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# Negotiating artefacts: student game creation for education and introspection

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Learning through gameplay is being increasingly adopted by educators, who integrate games into academic curricula to address complex subjects. “Existential” game design is recognised as a practice for personal growth, self-reflection, and therapy, though it has been underexplored in educational contexts. The research thus describes the creation and deployment of two game design assessments for a private higher-education institution in South Africa that allowed undergraduate students to explore various complex topics. The research utilized an action research approach with a pre-test/post-test design for data collection, with results being explored using sentiment-based and thematic analysis. The findings reveal mixed responses from participants which highlighted the usefulness of the exercise but noted that the courses’ focus on technical quality and a lack of adequate preparation hindered the experience, with adequate mentoring and developer support being suggested to improve it. Arts-based approaches to such educational interventions, with a focus on “deep” games, critical play, and values-conscious design throughout the curriculum, are discussed as a potential solution. While game design remains a useful educational tool for engaging with complex societal issues, educators must increasingly ensure they prepare undergraduate students adequately for such creative exercises.

## KEYWORDS

game design, education, reflection, creation, serious games

## 1 Introduction

The games medium is evolving past its old stigmas of being seen as unproductive recreation (Huizinga, 1980; Caillois, 2006) and an outlet for antisocial tendencies (Gentile and Gentile, 2008). Recent research instead advocates the usefulness of games for therapy, education, and the processing of personal experiences (Carras et al., 2018; Lawhead et al., 2019). These “games for change” (Games for Change, 2019) amalgamate “serious games” (Marsh, 2011)—games meant primarily for education and training—with games that encourage prosocial values and behaviours (Greitemeyer et al., 2010).

The examination of such “games for change” has become of particular interest to educators in recent years (Groff et al., 2014). Games are used, for example, as case studies when examining ethics (Schrier, 2017), morality (Staaby, 2015), and mental health (Dunlap, 2018). However, the use of game creation for teaching non-game contexts remains underexplored, despite an increase in teaching around sustainability and social responsibility in other design disciplines (Zande, 2011). Typically, technical game design and development degree programmes focus on teaching students the practical skills needed to work within the games

industry (e.g., programming, 3D modelling), with little focus given to educating students around the societal contexts into which their games will be released. Time and resources are often prioritised towards teaching the technical skills needed in the entertainment-focused games industry. However, institutions are starting to offer courses and degree programmes on serious, socially-conscious, or transformational game creation (Uppsala University, 2024; Abertay University, 2023; Nissenbaum and Flanagan, 2014), though this remains rare.

To contribute to the growing movement of socially-conscious creatives within technical game development programmes, this paper documents the design and pilot study of two game development assessments run by a private higher-education institution in South Africa. In these assessments students are tasked with creating games using Unity to explore complex problems as part of their undergraduate studies. This aimed to both educate them about the problem and allow them a creative processing outlet through which to deal with it. In doing so, the research explores students' reactions to serious game projects within a typical game development curriculum. It does so by using an action research design with pre- and post-test surveys, alongside qualitative sentiment and thematic analysis of students' experiences, which revealed mixed responses.

## 2 Background

### 2.1 Games for teaching

Play has long been considered an effective teaching tool for children, forming the basis of much of Piaget's (1951) and Vygotsky's (1967) work. Similar approaches were subsequently adopted by the serious games movement, which emphasised the use of games for training over entertainment (Abt, 1970). However, research by Gee (2003), Squire (2003) and Koster (2013) examines how all games, not just serious games, inherently teach players due to their constructivist nature.

Constructivism, much like gameplay, focuses on the experience of exploration as a learning process. Savery and Duffy's (1995) constructivist instructional principles can be directly mapped to games (Jerrett, 2016, pp. 28–31). Exploring an authentic game world and making decisions within it is a learning process that can be directly transferred to its real-world counterpart. This approach to learning is the lynchpin of Koster's (2013) "theory of fun." Koster posits that a game's "fun" comes from allowing the player to gradually master its systems through exploration and repetition. The pursuit of mastery encouraged by this mirrors the constructivist journey, connecting games, learning, and fun.

As a result of games' inherent educational potential, many formal curricula integrate games as learning experiences (Groff et al., 2014). Games are often used as case studies for various topics, allowing educators to broach discussions about complex topics such as mental health and morality (Staab, 2015; Schrier, 2017; Dunlap, 2018). Non-profit organisations also use games as a platform to educate players about specific topics: IThrive Games (2019) works with teenagers to develop their 21st century skills, while Games for Change (2019) provides a platform for communities to play, support and create games that deal with complex issues.

### 2.2 Games for change

Flanagan, alongside various colleagues, has explored gameplay to encourage prosocial outcomes like empathy (Belman and Flanagan, 2010; Flanagan et al., 2005; Flanagan and Nissenbaum, 2014). Key to understanding how this can be approached is the notion that the ideologies, politics, and values of creators influence their game designs (Flanagan and Nissenbaum, 2014; Fleischmann, 2013; Winner, 1980). Flanagan (2009) integrates this into their understanding of "critical play," which suggests that games can be designed or played in ways that express unconventional mechanics, contexts, and points of view. This can be done through, for example, "unplaying"—the enacting of culturally taboo actions during play as a subversion of the spirit of the game; "redressing"—the altering of game elements to change the traditional play experience; and "rewriting"—where redressing and unplaying merge to create a new context for the game itself.

A game that encourages such critical play is *Cunt Touch This* (Kirman et al., 2015), a mobile game in which players colour in pictures of vulvas. Because of the game's touch mechanics, the act of colouring mirrors the performance of a sexual act. This metaphor is extended when, after a while of colouring (through touches and strokes), the vulva fades out and a sexual sound is played, suggesting sexual satisfaction. The game aimed to normalize conversations about sex, a topic often seen as taboo for interactive media, both in games and in modern society (Harrer, 2017b).

Games can similarly allow players to experience contexts they would not otherwise be able to. *A Breathtaking Journey* is a mixed-reality game wherein the player takes the first-person role of a refugee fleeing their war-torn country by hiding in the back of a mandarin truck (Kors et al., 2016). During the game, the player must try not to be discovered by customs officers who have stopped the truck for inspection. Utilising technology like breath sensing, the player must stay still, quiet and breathe softly so they are not detected. The sequence simulates a potentially real scenario, and prompts players to empathise with the hardships refugees face.

Finally, Harrer (2017a) developed *Jocoi*, a game where a mother cares for her baby lamb who later dies in a natural disaster. The game is an expression of Harrer's personal grieving experience and was played by a grief support group that they were involved with. Praised for its representation of personal loss, *Jocoi* was a helpful tool that allowed players an outlet for their grief. Similarly, players of *Depression Quest* (Quinn and Lindsey, 2013) players have reported that playing the game, which models a depressive episode by mechanically decreasing the choices available to the player, encouraged them to seek help (Lewis, 2014).

These examples highlight the potential of games as a force for change. While these experiences can sometimes be uncomfortable, some players are increasingly drawn to them as a way to safely and cathartically explore their own emotions (Leonard and Thurman, 2019). This is known as "dark play" (Linderoth and Mortensen, 2015), "brink play" (Harviainen and Lieberoth, 2012), or "positive negative experiences" (Montola, 2014), and seeks to transform the discomfort of play into cathartic growth, aligning with understandings of "transformative play" (Back et al., 2017; Salen and Zimmerman, 2003). This type of play has the potential to affect meaningful change a player's life (Hugaas and Bowman, 2019).

These transformative experiences can also be seen in some commercially released games. Juul (2019) explores how the "indie

games” scene can contribute to transformative experiences by being “handmade”: authentic avenues for designers’ personal expression that can deeply affect players due to their often experimental, personal, or reflective themes. Similar research suggests that other commercial games have similarly beneficial outcomes: *Bejewelled* reduces depressive symptoms and stress; *Tetris* reduces traumatic flashbacks; and *Pac-Man* and *Guitar Hero* can help autistic children build social skills (Carras et al., 2018).

## 2.3 Using creation for learning and processing

While playing “games for change” can be a transformative experience, game *creation* (design and development) is beginning to be examined as a process that can lead to personal growth by negotiating the creative process for meaning-making (Danilovic, 2018; Rusch, 2018). This extends to the industrial independent development community, where developers have discussed the importance of creating personal games as a way for designers to explore, cope and find meaning in both negative and positive experiences (Lawhead et al., 2019).

In this vein, Danilovic (2018) and Harrer (2019) examine autobiographical game jams, where designers explored personal experiences and made games about them. Because of the necessity for narrative context in designing such experiences, these game jams also served as educational experiences for non-technical designers, allowing them to create small games with simple tools like Bitsy, a web-based game creation environment (Harrer, 2019). Danilovic (2018) notes that designers saw the game jam as a reflective and therapeutic process. Four elements made this possible: the social creation process, the necessity for reflection to find inspiration, the abstraction of the experience into a game product, and the learning that resulted from the iterative development process.

Game creation can also be an educational process. In their game design curriculum, Schrier (2017) teaches an ethics class where students are provided the opportunity to analyse and create games that address ethical conundrum, examination of biases, and the morality of players. Staaby (2015) presents a similar class, using Telltale Games’ *The Walking Dead* to explore moral philosophy. Sampat (2017) takes a different approach, providing a framework and exercises for designers that sees them critically consider game design. These exercises include “create a city simulation that makes redlining its focus” or “[systemise] a frustration you experience on a regular basis.” Designers are thus encouraged to do in-depth research about these topics, some of which are personal to them, to create systems that abstract these topics.

The integration of developers’ lived experiences into games is encouraged by Toft and Harrer’s (2020) “design bleed.” The term “bleed” stems from Nordic larp and denotes the fusion of boundaries between characters and players during role-playing activities. Game aspects may “bleed out” and influence the player, while personal emotions can “bleed in” and affect the role-playing scenario (Stenros and Bowman, 2018). Design bleed therefore expands the concept of bleed from the realm of play into design, inspiring designers to incorporate their personal experiences into game designs and explore topics and roles that are often overlooked in the wider games industry. This form of personally situated game creation can be a powerful process that allows developers to explore and articulate their personal

experiences, which can lead to personal growth for both developers and players (Toft and Harrer, 2020).

## 2.4 Negotiated artefacts

When exploring approaches to game design that incorporates personal experiences, Rusch (2018) promotes “existential game design.” Contrary to player-centric models that prioritise audience reception (Adams, 2013; Fullerton, 2008), existential game design is a designer-centric approach that posits that the essence of meaningful design stems from the designer’s introspective journey to comprehend and articulate their experiences. The design process is thus a process of *self-negotiation*, where designers examine their experiences, beliefs, and emotions. In being conscious of these internal thoughts and feelings during design, game creation becomes not just an artistic practice, but also a form of existential inquiry where creators are encouraged to understand, abstract, and process their lived experiences, as Sampat (2017) encourages.

The games that emerge from this self-negotiation process are tangible artefacts that represent this negotiation between a creator’s internal struggles and their creative process. To describe this, the research coins the term “negotiated artefact” as a unique contribution to knowledge. Despite the term’s uniqueness, such artefacts already exist, and are increasingly popular as a game genre. Academic and commercial games that represent such “negotiated artefacts” are presented in Table 1, and allow players to abstractly experience a life event of the designer, which may allow those players to feel less alone in their similar experiences. Such artefacts can further connect designers and their audience and emphasise the growing importance of game designs that challenge conventional player-centric wisdom.

## 3 Materials and methods

### 3.1 Assessment design

#### 3.1.1 Educational context

The research was conducted across four satellite campuses of a South African private tertiary institution in late 2019. Satellite campuses are becoming increasingly popular in tertiary education and aim to provide an equity of educational content across a geographically

TABLE 1 Negotiated artefact games made by creators to relay personal experiences.

Game	Topic	Creator
<i>Jocoi</i> (Harrer, 2017a)	A mother’s loss of a child	Sabine Harrer
<i>Cibele</i> (Freeman, 2015)	A woman’s first sexual experience	Nina Freeman
<i>Papo &amp; Yo</i> (Caballero, 2012)	An alcoholic family member	Vander Caballero
<i>That Dragon, Cancer</i> (Green et al., 2016)	A child’s terminal illness	Ryan and Amy Green
<i>The Beginner’s Guide</i> (Wreden et al., 2015)	Creators’ need for external validation	Davey Wreden

distributed area (Altbach, 2011). The assessments discussed in this research were developed and approved at a national level before being deployed to each campus, where they were delivered by various lecturers who served as mentors to the students during a six-month semester.

Notably, South Africa does not currently have a thriving game development industry, though small teams have produced successful indie games like *SuperBroForce* (Farmer, 2021). This has implications for degree programmes in the region, which often aim to produce generalists, proficient in both software development and 3D modelling software, rather than specialised roles (e.g., game artists, designers, producers, or programmers). These degrees primarily prepare students for broader employment opportunities in external, non-game industries. Much external game development work in the region, when available, is predominantly focused on serious games and commissioned projects, which drove the assessment design.

Finally, it is important to note that the “serious” nature of the assessment was restricted to thematic integration, as the courses already had existing technical learning outcomes. At the institution, curriculum content and assessments are developed nationally, and then provided to lecturers. Individual lecturers are then responsible for crafting their own lecture slides and other supporting material to facilitate their own teaching of the curriculum and assessment. In this regard, some lecturers may generate significant additional supporting content for their students, but others may not, instead opting to present only the provided curriculum content.

### 3.1.2 Student cohort

The student cohort for this study consisted of second- and third-year level students enrolled in two separate courses within a Game Development degree programme across four campuses (four groups took the second-year course, and three took the third-year course). Class sizes for the second-year course were 10, 9, 8, and 12 students ( $n = 39$ ), while the third-year course had 8, 9, and 12 ( $n = 29$ ) students. Notably, the content of these courses was primarily technical, and often unrelated to the assessment themes, which merely aimed to provide a serious game context to their coursework. The second-year course was a data structures and algorithms course, and the third-year course was an exit-level project and work readiness course. Second-year students received 48 h of contact time across the course, while third-year students received 36 h of contact time over 12 teaching weeks.

Students within these age groups were part of Generation Z (Gen Z), which helped determine the assessments’ themes. Reeves and Oh (2008) examine attitudinal differences across generations (boomers, Generation X and millennials), which can help describe the attitudes of Generation Z. Notably, Gen Z may be more selfless, have interest in personally meaningful careers and utilise technology both more frequently and more purposefully than previous generations. This is supported by further research that suggests Gen Z values diversity, appreciation and validation, human connection, critical analysis, and problem solving (Singh, 2014; Töröcsik et al., 2014; Sladek and Miller, 2018). These values suggest a generational desire to highlight and address the problems of a flawed world (Sladek and Miller, 2018). As such, the themes for these assignments aimed to allow the students to explore these problems.

### 3.1.3 Assessments

For both assessments, students were asked to explore their given theme through the creation of a game using the Unity game engine. These games needed to meet specific technical requirements (based on the technical content of each respective course) alongside addressing the given narrative theme. For example, these technical requirements included the use of specific data structures (for the second-year module) or the professional readiness of assets (for the third-year level module).

The second-years’ narrative theme was “mental health issues.” Self-reported mental health issues among young adults have increased dramatically in recent years (Gunnell et al., 2018). This may be for several reasons including Gen Z’s concern around world affairs, the environments and family structures they grew up in, and stresses about a lack of financial security amid economic crises (e.g., the 2008 recession and the COVID-19 pandemic) (Sladek and Miller, 2018). Traditional risk factors like abuse and trauma must also not be discounted (Gunnell et al., 2018). The choice of theme was therefore meant to encourage the exploration of a personal or tangential experience, or to explore the stigma surrounding mental health as discussed by Mak et al. (2014).

The third-years needed to create a game that acted as a commentary on a “wicked problem”—a complex social problem that requires multiple perspectives to understand and address (Rittel and Webber, 1974). This theme was chosen for three primary reasons. The theme is broader and more complex than the mental health brief, which reflected the third-years’ greater development experience. It also addressed the concerns regarding sustainability and problem solving valued by Gen Z (Sladek and Miller, 2018). Finally, the “wicked problem” is a core focus of the educational institution at which the study took place, with graduates expected to explore such complex issues during their studies (O’Hara, 2019). While students were not meant to find solutions to these problems, their games were meant to explore these problems in a meaningful way.

Exploring these topics through game creation was meant to provide an engaging and familiar context for a cohort readily engaged with games (Whistle, 2019). However, it is ethically important to note that neither assessment required students to explicitly engage with or chronicle *their own* struggles, though this was often how the assessments were interpreted, which will be discussed in the Results section.

## 3.2 Research design

### 3.2.1 Research context

The present research is positioned at the intersection of computer science and human-computer interaction within game development. The technical focus of such positionality differs from an intersectional or art-centric approach to game development, whereby developers from other fields (e.g., critical studies) utilise game creation as a form of creative expression (Rusch, 2017). An art-centric approach may seek not only to explore the process of student game creation, but also on analysing and understanding their response to the process, alongside their experiences with and expectations of games. While such an approach is valuable, the data collection for the study was narrower in scope, instead focusing on the practical aspects of creation process and student reportage on that process. Deeper analysis of

player responses using an art-centric approach may, however, be a valuable area for future research.

Additionally, the research was conducted within the confines of an educational course, which differs from research focusing on external activities like game jams (Danilovic, 2018; Harrer, 2019). The course-based approach is similar to research by Phelps and Consalvo (2020), Prax (2020), and Nissenbaum and Flanagan (2014). However, these examinations utilised arts-centric approaches. This research, due to the “generalist” educational context, aimed to promote the soft skills (e.g., empathy, critical thinking, problem solving) prioritised by arts-centric contexts within a technical-focused one to enrich the learning experience.

### 3.2.2 Aims, objectives, and research question

The research aimed to explore the additional educational and cathartic benefits of game creation within a technically focused context. By providing students with a safe space in which to explore their chosen topic, it was hoped that the creation experience would be cathartic and/or educational for them. It also aimed to understand how Gen Z engaged with such game creation by understanding how their values, and perception of the games medium, affected their creative process. The study’s objectives were to assess the impact of the assessment themes on students’ reception to the projects, understand how their knowledge and skills developed, and explore the emotional outcomes of the serious game design process.

As such, the research was guided by the following question: “*How did the technical and emotional challenges of serious game creation influence students’ perceptions, experiences, and outcomes within an educational course?*”

### 3.2.3 Research method

The research is qualitative in nature and utilises Pickard’s (2013) approach to action research (see Figure 1). Unlike research methods (e.g., survey research) where the researcher is an objective observer examining phenomena after-the-fact, action research positions the researcher, and the intervention they design, as a force for change within a population (Pickard, 2013). Like ethnography, action researchers become actively involved in the research context which can help encourage and engage research participants. This mirrors the expected collaborative relationship between lecturers and students in modern educational contexts (Mitra, 2009; Saavedra and Opfer, 2012).

The first two steps of Pickard’s action research approach were discussed in previous sections. The first step, problem identification, occurred when examining Gen Z and identifying themes that may be relevant to them. The next step, action planning, involved the creation of the relevant assessments for both courses. The third step, implementation, involved the students’ creative process throughout the semester. This was supported

through observation by the students’ lecturers as mentors, who chronicled their own, and the students’, experiences in a research journal—a vital instrument in the action research process (Pickard, 2013). Ongoing discussion of the projects between lecturers took place on the Slack social media platform to provide additional support.

### 3.2.4 Data collection

Evaluation, the fourth step of the action research approach, was done using two forms of data collection. The first was through the observation and support of students during the implementation phase of the project. These observations were chronicled in a research diary as suggested by Pickard (2013). The second data collection technique was a pre-test/post-test design (Gribbons, 1997) using surveys as the primary research instrument. Pre-test/post-test designs have been previously used in behavioural research for examining changes across interventions similar to those used in action research (Dimitrov and Rumrill, 2003). Online focus groups were considered for this. However, the distributed nature of the satellite campuses required an asynchronous data method, which resulted in the use of survey research using Google Forms. The surveys attempted to measure changes in students’ feeling towards the themes and implementation of the game design intervention, as well as to examine their feelings towards using game design as a creative outlet for such topics.

The pre-test questionnaire focused on the participants’ understanding of their project’s topic, as well as their feelings towards using the specifically the design of a game to explore this topic. The post-test questionnaire focused on what the students learnt during the development process, how they felt about their final product and what their thoughts were about developer support during the creative process. The questions are shown in Table 2.

### 3.2.5 Data analysis techniques

The data was initially analysed with a manual sentiment analysis (Liu, 2012) utilising both the pre- and post-test data to understand how students felt about the projects and how those opinions changed over the course of the semester. This is done to provide an understanding of student motivation and the overall success of the intervention. The data was then thematically analysed (Braun and Clarke, 2012) to support the initial sentiment analysis and uncover any additional notable themes.

### 3.2.6 Research ethics

Ethical approval for all data collection in the study was granted by the educational institution at which the study took place. However, the assessments themselves, and their use within the educational context, were not subject to ethical approval as part of the nationally approved curriculum.

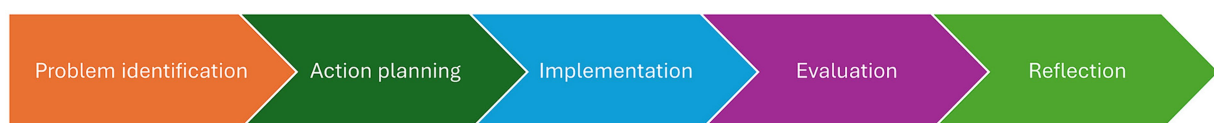


FIGURE 1  
Pickard’s (2013) action research process.

TABLE 2 The study’s pre- and post-test questionnaires.

Pre-test questionnaire question	Post-test questionnaire question
What was your first reaction when being told about the content of your project?	What issue did your game address?
What topics are you considering exploring for this project?	What do you feel you learnt from the design and development of this kind of serious game?
Why do you think exploration of this kind of content will be valuable?	How did the creation of the game affect your perception of the issue you addressed?
What concerns do you have about the completion of the project (e.g., time constraints, “triggering” material, approaching the problem)?	What difficulties did you experience whilst creating the game (e.g., technical, ethical, or emotional)?
What do you hope to gain from completing this project?	How did you approach addressing those difficulties?
What are your feelings about exploring your potential topics through game design and development?	What, if anything, would you change about the way in which you portrayed or addressed your issue?
	Did you feel the need to practice self-care (stepping away for a while, doing something else to take your mind off the project) as a result of the emotional impact of developing your game?
	How do you think a debriefing scenario (such as this questionnaire of a focus group or other discussion) is useful in allowing you to discuss/process your feelings about your game?

TABLE 3 Student sentiment towards the project.

Positive	Mixed	Negative
Pre-test data		
16	16	7
Post-test data		
7	15	4

## 4 Results

This section first presents a manual sentiment analysis (Liu, 2012) of students’ opinions towards the assessments. Following this, six themes are constructed through deductive thematic analysis (Braun and Clarke, 2012) as supported by *a priori* codes (Saldana, 2021) generated from the sentiment analysis (positive, negative, and mixed sentiment). These themes are: making a good game, the usefulness of serious game design, the themes of the finished games, development difficulties and the importance of developer support.

The pre-development questionnaires had a total of 39 respondents. The respondent rate for post-development questionnaires dropped to 26 respondents. Fourteen respondents answered both the pre- and post-test questionnaires, while 37 respondents answered only one of the questionnaires, totalling 51 unique respondents. The lower combined and post-test respondent rates were likely due to the questionnaires’ placement at the end of the semester when students were concerned with exams and other deadlines.

### 4.1 Student sentiment about the projects

The survey data was subjected to a manual sentiment analysis (Liu, 2012) that coded each response as positive, mixed, or negative for both pre- and post-test data. This sentiment is shown in Table 3. Pre-test sentiment was generally positive, with 16 positive, 16 mixed,

and 7 negative responses. Post-test sentiment was less “positive”—with only 7 positive, 15 mixed, and 4 negative responses.

Responses when asked to elaborate on why the students felt this way varied. “Negative” students expressed frustration at being forced to think about games, a medium they considered to evoke fun and excitement, as a tool for exploring more serious topics. “Mixed” students tended to understand the ability for games to be able to explore serious topics but did not feel comfortable doing so as this dampened the creative process. “Positive” students often cited a personal connection to the project they worked on and appreciated the necessity for deep research about their game. Exemplar responses from each category are shown in Table 4. Student sentiment across the semester for the 14 students who answered both questionnaires waned, with 6 “positive” students becoming “mixed,” often due to development difficulties. However, an initially “mixed” student turned “positive” noting that “the game [I] created is what I wanted to create” (P12).

### 4.2 Making a good game

Students of all sentiments worried about being able to express nuance around serious topics through design—they were “nervous about doing it justice” (P19). To this end, 26 participants noted that “making a good game” was a major concern pre-development. Students understood the weight of the subjects they wanted to address and cared about representing them authentically. The theme recurred in post-test discussion. When asked what they might change, students wanted to “find a better method of portraying the issue” (P24), or use “less literal” (P5) or “more literal” (P25) representations. Students wanted to “think of a better ending” (P14) and often wanted more polished final submissions (P15, P27, P29). Such responses suggest that, regardless of the students’ sentiment surrounding project themes, the game creation process engaged them. P16 “learnt the most when it came to actually producing a game that was finished. I found myself pushing with everything I had,” suggesting that the assessment framing encouraged polished artefacts.

TABLE 4 Students' elaborations about their sentiment.

Positive	Mixed	Negative
"I had something which I was confident and excited to work on and [it's] relatable to what I am going through." (P7)	"It's difficult to accurately portray something so serious [...] in a respectful way through a game when you do not share [those] experiences. [It's] easy to minimize or dramatize [...] which could come off as insensitive." (P17)	"Whether I'm making games, playing it or just watching people play, [i]t's a state of enjoyment and fun that in many sections of my life I do not have. [This enjoyment is ruined] by enforcing a topic that [is depressing]." (P31)
"I was intrigued by the prospect of exploring a meaningful and potentially educational topic through the research and development of a video game. I have always admired books, games, movies, and other mediums that have inherent meaning." (P44)	"I understand that video games can deliver messages but sometimes it comes [off] as preachy and [I] just want to play a fun game that does not judge me." (P37)	"It feels too close to home [...] It feels tacky [...] honestly I'm triggered because [it feels] like a personal attack." (P18)

TABLE 5 Students' game themes.

Theme	Count
Depression and anxiety	6
Drug addiction	3
Environmental sustainability	2
Schizophrenia	2
Gender dysphoria	2
Social media disconnect	2
Post-traumatic stress disorder	2

### 4.3 The usefulness of serious game design

Most students saw the value of exploring serious game design within the educational context, with 29 participants agreeing that exploring their project content was valuable: "Familiarising yourself with the 'what's and why's' of [an issue] is resourceful" (P17) and can "help end confusion and misunderstanding" (P15). Students generally agreed that their final negotiated artefact provided "a taste of what to expect from their future careers" (P44) by having them work on content "that [wasn't] in [their] comfort zone" (P36). Some even noted empathising through the ability to "help [...] identify people that are struggling and how to properly go about providing them with help" (P17) and "help [them] see through the eyes of others" (P16).

### 4.4 Final game themes

Various themes were explored across both projects, with popular themes shown in Table 5. Depression and anxiety was the most popular theme, likely due to its prevalence in modern society among younger people (Vos et al., 2015; Gunnell et al., 2018). Drug addiction is similarly prevalent and relevant, given the high proportion of adverse effects among young adults (Coffield and Gofton, 1994; White et al., 2011). Topics like gender dysphoria and environmental sustainability may have been chosen due to their direct relevance to creators. While a focus on sustainability may simply align with Gen Z's broader values (Sladek and Miller, 2018), examining the gender dysphoria responses reveals personal connections to the topic in both cases. P7 wanted players to "understand transgender people more"

and P15 wanted to elucidate "the mental and emotional stress transgender individuals go through."

Finally, some themes may have been chosen due to existing analogues in digital games. Schizophrenia was explored in *Hellblade: Senua's Sacrifice* (Ninja Theory, 2017); Post-Traumatic Stress Disorder was a core theme of *Spec Ops: The Line* (Yager Development, 2012); the complex nature of social media worlds is explored in the *Emily Is Away* (Seeley, 2015) series; and early-onset dementia is a narrative beat in *Firewatch* (Remo et al., 2016).

### 4.5 Development difficulties

Students faced several difficulties during project development, and not all students were engaged with the projects' themes. Students motivated by the projects' themes worked more diligently at the start of development than they did on other ongoing projects, but as development continued most students regardless of sentiment struggled with technical problems. 22 of the 26 post-test respondents noted this. For some, these difficulties were a focus of their post-test discussion, resulting in a "mixed" sentiment. Some of these issues deeply affected motivation (P10), but others were technical in nature, such as "code bugging out" (P27), "issues when designing my mechanics" (P25), source control (P42, 51) and modelling issues (P38, 48).

Participants also dealt with emotional issues during development, with 12 respondents citing emotional difficulties during the creation process. Some students experienced burnout as the semester progressed, especially due to the projects' placement in the second half of an academic year. Individual problems as noted by students are discussed in Table 6.

Finally, some students did not feel prepared to address serious issues through game creation. P49 thought that games and serious issues "do not connect very well." P50 did not feel equipped to deal with "such multi-faceted and difficult problems that humanity as a whole [has] been dealing with for thousands of years and by its own definition [is] considered unsolvable thus far," noting that using game design to explore this was "an injustice to [...] the [issue] by trivializing it and oversimplifying it." P3 noted the difficulty of balancing serious topics and game mechanics: "I wanted to cover suicide and self-harm (many of the things caused by depression) but I could not because I thought maybe it would be crossing the line in terms of sensitivity." Students struggled with confidence (P9), felt like

TABLE 6 Students' personal problems and their impact on development.

Problem explored/faced	Quote from respondent
Mental health	"I was not able to complete the project. Throughout the semester, I was having problems dealing with my mental illness itself" (P7) "The most difficult part of this topic was kind of separating myself from my design in a way that it does not influence my own well-being but not to separate myself so much that I am unable to create an accurate representation of my chosen mental illness. It was difficult to dedicate time to the assignment when it felt like my own mental health wasn't its best due to the link between myself and the game" (P17)
Social anxiety	"I suffered from a stutter for many years and was diagnosed with social anxiety" (P5)
Stress	"Mental issues are a serious topic, and is not easy to talk about especially when we are so stressed out already with assignments" (P26)
General	"[I faced difficulties taking] personal experiences and having to try put it into a game" (P15) "Every step of the way I was reminded of the situations where [my chosen issue affected] me personally. Apart from it ruining my emotional state for months [...] I had to continuously revisit a topic I was not comfortable dealing with." (P31)
Death	"Working [with] this topic brought back some old memories of friends that were lost during my school days, and although I may be sort of fine to interact with this topic, others may experience emotional anxiety or not have any reaction at all." (P26)

the theme was too difficult (P16), or felt they should not be exploring such issues (P18, P31, P32, P50) because they were too personal or difficult to understand. This led the lecturers exploring the suitability of serious game projects within the institution, which will be discussed later.

#### 4.6 The importance of developer support

The need for self-care and debriefing during development was mixed among respondents (10 respondents thought it was a good idea, 9 somewhat did and 7 did not). However, individual responses often advocated for such support. Responses noted that "if done after every hand-in, it would help re-motivate [students]" (P7), "[would] allow for [...] feedback" (P24), "[would] get people talking and sharing opinions" (P18) and "it may give developers and designers closure" (P48). It provides an opportunity throughout development to "[put] everything in perspective" (P38).

However, some raised issues around debriefing as a shared activity. Notably, debriefing "requires a form of vulnerability [...] having someone there that would disturb the 'safe space' would not allow for proper discussion" (P17). This can be seen in some student responses. P26 "generally [kept] things to [themselves so] as to not bother anyone else." P30 aptly noted that "some were open about their own [issues] and others not so much." Some participants found closure from addressing their difficult topic through game creation (P5), while others did not appreciate that the projects "[threw people] into an emotionally difficult topic" (P31).

### 5 Discussion

The study found that the designed intervention of using game creation to allow students to explore serious topics had mixed results. Student sentiment both before and after development was primarily "mixed." While some negotiated artefacts successfully represented students' chosen topics, many were incomplete as students struggled to fully implement their ideas. To further explore these outcomes, this section addresses the reflection section of Pickard's (2013) action research process to shed additional light on these results. By highlighting the difficulties this pilot study faced, the section proposes

potential solutions to assist future researchers and educators in designing similar interventions.

#### 5.1 Addressing enthusiasm disparities across campuses

Throughout the pilot study, it became evident that the satellite campus model, while beneficial in several ways (e.g., cost, student-lecturer relationships, convenience, and institutional identity) (Burke, 2017; Perkins, 2020) faces challenges in ensuring equitable delivery of content, despite the standardised nature of the curriculum (Brooks and Waters, 2018). The researcher—a lecturer of a student cohort tackling the mental health brief on one campus—actively engaged students with their project theme by having them play and discuss *Depression Quest* (Quinn and Lindsey, 2013) and organised a guest lecture from a medical professional. However, such efforts were not replicated across other satellite campuses. Lecturers on these campuses had varying enthusiasm for the projects' themes, with some placing a greater emphasis on the technical aspects of game development, given its importance to the marking rubric. As a result, most lecturers for the courses did not integrate additional sustainability education for students to assist students in their creative process, often dealing with questions or problems on a case-by-case basis. Most lecturer/mentors thus primarily provided technical support. These differing approaches may have diluted the impact of the projects' themes alongside affecting student engagement and sentiment of the projects.

The research thus highlights that the consistency of thematic delivery across satellite campuses remains challenging. The passion and engagement of lecturers with the content significantly influences students' experiences with such educational interventions. As a result, when dealing with such projects, a more structured approach to delivery across the whole curriculum—not just assessments—may be required. This could include supplementary materials and staff training to ensure a unified teaching approach. Additionally, serious game creation should not merely as a theme, but rather a central focus of the assessment, as exemplified in art-centric approaches (Nissenbaum and Flanagan, 2014; Phelps and Consalvo, 2020; Prax, 2020). Such a shift would ensure that all students receive a similar approach to and quality of engagement with the content, regardless of



their location, thereby enhancing the educational impact of these projects.

## 5.2 Managing technical and emotional struggles

Student difficulties during the project were self-reported to be primarily technical in nature, reflecting their status as game development students. Recognising this potential difficulty during assessment development, the projects were given to second- and third years in their final semesters. It was anticipated that students would then have sufficient development experience to be able to engage with the projects critically.

Technical issues often arose from misunderstanding the projects' themes or an inability to implement certain mechanics. However, successful projects showcased that high technical skills were not a prerequisite to such engagement. One developer, for example, notes that part of their design philosophy was to use “really simple game mechanics because [they] really did not want to [implement complex] code [because they were a poor programmer]” (P17). This philosophy, which focuses on simple mechanics to represent complex experiences, showcases a viable approach for students undertaking similar serious game projects.

Addressing students' mental and emotional challenges when dealing with complex topics is similarly paramount for educators. While some students simply expressed worries about adequately representing their chosen topics, mentors noted throughout the process that other students needed far more guidance throughout the process for them to engage critically. These challenges could be addressed through sustainability education which, while increasingly important within design education (Brundiers and Wiek, 2011; Lönngren, 2017), is often overlooked within practical game design courses (Hsieh, 2020). While the assessments attempted to introduce a focus on sustainability design, they still lacked a focus on sustainability education.

Finally, some second-year students expressed discomfort at addressing what they perceived as their own mental health issues through creation, despite the personal focus of the brief being optional. This issue was mitigated by providing a wider range of additional topics (i.e., the refugee crisis, the patriarchy) that aligned more closely with the wicked problem assessment while allowing these students to avoid personal narratives. This approach maintained student safety and wellbeing, and showed that a less prescriptive approach to such serious game assessments can still challenge students—an outcome similarly observed by Phelps and Consalvo (2020).

## 5.3 Placement of project timelines within the academic year

The assessments were deployed during the second semester of 2019 to students were technically prepared and to serve as a capstone for the year. However, as Sampat (2017) notes, addressing serious themes through design requires extensive research and internal processing prior to implementation taking place. Such complex projects required more time to implement, which meant

that projects were mentally and temporally taxing. Consequently, enthusiasm for the projects diminished over the semester, though some students maintained their motivation throughout the project. However, despite many high-quality games, students were rarely excited about their final output, possibly due to end-of-year burnout.

To address this, it is recommended that such projects span an entire academic year rather than a single semester. Starting projects earlier in the year could leverage increased start-of-year enthusiasm (Willis, 2019) into intrinsic motivation that sustains project interest through faltering engagement.

## 5.4 Different fun for different folks

“Negative” students were a particularly vocal minority who were vehemently opposed to the idea of exploring serious themes through game creation, despite a larger number of “positive” or “mixed” students. While differing student reactions are expected in any educational intervention, the results exemplify Koster's (2013) idea of “different fun for different folks.” Though Koster discusses this in the context of *games*, and not *game creation*, the concept remains relevant within an educational context. For example, Koster notes that learning affinity differs between individuals based on their preferences and skills. Consequently, not all educational interventions will appeal to every student, despite increasing pressure across Higher Education institutions to increase student satisfaction (Whitton and Langan, 2019).

To mitigate this, selecting themes with universal appeal that can foster personal connections while retaining creative freedom may be a useful approach. For example, the 2020 theme for the third-year assessment focused on “pandemics,” drawing a parallel to the ongoing COVID-19 pandemic. While this theme encouraged personal relevance, it also allowed students to explore the topic creatively, allowing them to create more entertainment-focused “pandemic” games (e.g., *Plague Inc.*).

## 5.5 Reflecting on the appropriateness of the intervention

The educational strategy devised for this project, which integrated serious game creation into a technically focused curriculum, may have inadvertently constrained the learning of both the soft skills (e.g., empathy), or hard skills (e.g., engine proficiency) for students. While the research aimed to offer an alternative to art-focused (Nissenbaum and Flanagan, 2014; Phelps and Consalvo, 2020; Prax, 2020) and game jam (Danilovic, 2018; Harrer, 2019) approaches to serious game development, the results indicate that these more flexible and expressive approaches might be better suited to such objectives.

Additionally, negotiated artefacts were primarily framed in this research as serious games, despite many students engaging in autobiographical design. While autobiographical games can be considered a type of serious game, this distinction may not represent the depths of their design implications. Rather than simply serving as educational tools (Abt, 1970), personal games align more closely with notions of critical play and design (Flanagan, 2009), suggesting that “art games” may be a more fitting description. This

perspective supports the art-centric methodological approach used by other scholars, which allows for more flexible curricula and assessment or the use of game jams to offer a supportive creative environment. However, even this change in context faces challenges, including cultural assumptions around games as “fun,” which remains deeply embedded within both player-centric design literature (Adams, 2013; Fullerton, 2008) and some player attitudes towards such games (Franklin, 2013). As such, exploring games as vehicles for self-expression within formal curricula may remain difficult. Exploring these cultural and pedagogical assumptions may offer valuable avenues for future research.

Despite these challenges, using game creation as a method for exploring societal issues within technically-focused game development programmes addresses a critical gap in sustainability education that would otherwise be absent within typical game development curricula. While game development can be taxing and time-consuming, its integration of technical skills and creative expression within an interactive medium provides comprehensive learning experiences for students while still utilising their developing practical skillset. While alternative artefacts like videos, podcasts, or presentations could allow for quicker exploration of complex topics, using game creation crucially addresses programme-level learning outcomes around technical readiness for industry, while additionally fostering deep critical engagement with sustainability content. This provides an additional vector for student learning that prepares them for responsible innovation in the industry. However, as discovered within this research, a delicate balance needs to be struck when attempting to integrate both elements into a single course. Game development educators may want to consider integrating separate sustainability coursework projects, adequately supported by relevant sustainability education, into their programmes instead.

Lastly, considering student agency within such educational interventions is paramount. The mandatory nature of the assessments led to dissatisfaction for some, though additional options were provided to those affected. Future implementations may consider making serious game creation an optional part of the curriculum, or otherwise clearly articulate the educational value of such approaches within a supportive curriculum. This may enhance student understanding and acceptance of such unconventional learning experiences.

## 6 Conclusion and implications

The present research explored the impact of technical and emotional challenges on students’ perceptions, experiences, and outcomes when creating serious games within an educational course. Conducted across four satellite campuses of a private higher education institution in South Africa in 2019, student sentiments towards the assessments were mixed. While some students gained valuable insights into their topics, the lack of preparation within the curricula resulted in negative emotional reactions, which made addressing serious themes a challenge. This was compounded by technical challenges that similarly hampered the effectiveness of the planned intervention for some.

The study’s limitations affect interpretation of its results. Notably, this research only showcases the results of a single deployment in 2019, without longitudinal follow-up on subsequent, similar assessments. The study’s South African location and educational context similarly limits generalisability. Future research may consider longitudinal study of such assessments, potentially in varying educational contexts.

Despite limitations, the study offers key insights for game development educators. It underscores the importance of enthusiasm and comprehensive support when guiding students through complex topics, which could be achieved through educator training. This can ensure the provision of adequate conceptual, technical, and emotional support to students, especially undergraduates. Adjusting timelines to allow for year-long engagement can provide similar support and can additionally be augmented with, for example, workshops on development techniques, emotional resilience, and ethical considerations within game design. Finally, redefining such assessments as “art game design,” alongside scaffolding the curriculum with explorations of, critical play, or values-conscious design (Flanagan, 2009; Flanagan and Nissenbaum, 2014; Rusch, 2017) may better accommodate a range of students. Offering alternate themes or framing “serious” components as optional can additionally allow students to retain autonomy of their learning experience.

Although not all findings were positive, this pilot study’s mixed results contribute valuable insights into the challenges and potential of using serious themes in game creation for education. Highlighting such troubled academic interventions, instead of merely positive ones, is significant in reinforcing that “all data is good data,” regardless of results. While further examination of sensitive themes in game creation requires additional research, this study aims to be a strong foundation for understanding how game creation can be an effective, meaningful process within practice-focused educational contexts.

## Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found at: [https://drive.google.com/drive/folders/1huXo9A-kFvN9JKHQLoPyoOu5\\_UJSC4Yy?usp=sharing](https://drive.google.com/drive/folders/1huXo9A-kFvN9JKHQLoPyoOu5_UJSC4Yy?usp=sharing).

## Ethics statement

The studies involving humans were approved by institutions at which the study took place. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

## Author contributions

AJ: Formal analysis, Methodology, Project administration, Writing – original draft, Writing – review & editing.

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## Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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