



Context-Adaptive Values-Based Games for the Young: Responsible Decision Making for a Sustainable World

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Abstract. This research aims to design and implement a framework and system platform for creating values-based digital games for the young. Studies show that many digital games include violence and about half of the violent incidents have negative repercussions such as increased aggression in the “real” world. This influential nature of digital games calls for research on ways in which games can be leveraged. One way is to use digital games to foster positive values and sustainable practices. This is especially relevant in the context of young players since they are malleable. Digital games present opportunities for learning via decision-making. When players interact with games, they go through several decision-making cycles, each time, subconsciously reviewing the consequences of their actions to guide future decisions. This research will use a multi-methodological approach combining qualitative and design science research to explore and create a platform to design and implement context-adaptive values-based digital games.

Keywords: Context-adaptive · Values · Digital games · Young
Responsible decision-making · Sustainable

1 Introduction

Digital games, particularly those classified as serious games are a prevalent mode of learning. Researchers find that these games are becoming increasingly “influential” and “persuasive” in our real world [1–8]. Values and sustainable practices are complex yet essential concepts that are learnt experientially as they are context specific. The possibility of using digital games to teach these would be very valuable given their importance to every individual, albeit subjective. Given that our value systems and beliefs are primarily moulded when we are young [3, 9], it would be useful to explore the potential of digital games in teaching these concepts to the young (ages 0–8 defined as early childhood) [10]. Preliminary research in this area suggests that research on digital games and the early childhood context is limited when compared to other age groups [11, 12]. Research on values in digital games, particularly for specific contexts is also limited. Lastly, research on early childhood and values exists in education and psychology literatures, however, research on the intersection of all these topics is scarce. In particular, we have the following interrelated research gaps and opportunities:

1. There is a paucity of research on the design of values-based digital games, especially for specific contexts [13, 14] such as early childhood.
2. Research on the implementation, particularly, platforms for creating context specific (early childhood) values-based digital games is lacking.

The philosophical assumptions guiding this research are a combination of interpretive and critical research. A multi-methodological approach has been outlined combining qualitative with design science methods. This will involve an exploration and first-hand review of existing digital games for the young, specifically games focusing on values and/or sustainable practices. The exploration and review will then be combined with design science research to propose a platform for designing and implementing context-adaptive digital games that can foster values and sustainable practices in the young [15, 16]. We also plan to evaluate the proposed platform by using it to create context-adaptive, values-based games for the young. The motivation for this research is illustrated in Fig. 1 [3–5, 7, 17].

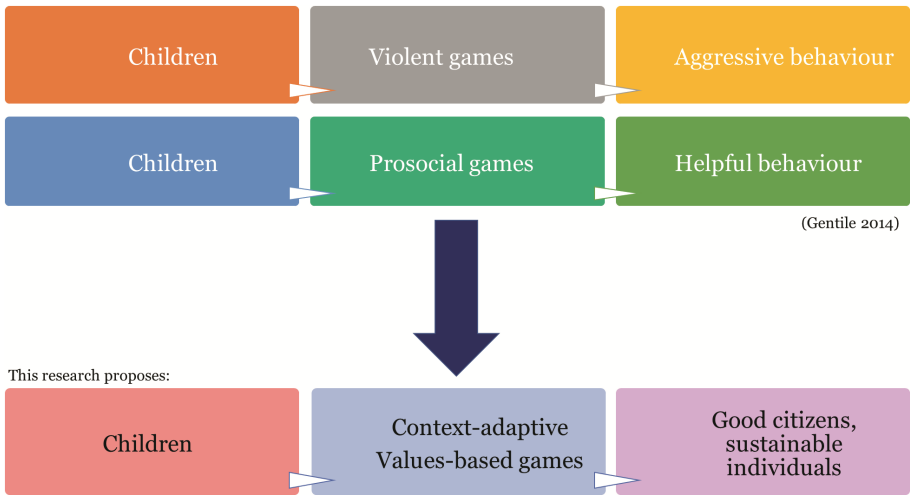


Fig. 1. Motivation for context-adaptive values-based games for the young

In the following sections, we discuss: values and sustainability in the context of this research; the context-adaptive nature of values; the role of decision-making in learning values and sustainable practices, and some preliminary findings on digital games and research in this area. We conclude with a summary of our preliminary research, challenges in this research, possible contributions and future research opportunities in this area.

2 Values and Sustainability

As a society, we have been passing down values and whatever we believe to be good practices for a sustainable life over the generations. The best way to teach these is through experience. Most of us can agree that this learning is therefore highly

unstructured, tacit, context-adaptive, subjective and complex. Learning these concepts also takes a lot of time. For this research, we use Rokeach's [18] view of a value as "a centrally held, enduring belief which guides actions and judgements across specific situations and beyond immediate goals to more ultimate end-states of existence". For example, the value "do not harm". While most of us can agree on this universal value, the context matters. If one "harms" in the process of defending themselves or their loved ones, the action may be justifiable despite the value.

When we talk about sustainability or being sustainable, we mean practices that enable the survival or preservation of existing systems or processes. The main types of sustainability are: *personal* – practices or beliefs that enable individuals thrive in the world; *social* – practices or beliefs regarding one's engagement with people in their surroundings, *economic* – beliefs regarding a country's survival and upkeep; *cultural* – practices or beliefs regarding the preservation of cultural aspects such as customs, language, dressing style; and *environmental* – refer to one's beliefs about maintaining and preserving the environment for the wellbeing of both the current and future generations. We consider the two concepts as being closely linked. In fact, being sustainable may also be considered a value. We therefore use the word "values" in a more holistic sense to include good sustainable practices.

The complex nature of values has also led to several controversies on the ideal time to teach these. In this research, we side with research that suggests that most individuals develop their value system, habits, and attitudes in their early years when they are most malleable [19]. In fact, many researchers find that a great part of learning values takes place during "play" [20–22], which is an essential component in a child's upbringing. In today's digital age, "play" is facilitated by technology in the form of digital games, making digital games a powerful means of fostering values, attitudes, and developing social and emotional learning in children [23]. In the next section, we discuss the potential of digital games in fostering values, particularly, the relevance of viewing this from a decision-making lens.

3 Responsible Decision-Making in Games

One way of understanding how digital games support learning, especially of complex concepts such as values, ethics and sustainable practices, is by viewing this process from a decision-making lens. This is because responsible decision-making is often viewed as a means to fostering good ethics and values [24]. This is because we are able to demonstrate possible choices for a scenario via decision-making. Further, decision-making may vary across contexts, in this case, decision-making in early childhood.

When one plays a game, the different components of the game and the holistic experience of playing the game gradually modify one's decision-making process. In fact, it may also subtly change one's mental model of decision-making. This is similar to the changes in our decision-making processes and models as we experience life in general [25]. For example, if a child is playing a game that involves different environments (a garden, a zoo, their early childhood centre) and they discover that they get rewarded if they decide to help someone in these different environments, they will always be looking

out for ways in which they can “help” to be rewarded. The opportunities to help can be provided via choices, where certain choices have positive consequences. The positive consequence may be someone reciprocating their good action later in the game or someone commending them on their positive actions.

The complex nature of values also calls for the need to acknowledge the context of the decision. For example, the value of “helping”. When parents ask a child to pack their toys after them, they would not like to endorse it as the value of “helping” but rather the value of “cleaning up after them”. Having context-adaptive games would therefore be appropriate in teaching values.

The decision-making process involved in the example above is typical in many other games (regardless of context) and demonstrates that as one progresses through the game, and as they play it more, they become better at it. This improvement can be tracked by the decisions and choices being made through the game. In majority of the games, these decisions have an impact on a game event later in the game. This may be compared to the five stage model of skill acquisition [26]. The decision-making process in the example above also demonstrates the interrelated nature of decisions in our life. Our decisions are often linked, where a certain decision will lead to a completely different pathway compared to a different decision. Langley’s model of decision linkages [27] illustrates this interrelated nature of decisions, and may be a valuable tool when considering the design of values-based digital games. Overall, the “sustainable” aspects of decision making are inherent not only in the nature of decisions posed, but also in the actual process of decision-making and mental model formation.

The next section explores existing research and values-based digital games for the young. In particular, we assess specific decision-making aspects or their lack of in these games. The purpose of this is to explore any opportunities to leverage these existing games to “experience” and “learn” values and sustainable practices virtually.

4 Context-Adaptive Games for Inculcating Values in the Young

Digital games have progressed from teaching basic literacies to more complex, tacit skills and concepts such as ethics in business. In fact, in many instances, digital games foster certain implicit values that they were never explicitly designed to teach. While this research may contribute to other contexts, our focus is on the early childhood (the young) context [10] since this is a phase when most of us develop our value systems, ethics, behaviors, habits and attitudes; and a time when our mental models for decision-making are fostered.

We explored and reviewed a handful of digital games designed to teach values in the young (Table 1). Our initial findings show that there are some games that teach values and sustainable practices using responsible decision-making. However, there is little research on the analysis of these games [13, 14].

In terms of the design and implementation of these games, there are only a few platforms such as Common Sense Media and Gameful that may support the creation of values-based digital games. The platforms are however not specific to the young. The platforms also do not explicitly cite any application of decision-making theories, or

allow for creation of context-adaptive games. Therefore, overall, platforms and research artefacts that support the creation of context specific (early childhood), responsible decision-making values-based digital games are lacking or non-existent.

Table 1. Examples of values-based digital games for the young

| Games | Values |
|--------------------------------|---|
| Kokoro | A virtual global community where the goal of the players is to help a society work together by making ethical decisions throughout the game. Some values described in the game include solving conflicts, challenging prejudices and stereotypes, respect, and improving relations. The overarching goal of the game is to promote unity and peace in the world |
| Minimonos ^a | A virtual world where kids create their monkey avatars and play mini games. The game is set nature, encouraging values of looking after the environment and planet |
| E-Critter game | This game is aimed at teaching children financial responsibility and personal values to children. It also teaches the values of living within your means (being sustainable financially) and separating needs from wants. Decision-making is not explicitly mentioned but it is clearly at the heart of this game's mechanisms |
| Peek-a-Zoo | Teaches kids (ages 1–5) emotions and behaviors. Decision-making is not evident in this game, but could easily be embedded given its nature |
| Cool School: Where peace rules | Teaches kids how to resolve conflicts and reduce bullying. The players are empowered to make decisions and choices in terms of their locations and their solutions, and they're rewarded for making good choices |
| Little Green Island | A game about environmental conservation. Kids are presented with environmental issues and are required to solve these |

^aThis game was closed in 2013.

The aim of this research is therefore to propose both theoretical and system artefacts for the design and implementation of context-adaptive, values-based digital games for the young. We plan to use theories on decision-making processes to architect the context-adaptive aspects of the game creation platform. The next section outlines examples of the types of games we aim to create using the platform.

5 Design of Context-Adaptive Values-Based Games

Some researchers have explored game mechanisms and components for values-based design of games [28–31]. This includes a generic framework for designing games with specific values [13]. An important consideration that researchers have discussed is the importance of having a “fun” element in serious games [32]. Last, but not least, designing for learning calls for a way to measure or validate the learning. Applying decision-making and making the decisions context specific not only guides the game design process, but also helps validate the learning by providing multiple versions of similar decisions across a period of time [26, 27]. With these in mind, the goal of this research

is to design and implement a platform for designing digital games for the young. Further, some researchers have acknowledged the need to assess values in digital games for the early childhood context and proposed a framework for identifying these values [21]. We plan to consider these in the evaluation of the game platform and games we design. We have come up with two scenarios that apply decision-making in fostering values.

5.1 Scenario 1: Context-Adaptive Values-Based Snakes and Ladders

The first scenario has been designed implemented non-digitally. It was created as a mock-up for a potential context-adaptive values-based digital game based on the popular board game Snakes and Ladders.

The game was used as an activity to encourage positive values in 5–6 year olds by taking them up the ladder for eliciting a positive value, and down a snake for a negative value. The activity was planned such that kids played on a live sized snakes and ladders board, and the respective values were read out to the kids when they landed on a snake or ladder. Table 2 outlines the list of values read out to the children. The game explicitly considers the context of the young players as well as the context of the decision/scenario. The context of the purpose of the game is also considered.

Table 2. Values-based Snakes and Ladders

| Ladders | Snakes |
|--|--|
| 1. You waited till mummy and daddy finished talking before you asked your question (Value: Respect/patience/discipline) | 1. You broke a plate and lied that you didn't do it. (Value: Truth – kids need to know that it is safe to tell the truth and a mistake is okay) |
| 2. You have learnt a new non-native cultural song. Well done! You respect and care for other cultures (Value: Unity) | 2. You did not finish the food on your plate (Value: Being thankful, do not waste food) |
| 3. You were brave to stand in front of the class and talk (Value: Self-confidence/courage) | 3. You forgot to say your prayers before going to bed (Value: Thankfulness, appreciation, devotion) |
| 4. You helped daddy water the plants (Value: Gentleness/caring for nature) | 4. You pushed your brother/sister/friend (Value: Right-conduct) |
| 5. You took your dog for a walk (Value: Responsibility) | 5. Oops you forgot to brush your teeth (Value: Loving yourself/cleanliness) |
| 6. You gave mummy a big hug and said thank you for the food (Value: Gratefulness) | 6. You didn't sleep on time. You slept late and could not get up on time for school (Value: Discipline) |
| 7. You said sorry to your brother/sister for breaking their favorite toy (Value: Right-conduct) | 7. You did not listen to mum and watched TV for 2 h and didn't finish your homework. (Value: Respect/Discipline – Do not waste time) |
| 8. I helped my friend get up when he/she fell (Value: Caring/helping) | 8. You were not patient for your turn on the swing (Value: Understanding/Patience) |

The snakes and ladders game was planned as a group, with teachers involved in facilitating various values-based activities outside the school curriculum. Careful consideration was made with the wordings of the negative values so as not to introduce the children to a negative value they didn't know of. Overall, the activity was enjoyed thoroughly by the young players and was used as a discussion topic in later sessions with the children.

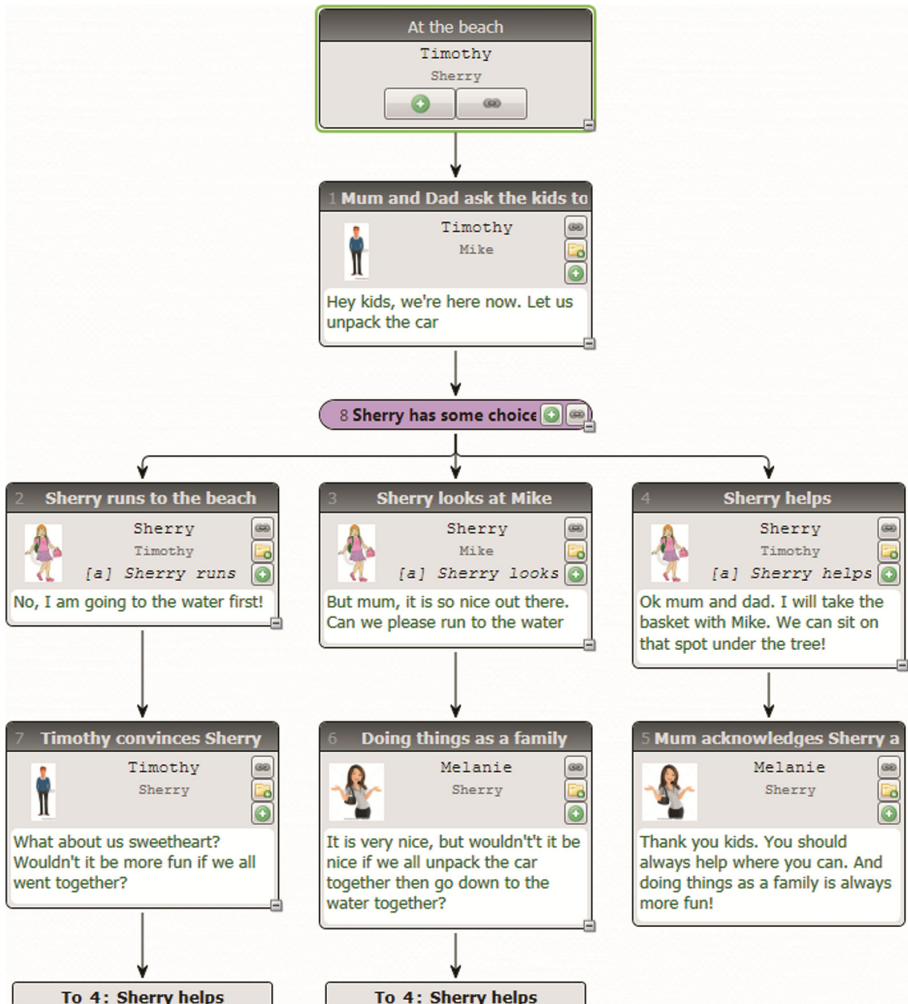


Fig. 2. Scenario 2 – Decision-driven Story of Helpfulness and Kindness created using ChatMapper

5.2 Scenario 2: Context-Adaptive, Decision-Driven Story of Helpfulness and Kindness

For the second scenario, we have used a storyline to pose various choices and invite the player to make decisions (Fig. 2). The player navigates through different pathways in the storyline to learn the underlying value behind the story. The storyline involves a decision map illustrating a child's potential response in a conversation with different members of the family. The main value in the storyline is the positive attitude of being helpful, kind, and doing things together as a family. The setting for the story is a family going to the beach. Figure 2 is a snapshot of the storyline, demonstrating some choices and pathways (decision map) in the storyline.

The goal of having this type of decision map is to come up with “before” and “after” scenarios around a specific value. The player's responses to each decision point can then be used to assess any changes because of the learning from their previous decisions.

6 Conclusion

This research applies decision-making theories to create and propose artefacts for the design and implementation of values-based digital games. A multi-methodological approach will be used to explore and create the artefacts.

As with any research, there are some challenges that we are trying to address as we progress through the research. These include designing serious games that are fun and engaging [32]. This is especially difficult with the plethora of digital games today, many of which are meaningless and mindless. Another challenge is to create a digital game that explicitly complements and promotes learning in the real world. While there is a benign relationship between real and virtual worlds [7, 29], we are aware that playing digital games may come at the cost of missing out on social interactions and play in the real world.

The cross-disciplinary nature of this research means that it will contribute to various fields of research that future researchers can expand on in their respective area(s) of expertise. These include, but are not limited to: digital games and responsible decision-making, digital games and early childhood, fun serious games, and values, ethics and sustainability in digital games. This research will contribute both to theoretical research on artefacts for designing values-based digital games, as well as system artefacts that may be used in practice. Future research may therefore build on the initial artefacts proposed in this research, as well as validate the proposed artefacts via experiments and implementations in different contexts. Our ultimate hope is that the artefacts will help bring about positive changes in individuals, families and organizations to foster a more sustainable, equitable and just society and world.

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