under their control (otherwise, the plot would not be sufficiently challenging). Because that can happen in many LARPs, it seems that either not all flow dimensions must necessarily be experienced in LARPs (flow can be conceptualized as a multidimensional construct, e.g. Moneta, 2012; and we are speaking here about "fluency" or "sense of control" dimension) or they are experienced, but these two questions from a validated instrument do not work well in the context of role playing activities.

5. Conclusion

As part of our three pilot runs of an edu-LARP on acquisition of mental models, we devised a method for administering short inventories in the game. Our present results indicate that our method works reasonably well. We believe that it can be used in other edu-LARP, but four things are probably needed should in situ measurements work: a) players are notified in advance (i.e., before the game); b) it is explained to the players what perspective they should adopt when filling in the questionnaires (the player vs. the role); c) it takes a short time to complete the inventories; d) players perceive administering the inventories as part of the game and the inventories' content is aligned with the instruction given in the game.

Another result is that some components of flow (particularly fluency/sense of control) seem to be influenced by role playing but others not so. This indicates that the concept of flow may be more heterogeneous in role playing activities compared to other activities supposed to induce flow.

Acknowledgements

This research was partially funded by the research project nr. 15-14715S supported by the Czech Grant Science Foundation (GA ČR).

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