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Persuasive games, designed to change attitudes and inspire behavior change, have attracted significant interest. In particular, persuasive recruitment games are increasingly in demand due to under recruitment in many occupations. However, research on persuasive games often lacks clear design guidance and tends to focus on individual player experience factors, rather than identifying and prioritizing the most influential ones that should shape design decisions. Our study (n = 957) examined how player experience impacts recruitment interventions aimed at encouraging careers in teaching. We compared three approaches; a persuasive game, a "realistic job preview" (RJP) and a control game. Effectiveness was measured by increases in Interest (in teaching), Person-vocation (PV) fit and Self-efficacy. Results showed that the persuasive game was the most effective at increasing Interest, while the RJP had the greatest impact on PV fit and Self-efficacy. Interest was primarily influenced by experiences of meaning, followed by mastery. Conversely, mastery followed by meaning were the strongest influences on PV fit and Self-efficacy. Experiences of immersion or autonomy had no significant effect on persuasion. We discuss how understanding which aspects of game experience have most impact can aid the design of persuasive games for recruitment and other purposes.

CCS Concepts: • **Human-centered computing** → **Human-computer Interaction (HCI)** → Empirical Studies in HCI

Additional Key Words and Phrases: Persuasive game, player experience, recruitment, interactive narrative, mastery, meaning

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1 Introduction

Persuasive games [1-4] are a type of serious game [5-7] which, rather than being solely designed for entertainment, also aim to encourage players to change their attitudes or behavior. They have attracted increasing research interest, with games developed in areas of pressing social interest such as the environment [8], health [9-13], civil discourse [14] and secure smartphone behavior [15]. An additional area of social concern that persuasive games have the potential to contribute to is recruitment. Key sectors such as health [16] and construction [17] have suffered from recruitment shortages, but this issue is particularly acute in teaching [18] with UNESCO (2025) [19] reporting a global shortage of 44 million teachers and the OECD labelling teacher shortages an 'urgent priority' (2024) [20]. Persuasive games have successfully been used to increase recruitment [21], however there are still questions about how they should be designed.

Considerable guidance into persuasive system design has been provided by research into the factors underlying successful persuasion. Different persuasive strategies have been evaluated [22, 23] with varying approaches being shown to be effective for different types of gamers [9, 24, 25] including different types of game framing [26]. Models of how persuasion works have been developed (E.g. [27, 28]) with one of the most influential being the ARCS (Attention, Relevance, Confidence, Satisfaction) model [29].

However, many of these approaches (e.g. [28, 29]) consider persuasive games as just one branch of "persuasive systems" rather than specifically looking at games. An issue with this broader approach is that it tends to see persuasion in terms of low level interactive features such as "self-monitoring" [29] or "reminders" [28] whereas games are often considered in terms of the overall experience they create. [30-34]. Engagement is one of the main facets of the experience of playing games [35-37] and is often viewed and measured as a multi-dimensional entity made up of several factors, such as immersion, mastery and autonomy [38, 39]. Many of these individual game experience factors have been linked to the effectiveness of persuasive games, for example Hafner & Janz [40] found that experiencing increased immersion heightened susceptibility to persuasion in socio-political persuasive games.

Viewing persuasive game design through the lens of experience factors is advantageous because these factors have been linked to game design features. For example, immersion can be increased by changing the camera position from a third-person to a first person or removing a head-up display (HUD) [41, 42]. Similarly, feelings of competence can be moderated by feedback [43]. However, persuasive game designers face challenges in determining which experience factors are most critical to persuasion. While many factors have been proposed, much of the evidence is indirect or hypothetical, in particular it is not clear which are most important factors and which are less influential. Game design is the art of compromise [44] with different game genres creating different experiences [45, 46] and even within a genre, designers have to make trade-offs between different experience factors. For instance, removing a HUD may increase immersion [42], but make the game harder and so decrease feelings of mastery.

Despite numerous studies on the relationship between game experience and persuasion, few identify which are the most influential experience factors and which are less important for persuasion. While Orji et al [9, 29] provide rankings of the persuasion-related features in

persuasive systems, they do not focus on games or game experience. Thus, persuasive game designers are left with a long list of considerations which *could* improve effectiveness, but less guidance on which to prioritize. Thus, our overall research question is "What player experience factors influence the effectiveness of persuasion across a variety of game and non-game recruitment materials?" To address this question, we conducted a large-scale (*n*=957) exploratory study that used regression analysis to determine which game experience factors had the most impact on persuasion across both a persuasive game and a non-game persuasive system (RJP) currently used for recruitment. Our context was teacher recruitment which -with many key occupations facing recruitment shortages [19, 47] -reflects a wider demand for persuasive recruitment interventions.

Theories of teacher recruitment are underpinned by core motivational constructs, with particular emphasis on interest, self-efficacy (i.e., confidence to teach), and person-vocation fit (i.e., perceptions that personal characteristics match well with the values inherent in teaching). Considerable past research has explored the motivations associated with prospective teachers' career decision-making (e.g., [48]). In this paper, we adopt a motivation framework to explain how prospective teachers make decisions about entering training for the profession. Rather than assessing effectiveness of our interventions by measuring "perceived persuasiveness" as done in many studies (e.g.[25, 29]) we measured actual change in attitudes and motivations using a pre and post design to assess three different motivation constructs associated with persuasion in a teacher recruitment context.

Our main contribution is to provide empirical evidence that the effectiveness of persuasive games for recruitment may be most strongly influenced by meaning and mastery experiences but not by immersion and autonomy experiences. We find that the influence of experience factors depends on the specific persuasion measure being considered and that understanding these relationships can lead to specific design changes which could improve the effectiveness of persuasive games for recruitment and other purposes.

2 Related Work

Recruitment shortages are affecting many key professions such as health and construction [16, 17] which also includes a shortage of applicants to teacher training courses [18, 19]. Governments have responded with bursaries [49] and non-interactive advertising such as, in England, the *Every lesson shapes a life* campaign. Persuasive games offer the promise of deeper engagement and more effective persuasion [1] leading to higher recruitment. Persuasive recruitment games are not new, with military recruitment board games dating back to the first world war [50] and more recently, the digital *America's Army* designed to increase recruitment to the U.S. military. America's Army has been criticized for targeting children and product placement [51], though others claim this is overstated [21]. However, these issues are unlikely to apply to persuasive teacher recruitment interventions which are targeted at adults and aim not just to increase teacher recruitment but also to ensure that potential recruits are well informed about what the profession entails [52, 53]. In addition, the persuasive elements in the current interventions are based on the principles of authenticity, believability, and addressing knowledge deficits held by potential teaching recruits (i.e., not through deception of painting an unrealistic portrayal of teaching).

Despite their potential there has been little explicit consideration of how recruitment games should be designed. However, the wide variety of persuasive games may offer guidance. Some have goals to change everyday behavior in areas such as dietary change (like *Lunchtime* [11]) whereas others seek to increase empathy to promote socio-political change (like *My Life as a Refugee* [40]). Recruitment games fall somewhere between these positions as they seek to change long term career plans by influencing short term behavior – namely applying for teacher training. Thus, it seems likely that some guidelines for designing effective persuasive experiences will also apply to recruitment games even if it is not clear which guidelines are most appropriate.

Many approaches to the design of persuasive technologies build on the work of Fogg who considered the persuasive potential of viewing technology as a *tool*, *media* or *social actor* [54]. This taxonomical approach is taken by Oinas-Kukkonen & Harjumaa [23, 28] who divided persuasive technology features into the categories *primary task*, *dialogue*, *system credibility* and *social support*. Similarly, Orji et al [29] considered 10 different persuasive system design strategies through the lens of the ARCS model of motivation. The ARCS model, with its roots in instructional design [55], posits that effective persuasion technology requires users to experience Attention ("The system would capture and hold my attention") , Relevance ("I can relate with the content of this system"), Confidence ("It would be easy to understand and use the system") and Satisfaction ("I would really enjoy using the system"). Other approaches have considered the effectiveness of different persuasive strategies in areas such as healthy eating [25], alcohol behavior [10] and sustainable transport [56]. Many of these studies on persuasive technology measure persuasion effectiveness using a 4-item scale adapted from Drozd et al [57] which measures "persuasive potential" - how much participants anticipate they will be persuaded by a system rather than how much they were actually persuaded. An issue with all of these approaches is that they consider persuasive technology systems in the broadest sense, rather than looking only at games and so may miss the factors such as challenge [58] and autonomy [59] which make games distinct.

2.1 Game-Focused Approaches to Persuasion

Game-focused approaches to persuasion examine both the design process, and the design elements of the game itself. Duncan et al's [60] propose "game playbooks" to guide multi-disciplinary teams in creating persuasive experiences. Similarly, Culyba's [61] transformational framework considers not only the design process, but also the broader player and contextual landscape. De la Hera Conde-Pumpido [2] divided the context of game persuasion into three categories; Exocentric (attitude shifting messages embedded within the game), Endocentric (playing the game itself fulfils some other purpose, such as in exergames) and Game-Mediated (the purpose of the game is to stimulate other related activities, such as online game community support groups). Epstein at al [62] emphasize both development processes such as local teams and pilot testing, as well as how design features such as mechanics and dynamics, can influence persuasion. Games can be designed to increase self-efficacy, or confidence beliefs in the capabilities to successfully carry out desired tasks [63]. Chen et al. [64] explicitly grounded a cybersecurity game in self-efficacy theory, embedding information of risk factors, skill development, and guided practice into the design of the game.

Kaufman et al [65-67] focus on rhetorical strategies   advocating "stealth" persuasion to avoid creating player "reactance" against change. Conversely, Khaled [68] favors direct engagement to prompt reflection. Iacovides et al [69] propose a balance, suggesting that persuasion is most effective when the game's message is explicit, yet player - avatar distance allows for reflection. Across these approaches attention to narrative and rhetoric plays a central role in shaping persuasive impact - though these are just one dimension of the broader player experience.

As well as these rhetorical and narrative strategies, research has increasingly explored how aspects of player experience contribute to persuasive impact. Although *engagement* [35, 38] or *enjoyment* [36, 45, 70] have been seen as the primary experiences that games create, these broad concepts do not reflect the complexity of player experience. Accordingly, approaches to measuring this experience such as the Player Experience Inventory [39] consider player experience as a multi-dimensional entity made up of a number of factors such as *immersion*, *challenge* and *mastery*. Individual player experience factors have been found to be moderated by specific game design features; for example, changing camera positions from third-person to first-person can increase immersion [41] or changing perceived difficulty can affect mastery [71]. These links between game design and experience factors are notable because they have the potential to inform persuasive game design. Reviewing the literature, we found four specific experience factors, immersion, competence, autonomy, and relevance – have been consistently linked to the effectiveness of persuasive games through both theoretical reasoning and empirical findings (e.g.[60, 70, 71]). Thus, designing games to increase these experiences could enhance their persuasive power. Below we discuss the evidence linking each of these four experience factors to persuasion.

2.2 Immersion

Immersion has been described as the degree to which players feel they are "in the game" without noticing what else is going on around them [72, 73] due to directing their full attention on the game [74, 75]. Jacobs [76] predicts that if players devote their full attention (i.e. they are immersed) to a persuasive message, the player is more likely to change their attitudes [77, 78]. The importance of full attention to persuasion is also highlighted by the ARCS model of persuasion with Orji et al [29] finding attention second only in importance to relevance. Empirical support for links between immersion and persuasion is provided by studies which found that immersion heightened players susceptibility to persuasion in socio-political games [40] and that increased immersion was more likely to lead to changed attitudes and behavioral intentions in the socio-political game *Darfur is Dying* [79]. Conversely Khaled [68] argues that if games immerse players too strongly this will make them less likely to reflect on their experience and thus change their attitudes. Thus, in contrast to other accounts which posit that increased immersion *increases* persuasion, Khaled argues that increased immersion may *reduce* persuasion.

2.3 Competence and Autonomy

Competence and autonomy experiences are key aspects of the influential Self-Determination Theory (SDT) of motivation [80, 81]. The Basic Psychological Needs mini-theory of SDT posits that individuals are motivated to satisfy basic psychological needs of competence ("I felt that I made progress"), autonomy ("I could play in the way I wanted") and relatedness ("I felt a

connection to others") [82]. Games have been found to satisfy these needs (E.g. [83-85]) and within the context of persuasive games, it seems possible that players who experience needs satisfaction from gameplay will be more engaged and thus more likely to be persuaded. In particular, persuasive games in areas such as recruitment or behavior change may be based on a simulation of the activity that they wish players to perform in real life [86]. If players then experience competence, autonomy or relatedness during the simulation they may be more well disposed towards the activity being simulated. This is further explored by Lu & Moller [87] who posit that persuasive games that create experiences of competence, autonomy or relatedness deepen players' engagement with persuasive narratives and make them more likely to be persuaded. Empirically, Orji et al [88] found links between competence, autonomy and relatedness experiences and the effectiveness of persuasive educational systems. Similarly, Tsai et al [89] found links between autonomy and relatedness and the effectiveness of a persuasive system for increasing exercise. Conversely Gerling et al [90] found no effect of competence or autonomy on the effectiveness of a persuasive game on attitudes towards wheelchair users. This mixed evidence suggests the relationship between competence, autonomy and persuasion in games may be more complex than simple cause and effect.

2.4 Relevance

The experience of relevance has been seen as key for effective persuasive technology. Relevance has been defined as "related to the user's experience and values" and "how performing the behavior would aid the user in achieving their …. goals" [29]. Relevance is one of the four factors in the ARCS model of persuasive technologies [55] and was found to have the strongest association with persuasiveness by Orji et al [29]. Within games, Hart et al [91] found relevance important for engagement in a serious game about police training and Khaled [68] posited that relevance is important for persuasion via reflection. Empirical support for this comes from Iacovides et al [69]'s finding that relevance to players' lives was an important theme in how a persuasive game about work/life balance supported reflection and behavior change. Conversely Kaufman et al [67] found that a more fictionalized and fantasy driven version of a persuasive game to promote vaccination was more successful in increasing empathic concern than a more relevant and realistic version of the same game.

Thus, player experience factors of immersion, competence, autonomy and relevance have all been linked to the effectiveness of persuasiveness games, but often not in a way as to provide guidance for persuasive game design. Evidence of the effect of experience on persuasion comes from games with a wide range of goals including socio-political attitude change [40], exercise promotion [89] and self-improvement [69], and it is not clear whether these factors apply equally to all persuasive games or just games with these goals. In addition, game design is often a compromise between competing experiences. For example, a game which maximizes autonomy experiences by giving lots of options may confuse players and thus reduce the experience of competence. Orji et al [9, 29] have ranked both the importance of persuasive strategies and also of ARCS model factors, but for persuasive technologies rather than games. To enable games to be designed to maximize persuasion there is a need for evidence, not only of which experience factors influence persuasion but also which factors are the most important for particular persuasive needs.

3 Method

3.1 Study Design

Our overall research question was ""What player experience factors influence the effectiveness of persuasion across a variety of game and non-game recruitment materials?" We used data from another, unpublished investigation into the effectiveness of teacher recruitment persuasive systems. This was a between-participants study with three conditions; a control game, a persuasive game designed to increase interest in teaching, and a non-game "Realistic Job Preview" (RJP) [92]. Three different persuasion measures were employed both before and after the intervention to determine the degree of change in attitudes (see section 3.2 Measures). Player experiences of meaning, mastery, autonomy and immersion were measured after the intervention (see section 3.2 Measures). Ethical approval for this study was obtained from the ethics committee of the University of York.

As we aimed to give guidance to game designers, we considered analyzing only the persuasive game condition, but were concerned that this single condition may lack variation in both the experience measures and the persuasion outcomes (e.g. all participants may have a similar experience and similar persuasive outcomes). As an exploratory study, we wanted to consider the widest possible variation in both levels of persuasion and player experience. Therefore, we included all three conditions with potentially varying effects on persuasion – the control game was unlikely to affect persuasion, but the RJP, although not a game, had already been found to increase teacher recruitment [92]. As the three conditions consisted of an action game, a narrative game and a non-game interactive activity this created considerable variation in the player experience factors of interest. This gave a meaningful level of variance in experience factors across a large sample size, allowing a regression analysis to determine the effect of each experience factor on persuasion.

This is in contrast to randomly controlled studies such as [93] which measure the effect of a single design variation with tightly controlled difference between conditions, but make it more difficult to consider such a wide range of potential moderators. This exploratory observational approach meant we could consider a wider range of experiences, outcomes and moderators, but is more susceptible to confounds due to non-independent observations. For example, a possible confound is that the conditions varied in other dimensions (such as graphics quality) that were not explicitly measured, but may also influence persuasion. To minimise this type of confound, we included the condition as a predictor in the regression, thus controlling for condition specific factors and leaving only the effect of differences in experience factors as predictors of persuasion. Although this was not our main focus, we also gave context to the data by performing descriptive analysis of measures and comparative analysis of levels of persuasion between conditions.

3.2 Measures

To measure persuasive effectiveness and link it to player experience we required a measure of experienced persuasion rather than persuasive potential. Fortunately, teacher recruitment has a rich theoretical background (as discussed by [47]) which identifies three main factors which affect likelihood to apply for teacher training. Each factor has an associated and validated scale. To

measure persuasion and assess how effective our system was at increasing teacher recruitment we used a pre/post design which measured these factors both before and after the game and then looked at the difference between time periods. The 3 persuasion measures are listed below:

- Interest in teaching as a career [94, 95]. This was measured using Hackett et al's occupational commitment scale [96].
- Person-vocation (PV) fit; that is, how well a person's interests and abilities match those required by the job has been found to be a strong predictor of likelihood to apply for a position [97, 98]. This was measured using Chuang et al's [99] Person–Job Fit Scale.
- Self-efficacy for teaching. Self-efficacy is a person's belief in their capabilities to carry out a desired course of action [63]. This was measured using the Teacher Sense of Efficacy Scale [100].

The full item text of each scale is available in supplementary materials.

To measure player experience factors, we aimed to use an established and well validated multi-factor scale. We considered the ARCS scale [29] which may have a closer mapping to persuasion concepts even though it was not specifically developed for use with games. However, our main goal was to investigate how widely studied player experience factors influence persuasion so we used a scale specifically designed for player experience. The Player Experience Inventory (PXI) [39, 101] is a well validated multi-factor player experience scale which measures 10 experience factors. This scale has been widely used so that any links we find between persuasion and player experience can be put in the context of other studies on that same experience factor which may then point to particular game designs or genres which are effective at creating that experience. Accordingly, motivated by literature previously discussed under related work, we measured four factors from the PXI; immersion, mastery, autonomy and meaning. We were limited in the number of experience factors by budgetary constraints – participants are paid by the minute and in large study like this every additional measure increases the cost. Immersion and autonomy were directly motivated by existing evidence on the effect of these experiences on persuasion. Our motivation for measuring mastery derived from evidence on the effect of competence on persuasion. The PXI progenitors [39, p. 5] define mastery as "A sense of competence and mastery" and we follow others [e.g. 43, 59] in seeing the factor as being related to the intrinsic motivation experience of competence. Our motivation for measuring meaning derived from evidence on the effect of relevance on persuasion. The PXI does not have an explicit relevance factor however 2 of the 3 meaning factor items are strongly linked to relevance; "The game felt relevant to me" and "Playing this game was valuable to me". Therefore, it seemed likely that the meaning factor could be related to experiences of relevance.

3.3 Materials

Participants were randomly allocated to one of three interventions: the teacher recruitment game, a realistic job preview, or a control game. The three interventions were balanced in terms of duration (10-15 minutes), interactivity, and engagement (i.e., the two recruitment interventions each required close reading and decision-making) and are described below.

Teacher Recruitment Game. The teacher recruitment game was designed to create an engaging experience whilst also increasing the likelihood that players would consider teaching as a career. The game takes the form of an interactive narrative, inspired by commercial games such as *Heaven's Vault* [102], *The Murder of Sonic the Hedgehog* [103] and *Reigns* [104]. Players take the role of a newly qualified teacher experiencing their first term at a UK based high school. They are presented with a series of situations, each of which have two or three options (see Figure 1). Choosing an option gives appropriate feedback and determines which situation is presented next. The narrative covers the first five weeks of term and contains a variety of events and dilemmas that reflect the diversity of a teaching career. Players encounter pupils, teachers, friends and parents and have to consider the different perspectives of each when deciding how to respond.

Figure 1. Each situation the player encounters has two or three options which determine how the narrative unfolds

As we could find little clear guidance on which are the most important principles or experiences for persuasion, we relied on discussions with teacher recruitment experts and feedback from play testing sessions to determine the choice of persuasion techniques. These include established persuasive techniques described by Oinas-Kukkonen & Harjumaa [28] and Ndulue & Orji [3], which are highlighted below in italics. As players take the role of a teacher, the game is a type of *simulation* which uses high production values for *surface credibility*, is based on real teacher stories for a *real world feel* that feels *relevant* to players. It incorporates some of the negative aspects of teaching, such as misbehaving pupils, to increase *trustworthiness*.

The game also employs other techniques recommended for the design of persuasive games. Following De Le Hera's model of persuasive games [27] the game includes strong narrative elements in which the player can follow individual pupils' progress and how the pupils respond to the players' choices. This narrative emerges procedurally from the players decisions [105] but always follows the path of initial uncertainty, meeting of challenges and successful resolution. However, following Khaled's [68] recommendation of leaving space for reflection by prioritizing open questions over right/wrong answers, the game does not give immediate feedback on choices,

rather overall feedback comes at the end of the game (see Figure 2). This feedback is based on choices made during the game such as interactions with pupils and pedagogical decisions and focuses on successes rather than failures. Following Lu & Moller [87] we increased players experience of autonomy by allowing them to choose which pupils to spend more time working with (see Figure 3).

Figure 2. Players are given overall feedback on their choices which always includes a positive aspect
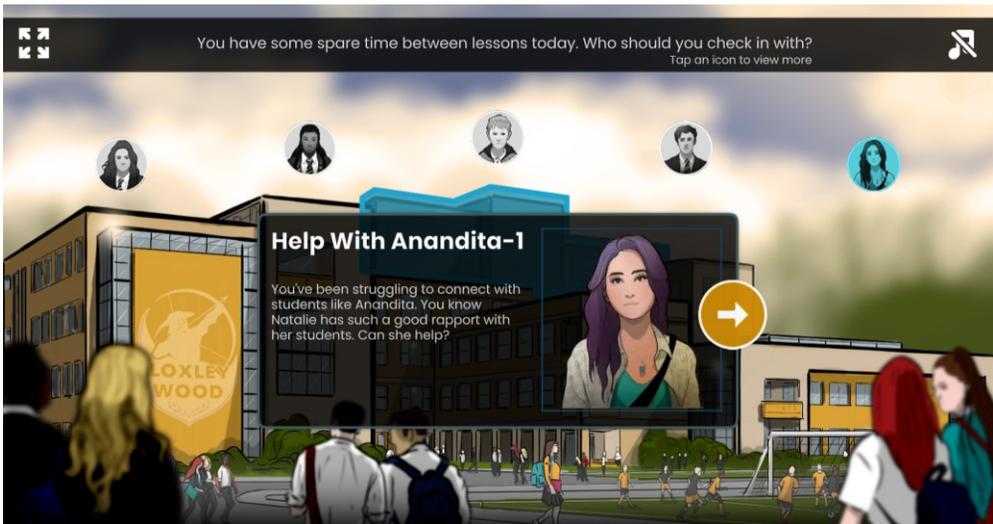

Figure 3. Allowing players to choose which pupils to spend more time with may increase their experience of autonomy

Realistic Job Preview (RJP). Realistic Job Previews (RJP) are currently in use by England's Department for Education to attract applicants into teacher education. They consist of a series of realistic vignettes designed to offer a potential job applicant an authentic portrayal of the situations they are likely to face in a job situation [106]. In the education context, RJPs were originally developed by Klassen et al [107] for screening recruits to initial teacher training programs where they have been found to be effective as an honest depiction of classroom teaching, modelled on the scenarios used in situational judgement tests [108]. They have since been found to increase undergraduates' interest in pursuing a teaching career [92]. We chose to include an RJP as a comparison condition because it is one of the only digital teacher recruitment interventions that we found in the literature and because it is currently in use for the purpose of teacher recruitment. The RJP offers a useful contrast in terms of its discrete scenario approach (i.e., not linked through a narrative), and with limited player autonomy and choice.
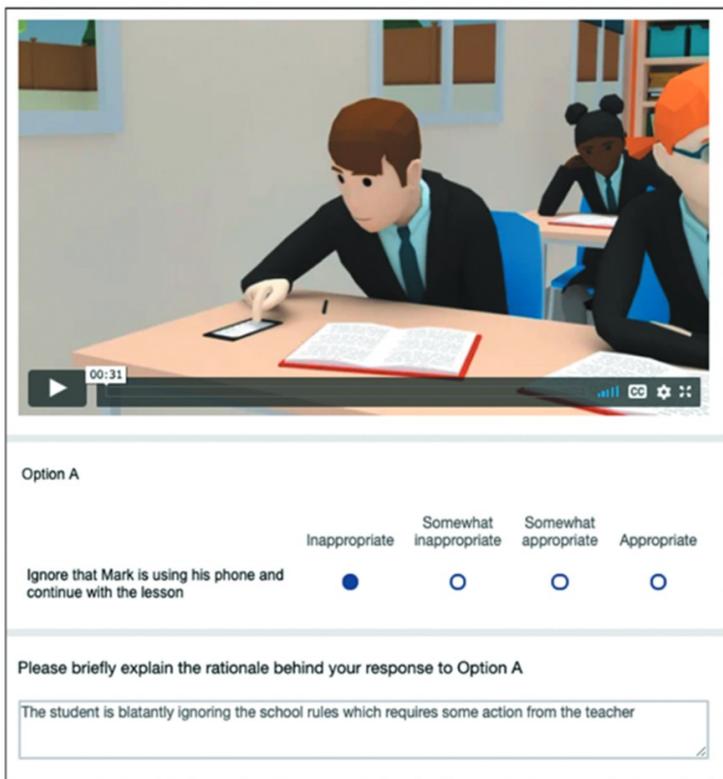

Figure 4. In each scenario, participants are presented with a classroom dilemma. In this scenario, a pupil called Mark is using his phone during a lesson

The intervention consists of four classroom scenarios which are presented via animation with an audio narration (see Figure 4). In each scenario, participants:
1. Are presented with a classroom teaching dilemma.
2. Submit appropriate ratings for three possible responses to the dilemma. Each response is rated from *Inappropriate* (1) to *Appropriate* (4).
3. Then write an open text reflective rationale for each of their choices.

4.   Receive real-time feedback on how well their own ratings align with ratings from experienced teachers.
5.   Are then provided with a rationale for the appropriate response to the dilemma.

Klassen et al. derived appropriate responses to the dilemma using concordance panels of experienced teachers. Once a participant has completed all the scenarios each of their responses is scored from 0-3 based on how close it is to the set appropriate response. Participant's total score then determines which one of four feedback messages they receive. Feedback messages range from "*Excellent fit* (You think like a teacher! Your judgement matches closely with that of experienced teachers)" through '*Quite good fit* (Some experienced teachers think differently than you about these situations. But you have the capability to improve)' to '*Some areas of fit* (Most experienced teachers think differently than you about these situations).'

Figure 5. Participants receive feedback on their answers for each scenario

Control Game. Following Chen et al [64], participants in this condition played a game with no teaching content. This controls against any effects of repeatedly asking participants about their attitudes to teaching and asking them to perform a novel interactive activity for 5-10 minutes. We considered using a non-interactive, teaching-themed control, but rejected this option as it would not account for effects related to simply playing an engaging game. Our goal was to isolate the impact of our game's content rather than the act of gameplay itself. The control game we used, Gravity Heist, is a puzzle platform game set in a science fiction world. The game has ten levels which gradually increase in difficulty, but regardless of players' performance the game always ends after ten minutes.

3.4 Research Questions

Our overall research question was "What player experience factors influence the effectiveness of persuasion across a variety of game and non-game recruitment materials?" To answer this question we created two sub RQs.

RQ1 How do player experience factors of meaning, mastery, autonomy and immersion moderate the effectiveness of the persuasion measures?

RQ2 Which of the four player experience factors are the most important for different measures of persuasion?

3.5 Participants

A total of 957 participants were recruited via the Prolific online recruitment system and paid a small honorarium for their time. Ages ranged from 18-50 (M=26.6, SD=6.96). They had all indicated to Prolific that they were UK based students on undergraduate or postgraduate programs. 545 were female, 427 were male, 11 non-binary, 2 self-declared gender and 4 declined to give a gender. The ethnicity breakdown was that 63.8% identified as White, 15.3% as Black and 14.7% as Asian. The remaining 6.2% identified as Mixed, Other, or did not report their ethnicity. Participants were assigned randomly to one of three conditions: Teacher recruitment game (n = 326), RJP (n = 339), and Control (n = 324).

4 Results

We conducted three different types of analysis:
1) A descriptive analysis to ensure there were no systematic differences between participants in each condition and get a picture of how experience factors differed between conditions.
2) An ANOVA pre/post analysis by condition to provide further context by determining how effective the game and RJP were at changing the persuasion measures of interest, person-vocation fit and self-efficacy.
3) A regression analysis to answer the main study RQs 1 and 2 which look at the effect of experience factors on persuasion.

4.1 Descriptive Analysis

The descriptive analysis (see Table 1) found no systematic differences in participants between conditions. However, there were differences between player experience factors:

- Meaning was much higher in the recruitment game and RJP than the control.
- Mastery was highest in the RJP, followed by the recruitment game and control.
- Autonomy was highest in the recruitment game followed by the RJP and control.
- Immersion was higher in the recruitment game and control than the RJP.

Table 1. Descriptive analysis of measures showing means and standard deviations in brackets. Note that Interest, Person Vocation (PV) fit and Self-efficacy are scored (0-6) whereas meaning, mastery, autonomy and immersion are scored (-3-3).

Condition	Recruitment game	RJP	Control
Gender	122 male, 199 female, 1 non-binary, 1 declined	158 male, 174 female, 4 non-binary, 2 self-declared, 2 declined	147 male, 172 female, 6 non-binary, 2 declined
Age	27.5 (8.83)	28.5 (9.23)	26.9 (8.38)
Pre			
Interest	2.37 (1.80)	2.62 (1.90)	2.59 (1.82)
PV fit	3.70 (1.37)	3.71 (1.39)	3.55 (1.49)
Self-efficacy	4.40 (1.19)	4.37 (1.24)	4.31 (1.31)
Post			
Interest	3.11 (1.76)	3.25 (1.90)	2.57 (1.86)
PV fit	3.91 (1.36)	4.30 (1.29)	3.41 (1.63)
Self-efficacy	4.28 (1.26)	4.61 (1.20)	3.94 (1.55)
Meaning	0.90 (1.42)	1.00 (1.40)	-0.36 (1.60)
Mastery	1.15 (1.23)	1.56 (0.94)	0.71 (1.61)
Autonomy	1.41 (1.23)	1.04 (1.30)	0.24 (1.65)
Immersion	1.47 (1.23)	1.16 (1.15)	1.40 (1.25)

4.2 ANOVA Analysis

The ANOVA analysis provided context by determining how effective each condition was at increasing each of the three persuasion measures. Three repeated measures omnibus ANOVAs were performed to compare the effect of time and intervention type on Interest, PV fit and Self-efficacy respectively. Following Howell [109] we then performed pairwise t-tests on the effect of time for each intervention condition, including applying Bonferroni corrections when interpreting p values. (NB, in the following analysis *** indicates significance at .001 level, ** indicates significance at .01 level and * indicates significance at .05 level and ‼ indicates that this not significant after the appropriate Bonferroni correction). As described below, there were significant increases in persuasion measures in both RJP and the recruitment game.

Interest. There was a significant main effect for time, $F(1,986) = 169.1$, $p < .001$, a significant main effect for the intervention type, $F(2,986) = 3.39$, $p = 0.034$, and a significant interaction between time and intervention type $F(2,986) = 47$, $p < .001$. Pairwise comparisons found Interest increased significantly after both the recruitment game and RJP, but not the control (see Table 2 and Figure 6).

Table 2. Pairwise t-tests of pre/post intervention Interest for each condition found that Interest increased significantly after both recruitment game and RJP.

Condition	*t*-stat	*df*	*p*	Cohen's d
Recruitment game	11	323	<.001***	0.41
RJP	11.1	338	<.001***	0.34
Control	-0.41	325	0.67	0.01
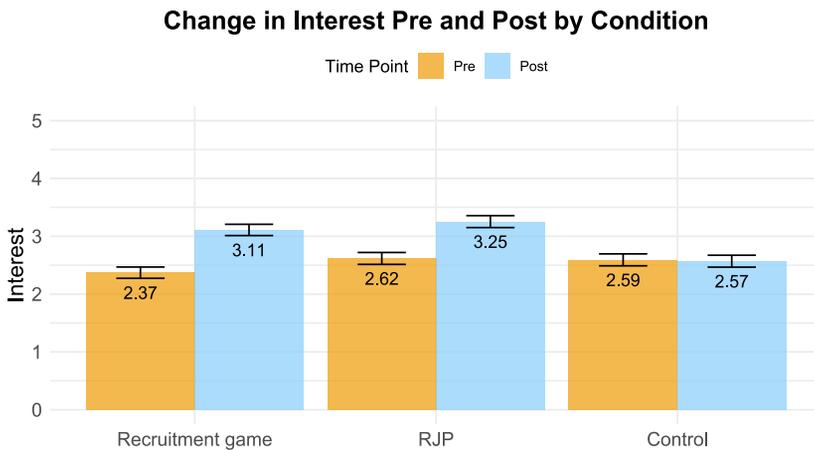
Figure 6. Interest was increased after both the recruitment game and RJP, but not the control. Error bars show standard error.

Person-Vocation fit. There was a significant main effect for time, $F(1,986) = 53.1$, $p < .001$, a significant main effect for the intervention type, $F(2,986) = 12.8$, $p <.001$, and a significant interaction between time and intervention type $F(2,986) = 49.6$, $p < .001$. Pairwise comparisons found PV fit increased significantly after both game and RJP but decreased significantly after the control (see Table 3 and Figure 7).

Table 3. Pairwise t-tests of pre/post intervention Pre/Post Person Vocation (PV) fit for each condition found that PV fit increased significantly after both game and RJP but decreased significantly after the control

Condition	t-stat	df	p	Cohen's d
Recruitment game	3.62	323	<.001***	0.15
RJP	12.29	338	<.001***	0.43
Control	-2.76	325	.006**	0.09
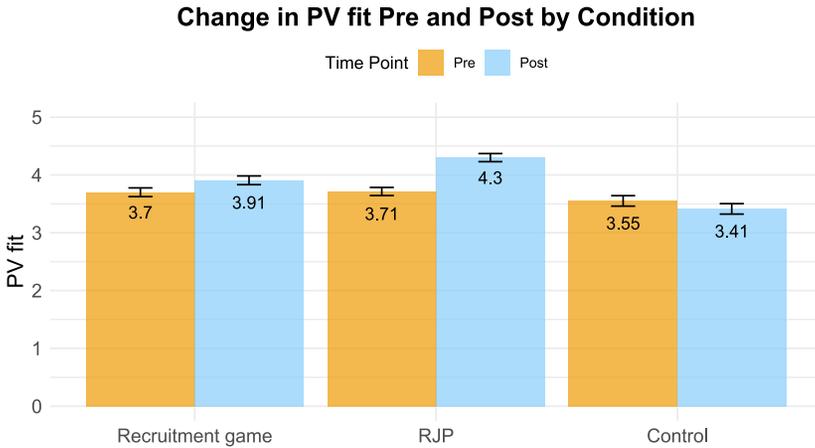
Figure 7. Person-Vocation fit was slightly increased after the game, but much more strongly after the RJP. PV fit decreased after the control. Error bars show standard error.

Self-efficacy. There was a significant main effect for time, F(1,986) = 8.37.1, p = 004, a significant main effect for the intervention type, F(2,986) = 7.37, p < .001, and a significant interaction between time and intervention type F(2,986) =37.7, p < .001, Pairwise comparisons found Self-efficacy significantly increased after the RJP, significantly decreased after the control and after a Bonferroni correction there was no significant difference for the game (see Table 4 and Figure 8).

Table 4. Pairwise t-tests of pre/post Self-efficacy for each condition found that Self-efficacy significantly increased after the RJP, significantly decreased after the control and after a Bonferroni correction there was no significant difference for the game.

Condition	t-stat	df	p	Cohen's d
Recruitment game	-2.2	323	0.028*!!	0.10
RJP	6.27	338	<.001***	0.19
Control	-6.59	325	<.001***	0.25

Change in Self-efficacy Pre and Post by Condition

Figure 8. Self-efficacy increased after the RJP, but decreased after both the game and control. Error bars show standard error

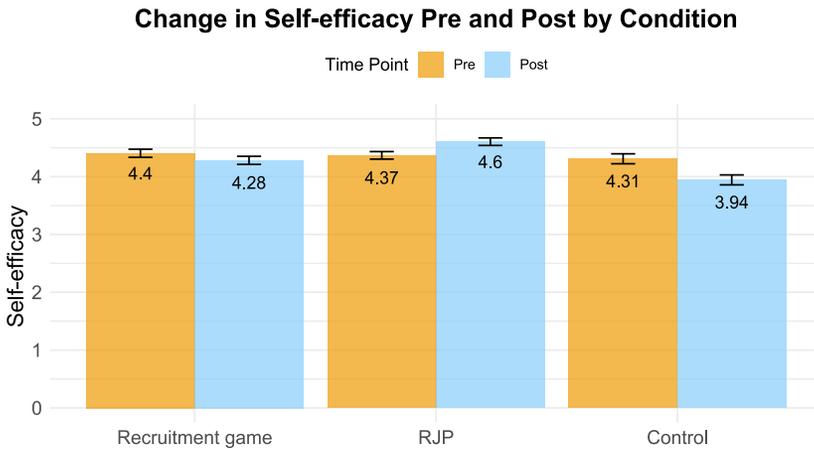*Anova Analysis Summary.* Both the persuasive game and RJP effectively increased participants' likelihood of applying for teacher training. Interest and PV fit were significantly higher after both the game and RJP, however Self-efficacy was only significantly increased by the RJP and not the game. The game increased Interest the most (d=0.41), followed by the RJP (d=0.34). However, the RJP increased both PV fit (d=0.43) and Self-efficacy (d=0.19) more than the game which had a smaller increase in PV fit (d=0.15) and a slight decrease in Self-efficacy (d=0.10) which was not significant after a Bonferroni correction.

4.3 Regression Analysis

To answer RQs 1 and 2 and determine the effect of each player experience factor on persuasion we created a linear regression model for each persuasion measure (Interest, PV fit and Self-efficacy). The dependent variable for each model was the degree of change in the persuasion measure; as calculated by the difference between that measure before and after the intervention. The independent variables were:

- The measure before the intervention (pre-test measure)
- The intervention condition (Game, RJP or Control)
- Meaning experience factor
- Mastery experience factor
- Autonomy experience factor
- Immersion experience factor

All three models fulfilled standard assumption checks [110]. The VIF statistic for all independent variables was in the range 1-2 indicating a low level of collinearity. The Durbin-Watson statistics for Interest, PV fit and Self-efficacy were 1.90, 2.09 and 1.98, indicating that autocorrelation is likely not a cause for concern. Inspection of the Q-Q plots of residuals for each model showed that the assumption of normality was not violated.

The regression analyses found:

- Change in Interest is most strongly predicted by meaning, with a smaller effect of mastery, but no significant effect of immersion or autonomy (see Table 5 and Figure 9).
- Change in PV fit is most strongly predicted by mastery, with a smaller effect of meaning, but no significant effect of immersion or autonomy (see Table 6 and Figure 10).
- Change in Self-efficacy is most strongly predicted by mastery, with a smaller effect of meaning, but no significant effect of immersion or autonomy (see Table 7 and Figure 11).

Interest

Table 5. Regression analysis found that experiencing meaning was the strongest predictor of changes in interest, with a smaller effect of mastery.

Independent variable	β	Standard error	t	p	Standardized β	95% CI	
						Lower	Upper
Intercept	0.708	0.084	8.42	< .001***			
Interest (pre intervention)	-0.282	0.017	-16.31	< .001***	-0.456	-0.511	-0.401
Intervention:							
RJP – Control	0.204	0.082	2.50	0.013*	0.179	0.038	0.320
Game – Control	0.267	0.081	3.30	0.001**	0.234	0.095	0.373
Meaning	0.285	0.027	10.48	< .001***	0.398	0.324	0.473
Mastery	0.062	0.028	2.20	0.028*	0.073	0.008	0.138
Immersion	0.034	0.030	1.16	0.247	0.036	-0.025	0.098
Autonomy	0.039	0.027	1.43	0.152	0.051	-0.019	0.120
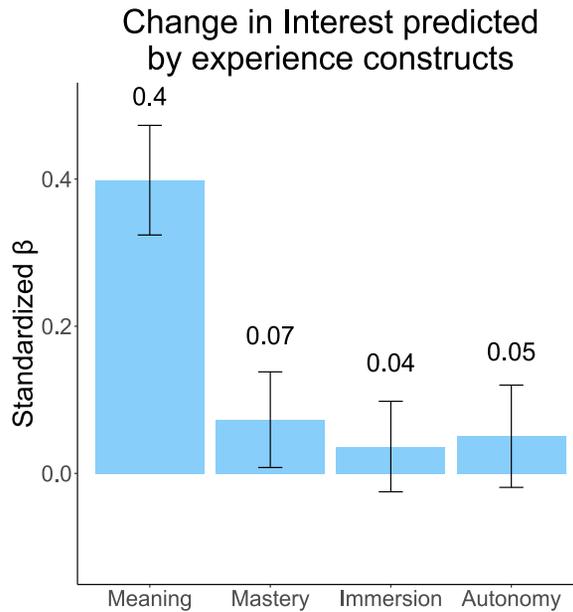
Figure 9. Change in Interest is most strongly predicted by meaning, with a smaller effect of mastery. There was no significant effect of immersion or autonomy. (Error bars show 95% confidence interval).

Person-Vocation Fit

Table 6. Regression analysis found that experiencing mastery was the strongest predictor of changes in Person-Vocation fit, with meaning having a smaller effect

Independent variable	β	Standard error	t	p	Standardized β	95% CI Lower	Upper
Intercept	0.758	0.0934	8.079	< .001***			
PV fit (pre intervention)	-0.294	0.020	-14.527	< .001***	-0.425	-0.482	-0.368
Intervention:							
RJP – Control	0.497	0.073	6.829	< .001***	0.506	0.361	0.652
Game – Control	0.211	0.072	2.943	0.003**	0.215	0.072	0.358
Meaning	0.085	0.024	3.519	< .001***	0.138	0.061	0.215
Mastery	0.214	0.026	8.372	< .001***	0.289	0.221	0.357
Immersion	0.024	0.027	0.900	0.368	0.029	-0.035	0.093
Autonomy	-0.021	0.024	-0.880	0.379	-0.032	-0.105	0.040
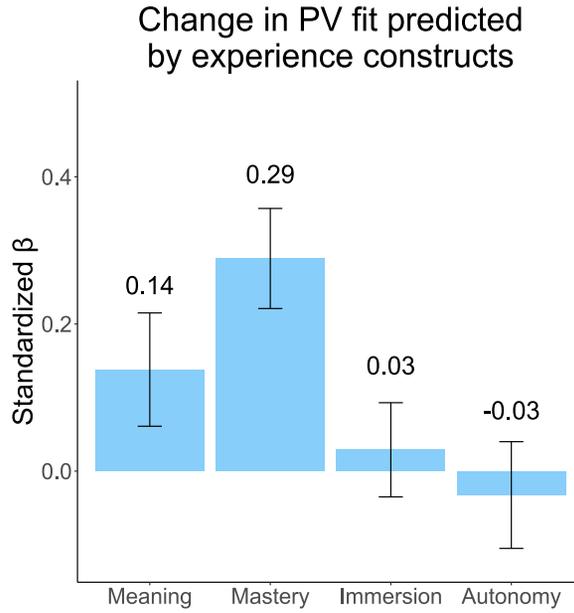
Figure 10. Change in Person-Vocation fit is most strongly predicted by mastery, with a smaller effect of meaning. There was no significant effect of immersion or autonomy. (Error bars show 95% confidence interval).

Self-efficacy

Table 7. Regression analysis found that experiencing mastery was the strongest predictor of changes in Self-efficacy, with meaning having a smaller effect

| Independent variable	β	Standard error	t	p	Standardized β	95% CI Lower	Upper
Intercept	0.709	0.112	6.323	< .001			
Self-efficacy (pre intervention)	-0.279	0.0230	-12.19	< .001***	-0.371	-0.430	-0.311
Intervention:							
RJP – Control	0.367	0.073	5.027	< .001***	0.390	0.238	0.542
Game – Control	0.108	0.072	1.505	0.133	0.115	-0.035	0.264
Meaning	0.076	0.024	3.25	0.001***	0.130	0.051	0.208
Mastery	0.196	0.026	7.543	< .001***	0.278	0.205	0.350
Immersion	0.016	0.027	0.607	0.544	0.021	-0.046	0.088
Autonomy	-0.019	0.024	-0.799	0.424	-0.031	-0.106	0.045
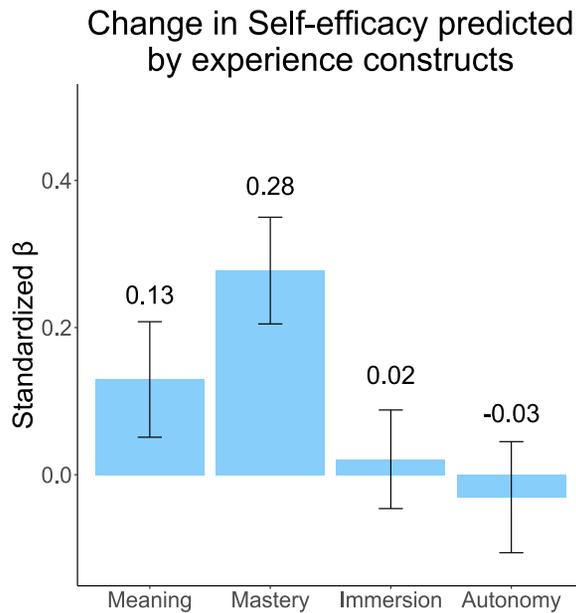
Figure 11. Change in Self-efficacy is most strongly predicted by mastery, with a smaller effect of meaning. There was no significant effect of immersion or autonomy. Error bars show 95% confidence interval.

Regression Analysis Summary
RQ1 How do player experience factors of meaning, mastery, autonomy and immersion moderate the effectiveness of the persuasion measures?

The regression analysis found that both experience factors of meaning and mastery were significant predictors of Interest, PV fit and Self-efficacy and thus are likely to impact the effectiveness of the interventions. However, neither immersion or autonomy significantly predicted any of the persuasion measures and are less likely to impact persuasion.

RQ2 Which of the four player experience factors are the most important for different measures of persuasion?

Meaning had the strongest impact on Interest (standardized β=0.398), which was higher than mastery (standardized β=0.073) (see Figure 9). Conversely, experiences of mastery had much more impact on PV fit (standardized β=0.289) than meaning (standardized β=0.138) (see Figure 10). Increases in Self-efficacy were also much more strongly impacted by mastery (standardized β=0.278) than meaning (standardized β=0.130) (see Figure 11).

We were concerned that the control game, which is not designed for persuasion, may have acted as confound on the regression analysis, so we repeated the analysis without the control game. The results showed a similar pattern of effects from the same experience factors.

5   Discussion

The results found that both the RJP and the persuasive game were effective at persuasion, but each affected the three persuasion measures differently. The persuasive game had a stronger effect on Interest in teaching, whereas the RJP had a stronger effect on Person-Vocation fit and Self-Efficacy. Our overall research question: "What player experience factors influence the effectiveness of persuasion across a variety of game and non-game recruitment materials?" was answered by the finding that, in both interventions, the degree of persuasion was moderated by meaning and mastery, but not immersion or autonomy. The differences in effectiveness between the RJP and persuasive game are mainly explained by these differences in experience which are discussed below.

5.1   Player Experience Explains Differences in Effectiveness Between Interventions

The differences in intervention effectiveness can largely be explained by the varying influence of different player experience factors. Interest increased significantly with both recruitment game and RJP, but not by the control. This aligns with the finding that meaning was the strongest predictor of Interest. Both RJP and recruitment game elicited higher levels of meaning than the control, leading to greater Interest. PV fit was significantly increased by both RJP and recruitment game although the RJP had the largest effect size, while the control resulted in a significant decrease. Similarly, the RJP significantly increased Self-efficacy, but the control game had a significant decrease. These differences are explained by mastery, which was the strongest predictor of both PV fit and Self-efficacy. The RJP had the highest level of mastery, followed by the recruitment game, with the control showing the lowest levels. Consequently, increases in both PV fit and Self-efficacy mirrored the levels of mastery experienced. The recruitment game had much higher levels of autonomy and immersion than the RJP, but regression analysis found these factors had no effect on persuasion measures. This may explain why the recruitment game was not more effective than the RJP for two of the persuasion measures.

The influence of player experience on persuasion may suggest design improvements to enhance the effectiveness of the recruitment game. One key factor is feedback, unlike the RJP, the recruitment game did not provide specific feedback on individual choices, a decision inspired by Khaled's [68] recommendation to encourage reflection. It is possible that this design decision reduced experiences of mastery. The RJP gave more specific positive feedback and resulted in higher mastery which aligns with both Deterding & Cutting [71] and Kao et al [43] who found that feedback on game choices influences experiences of mastery. As mastery had the largest impact on PV fit and Self-efficacy, this lower experience of mastery could explain the recruitment game's lower effectiveness. These insights suggest that redesigning the recruitment game to combine features from both game and RJP could lead to more effective persuasion. In particular, adding the RJP's more explicit positive feedback on players' choices could increase mastery which may enhance its effectiveness at increasing PV fit and Self-efficacy. Additionally adopting the RJP's more authentic feel could further increase PV fit and Self-efficacy.

Similarly, design refinements could be inspired by the finding that autonomy and immersion had no effect on persuasion. The recruitment game included features aimed at increasing autonomy, such as allowing players to choose which pupils to interact with and which teaching methods to

use. However, since autonomy did not contribute to persuasion, these features may be unnecessary. Removing, or perhaps simplifying these elements could allow the game to focus on enhancing meaning and mastery which had more impact on persuasion.

Our findings about the relative importance of game experience factors align with some existing work on player experience and persuasion. Mastery was the strongest predictor of increases in Self-efficacy and PV fit, and a weaker predictor of increases in Interest. PXI mastery has been linked [39] to the competence concept from Basic Psychological Needs Theory (BPNT) and this could support an account in which satisfying psychological needs during a teaching simulation could increase motivation to become a teacher in real life. BPNT sees both competence and autonomy as equally important needs, and research applying BPNT to persuasion [87-89] typically considers both as equally significant. However, autonomy, another important element of BPNT, had no significant effect on any of the persuasion measures. This points towards an alternative interpretation based on Social Cognitive Theory [63, 111] which sees experiencing mastery as one of the strongest influences on feelings of Self-efficacy. In our study the strong influence of mastery on changes to Self-efficacy suggests that experiencing feelings of mastery in a simulation of an activity (in this case teaching) can then increase feelings of Self-efficacy for the actual activity. However, the explanation for why mastery, but not autonomy would also influence Interest and PV fit are less clear. One possible explanation related to the teacher recruitment context. Participants may already perceive teaching as a profession with a high degree of autonomy, so experiencing autonomy during an intervention has little effect on their attitudes. However, they may doubt their skill at teaching, so experiencing mastery during an intervention has a stronger persuasive effect.

Meaning emerged as the strongest predictor of Interest and a weaker predictor of increases in PV fit and Self-efficacy. PXI meaning is measured by three questions, two of which closely align with Orji et al [29]'s measurement of relevance in persuasive systems. However, the third PXI meaning question ("Playing the game was meaningful to me.") has no equivalent in Orji et al's framework. This suggests that PXI meaning and relevance are related but distinct concepts. Despite this distinction, the strong effect of meaning on all three persuasion measures aligns with predictions from Khaled [68] and findings from Orji et al [29] and Iacovides et al [69] on the importance of relevance for persuasion. However, our study differs from previous work in that the degree to which PXI meaning predicted persuasion varied considerably between persuasion measures. Meaning was the strongest predictor of changes in Interest in teaching, but was much less influential on changes in Self-efficacy or PV fit.

In contrast, PXI immersion did not significantly predict any persuasion measures, which was unexpected. This contradicts predictions from Jacobs [76] and findings of links between immersion and persuasion [40, 79]. Furthermore, if immersion is framed as a form of directed attention (as in [74, 112]), our results also challenge Orji et al's [29] finding that Attention was the second strongest predictor of persuasion among the four ARCS persuasion factors. One possible explanation for this discrepancy is that a baseline of immersion or attention may be necessary for persuasion otherwise participants may not notice the message. However, once this threshold is met, further increases in immersion do not enhance persuasion. Since most

participants in our study likely exceeded this level of immersion, the regression analysis did not show a significant effect.

5.2 Contribution and Implications

The main contribution of this study is evidence that the effectiveness of persuasive recruitment games may be primarily driven by meaning and mastery experiences, rather than immersion and autonomy. This suggests that the differences in effectiveness between recruitment game and RJP are due to variations in the type of experience they create, rather than the format of the intervention. By analyzing effective persuasion as a product of several game experience factors we identified specific design changes that could improve the effectiveness of recruitment games.

Our findings give practical guidance for designers of persuasive recruitment games: they should design for experiences of meaning and mastery whilst deprioritizing immersion and autonomy. For instance, Iacovides et al [42] found that removing a Head-Up-Display (HUD) from a game increased immersion but could reduce mastery for novice players. While removing the HUD may be beneficial in entertainment-focused games, our study suggests that mastery is more important than immersion for persuasion so keeping the HUD in a persuasive game may enhance its effectiveness. Design guidance on how to increase experiences of meaning is less straight forward, but Inzlicht et al [113] suggest that greater effort can enhance experiences of meaning, implying that making games which feel harder or more demanding [114, 115] could increase meaning experiences. If PXI meaning is related to relevance, then following Orji et al [29]'s design recommendations such as "Familiarity", "Goal Orientation" and "Motive matching" may also enhance meaning experiences. A consequence of highlighting the importance of meaning and mastery experiences for persuasion is to motivate future work on determining which game design features increase players' experience of either meaning or mastery.

A additional contribution of this study is evidence of the benefits of considering persuasion as a multi-dimensional entity rather than a single factor (as is done in Drozd et al's scale [57]). By considering three distinct persuasion measures (Interest, PV fit and Self-efficacy) we found different persuasive interventions (game or RJP) showed varying effectiveness across persuasion measures. This could imply that some intervention types are better suited to particular contexts – for example the game may be more likely to attract casual players than the RJP so may be used for increasing initial interest in teaching, whereas the RJP is more effective at increasing Self-efficacy so may be used later in the recruitment process. Our persuasion measures were derived directly from the context (teacher recruitment) which may be more ecologically valid than generic measures of persuasion and could be a stronger predictor of behavior change.

A key question when assessing the implications of this study is the extent to which the findings generalize to other recruitment games in particular, and persuasive games in general. The three persuasion measures of Interest, Self-Efficacy and PV fit have been applied to recruitment for other professions other than teaching [47], so our findings are likely to generalize to other persuasive recruitment games. The extent to which they generalize to persuasive games more generally is likely to depend on the nature of the persuasion and the barriers to attitude or behavior change that the game addresses. Relevance has been linked to persuasion in a Work/Life

balance game [69] and more generally [29, 68] and thus it seems likely that the associated experience factor of PXI meaning could have impact in similar contexts. Mastery was most strongly linked to Self-efficacy and PV fit, thus it seems likely to be important in any persuasive game where a barrier to successful persuasion is that participants lack self-efficacy at the desired behavior or belief that they are "not the sort of person" who performs that behavior. This could apply to games which aim to encourage behaviors that participants find challenging or out of the usual such as taking more exercise [116], eating healthier food [11] or promoting more civil discourse [14]. Our findings are less likely to generalize to socio-political persuasive games such as *My Life as a Refugee*. The goal of such games is often to generate empathy rather than persuading participants to perform a behavior which they may have considered difficult or unusual. Indeed, this difference in context may explain why Hafner & Jansz [40] found an effect of immersion on persuasion in socio-political games which we did not find in recruitment. Even if our exact finding of the importance of meaning and mastery does not generalize to all persuasive games, it is possible that the general approach of measuring a battery of game experience factors and then relating them to multi-dimensional measures of persuasion could generalize more widely. As with our study, this could identify the particular experience factors which are important in each context that could then guide redesigns and future game designs within that context.

A limitation of our findings is that they come from an exploratory study which did not seek to tightly control the differences between conditions but instead used regression analysis to determine the impact of each experience factor. The regression analysis provided statistical control for both differences between individual conditions and pre-existing inclinations towards teaching, making it unlikely to be confounded by unaccounted differences between conditions. Future work could confirm these findings using an experimental approach with tightly controlled conditions which differ only in a single experience factor. As with any regression analysis, it is possible that our study materials did not provide sufficient variance in experience to show all significant predictors. For example, it is possible that if we had used VR then immersion may have been higher and become a significant factor. However, our study materials covered a wide range of experiences including an action game, a narrative game and a non-game system so it is likely that the most common game experiences were included. Nevertheless, future work could investigate the effect on persuasion of specific games designed to create extremes of experience. Another potential limitation is that we only looked at the effect of four experience factors on persuasion. We chose the four experience factors most prominently linked in the literature to the effectiveness of persuasive games, however there are many aspects of player experience that we did not consider. Future work could look at the effect of wider range of experience factors, including some linked to persuasion in non-game contexts. For example, the experience of curiosity has been linked to persuasion in marketing and psychological contexts [117, 118].

6 Conclusion

We performed a large-scale study on the effectiveness of two different persuasive interventions, a persuasive game and realistic job preview (RJP). Both were effective at increasing measures of persuasion but they differed in which they increased the most. The game was most effective at increasing Interest in teaching whereas the RJP was most effective at increasing PV fit and Self-efficacy at teaching.

We assessed the influence of four different player experience factors on persuasion and found that meaning had the strongest influence on Interest, followed by mastery. Mastery had the strongest influence on Self-efficacy and PV fit, with a small effect of meaning. Neither immersion or autonomy had any significant effect on any of the persuasion measures.

Our results provide evidence that it is not the type of intervention which made a difference to the effectiveness of persuasion, but more the experience created by that intervention. The influence of individual experience factors on particular persuasion measures then suggested which design improvements to the recruitment game may maximize persuasion. This ranking of the experience factors also gives designers of future persuasive recruitment games clear guidance on which experiences to prioritize and which are less important. Our findings suggest that viewing persuasive game design through the lens of individual player experience factors may provide concrete design guidance for optimizing persuasion in many different contexts.

Supplementary Material

Supplementary materials contain the full dataset used for analysis and the full list of questionnaire items. In addition, there is a short video showing an abridged play through of the teacher recruitment game.

Acknowledgements

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