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The Player-Role Nexus and Student Engagement in Higher Education Online Role Play Simulation Games

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SimPlay.Net

Abstract

While there is no lack of Literature on role-play, there is a lack of empirical based studies. Further, what it is about role plays that makes them engaging educational tools is far from clear. The present paper argues that the structural properties of roles, and the players' preferences/assessments are two contributing factors in explaining student engagement. The paper is part of a larger exploratory study on the structural components of role plays and their properties in relation to motivation and engagement. This paper focuses on the structural properties of roles (i.e. the way roles are constructed) in role plays, the players preferences and evaluation of these roles and their correlation to student engagement in different higher education institutions and in different areas of study. It uses both student perceptions and preferences gathered by questionnaire and quantitative data analytics to examine a limited number of structural properties in relation to student engagement with Multi Player Online Role Play Simulation Games (MORPSGs) for learning in higher education.

Introduction

Though there are many studies of role-plays in higher education, the research evidence on the use of role-play simulations, in both face-to-face and online environments, is mostly anecdotal (Shaw, 2010; Linser, 2011a; Raymond, 2010; Schnurr et al., 2014). Nevertheless, it still seems to suggest that role-plays engage students (Vincent & Shepherd, 1998; Shaw, 2004; Raymond, 2010; Schnurr et al., 2014). Thus, it is important for research in instructional technology, to understand the factors that support student engagement in learning (Henrie et al., 2015).

The anecdotal evidence in past and current research on role-play simulation games is closely tied to the fact that, there is no agreed definitions nor terminology in the literature (Shaw, 2010; Linser, 2019). As Sauvé and his colleagues have argued, research finding on the effectiveness of games and simulations for educational purposes show mixed results because there is no agreement on terms (Sauvé et al., 2007). Thus, as Sauvé and his colleagues argued in relation to games and simulations, comparing results of studies on role-play simulation games in higher education is also problematic.

The consequences of lack of agreement on terms and the absence of a definition of role-play in the literature is that there seems to be no discussion on the essential structural components for role-plays in contradistinction to games where the definition leads to a well-developed description of the essential constituents of a game (Salem & Zimmerman, 2007) or the essential components of simulations (Sauvé et al., 2007).

Having found no clear definitions of role-plays but mostly descriptions of what constitutes a role-play, Linser (2019) based on the work of Salen and Zimmerman (2003) and Sauvé and his colleagues (2007), suggested to define a role play simulation as *a dynamic artificial environment representing a simplification of a real or fictional social system in which participants interact with one another as roles with given characteristics, objectives and relations (social rules) to one another and within a specified scenario (set of conditions/state of affairs)*.

As Linser (2019) points out, given the definition above, theoretically it follows that every role-play simulation game must have at least five basic structural components: an environment for social interaction that represents a simplified model of some world (or part of it); players who play the roles; roles with definable characteristics, objectives and relations to one another (social rules), interactive communication between roles, and a scenario (specifiable set of conditions or state of affairs within that world). Given the limitations of this paper, the focus here is on only two structural components (Players & Roles) and only on a few of their design properties.

Design properties of the Player Component - The student as player.

The players, in our case students, play the roles, or rather bring life to the roles. It is the student-player's empathetic understanding and interpretation of the role, its characteristics, objectives, capacities and social relations to other roles which forms the basis for the actions of the role and interaction between roles (Shaw, 2010). Unlike games and simulations, the student-player's knowledge and understanding of the world being modeled and the social roles within it, determines the rules of play – the social rules of interaction – in contrast to the arbitrary rules of games or the given built-in rules of simulations (Linser, 2011b). The student/player must, research the role, keep in mind the details of the world being represented and transform these into action during gameplay. They do so by using, among other things, their imaginative capacity and understanding of the role, its context and potential impacts.

Linser (2019) examines diverse designs by which the properties of the "Player" structural component can be implemented. Some role-plays are designed so that the student-players remain anonymous (Cornelius et al., 2011; Linser, 2004), others are not (Shaw and Mendeloff, 2007; Coll-Garcia & Linser, 2006). Some are designed so that the roles would have personal relevance to the player-student (Nelson & Blenkin, 2008) and/or designed so that players are likely to identify with the role they are playing (Linser et al., 2008). The assumption in both these last cases is that students would be more engaged if they find the roles to have relevance to themselves or if they can identify with the role's expected motivations and interests.

Giving students a choice to select which role they want to play is another "Player" design property that aims to motivate and engage students (Cornelius et al., 2011; Lantis, 1998; Nelson & Blenkin 2008; Ching, 2014; Rector-Aranda et al., 2015). Providing students with choices, it is argued, leads to higher engagement levels (Mandernach, 2015; Skinner et. al., 2008; Berson et al., 2008). But though the majority of role-play simulations reported, students are given the opportunity to choose roles, some simply assign roles to the students (Newberry & Collins, 2012). However, even when such a choice is provided, it may happen that not all players actually play the role that they chose. High demand for a particular role may force students to play their 2nd or 3rd preference or even not to play any of their preferred roles but rather play a role allocated by the teacher. Whether students get to play only their 2nd or 3rd preference, or not any of their choices may thus influence the player's level of engagement.

Design properties of the "Role" component – the interactive agents.

At the most basic level, and what distinguishes role-play generally from games and simulations is the fusion of the player and role within the system - the role, is the central pillar of any role-play (Druckman & Ebner, 2013). Roles are the interactive agents in the system. They define the specific social relations being represented in terms of their scope for potential activity and behaviors to be expected. As indicated above, roles draw their life – their actions and interaction within the system - from the player's interpretation and/or understanding of the expected characteristics, objectives and relations in the world being represented in this environment.

Linser (2019) demonstrates that the Role component varies considerably in the way it is designed for different educational purposes depending on the area of study and the specific scenario that represents it, as well as the objective of the role-play and the number of students who will participate. Role-plays may be designed with few central roles and many peripheral ones or with most roles being central and critical to the scenario (Coll and Ip, 2008). Roles may also be designed to achieve individual or common objectives in relation to the scenario, and the strategy expected to be used to achieve these objectives may be cooperative strategy or it may be a competitive strategy. Like in adventure and strategy games, objectives and strategy are related to student engagement (Amory et al., 1999). Linser, and his colleagues, (2008) argued that individualized type of objectives rather than a common objective for all roles, as well as competitive strategy (conflict vs. cooperation), are more engaging for students.

Furthermore, some MORPSGs are structured so that roles are played in teams rather than each player individually playing a role. Though constructivist literature on collaborative learning suggests that collaborative work is motivating and engaging (Bonk, 1999; Ellis & Newton, 2004; Rice, Wilson & Bagely 2001; Donnelly & McSweeney, 2009) there seems to be very little work on whether collaborating in playing a role is also more engaging (Kaufman 1998; Chou & Hart, 2009).

MORPSGs may also be structured as having many roles or a small number of roles. The total number of roles is a design property of role-plays that the literature ignores. Yet a large number of roles may enable players greater variety and choice in the interactions they can enter into and may give players a better sense of the world being modeled, while smaller number of roles may focus attention of players on specific features of that world (Nelson & Blenkin, 2008).

Finally, some roles may be designed on the bases of either real world personas or just their function – particular vs. generic (e.g. President Clinton vs. The President) that exist in the world being modeled (Matz & Ebner, 2011). The former, apart from the social function that the latter represents, also includes personal characteristics and known inclinations of a particular real-world person occupying such a social function. Linser, and his colleagues, (2008) observed that the greater the link of roles to real world personalities, rather than functional or fictional ones, the more motivated and/or engaged players will be because it refers the player to the real world in a reflexive process of role identity and real player identity.

Dimensions of Engagement

Though engagement in games may be self-evident (Connolly et al., 2012), the dimensions that constitute engagement are not. Engagement is an interactive and dynamic construct (Stevens, 2015) that encompasses behavioral, affective and cognitive dimensions (Handelsman et al., 2005; Chapman, 2003; Hew, 2014; Mandernach, 2015). The criteria for measuring these however varies in different studies.

The student Engagement Survey (SE) highlights student engagement as a function of 1) collaborative learning; 2) cognitive development; and 3) personal skills development (Mandernach, 2015). Other researchers attend to more specific variables relating to games, simulations and role-plays like: the level of participation and exuberance in participations (Dingli et al., 2013); selection of virtual characters, environments, narratives, and multimedia elements as well as on attributes of players such as attention, concentration and self-esteem, the learning objectives, the playability experience, control, and attraction to the game as well as support and rewards (Abdul Jabbar & Felicia, 2015); choice of real-life stakeholders, immersion, anonymity of players and interaction (Schnurr et al., 2014); familiarity with the role being played (Ching, 2014; Cornelius et al., 2011); the number of tasks involved (Huizenga et al., 2009); exchanges with others and group size (Stevens, 2015); and identification with the role (Repenning et al., 2010). Engagement has also been linked to 'flow' (Csikzentmihalyi, 1990) which is a state of complete absorption in a task or a game (Huizenga et al., 2009) and can be construed as optimal engagement (Salmon, 2003).

Aim of the Study and Research Questions

Given the literature and the limitations of this exploratory study, the present paper aims to examine students' evaluation and preferences for particular properties in the Player and Role components (out of the five components mentioned above), alongside with data analytics of these properties, and the extent to which they may explain students' engagement with the role using MORPSGs for learning in higher education.

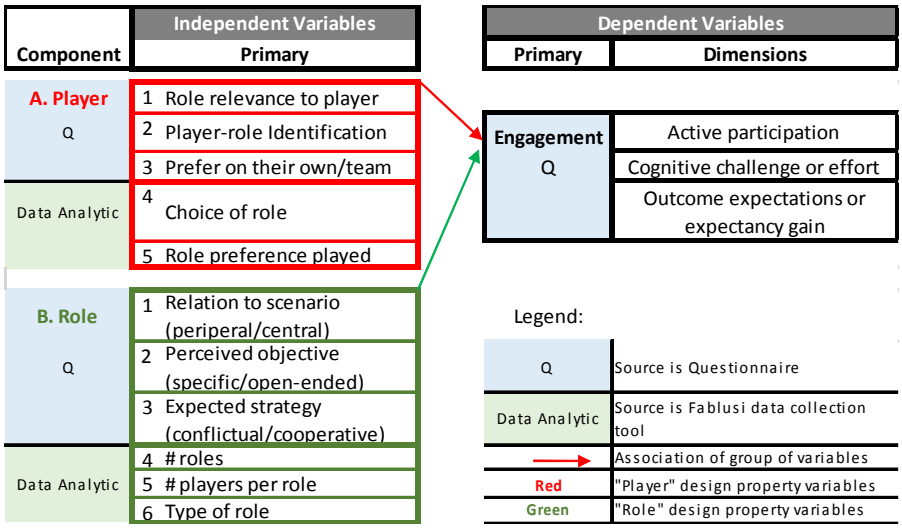
Our research questions are:

1. To what extent do the properties of the Player structural component in a MORPSG explain the perceived engagement of higher education student in learning using MORPSG?

2. To what extent do the properties of the Role structural component in a MORPSG explain the perceived engagement of higher education student in learning using MORPSG?

The paper thus examines the extent to which variables for the player structural component explain the level of student engagement and the extent to which variables for the Role structural component explain the level of student engagement (see Diagram 1).

Diagram 1 – Structural Components and Variables



The SE engagement scale

To measure the level of student engagement, a modified and validated form of the Student Engagement survey (SE), (Ahlfeldt et al., 2005) was used. The Student Engagement (SE) survey developed from the National Survey of Student Engagement (NSSE) by Ahlfeldt and her colleagues (2005), examines variables that influence engagement levels in the context of college students using Problem Based Learning (PBL) (Ahlfeldt et al., 2005). Because the SE was designed for examining the impact of PBL (Problem Based Learning) on student engagement and since problem-based learning has affinities with games, simulation and role-plays (Sancho et al., 2009), it makes this instrument useful for the purpose of this study into MORPSGs. In particular, these learning techniques share the basic principle of Constructivist theory that places the student at the center of the learning process confronting authentic problems.

To be useful for evaluating the relationship between design properties of MORPSGs and engagement some words in the scale were substituted to fit the MORPSGs context. Given the word modification, the internal consistency of the scale was re-validated in the current study using Cronbach's alpha test with results: Active participation - α=.560; Cognitive effort - α=.758; Development of personal skills - α=.800; Total Engagement reliability - α=.812.

Research Methodology

The Research Environment. The study used the Fablusi Role-play Simulation Generator (www.fablusi.com) (Fablusi software – for short) that enables the online design, delivery and administration of simulated social systems as well as providing analytic data of the MORPSG.

Population: Out of a total of 155 students from 2 different higher education institutions and 2 different courses ("Business Strategy and Politics" at Oxford University, UK and "Practical Nursing" at Saskatchewan Polytechnic, Canada), 84 students (54.2%) submitted the questionnaire for this study (see Population & Sample at end of uploaded Slide Presentation) Each course ran a MORPSG specifically designed for their course twice during 2017-2018.

Despite the limitations of the sampling procedure, the large sample of our population suggests that our sample is representative of the research population. Moreover, the comparison between two very different MORPSGs from the two institutions enables us to explore both different and similar design properties.

Research design and instruments: The research design is a mixed quantitative study using: An online post-simulation self-reporting questionnaire composed of 52 items (see https://www.simplay.net/papers/Questionnaire_2019.pdf); Data collection tool provided by the Fablusi software; and the SPSS statistical package for the analysis of the data.

Data Analysis: Bivariate correlational analysis was conducted for the independent and dependent variables. For the analysis of the correlation between engagement (dependent variable), with each of the student demographic variables: Age, Gender, Education level, and language (independent variables) we used one-way Anova tests as well as for some of the data analytic. We conducted Spearman's correlations to probe associations between Engagement as the dependent variable with each of the independent variable measures for "Player" and "Role". The limitation of this analysis is that we did not carry out multivariate analysis to find out the extent to which various variables correlate in explaining engagement nor a comparison of which had the greater impact on engagement.

Findings:

Demographics: Of the total 84 respondents, 43% were between the ages of 28-32; 93% had attained an undergraduate, or higher level of education; and 62% reported English as the language they spoke best (see Student Demographics at end of uploaded Slide Presentation). No significant differences were found for Age, Gender nor Education for the total engagement level nor any of its factors.

Language and Engagement: Significant negative correlations were found between the language students felt they spoke best and the total engagement score ($p=<.01$) and the factor Active participation factor of engagement ($p<.01$). English speakers had higher engagement levels in the active participation factor and in total engagement.

Experience and Engagement. Significant low, positive correlation was found between the student's reported experience with playing online games, and the Cognitive effort factor ($p=<.05$) and between the student's experience with educational role-playing and the Cognitive effort factor ($p=<.05$). Meaning the more experience with online games the student reports, as well as the more experience with educational role-playing the student reports, the higher is their cognitive effort. However, no significant correlations were found with the total level of engagement.

Personal relevance and Engagement. Significant low positive correlation was found between the scores of players who felt that the role they played had personal relevance and the cognitive effort factor ($p<.05$). Meaning players who did feel their role had personal relevance felt more cognitive effort and conversely, but no significant correlations were found with the total level of engagement.

Personal identification and Engagement. Significant low positive correlations were found between the scores of players who personally identified with their role and the total engagement score ($p<.05$), the active participation ($p<.05$) and cognitive effort ($p<.05$) scores. Meaning, the greater players' identification with their role, the higher their total engagement, active participation and cognitive effort and conversely.

Choice of role and Engagement: Significant differences were found for the two groups of choice of role (yes/no) and the Active participation factor of engagement [$F(1,82)=8.479$, $p<.005$]. Meaning to the extent to which choice of role was

provided to students, they reported higher active participation levels. But no significant correlations were found with the total level of engagement.

No significant differences were found for the five groups of Choice played and the total engagement score nor any of its factors.

Role centrality and Engagement: Significant low negative correlation was found between students' perception of the centrality of the role to the scenario (peripheral versus central), and the active participation score ($p<.05$). Meaning, to the extent that players perceived their role to be central to the scenario, the higher was their active participation levels. But no significant correlations were found to the total level of engagement.

Role objectives and Engagement: Significant positive correlation was found between the student's perception of the role's objectives in the game (specific objectives versus open-ended objectives) and the total engagement score ($p<.01$), and the cognitive effort factor ($p<.01$). Meaning, students who perceived their role to have open-ended objectives felt they were more engaged and exerted more cognitive effort.

Role strategy and Engagement: No significant correlations were found between the student's expected strategy of the role (cooperation versus competition) and the total engagement level or any of its four factors.

Play Own/Team and Engagement: Significant negative low correlations were found between the students' preference to play on their own rather than in teams and the total engagement score ($p<.05$) and the cognitive effort score ($p<.05$). Meaning, to the extent that students preferred to play in teams rather than on their own, their engagement was higher, and the cognitive factor level was higher.

# of Roles and Engagement: Significant difference was found for the two groups of number of roles in the total engagement score [$F(1,82)=13.881$, $p<.001$], the active participation score [$F(3,82)=6.818$, $p<.01$] and the Cognitive effort score [$F(1,81)=14.141$, $p<.001$]. Meaning, to the extent that the number of roles was 20 and above students reported higher engagement, greater active participation and more cognitive effort levels and conversely.

players per role and Engagement: Significant difference was found for the four groups of number of players per role and the total engagement score [$F(3,80)=5.691$, $p<.001$], the active participation score [$F(3,80)=4.336$, $p<.007$], and the cognitive effort score [$F(3,80)=5.112$, $p<.003$]. Meaning, those who played their role in teams of 2 or above, reported they were more engaged, had higher active participation and exerted more cognitive effort and conversely.

Type of role and Engagement: Significant differences were found for the two groups of type of role (g/p) and the total engagement [$F(1,82)=13.881$, $p<.001$], the active participation factor [$F(1,82)=6.818$, $p<.01$], and the cognitive effort factor [$F(1,82)=14.141$, $p<.001$]. Meaning, students who played particular roles ('p') rather than generic ones reported significantly higher engagement, higher active participation and higher cognitive effort levels and conversely.

Table 2. Summary of the findings:

Student Background	Engagement: Active Participation	Cognitive effort	personal skills	total
Age				
Gender (M/F)				
Education level				
Language (English/NonEng.)	-.328**			-.298**
Experience with Online Games		.239*		
Experience eductional Role Plays		.267*		
Player				
Personal relevence of role		.233*		
Personal identification with role	.243*	.234*		.246*
Prefer to play on own/team		-.228*		-.217*
Choice of Role	p=.005			
Choice played				
Role				
Relation to scenario: peripheral/central	-.261*			
Objectives: specific/open-ended		.354**		.351**
Strategy: cooperative/competetive				
# of Roles	p=.01	p<.001		p<.001
# of Players per role	p=.007	p=.003		p=.001
Type of role: generic/particular	p=.011	p<.001		p<.001

* p<.05 **p<.01 ***p<.001

Discussion and Conclusion:

Of the 6 demographic variables, only Language significantly correlated with engagement. However, those who reported they had experience with either online games and/or educational role-plays had higher cognitive effort levels on the engagement scale. Thus, though experience with online games and educational role plays may help explain the cognitive dimension of engagement, they are insufficient to explain level of student engagement with MORPSGs for learning in higher education.

Of the 6 properties of the Player component of role-plays we examined, only 2 properties, players' identification with the role and the player's preference to play collaboratively as a team, were significantly correlated with engagement. But of the 7 properties of the Role component, 4 were significantly correlated with engagement.

Turkle (1994) has argued that role-playing games enable people to work through issues of identity. Linser (2004) has argued, that student identification with the roles they play is indeed what makes role-plays effective due the recursive resonance between the identity of the role and identity of the student created by playing a role. Our findings suggest that identification of the student with the role does to some extent explain higher levels of student engagement, as well as higher active participation and cognitive effort on the engagement scale.

Student's preference to play their role collaboratively as a team, rather than individually, was also significantly correlated with student engagement and thus confirms the utility of collaboration, as the constructive theory suggests, to student engagement in learning using MORPSGs.

Interestingly, and contrary to our expectation, neither having a choice in which role to play nor playing one of their preferred roles showed significant correlations with student engagement. However, those who did have a choice of role reported higher active participation levels on the engagement scale than those who did not.

Giving students a choice, it has been argued, leads to engagement with role plays for learning (Skinner et. al., 2008; Berson et al., 2008). Yet this was not confirmed by our findings and seems to go against the grain of the literature on constructivism generally (Bandura, 1999; Sharan & Sharan 1992) and on role-play in particular (Cornelius et al., 2011), and is contrary to the majority of practice of giving students a choice in which roles they would play (Lantis, 1998; Nelson & Blenkin, 2008; Ching, 2014; Rector-Aranda et al., 2017).

While, students' preference for roles that are perceived to have open-ended objectives rather than particular ones, was correlated to their engagement levels, their perception of the role's relation to the scenario (peripheral/central) did not. However, the latter did significantly correlate to higher participation levels on the engagement scale.

Number of roles in a MORPSG that are 20 or above, playing collaboratively in teams of 2 or more, as well playing particular real-world personas rather than generic roles were all significantly correlated with student higher levels of engagement, active participation and cognitive effort.

Given the findings of this exploratory study, and despite its limitations, it provisionally suggests that a design of a MORPSG, where students can personally identify with the role they are playing; where they play collaboratively in teams; where the roles have open ended objectives with a large number of roles modelled on real-world personas; is more likely to engage students using MORPSGs for learning in higher education. Whether students can choose their roles or play one of their chosen roles or not, does not seem to make a difference to student engagement.

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