

Serious Games in EDI Education: A Preliminary Discursive Literature Review University of the West of Scotland

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In Higher Education Institutions Equality, Diversity, and Inclusion (EDI) training sometimes has great variability and may lack sensitivity. As a result, the process often lacks depth and does not provide the ability to make mistakes in a more risk free/simulated practice environment in a simulated practice way. EDI can often encompass and touch on rather uncomfortable subjects that people would much prefer to avoid such as racism, discrimination, sexuality, religion, disabilities, marginalisation, lack of representation, unconscious bias and micro-aggressions, professional dilemmas, and ambivalence. People tend to avoid having difficult conversations and asking questions to enhance understanding. Serious games can offer a vehicle to explore some of these issues in a simulated, risk free, immersive environment with no real world consequences. They are a legitimate academic discipline used in a number of diverse fields such as business, mathematics, and soft skills. This paper will perform a preliminary discursive review of the use of games-based learning and serious games in EDI education and associated terms to produce valuable empirical evidence. The study will review developmental, evaluation and development frameworks for developing serious games for potentially difficult contexts in line with EDI i.e. resistance, ambivalence, and challenging confrontational discussions.

Keywords: Serious Games, Equality, Diversity, Inclusion, Preliminary Discursive Literature Review

1. Introduction

Dedicated educators strive to enhance the educational experience for their learners. This can entail methodological approaches or the integration of innovative technological learning, teaching, assessment, and evaluation tools to provide a more effective and immersive educational experience at all educational levels. Serious games offer a platform to increase motivation, engagement, immersion and provide, risk free, experiential simulated learning (Connolly et al., 2012; Boyle et al., 2016). Not only must educators attempt to utilise and take cognisance of potential innovative teaching approaches, but they must also take time to reflect on their own practice (Djumagulov, 2019). This means additional CPD, keeping up with modern practice and filling in the gaps in knowledge for self-improvement. Serious games can also be utilised tools for educators to enhance their own teaching and learning practice in a simulated class room environment where teachers can learn and make mistakes with decreased risk and without potential insensitivity. Educators at all levels may find themselves in front of a diverse group of students which requires empathy, understanding, sensitivity, respect, and adaptability on their part. This entails educating learners from different cultures, race, social backgrounds where they are expected to adapt to identifying pronouns learners that are disabled or from the LGBTQIA+ community. In his chapter which is an excerpt of his book available at (https://www.academia.edu/9878443/DIVERSITY_IN_EDUCATION, p.3), Johnson (2014) citing Johnson (2010) states that diversity in an educational setting includes: “*social economic status (SES), ethnicity, religion, gender, sexual orientation, cultures and abilities, exceptionalities and language.*”

Serious games have been used in a variety of incredibly diverse areas including culture, health and wellness, education, support, professional learning, and training and for social skills (Din, Baig, & Khan, 2023; Boyle et al., 2016; Connolly et al., 2012). The development of serious games which incorporate appropriate pedagogical content and marrying fun and engagement to the educational learning outcomes is a complex, intricate, and challenging process. This is exacerbated when the learning content can be of a potentially sensitive and complex nature. This study will also perform a preliminary review of evaluation and developmental frameworks in the field of games-based learning and serious games to ascertain if any particularly take into account EDI aspects or have been utilised to integrate content of a potentially sensitive nature. The study will be a first step to a larger study to create a serious game for some aspect of EDI education or training. It will also be a first step to attempt to

synthesise some of the literature in serious games for EDI and evaluation/developmental and pedagogical content integration frameworks for subjects of a potentially sensitive nature.

2. Equality, Diversity, and Inclusion

Definitions of 'equality', 'diversity' and 'inclusion' are exceptionally varied and therefore it is difficult to establish a definitional consensus and theorise the concepts. The Scottish Government defines **Equality** as "making sure every individual has an equal opportunity to make the most of their lives and talents. It is also the belief that no one should have poorer life choices because of where, what or whom they were born or because of other characteristics." Capaldi (2002) points out that the concept of equality is both descriptive and normative. In the descriptive sense meaning that entities are in some respect identical and in a normative sense that all humans are in some special respect equal where the reality is that to achieve this equality that special treatment may be required to achieve the descriptive state. The Scottish Government (2024) defines **Diversity** as "an acceptance that everyone is different and that those differences are to be recognised, respected, valued, promoted, and celebrated. They may include but are not limited to differences protected by equalities law." Diversity is a multi-layered concept with many frameworks proposed in the literature. One comprehensive framework/model by Gardenswartz and Rowe (1994) was proposed for application in healthcare sector organisations. In 2003 it was enhanced and defines the dimensions of diversity into four layers including personality, internal dimensions, and external dimensions. Leicht-Scholten (2012) transferred those four layers to the context of a university i.e. Higher Education organisation. This dimensional layers for an organisation and for a university are displayed in Table 1. Differing attributes of the dimensions are displayed in bold. It is interesting to note that these attributes are more frequent at the organisational level.

Table 1: Dimensions of diversity

Level	Organisational Description (Gardenswartz and Rowe, 2003)	University Description (Leicht-Scholten, 2012)
1. Personality	which can be broken down into the big 5 personality traits i.e. openness to experience (inventive/curious vs. consistent/cautious), conscientiousness (efficient/organised vs. extravagant/careless), extraversion (outgoing/energetic vs. solitary/reserved), agreeableness (friendly/compassionate vs. critical/judgmental) and neuroticism (sensitive/nervous vs. resilient/confident) (McCrae and Costa (1987).	
2. Internal Dimensions	ethnicity, race, age, gender, sexual orientation, mental and physical ability.	age, colour of skin, educational background , migration background/experience , nationality (intern students) , gender, sexual orientation, mental and physical abilities.
3. External Dimensions	Income, personal habits, recreational habits, religion, educational background, work experience, appearance, parental status, marital status, and geographic location.	Geographic location, caring responsibilities , religion/philosophy, social-economic status , professional experience , recreational habits, personal habits, admission to university .
4. Organisational Dimensions	Work content field, division/department/unit/group, seniority, work location, union affiliation, management status, functional level/classification.	Degree , doctorate , combination of subjects , study programme , student employment (tutor/mentor/student assistant) , module, focus of studies, phase of studies, University/subject-specific semester , department/institute/academic centre/faculty , guest auditor/part-time studies .

The Scottish Government (2024) defines **inclusion** as “where everyone feels valued at work. It is about providing equal access to opportunities and resources for people who might otherwise be excluded or marginalised.” Winters (2013) citing Tapia (2009, p. 12) when distinguishing between diversity and inclusion states that “Diversity is the mix. Inclusion is making the mix work” Winters (2013) points out that others have defined the distinction as “diversity is about counting heads; inclusion is about making heads count” and personally defines inclusion as “creating an environment that acknowledges, welcomes, and accepts different approaches, styles, perspectives, and experiences, so as to allow all to reach their potential and result in enhanced organizational success.” The Quality Assurance Agency in partnership with the University of Hull, University of Derby, Staffordshire University, York St John University and Keele University generated a cross institutional Inclusive Higher Education Framework (<https://www.inclusiveeducationframework.info/#Framework>). Hubbard and Gawthorpe (2023) provided detailed documentation on the Inclusive Higher Education Framework highlighting five areas of activity:

- Structures and Processes
- Curriculum Design and Delivery
- Assessment and Feedback
- Community and Belonging
- Pathways to Success

And six key principles or ways of working:

- Clear, consistent language and communication
- Leadership, responsibility, and accountability
- Wellbeing, empathy, and authenticity
- Development and training to empower individuals and teams
- Partnership working across an institution
- Evidence, reflection, and evaluation

Each area of activity in the framework document presents an individual teaching practice checklist, a programme team checklist, and a senior leader checklist. E.g. the Design and Delivery Activity Checklist for personal teaching practice includes some of the following:

- “I embed inclusive education practices within my teaching and assessment planning, design and delivery, with support from the programme team”
- “My teaching highlights diverse figures within the discipline to students (e.g. LGBTQIA+/Black/Asian/Disabled researchers, authors, or policy makers)”
- “My teaching adopts an active and authentic learning approach, not being overly reliant on didactic lecturing, and designed to be accessible to all students (considering e.g. disability, international students, those with limited financial resources)”

‘EDI’ (Equality, Diversity, and Inclusion) or ‘DEI’ (Diversity, Equality, and Inclusion) are often used as flippant, buzz acronyms but in reality are a set of immensely intricate, interconnected terms. The relationship between Equality, Equity, Diversity, and Inclusion is complex and nuanced with the Equity being the how, the Diversity being the who and the Inclusion being the what in relation to organisations (Davis, 2022). Figure 1 shows the concept of Diversity, Equity & Inclusion, and the interconnected/related terms. It should be noted that this diagram is not exhaustive.

tests (repeated measures ANOVA) the serious game intervention yielded a statistically significant positive result in relation to autonomy in promoting strategies however there was no significant results in relation to self-efficacy across the three conditions.

3.3 Neurodivergence

Azadboni et al., (2024) performed a systematic review of serious games for training social skills to autistic individuals which highlighted that serious games have tremendous promise in this area. The study discovered 25 games within 25 studies where 104 pieces of criteria were assessed with 57 of these criterion showing significant improvement in the participants. 22 of the studies showed significant enhancement in at least one piece of measured criterion and 13 significant improvement in all assessed outcomes. Targeted skills included: social interaction, communication skills, collaboration, recognising facial expressions, emotional understanding, emotional management, empathy, and social functioning. Some of the games found in the studies were: Guess Who? GOLIAH, Join-In, No-Problem, The Junior Detective Training Program (JDTP), Secret Agent Society, ECHOES, CVLE 3D empathy system, Mario & Sonic at the Olympic Games, FindMe, WUBees, VR-SCT, Zirkus Empatico (ZE), Social Tutor, CoASD, MEBoo and ShopAut 2.0. For comprehensive article coverage the study performed a backward snowball literature search and found 8 related works consisting of systematic reviews, meta-analysis and scoping reviews of the literature associated with serious games, social skills, and autism.

Derks, Willems and Starckenburg (2022) performed a meta-analysis of Randomised Controlled Trials (RCTs) of the effect of serious games for improving adaptive and cognitive skills of children with Intellectual Disability (ID) or Autism Spectrum Disorder (ASD). The study involved 11 RCTs with a total of 654 participants and the findings indicated that serious games can be linked to improvements in adaptability and cognitive skills. It should be noted however that more research is required as this is not a straightforward association.

3.4 Transgender Representation/Trans and Gender Diverse attitudes to GBL

Stauss et al., (2019) performed a qualitative study to ascertain young trans and gender diverse (TGD) people's attitudes to digital games-based learning mental health interventions. The study utilised 14 TGD people aged 11 – 18 for a focus group and utilised a general inductive thematic analysis approach. The study indicated that using games-based mental health interventions for the improvement in mental health of TGD individuals was feasible with the implications being that games need to be of high quality and recommended by health professionals and/or peers. Games should also be inclusive of sexuality and diverse genders and be preferably preventative rather than treatment focussed with the games being discretely about mental health. Given that TGD you people are at a very high risk of mental health difficulties further empirical evidence is required in this field and mental health interventions should address clinical and subclinical symptoms.

As a result of sexual minorities having a higher frequency of mental health issues in comparison to the heterosexual peers Iacovides *et al.*, (2017) conducted a study utilising three focus groups with sexual minority youths in the UK ages 15 to 22. Ten participants identified as male, four female, three transgender (1MTF, 2 FTM), three were gender diverse or queer or non-binary. One participant responded as "N/A". The focus groups were 1.5 hours where each participant had the opportunity to play Module 1 of the game Rainbow SPARX (Smart, Positive, Active, Realistic, X-factor thoughts). The findings showed that there was a low level of acceptability for the game (i.e. only 38% of participants suggested they would use Rainbow SPARX themselves) as it was dated. This highlighted useful aspects to be considered when designing games in this area i.e. the serious game or games-based learning application should be indicative of the times.

In relation to the production of the commercial game *Tell Me Why*, trans/non-binary and gender non-conformant staff at Xbox and Dontnod Entertainment made countless creative contributions to including character design, narrative, and dialogue to provide inclusive online spaces. This was to ensure that Tyler's character would resonate with the wide and diverse audience of trans people (Eurogamer, 2021).

The literature review indicates that any serious game developed for these purposes of EDI related, sensitive topics must be: indicative of the times and utilise high fidelity graphics (Iacovides *et al.*, 2017), where possible utilise creative, real life, subject matter experts to appeal to the intended audience

(Eurogamer, 2021). It is also beneficial to introduce games to displace stigmatisms as early as possible (Yañez, Alonso-Fernández & Fernandez-Manjon, 2020)

4. Serious Games Development Frameworks

For the purposes of developing a serious game for EDI education and training it was considered appropriate to review developmental and evaluation frameworks for games-based learning and serious games to attempt to begin to synthesise the literature. Pistono, Arnaldo and Baptista (2022) performed a study to qualitatively analyse serious games frameworks where the findings were that there was twice the tendency to use a game approach rather than a pedagogical one. That although learning outcomes are mentioned in a few frameworks that they are no examples of them being dimensions within frameworks. This work is based on previous research by Pistono, Arnaldo and Baptista (2021) which performed a literature review identifying 11 serious games frameworks. The frameworks identified were very much a mixture between developmental and evaluation frameworks. 5 were development frameworks, 3 were evaluation frameworks and 3 were categorised as both developmental and evaluation frameworks. The study also highlighted two particular frameworks that referenced a flow state and also focussed on identifying the gaps in relation to planned adaptation of serious games. Some of the future research directions within the context of professional training included: looking at the relationships between game elements and learning outcomes, the relationship between learning outcomes and professional competencies and designing and developing models and frameworks for the adaptation of serious games. The study identified the following frameworks which we looked at in more depth:

- The four dimensional framework (de, Freitas and Oliver, 2006) taking into account the following dimensions: context, learner of learning group, internal representation, and pedagogic considerations.
- The serious game design assessment framework (Mitgutsch and Alvarado, 2012) taking into account: mechanics, framing, content information, purpose, aesthetics/graphics, and fiction/narrative.
- A framework of mission based scenario generation (Luo et al., 2013). Allows direction of the scenario generation process in the context of a virtual training application.
- The framework for cognitive load and empathy in serious games (Huang and Tettegah, 2010) taking into account: environments, characters, and activities in serious games.
- The flow framework to analyse the quality of educational games (Kiili, Lainema, De Freitas and Arnab, 2014) taking into account the antecedents of flow (clear goals, playability, sense of control, feedback, and challenge), factors effecting a flow state (context, representation of context, learning objectives, learning characteristics and pedagogy) and five mind lenses (sensing, processing, integrating, relating, and transferring).
- The serious game evaluation framework for evaluation driven design (Emmerich and Bockholt, 2015). This takes into account the preparation phase which is vital to the planning of every serious game which is relevant to this study as it may potentially concern minority groups or specialised groups. There is also an iterative process of games design and evaluation where the measurements of the effect of the game have to be operationalised, the experiment has to be design, conducted, and interpreted. This particular study also interestingly highlights stakeholders and their advantages to a serious games evaluation such as: games developers and marketing, game researchers, intermediaries, and users.
- The framework for evaluating serious games (Wilson et al., 2016) taking into account theoretical, technical, empirical, and external grounding.
- A framework to conceive, design, and evaluate immersive and collaborative serious games in cultural heritage (FRACH) (Andreaoli *et al.*, 2017). This takes into account the full developmental process in terms of preliminary, conceptual, developmental and evaluation phases.
- The interpretive framework for serious game mechanics (Ulrich & Helms, 2017) which takes the following considerations into account: pedagogic, knowledge, sociotechnological and design. It also takes the following mechanics into account: learning, social, game and immersive mechanics.
- The LEAGUE conceptual framework for evaluation (Tahi & Wang, 2020). The framework takes into account the following dimensions: learning/pedagogical, game factors, affective cognition reactions, usability, user, and the environment.
- Conceptual framework for Student-Centred Digital Games-Based Learning (Coleman and Money, 2020). This framework takes into account: player engagement (single, mixed, and

multi-player), intervention type (setting (level and situation), study type (data type, study design)), game design (platform, development style), educational factors (gaming principles (understanding, problem solving and learner empowerment) and student centred learning (learner independent, mutual respect, reflexive attitude to learning, active learning, deep learning, increased responsibility, and sense of autonomy)).

Connolly, Stansfield and Hainey (2009) developed an evaluation framework for games-based learning where the study identified a number of previous frameworks and models including:

- The Four Dimensional Framework (de Freitas & Oliver, 2006),
- The SIG-Glue quality criteria framework (Dondi and Moretti, 2007)
- The CREST model of learning (Baker and Mayer, 1999)
- Kirkpatrick's four level of evaluating training (Kirkpatrick, 1994)
- The GOM and GOM II models (Amory et al., 1999 and Amory 2006)

Hainey, Connolly and Boyle (2010) expanded on this research to produce a refined evaluation framework for games-based learning which found additional frameworks including the theoretical model of game consumption (Lee and LaRose, 2007). It should be noted that some of these frameworks/models are duplicated.

5. Conclusions

The preliminary review has indicated that serious games and sometimes even commercial games have been used for education and training in relation to EDI related subjects. It should be noted that it is necessary to drill down into these individual subjects and that using search terms such as "serious games" coupled with the terms "equity", "diversity" and "inclusion" yields very little in relation to results where academic databases are concerned. Serious games were discovered in the following EDI related fields: gender equality, bullying, neurodivergence and transgender representations. Bullying and gender equality have been synthesised in systematic literature reviews (Calvo-Morata et al., 2020; Yañez, Alonso-Fernández & Fernandez-Manjon, 2020) suggesting that there is scope for many systematic literature reviews to be conducted in EDI related subjects.

One of the key challenges for performing a systematic literature review in these areas was that the literature on both serious games and EDI is extremely extensive. Although it will be possible to perform this in a comprehensive fashion it will not be possible to find all sources. A major challenge will be using interconnected related terminology and adopting a snowballing approach to thoroughly search for literature. This could involve backward and forward snowballing. Backward being where the reference list is used to identify new papers and forward being where new papers are identified which cite the paper of interest. If such an approach is adopted then it is necessary to be cognisant of the guidelines (Wohlin, 2014).

The preliminary review included investigating development and evaluation frameworks for serious games and games-based learning to ascertain if any of these frameworks significantly took Diversity, Equity and Inclusion into account or had been utilised to develop a game with sensitive content. The results seemed to indicate that there were few developmental frameworks that particularly took the integration of sensitive pedagogical content into account (Pistono, Arnaldo and Baptista, 2022; Pistono, Arnaldo and Baptista, 2021). Although some mention the particular user and empathy for characters which is highlight important in relation to immersion and empathising with characters/situations in games.

In relation to future research directions, we wish to expand the literature search to ascertain if serious games have been utilised in any other EDI related concepts. While there have been a number of developmental/evaluation frameworks and models identified from this preliminary overview, this is by no means exhaustive, and we wish to formulate a comprehensive synthesis of games-based learning and serious game frameworks in the first instance. One potential future research direction is to take a previously developed evaluation framework and enhance it to be a developmental framework for serious games to train/teach/educate about EDI related subjects taking into account sensitive nature of topics and the fact that creative subject matter experts with real life experience may be required (Connolly, Stansfield & Hainey, 2009). We will work very closely with a serious games developer in this regard who has had extensive experience of developing serious games for industrial/corporate practice. We believe that serious games lie in between the development of traditional functional software and games development and that when serious games are developed for the purposes of corporate training that

user requirements should be considered and that a developmental framework should take traditional software requirements and learning outcomes into account.

Future work will entail a synthesis of serious game EDI literature and development of a serious game developmental framework for potentially sensitive topics requiring mixed methods requirements capture.

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