Chapter 3

Intrinsic Motivation in Serious Games: A Volition-Centered SDT Approach

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Abstract

This book chapter proposes how to create intrinsic motivation for players in serious games based on Self-Determination Theory. Serious games are not just fun-based; they are designed with goals such as behavior change, motivation, and learning. However, many serious games do not go beyond traditional teaching methods and are developed by integrating game mechanics in a superficial way—often referred to as "chocolate-covered broccoli." This limits both the motivational and learning effectiveness of the games. According to SDT, three basic psychological needs must be satisfied to ensure intrinsic motivation: autonomy, competence, and relatedness needs.

In the current study, the concept of "volition" is preferred over "autonomy." This is because the goal is not merely to offer multiple choices or independence, but to create a meaningful path that the player willingly adopts. The model argues that offering meaningful choices, supporting identity formation, and allowing player decisions to have an impact—either on the player or the game—fosters volitional engagement. Another core need in the model is competence, which supports meaningful development and growth. Relatedness, meanwhile, emphasizes the importance of meaningful social connections. Furthermore, the model recommends designs that genuinely integrate learning content with game mechanics, stressing that adding game elements independently of the learning process does not enhance motivation. Within this framework, the SDT-based model is proposed as a guide for serious game designers and educators. It suggests that such a design will promote intrinsic motivation in players, ultimately leading to improved learning outcomes.

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1. Introduction

Serious games are interactive experiences available across various platforms, designed for one or more players with objectives that extend beyond mere entertainment (Ritterfeld et al., 2009). In other words, they are games developed with specific goals or used for educational purposes rather than purely for amusement (Naul & Liu, 2020). The growing popularity of serious games has garnered significant attention at international conferences, congresses, and symposia, as they have been applied in a wide range of contexts—to educate, motivate, and promote behavior change (Ritterfeld et al., 2009). Despite their increasing use in both academic and applied settings, striking a balance between educational value and entertainment remains a design challenge. In addition, the obligatory participation in serious games or gamification efforts can undermine the autonomy of the participants (Deterding, 2016). Ideally, serious game content should place learning objectives at one end of the spectrum and entertainment at the other, while still maintaining player engagement and interest (Westera, 2019). Consequently, for motivational design to be effective, a serious game must not only deliver educational content but also provide an enjoyable experience (Pange et al., 2018).

One of the key problems in serious games is the design of learning-focused applications that are superficially enhanced with random game elements. While such designs may resemble games on the surface, at their core they remain digitized learning activities (Deen, 2005). Simply adding visual elements to educational content, without meaningfully integrating game mechanics into the learning process, does not make it a game—it merely turns learning exercises into something that looks like a game. Similarly, while rich soundscapes and dynamic visuals may initially evoke emotional responses from players (Dickey, 2005), these features are essentially extrinsic motivators. As such, they are unlikely to foster sustained, intrinsic engagement over time (Westera, 2019). For this reason, designing with intrinsic motivation in mind is crucial—not only for engaging players, but also for enhancing learning effectiveness and supporting long-term motivation (Kusrini & Agustyarini, 2024).

Self-Determination Theory (SDT), which this chapter draws upon, views humans as active organisms with natural tendencies toward psychological growth, development, and motivation (Ryan & Deci, 2002). Recognized as a leading, empirically grounded theory of human motivation, development, and well-being (Ryan & Deci, 2000), SDT posits that all individuals have three basic psychological needs: competence, autonomy, and relatedness.

Satisfying these needs is related to achieving intrinsic motivation, a desirable motivational state (Sailer et al., 2013). SDT has also been used in various studies to investigate game motivation (Peng et al., 2012; Ryan et al., 2006) and is one of the most important theories for explaining both the player's motivation to play a game and the factors that may motivate the player's character or avatar as they progress through the game (Ryan et al., 2006). Considering fun-based game studies, SDT can provide a comprehensive and general framework for serious game design.

This book chapter proposes a motivational model based on Self-Determination Theory (SDT) that promotes intrinsic motivation in serious game design. It explores how to practically integrate game mechanics in a way that satisfies the player's needs for autonomy, competence, and relatedness, rather than integrating them randomly into learning content. While previous studies have addressed SDT's theoretical framework and the distinction between intrinsic and extrinsic motivation in gaming contexts (Farrell et al., 2014), the aim of this work is more specifically focused on autonomy. The chapter begins with an overview of SDT and serious games, followed by a critical evaluation of current design strategies used in serious games. It then presents a motivational model based on SDT, specifically tailored for game design. Finally, the chapter discusses how this model can be applied in both theoretical and practical contexts, and offers suggestions for future research.

2. Theoretical Background

2.1. Overview of Serious Games

Serious games refer to the use of games or gaming technologies for purposes beyond mere entertainment (Susi et al., 2007). Their primary aim is not to provide fun or enjoyment (Michael & Chen, 2006). In the 1990s, however, a different approach emerged with the rise of "edutainment"—a concept that sought to blend education and entertainment. Early edutainment practices were criticized for being dull and repetitive, as they gradually evolved into skill-based drills where the fun aspect was diminished (Susi et al., 2007). There is also a common perception that serious games are synonymous with edutainment games (Ritterfeld et al., 2009).

Another key concept is gamification, which differs from serious games in a fundamental way. While serious games are complete game-based systems designed for educational or training purposes (Sailer et al., 2013), gamification involves using individual game elements in non-game contexts (Deterding et al., 2011). Moreover, gamification tends to have broader

applications and is often used to motivate specific behaviors (AlMarshedi et al., 2016; Sailer et al., 2013).

Many studies from past to present have utilized serious games for various purposes, such as motivating and educating users in different fields. For instance, in a report on the use of games in education, there is evidence that games improve personal and social skills, knowledge and understanding of the world, language and literacy, physical development, math skills, and creativity (McFarlane et al., 2002, as cited in Naul, 2020). However, serious games are used not only in education but also in other disciplines. These include military games, educational games, government games, corporate games, and healthcare games (Susi et al., 2007). *America's Army* (2002), a digital game developed by the U.S. military to recruit ideal soldiers, is an example of a serious game designed for political purposes (Ritterfeld et al., 2009). Another game in this category is *Re-Mission*, a health-related game aimed at improving understanding of physical illness and the psychological and behavioral outcomes associated with cancer (Bacharz et al., 2020). As a result, serious games can be considered a potential tool to increase user engagement, promote behavioral change, and develop skills.

Many serious games are considered to be inherently motivating because they are labeled as games. However, many serious games are described as not fulfilling the potential they promise (Damaševičius et al., 2023). One of the main challenges of educational game design is how to maintain the fun while enriching the content (Haring et al., 2011). Nevertheless, most serious games do not go beyond the traditional role and fail to fulfill their true potential. Many so-called educational games are developed on limited budgets and suffer from poor design quality (Ritterfeld et al., 2009). Given that the aim of serious games is often to motivate learners to engage with content they might otherwise find dull, understanding the psychological foundations of motivation is crucial in the design process (Deen, 2015).

2.2. Self-determination Theory (SDT) Overview

At the heart of understanding players' motivation in video games lies Self-Determination Theory (SDT), a well-established psychological framework that emphasizes the fulfillment of three basic psychological needs: autonomy, competence, and relatedness (Ryan et al., 2000). SDT has been applied across various disciplines, including education and game studies (Yuheng, 2024). It conceptualizes individuals as active organisms naturally inclined toward growth and development (Ryan & Deci, 2000). This study adopts SDT for several reasons. Most notably, it has been widely validated as a

useful framework for understanding motivation in both educational and gaming contexts (Guay, 2022). As such, SDT offers a strong theoretical foundation for the motivational design of serious games.

Autonomy refers to "acting with a sense of volition and having the experience of choice" (Gagné & Deci, 2005, p. 333). At its core, autonomy entails aligning one's actions with their inner self and values and feeling a sense of agency in making decisions. While the experience of choice plays a significant role in autonomy, it is important to note that autonomy does not solely depend on having a choice. In other words, people who may not have a freedom to choose certain aspects of their lives can still experience a sense of autonomy (Rigby & Ryan, 2011). Competence need is one of the psychological needs described in Self-Determination Theory (Deci et al., 1985) and refers to productivity and success experienced when interacting with the external environment. It relates to innate propensity to improve skills and abilities or a desire to seek out the optimal challenge (Legault, 2017). The third psychological need within SDT is the sense of relatedness, which pertains to an individual's need for belongingness and social connection with others. Specifically, when this need is satisfied, it can lead to increased intrinsic motivation and overall wellbeing (Ryan & Deci, 2000). Establishing significant and supportive relationships with others plays a fundamental role in fulfilling this autonomy and relatedness need, contributing to feelings of significance and support for each individual (Rigby, 2014).

SDT theory has been applied in many different areas such as workplace, language learning, education, health, relationships (Self-Determination Theory, n.d.). This theory has three basic building blocks, which are the needs for autonomy, competence and relatedness. These are at the core of the individual's self and well-being structure and are key motivations for behavior change (Cheek et al., 2015). In one of the first studies conducted by Ryan et al., (2006) in the literature, SDT theory was utilized to explain how video games motivate players. The effect of autonomy, competence and relatedness need satisfaction on gamers' motivation and well-being when they play video games was examined. As a result of four different studies, the motivation of players in video games was found to depend on the degree to which players' psychological needs (autonomy, competence and relatedness) are satisfied. This demonstrates that SDT theory is one of the well-established and previously studied frameworks for understanding video game players and for designing games that enhance player motivation.

3. Rethinking Motivation in Serious Game Design

Play is defined as a completely voluntary, free and autotelic purpose in itself, different from school and work (Huizinga, 1949). Deterding (2016) emphasized that some gamification practices and game scenarios remove voluntary participation and players may feel obliged to play the game. In this case, players may perceive the game as an assignment and their intrinsic motivation may suffer. For serious game designs to be effective, it is important that they support intrinsic motivation in players. However, when game designs are based on reward systems, they tend to limit the depth and sustainability of learning. For example, many games—such as those focused on math, spelling, or vocabulary—rely on behaviorist methods like repetition and reinforcement to encourage players to complete routine tasks (Ritterfeld et al., 2019; Westera, 2019). This behaviorist approach, often seen in drill-and-practice games, hinders learning processes such as deep thinking and reasoning (Deen, 2015). A key criticism of behaviorism is that it emphasizes observable behavioral responses while overlooking underlying mental processes (Marini et al., 2018). From this perspective, it can be argued that good game design should aim to create a meaningful learning journey (Chou, 2019), rather than simply motivating repetitive tasks through external rewards. Therefore, unlike the graphical features of game environments, it is the gameplay scenarios that serve as the foundation for intrinsic motivation. These scenarios allow players to become active participants in a narrative. By adopting specific goals, roles, responsibilities, and competencies, players take on a central role within the game (Westera, 2019).

However, serious game designs still often rely on the "chocolate-covered broccoli" approach, which separates the learning material from the core game structure. This term refers to the superficial embellishment of educational content with rewards or game-like elements (Bruckman, 1999). The underlying assumption is that learning is inherently boring, and that combining it with something enjoyable—such as a reward—will make it more appealing. A classic example of this is quiz-based games where the quizzes are not embedded in the gameplay, or game mechanics that do not align with the learning content. However, it has been argued that this method is ineffective, and that simply adding a sweet layer does not make learning more enjoyable (Farber, 2014).

One of the most notable studies on this issue is a thesis project developed around the math game Zombie Division. In this study, two different versions of the game were designed. The version in which mathematical

division tasks were directly embedded into the game mechanics was called the internally integrated version. In contrast, the version that presented math tasks in separate sections outside the core gameplay was referred to as the externally integrated version. According to the study's results, the internally integrated design was more effective than the externally integrated one, both in terms of learning outcomes and motivational impact (Habgood, 2007)

The quality of game graphics, the overall visual appearance, and rich sensory effects are also important factors contributing to game enjoyment (Ritterfeld et al., 2009). Adding dynamic sound and visual elements has been shown to improve user engagement in serious games (Schuurink et al., 2018). However, the motivational effects of these elements remain largely extrinsic in nature. The underlying gameplay scenarios are described as the "true carriers of intrinsic motivation," where players actively participate through defined goals, roles, and responsibilities (Westera, 2019).

Another perspective is offered by Gee (2003), who argues that the secret of video games lies not in high-specification graphics but in their ability to function within a "regime of competence." In this sense, they describe this as the balance between the challenges presented by the game and the player's abilities.

In conclusion, while elements such as the graphic interface and game art contribute to the entertainment value of games, other deeper factors are believed to have a stronger motivational impact.

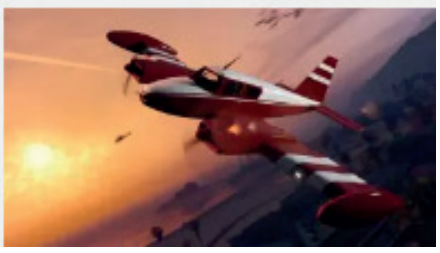
4. Implementing SDT with Volition in Games

In order to explore SDT-based game design, it is necessary to address the core components of Self-Determination Theory. Current work emphasizes the importance of supporting psychological needs through game mechanics and dynamics in serious game design. This section discusses the main component of SDT –autonomy- and highlights relevant research in the context of gaming. According to Deci and Ryan (2013), the need for autonomy is consistently identified as central to SDT. Ryan et al. (2002) similarly define autonomy as the perceived source of behavior and do not see it as the same as merely offering choice. In their study, Deterding (2016) argues that even an monk's getting up early in the morning and going to ritual can be perceived as autonomy if it is aligned with the individual's goals, values and needs. In this sense, autonomy is not about having freedom of choice, but rather about the integration of behaviour with personal values and identity. However, in game literature, especially in non-English contexts, the concept of autonomy is often misunderstood. To address this,

this study adopts the term "volition", which better captures the motivational nuance of acting in accordance with one's values and goals.

Building on this distinction, Rigby (2018) also criticized common interpretatipn of autonomy as "freedom" in a a talk titled *The Freedom Fallacy*. He argued that the concept of autonomy is often mistaken for unrestricted freedom or independence. *Merriam-Webster* dictionary defines autonom as "self-directing freedom and especially moral independence"—which emphasises freedom and indepence. However, interpreting autonomy in this way is misleading in the context of games. One interpretation of autonomy is that when we act, we do so volitionally (Gagné & Deci, 2005). Volition is not the same as independence or the freedom to do whatever one wants. Nor does volition mean simply wanting to do the things one is already doing. Rather, autonomy is more closely tied to sconcept of *volition* (Rigby, 2018; Ryan & Deci, 2000).

For example, a player may follow a linear quest path in a game yet still feel volitional engagement if the quest aligns with their in-game identity or values. Moreover, volitional engagement varies according to the context. Even when gameplay is obligatory such as for game designers testing their own games, players may enjoy the experience less and perceive it more as work (Deterding, 2016).



Arms Trafficking-Air

Arms Trafficking-Ground

Tennis

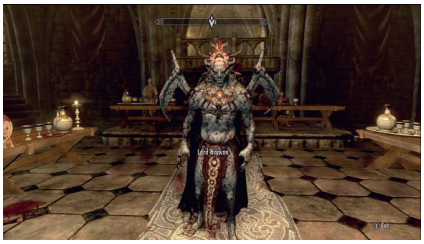
Parachuthing

Stock Car Races *Yoga*

Figue 1. GTA 5 Hobbies and Activities (GTABase, n.d.)

In the context of games, if autonomy is perceived as freedom, it should not be interpreted as offering too many options or choices. In other words, volition is about the provision of *meaningful* choices. Players have a strong need for meaning, which overlaps with their needs for autonomy, competence, and relatedness, which creates volitional engagement. Studies have shown that the meaningfulness of an activity depends on how well it fulfills psychological needs (Eakman, 2014). Therefore, meaningful choices foster volition in games. This is evident in the success of games like Grand Theft Auto (GTA): it is the presence of meaningful activities—not merely the size of the map—that plays a key role. In GTA, the fun and meaningful activities offered to the player can enhance volitional engagement. This is because there is a high probability of finding an activity that is compatible with the player's interests and values. As seen in the figures, the player can find activities across many different categories such as parachute jumping, flight school, golf, car racing.

In addition to meaningful choices (or activity), providing a narrative or supporting identity can also foster volition in players (Rigby & Ryan, 2011). Identity development in PC games such as *Skyrim* is a good example as shown in Figure 2. Becoming a vampire, a guild leader, or taking on other defined roles enhances the player's sense of agency. These elements, in turn, increase intrinsic motivation.



Becoming A Vampire Lord

General Tullius

Skyrim Battles-Civil War Leaders vs Guild Leaders

Paarthurnax

Figure 2. Role Choices and Leadership Paths in Skyrim

While existing research often equates autonomy with offering choices or different strategies, there is no precise formula for how to create volition. Each game has its own strategies. Therefore, as game designers, the key question to ask is: "How can we build volitional engagement?" The content of the game should be designed in response to the player's actions, rather than simply producing a large amount of content. What matters is that the content has an impact on the player. Another recommendation is that choices in the game should have meaningful consequences. This occurs when players can see the results of their decisions—either within the game or reflected in themselves. Players want to see a change either in themselves or (in the game world) through their actions in the game. Therefore, every action in the game should be designed to create a meaningful change or contribute to the story of the game. However, if play is to contribute to autonomy, it must not have social and material consequences. In Deterding's study (2016) on autonomy and play, it was seen that the protection of time and space away from external demands, the freedom to structure the situation according to one's immediate interests and to participate or not participate in the game, and the absence of social and material consequences contribute to autonomy.

4. Conclusion

This book chapter proposes a design for serious game design whose main focus is intrinsic motivation, which can be achieved through psychological needs. The proposed model in this book chapter focuses especially on the concept of autonomy. This is because autonomy is at the heart of intrinsic motivation. However, the concept of volition is preferred because the model argues that autonomy is not fully understood. The model argues that, rather than providing the player with a multitude of choices, they should be offered options that meaningfully develop the player, foster social connection, and align with the player's identity and intrinsic values.The importance of this distinction stems from the fact that it aims to provide a game experience that offers meaningful choices and identity formation, rather than freedom-based choices.

A key design principle is the interweaving of educational content and game mechanics. Instead of superficially integrating game mechanics, as the "chocolate covered broccoli" design advocates, a structural design is proposed where learning and play reinforce each other. This alternative approach, especially evident in the Zombie Division experiment, demonstrates that a holistic design leads to higher player motivation and learning outcomes. Game designs supported by SDT principles, especially volition, can foster deeper player engagement and more meaningful experiences. For the game experience to be truly voluntary and volitional, the game context must be free from control and social demands, providing a space where the player can freely express themselves (Deterding, 2016). In short, the intrinsic motivational design of the game is tied more to voluntary participation than to game mechanics themselves. Future research could expand on these findings in both theoretical and applied contexts, either by developing a more comprehensive model or by conducting empirical, contextualized studies to better understand the practical implications of the volition principle.

5. Declaration of Interest

"No conflicts of interest exist."

6. Declaration of generative AI and AI-assisted technologies in the writing process

"During the preparation of this work the author(s) used ChatGPT 4o to improve language and readability with caution. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

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