

# Chapter 4

## Development and Pilot Testing of a Financial Literacy Game for Young Adults: The Happy Life Game



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### 4.1 Introduction

The effective promotion of financial literacy (or financial competence)<sup>1</sup> has become increasingly important in the international debate over the past two decades. Numerous German and international studies have revealed that young people, in particular, lack financial literacy and practical skills when it comes to handling finance-related issues. They often overestimate their competencies in this domain (FINRA, 2016; Kaminski & Friebe, 2012; Union Investment, 2017). While Fürstenau and Hommel (2019) found that informal learning situations via the internet without sound prior knowledge have no positive effect on financial competence, internationally relevant literature shows that targeted teaching situations can have a positive effect on the financial literacy levels of students (Walstad, 2010, p. 353; Asarta, 2014, p. 49; Cameron, 2014, p. 17; Tang & Peter, 2015, p. 129; Bover et al., 2018; Bruhn et al., 2018; Frisncho, 2018). By contrast, there were only a few studies that found teaching financial literacy had no impact on the students' levels of financial literacy (Mandell & Schmid-Klein, 2009; Peng et al., 2007).

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<sup>1</sup>The terms are not used uniformly. Financial literacy, financial capability, and financial education are sometimes used as synonyms, and in other cases one subsumes the other. In this chapter, financial literacy and financial competence are used as synonyms. A competence-oriented view of financial literacy is preferred, and financial knowledge is only a precondition to develop financial competence, which leads to adequate financial decision making and financial behavior.

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In recent years, numerous interventions to promote financial literacy have been put into practice. In a meta-analysis, Kaiser and Menkhoff (2018a), Kaiser & Menkhoff, (2018b) found that such interventions have a far greater effect on financial knowledge than financial behavior. Fernandes (2014) question the long-term learning effect of teaching financial literacy. They discovered that the learning effect of interventions of different duration (24, 18, 12, and 6 h) is the same after 24 months. Lusardi and Mitchell (2014) see the reasons for this in the low quality and motivation of the teachers teaching personal finance. Furthermore, they state that the financial literacy programs are still not tailored well enough to the respective target groups. Other studies show that the positive correlation between financial literacy and good financial decision-making is significantly influenced by other individual factors, such as an increased affinity for numbers (Erner & Oberste, 2016), mathematical competencies (Cole et al., 2015), motivation to deal with personal finances (Bucher-Koenen & Lusardi, 2011), and patience (Hastings & Mitchell, 2011). Therefore, each of these competencies needs to be promoted individually. In particular, it was found that training young people to be more patient and exercise better self-control leads to lasting positive effects (Alan & Ertac, 2018; Lührmann et al., 2018). The increased acquisition of financial experience that comes from having a bank account and a higher income, combined with the socioeconomic status of the family of origin, also have an impact on financial literacy (Förster et al., 2019; Lusardi et al., 2009; Sohn et al., 2012; Zhan et al., 2006).

A further explanation for the lower effectiveness of these financial literacy programs in the long-term could be the lack of applicability and relevance of the material in the period immediately following instruction, which decreases the likelihood of retention (Renkl, 1996). On the one hand, it is assumed that things are more likely to be retained in memory if they are associated with strong emotions (Sembill, 2010). On the other hand, some emotions can be an additional obstacle to rational financial decisions, namely attachment (property, real estate), aversion (fear of loss), ignorance, delusion and confusion, envy and jealousy, and pride (Gonzales & Byron, 2010, p. 55). As a result, adequate handling of these emotional states is necessary and should be trained to allow youth to make meaningful financial decisions—in addition to imparting financial knowledge.

Furthermore, the promotion of financial literacy must be holistic and multidimensional if it is to have a sustainable impact (Smith et al., 2015). According to Hira (2012), such a program should address the required values and attitudes required to make long-term responsible financial decisions and to encourage reflection, yet should be simple and realistic. The inclusion of a game as a part of an intervention could be helpful to overcome the shortcomings of traditional financial literacy programs. Boyle et al. (2016) found positive effects on cognitive, physiological, affective, and social skills of both entertaining computer games and serious games. Moreover, board games are effective teaching tools (Berland & Lee, 2011; Gobet et al., 2004; Shanklin & Ehlen, 2007; Shanklin & Ehlen, 2017; Treher, 2011; Yoon et al., 2014). Games kindle emotions such as curiosity, frustration, and fun (Kim, 2012), and make learning possible through trial and error, failure and success, and through practice, experience, and reflection (Buckley et al., 2016). Since games can be played repeatedly and thus lead to experimentation, initial failure is not final,

but rather the first step to success (Lee & Hammer, 2011). This has the potential to increase motivation, which can be seen as a key determinant of learning (Brophy, 2013). These findings could explain the boom of serious games, gamification, and physical and analog learning games in recent years.

For a game to be successful at increasing an individual's financial competence and financial literacy, it has to simulate the financial context in a way similar to how young adults are required to manage their money. Furthermore, its design should be motivating enough so it can be played with pleasure. With this in mind, the board game here presented has been developed based on the following assumptions:

1. The game characters live in an industrialized country and lead an average, middle-class life.
2. The game is based on the comprehensive competencies model for financial literacy (Aprea & Wuttke, 2016).
3. It takes a holistic approach in that not only knowledge is taught but also decision-making competency is promoted.
4. The emotional–motivational facets play a central role.
5. While financial well-being plays an important role, it is not the sole determinant of success as the winner is the happiest player, not the richest in financial terms. This implies that to become the happiest player, you need to make sound and reflected financial decisions.

The research objective presented in this chapter is the development and the pilot testing of a financial literacy board game, which can be used solely or in combination with other tools to foster financial literacy.

This chapter is structured as follows: Section 2 contains the relevant theoretical foundations. After presenting important definitions, the latest research results in the fields of financial literacy (Sect. 4.2.1), happiness research in relation to money (Sect. 4.2.2), and game-based learning (Sect. 4.2.3) will be illustrated. Taking the theoretical foundations into account, the development of the game is described and the methods and results of the pilot testing are presented (Sects. 4.3 and 4.4). Finally, the results are discussed, limitations are specified, and an outlook for future research is presented (Sect. 4.5).

## 4.2 Theoretical Foundations

### 4.2.1 *Financial Literacy*

#### 4.2.1.1 Concept, Underlying Definitions, and Competency Model

In academic literature, there is a wide range of concepts surrounding financial literacy (Davies 2015; Kaminski & Friebe, 2012; Remmele & Seeber, 2012; Schlösser et al., 2011; Retzmann, 2011; Aprea & Leumann, 2016), and there exist several

competency models for different target groups and educational contexts.<sup>2</sup> Only the most important concepts, terms, and definitions deemed relevant for this article will be examined here.

Financial literacy is defined by the OECD as “the knowledge and understanding of financial concepts, and the skills, motivations and confidence to apply such knowledge and understanding to make efficient decisions across range of financial contexts, to improve financial well-being of individuals, and to enable participation in economic life” (OECD, 2014, p. 33). It is “a combination of awareness, knowledge, skill, attitude, and behavior necessary to make sound financial decisions and ultimately achieve individual financial well-being” (OECD, 2017, p. 50). Financial literacy can thus be compared with the concept of competence. Based on Weinert’s definition of competencies, they “are the cognitive abilities and skills available in or learnable by individuals to solve specific problems, as well as the associated motivational, volitional and social willingness and ability to use problem-solving in variable situations successfully and responsibly” (Weinert, 2001, p. 27).

As financial literacy focusses more on basic education like “money and transactions,” “planning and managing finances,” or “risk and reward” (OECD, 2017, p. 50), this concept is criticized for referring more to knowledge than the application of this knowledge and for disregarding the relevance of motivation, emotion or attitudes (Rudeloff, 2019, p. 53). In contrast, competence emphasizes motivation, emotion, and attitudes within a holistic approach and refers to more complex issues (Fürstenau & Hommel, 2019, p. 3).

According to Aprea and Wuttke (2016), financial literacy is “the potential that enables a person to effectively plan, execute, and control financial decisions” (p. 402). In their competence-oriented working model of financial decision-making, they have adopted Weinert’s definition of competence. The authors argue that intellectual activities (e.g., reasoning and decision-making) depend partially on the person and his /her individual characteristics and partly on his/her individual situation and environment. These activities can be subdivided into a planning phase, an execution phase, and a control phase. As an outcome of this process, the person gains a new mental attitude and motivation by developing knowledge and skills, and the person shows an observable performance (Aprea & Wuttke, 2016, p. 401). By repeating the process, earlier decision processes and their decision outcomes affect subsequent processes and decision outcomes (referred to as a decision product in the model). Accordingly, financial literacy can change a person’s financial behavior.

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<sup>2</sup>(1) Basic education (Finanzielle Grundbildung) (Mania & Tröster, 2015), (2) financial education (Finanzielle Bildung) (Retzmann & Seeber, 2016), (3) basic education (Ökonomische Grundbildung) (Remmele et al., 2013) and (4) general economic education (Ökonomische Allgemeinbildung) (Seeber et al., 2012).

#### 4.2.1.2 Spheres of Activity and Central Competences

For young adults, the spheres “money and transactions, planning and managing finances, risk and rewards, and financial landscape” (OECD, 2017, p. 50) are relevant for managing their personal finance issues. Manz (2011) specifies the spheres of financial literacy as *earning and spending money, making debts, saving and investing, and dealing with risk*. In an interview-based study, Aprea et al. (2015) broke this down even further and found the following individual cognitive competence facets: *Earning money, planning and dealing with money issues in everyday life, spending money, dealing with debt, and avoiding excessive indebtedness, wealth-creation, and retirement savings, and managing risks with insurance policies*. A similar breakdown of important individual financial decisions in private life and their interdependencies was found in a multidimensional expert survey on the topics relevant to the target group *Young Adults on the Road to Financial Independence*, (Pfändler, 2021): *Earning and spending money* (budgeting including money earned/money spent calculations as well as saving), *taking on debt* (including various forms of debt such as overdraft facilities or real estate financing, interest and repayment, and over-indebtedness), *identifying, taking on and covering risks* (by defining insurance concepts for the most serious life risks and differentiating between relevant and less relevant insurance policies), *saving and investing* (with a focus on investing money in securities, identifying asset classes and investment forms with regard to the relationship between risk and return, interest rates, and changes in value).

In addition to these cognitive competencies, there are non-cognitive competencies with respect to emotion, motivation, and volition relevant for financial decisions (Aprea et al., 2015, p. 13). Manz (2011) emphasizes that *mathematical skills, discipline, and intuitive cleverness* are relevant for being successful regarding financial matters. Furthermore, the abilities of *structuring information, self-motivation, openness, decision-making ability, (self-)reflection, information exchange within the peer group, mutual support, and patience* are crucial as well (Pfändler, 2021).

#### 4.2.2 Findings of Happiness Research in Relation to Money

Happiness research is helpful in understanding why people spend money. “General happiness is, philosophically, a sense of well-being which in turn has been defined either as a complete and lasting satisfaction with life-as-a-whole, or as a preponderance of positive over negative feelings” (Kamann et al., 1984, p. 91).

Regarding the connection between happiness and money, Jebb et al. (2018) showed that globally, people are the happiest in terms of how they evaluate their life and emotional well-being when they receive a solid middle income. In the sense of Maslow’s pyramid of needs, money is associated with security and thus is a basic need (Howell et al., 2013). Financial well-being is important to sustaining current and anticipating desired living standards and financial freedom (Brüggen et al., 2017).

In addition to income and wealth, this also includes work and the quality thereof, work-life balance, health status, education and skills, social connections, civic engagement and governance, environmental quality, personal security, and subjective well-being (OECD, 2011, p. 6). Within the context of the phrase *money can't buy happiness*, the question is often raised whether or not spending on events to gain positive experiences can increase subjective well-being and personal happiness (Pchelin & Howell, 2014).

According to Haidt (2018), the living conditions of a person and his or her voluntary activities add up to a fixed, personally individual target value (p. 130). This implies that each person has an individual level of happiness that is influenced by his or her living conditions and actions.

There is a variety of factors that have a positive or negative effect on the feeling of happiness. In their research, Kumar et al. (2014) have found that anticipating a (positive) experience makes people happier than anticipating a new possession. Furthermore, one of the most important life conditions with regard to the feeling of happiness is the intensity and number of relationships a person maintains (Baumeister & Leary, 1995; Myers, 2000). With regard to living conditions, constant noise can cause stress and reduce the quality of life, and thus the feeling of happiness (Glass & Singer, 1972). Other investigations have shown that people do not get entirely used to a longer commute to work, which is generally associated with stress (Koslowsky et al., 1995). Also, a lack of control and the inability to make decisions for oneself affects people's living conditions negatively (Langer & Rodin, 1976).

What if you use your money to create these situations that have been found to be relevant to happiness? Will that make you happy? One argument in favor of this is that if people can spend money to live in a quieter and more prosperous area closer to their workplace, they reduce stress (Firebaugh & Schroeder, 2009). They could have more leisure time and can build and maintain more positive relationships with other people. According to Haidt (2018), spending money on simple and functional appliances or cars makes people happier than saving and investing the rest of the money in high-priced consumer goods for later consumption (p. 140). Demonstrative consumption can thus be seen as a zero-sum game since the acquisition of increasingly expensive status symbols by one person devalues the possessions of another and vice versa (Haidt, 2018, p. 141). *Keeping up with the Joneses*—the comparison of income within the peer group—can make people unhappy (Harris, 2008).

In contrast, spending money on things that put you in the flow state, i.e., the temporary and subjective feeling of deep happiness combined with high commitment can make people happy (Cziksentmihalyi, 1990). Flow can come from hobbies or enjoyable work, challenging and voluntary physical activities, mental activity in the form of thinking or remembering, philosophical considerations, communication, writing, or diversified work. According to the author, the following prerequisites are necessary to attain this state (Cziksentmihalyi, 1990, p. 304):

1. tasks with a reasonable chance of completion
2. the ability of full concentration on the activity
3. clear goals

4. immediate feedback
5. deep but effortless involvement that removes from awareness the frustrations and worries of everyday life
6. sense of control over our actions
7. no concern for the self
8. alteration of the concept of time, hours can pass in minutes and minutes can feel like hours.

These findings would seem to indicate that spending on hobbies, further education, or other activities should be high to achieve a high balance of happiness. There is also another relationship between happiness and money, e.g., people feel happy when they donate money or spend their money on other people (Dunn et al., 2008). Children have a positive influence on the life satisfaction of parents if the parents do not experience a noticeable deterioration in their material circumstances after the birth of their children, according to Blanchflower and Clark (2019). However, people who get into financial difficulties as a result of having children are less happy than before.

In summary, it can be assumed that money alone does not make people happy, but indirectly money can make people happy as a certain amount necessary to create security, freedom, and pleasant living conditions.

### ***4.2.3 Game-Based Learning***

#### **4.2.3.1 State of Research**

Game-based learning can be implemented in analog or physical (non-computer simulation games, board simulation games) or digital settings (computer simulation games), i.e., video games or apps (Geuting, 2000). This gamification of learning is defined by Landers (2014) as “the use of game elements, including action language, assessment, conflict/challenge, control, environment, game fiction, human interaction, immersion, and rules/goals, to facilitate learning and related outcomes” (p. 757).

By using special learning games, students can experience motivation and engagement in complex learning situations where problems are solved, decisions are made, and metacognitive thinking is required. This in turn leads to changes in attitudes, behavior, and skills (Ifenthaler et al., 2012; Kim et al., 2009; McClarty et al., 2012; Mishra & Foster, 2007). Furthermore, they receive constant feedback via a score or changes in the game world that enables them to monitor their progress (Prensky, 2001). Game-based learning is understood as the use of games for teaching and learning purposes (Wilson et al., 2013). It focuses on interactive problem-solving to reach a specific objective by using required competencies where the learners receive timely feedback on previously uncertain game results to promote learning (Eseryel et al., 2014). It can be used as an assessment tool as well (Ifenthaler et al., 2012;



Shute & Ke, 2012). In comparison with digital games, analog games, especially board games, are often much simpler and more transparent in terms of game mechanics and the associated links (Zagal et al., 2006). The decision-making and the execution speed of a game move are higher in physically tangible games than in screen-based games or exclusively virtual versions (Esteves et al., 2013).

Several reviews and meta-studies have shown the positive effects of game-based learning. In an evaluation by Boyle et al. (2016), games are seen as a way to change behavior via unintentional learning opportunities. Hamari (2014) has also identified positive effects from gamification. Granic et al. (2014) summarized the cognitive (e.g., attention), motivational (e.g., resilience in the face of failure), emotional (e.g., mood management), and social (e.g., prosocial behavior) benefits. Moreover, Wouters et al. (2013) state that games are more effective in terms of learning and retention than other teaching methods.

The studies also identified shortcomings of learning with games. Boyle et al. (2016) noted that the primary outcome of learning-focused games was knowledge acquisition, whereas entertainment games achieved a broader range of affective behavior change, perceptual and cognitive, and physiological outcomes. According to Wouters et al. (2013), games for learning are not more motivating than conventional instruction methods. They also found that students only learned more using games in comparison to conventional instruction methods when the gameplay was supplemented by other instruction methods, when multiple training sessions were involved, and when players were working in groups. Furthermore, Hamari (2014) claimed that the effects of gamification greatly depend on the context of usage and the individual user. In other words, not all learning games are interesting and motivating for every player. Expectation also played a role. Motivation dropped in particular when learners went into a game expecting a gaming experience offering problem-solving within a complex system, but came to realize they dealing with nicely packaged teaching material that failed to create a context they could identify with and did not succeed at creating a flow state (Granic et al., 2014). In some cases, learners recognizing that they were playing a learning game led to resistance against the game (Remmele, 2017). Finally, based on data on 9343 games taken from BoardGameGeek.com, Koehler et al. (2016) came to the conclusion that learning games were rated as less entertaining than traditional games. They surmised this could be because the design of good education is different from the design of a good game.

That being said, positive learning effects have been achieved through the use of computer games and board games—within the framework of intervention studies—in the domains of pharmacology (Karbownik et al., 2016), marketing (Ross, 2013), information literacy (Greifender & Markey, 2008; Wilson et al., 2017), physics and astronomy (Cardinot & Fairfield, 2019), and in the learning of abstract scientific concepts such as quantum mechanics, relativity and nano-biology (Chiarello & Castellano, 2016).

In the field of financial literacy, too, there are various analog and digital games and intervention studies, e.g., Credit Union Island in the Teen Grid of Second Life



3D<sup>3</sup> (learning objective: budgeting, saving, how to deal with loans and investing in a house) (Elliott, 2009; Liu et al., 2011), The Stock Market Game (learning objective: promoting investment decisions and mathematical knowledge) (Harter & Harter, 2010; Hinojosa et al., 2010), Cashflow 101 (learning objective: training of investment and saving behavior with the aim of living on passive income only) (Sánchez-Macías et al., 2018), Finance Mission Heroes in which financial-eating robots must be actively combated (learning objective: earning, spending and saving money) (Aprea et al., 2018).

Other examples of educational games in the financial sector are W2 Finance ABC from the Schufa education initiative<sup>4</sup> (learning objective: basic financial knowledge), Visa's Financial Soccer and Financial Football<sup>5</sup> (Learning objective: basic financial knowledge), Piggy Bank Game,<sup>6</sup> (Learning objective: earning money), D2D's Celebrity Calamity Game<sup>7</sup> (learning objective: budgeting, avoiding overindebtedness, see Aprea & Schultheis, 2019). But there are no intervention studies in which the educational use of these games has been tested. Regarding the game Isle of Economy<sup>8</sup> (learning objective: general economic competences and financial literacy), the study showed that the learning effects, and especially with regard to motivation, were rather low (Remmele, 2017).

Based on this review, it would appear that a financial literacy game that covers all relevant competencies needed by young adults and does so in an authentic, interesting, and motivating way, does not yet seem to exist. In the following section, this paper will outline the theoretical foundations of a workable concept and competency model of financial literacy, the findings of happiness research in relation to money, and the principles and mechanics of game-based learning, which would be relevant to developing such a game.

#### 4.2.3.2 Principles, Mechanics, and Elements of Game-Based Learning

According to Perotta (2013) and Eseryel et al. (2014), there are several interdependent principles or concepts and mechanisms (or processes) that are important in

<sup>3</sup> *Second Life* (released in 2003) is a virtual 3D world with virtual figures, which was developed by *Linden Lab* for use in various games for people over 16 years. There are no further documents or entries online about the Financial Literacy Game and its further use. In Germany, the platform came into disrepute due to a lack of youth protection (young people worked virtually in brothels and earned Linden Dollars) and criminal activities (child pornography). For more details see <https://secondlife.com/>

<sup>4</sup> For more details see <https://www.schufa.de/ueber-uns/presse/pressemitteilungen/finanz-abc.jsp>

<sup>5</sup> For more details see [https://www.visa.co.in/dam/VCOM/download/corporate/media/Visa\\_FinancialSoccer\\_FactSheet\\_012915\\_v8.pdf](https://www.visa.co.in/dam/VCOM/download/corporate/media/Visa_FinancialSoccer_FactSheet_012915_v8.pdf)

<sup>6</sup> For more details see <https://mymoneyrain.com/piggybank>

<sup>7</sup> For more details see <https://www.thesolutionsjournal.com/article/video-games-teach-financial-skills-to-women/>

<sup>8</sup> For more details see <https://www.teacheconomy.de/planspiele/isle-of-economy/>

game-based learning. There is (1) intrinsic motivation (see Ryan & Deci, 2000), which manifests itself through voluntariness and self-determination when playing. When a game awakens a player's intrinsic motivation, learning is accompanied by (2) intense enjoyment, fun, and authenticity, and can lead to flow (see Csikszentmihalyi, 1990). The learning processes should exhibit (3) authenticity. That means that they are concrete, coherent, and goal-oriented in a way that allows the player to experience (4) autonomy and self-control. The passion and interest in the subject matter resulting from this (5) experimental learning lead the learner to become more and more immersed in the subject matter.

Based on self-determination theory, motivation consists of three basic needs: autonomy, competence, and connectedness (see Ryan & Deci, 2000). When these needs are satisfied, intrinsic motivation arises, leading to a qualitatively higher commitment, and thus to learning processes. Experiencing self-efficacy and the belief in achieving the desired results, in turn, leads to higher motivation (Bandura, 1997). According to Csikszentmihalyi (1990), individuals can reach a state of flow, a state characterized by optimal experience, if (1) they believe that they are approaching the envisaged goal, (2) this is signaled to them by feedback, and (3) the achievement of the goal is not associated with uncertainty and the associated challenges correspond to their abilities and skills (Schell, 2012, p. 194). Commitment can be represented by indicators like effort, persistence, and perseverance arises when the motivational factors interest, autonomy, competence, connectedness, and self-efficacy are demanded in the context of a task (Ryan & Deci, 2000).

Given the abovementioned principles, an effective game would implement the following mechanisms (Perotta, 2013; Shute & Ke, 2012, p. 46). Complex decisions must be made based on (1) *clear rules*, and (2) *objectives* of the game need to be *clear and challenging*—but not too challenging (Csikszentmihalyi, 1990)—for the learner. The game should take place in a (3) *fictional setting* or a *compelling background* and should contain (4) *progressive difficulty levels*. (5) *Interaction and control* should exist although there should be a (6) degree of *uncertainty and unpredictability* combined with (7) *immediate and constructive feedback*. Finally, it is important that the players feel a sense of cohesion and belonging through the (8) *shared experience*.

A game basically consists of the elements mechanics, story, aesthetics, and technology (Schell, 2012, p. 93). The mechanics of the game are the processes and rules of the game as explained in the section above. They determine what the game's goal is and how the players can achieve it. The story of the game comprises the sequence and events (actions) during the game, whereas the aesthetics of the game are responsible for the sensory perception of the game. Technology is the medium through which the aesthetics are transported, the mechanics come into play, and the story is told.

It is based on these principles, mechanics, and elements that the development and pilot testing of the *Happy Life Game* will be presented in the following chapter.

## 4.3 Methodology

### 4.3.1 *Development of the Happy Life Game*

#### 4.3.1.1 Requirements for the Specific Game Design

Based on the theoretical foundations, the following requirements can be postulated for a good game design that fosters financial literacy in young adults. (1) The decision-making process of the competency model as well as the concrete competencies and their interdependencies (see Sect. 4.2.1.2) should have a clear practical manifestation in the game. (2) The game principles need to be implemented by adequate mechanics as explained above (see Sect. 4.2.3.2). (3) The game has to be challenging but not too challenging for the target group. (4) In particular, it has to be designed in a manner that allows the target group—the *late Millennials* and the early born of *Generation Z*<sup>9</sup>—to be enthusiastic and excited about playing it (Schell, 2012, p. 167). This could be achieved by stimulating a situation in which the players envision a possible future. (5) Additionally, a credible connection between money and happiness (see Sect. 4.2.2) is key to game authenticity as the target group sees life as “a journey to find their purpose in life, a pursuit of happiness” (Tan et al., 2015, p. 9). In particular, being healthy, both physically and mentally (94%), as well as having a good relationship with one’s family (92%) and friends (91%) contributes mostly in their opinion but having enough money to make life comfortable (86%) is very important for them, too (Broadbent et al., 2017, p. 30).

#### 4.3.1.2 Aim of the Game and Game Structure

Happiness and well-being are seen by the target group as reasons for spending money. Happiness is operationalized in the *Happy Life Game* by giving players the goal of accumulating as many happiness points as possible in the course of their play-life. The players can only earn happiness points if they are careful with their finances, especially in their younger years. In other words, by not spending too much at the beginning of the game, their income increases through further rounds, they build up savings and investments and can take out necessary insurance policies early on. This framework balances rewards for good against setbacks for bad financial choices, thus encouraging responsible financial behavior. In addition to the happiness points collected (e.g., for pleasant shared experiences or goods and services that make life easier, see Sect. 4.2.2), earned money and assets are converted into happiness points at the end of the game, as wealth increases financial security and thus the probability of continuing to live happily after retirement. However, you receive fewer happiness points when converting at the end of the game than you

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<sup>9</sup>Millennials are those born between the early 1980s and the late 1990s, Generation Z are those born afterwards.

would have earned from happiness-enhancing extra spending during the game. Players are in competition with each other but without the possibility of consciously hindering one another.

#### 4.3.1.3 Story, Aesthetics, and Technology

The story of the game covers the years of life from young adulthood, employment to retirement age. Corresponding decision-making situations with financial consequences are implemented on this path of life. This period of time, the *Path of Life*, is depicted on the game board in different game field colors (see Figs. 4.1 and 4.2): Green for payday, blue for income earned by securities, e.g., stocks and bonds, and rental income, yellow for extra expense fields and cards, orange for property fields and cards, and grey for event fields and cards. Further education (pink) and the birth of a child (delicate pink) lead to both higher spending and higher happiness (by gaining happiness points). Unemployment, which means the player must sit out three rounds, has been designed in alarming red. The technique itself is simple as it consists only of a game board, different cards, game pieces, and 6-sided and 12-sided dice.

**Fig. 4.1** Happy Life Game  
(own illustration)



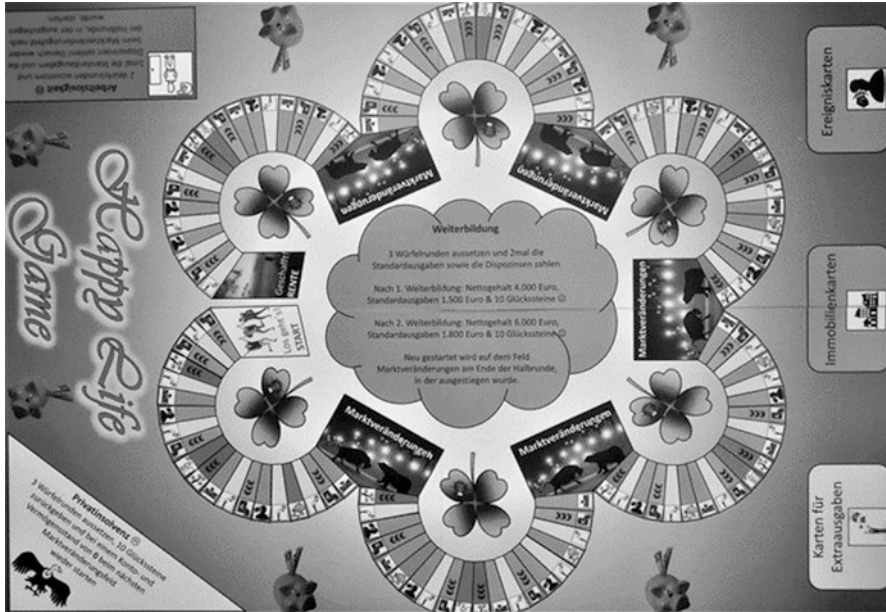


Fig. 4.2 Game board of the Happy Life Game (own illustration)

#### 4.3.1.4 Game Mechanics

The game board represents the path of life and consists of six connected semicircles (see Fig. 4.2). Each player receives start-up money at the beginning of the game. For the rest of the game, the players are financially autonomous and have to design their earning and spending independently from each other, i.e., plan and make permanent financial decisions. This includes the long-term increase of income through further education, conscious decisions for or against spending money, investing in the capital market or buying real estate, taking out loans, and insurance policies against undesirable life events. Each player has to keep track of these activities on an earning/spending and an asset portfolio sheet. Furthermore, the players are constantly confronted with decisions such as rewards by spending more on education or investing in securities or real estate to generate higher future monetary income; or spending their money in the present time and acquiring immediate happiness points. As the players are not able to foresee future events, they are always being faced with realistic life decisions.

In the *Happy Life Game*, each move consists of financial planning, decision-making, and repeated decisions being reviewed. The players can revise their decisions from move to move. They have to apply their financial knowledge to different situations with the goal of improving their financial competence (see Sect. 4.2.1).

Expensive losses can also come about, and the only way to protect against these is to take out the right insurance policy or to have enough money or/and liquid

assets. Stocks, bonds, and real estate investments may increase or decrease in value at the end of each semicircle (when the first player lands on or passes the field *Marktveränderungen*, see Fig. 4.2). Additional costs in the form of mandatory expenses (e.g., car repair, broken smartphone) or optional expenses, which increase the player's happiness (e.g., holidays, candlelight dinner) are incurred when players land on the extra expense field. In addition, players may unexpectedly become unemployed, resulting in a loss of income. Players receive happiness points due to the birth of a child but may also face permanently higher future expenses, which is determined by a throw of the dice after landing on a specific field. The worst-case scenario for players is private bankruptcy, i.e., they no longer have any assets and have exhausted their overdraft to the maximum amount of three months' salary. In this case, the player has to sit out several rounds and loses happiness points. Afterward, the player reenters the game with a balance of zero at the beginning of the next semicircle. At the end of the game, when all players have reached the retirement field, the money and assets they have accumulated are converted into happiness points and added to the happiness points they earned during the game.

In addition to throwing the dice, there are two ways that gameplay is advanced. Firstly, there are real estate, event cards, and extra-expense cards. Secondly, there are chance-based, recurring market changes. The probability of falling asset prices is slightly lower than that of rising prices, which takes into account that over the last 70 years asset prices have, on average, shown positive trend growth (Claessen, 2017).

In addition, a snowball system as per Friese (2010) has been integrated into the game, i.e., early saving and investment, as well as the deferral of rewards all result in income that the player can then invest again (compound interest effect) or spend. Players are usually quite uncertain when making their early decisions about which real estate, bonds, or stocks to invest in. As the values of these investments fluctuate independently later in the game, this can be equated with a large element of chance (implementation of lotteries). The only way to hedge against these risks is to achieve sufficient diversification in terms of portfolio selection (Markowitz, 1952).

## 4.3.2 Pilot Testing of the Happy Life Game

### 4.3.2.1 Criteria of Game Evaluation

Annetta (2010) and Aprea and Schultheis (2019) provide suitable criteria for evaluating a serious game. According to Annetta (2010), a game requires six central characteristics to enhance motivation and sustained commitment of the player and to fulfill didactic purposes. The first is *identity*, which means that the player quickly identifies with the game and perceives himself as a unique individual in this new environment. It is a prerequisite for achieving complete *immersion* in the game without experiencing real consequences. The *interactivity* of the players, the *increasing complexity*, and the direct feedback by evaluating the actions through *informed teaching* lead to a deeper involvement in the game. The focus of a serious



game should be *instructional learning*. On the one hand, this requires the fulfillment of the previous elements, on the other, the content must also be meaningful for the learner and draw on his or her previous knowledge to address long-term memory. In this sense, Annetta (2010) argues from a constructivist's point of view, claiming that to generate new knowledge, serious games must be structured in a way that game experiences can be linked to existing ones. Ideally, the players are not consciously aware of this learning process, resulting in implicit learning.

Apra and Schultheis (2019) likewise summarize six design principles of game design. They partially overlap with those of Annetta's (2010). Firstly, situatedness (*Situiertheit*), can be compared to characteristic identity. Furthermore, goal and rule orientation (*Ziel- und Regelorientierung*) in connection with a transparent goal, an increasing challenge (*zunehmende Herausforderung*) in the course of the game, the easy learnability of the game mechanics (*Erlernbarkeit der Spielmechanismen*), especially linked to the examination of the game content, social interaction possibilities (*Soziale Interaktionsmöglichkeiten*) of the players as well as direct control (*Kontrolle*) connected with the experience of autonomy and competence are mentioned.

The evaluation of a game is possible during and after playing (Eseryel et al., 2011, p. 164). The assessment during the game refers to the gameplay itself, while the assessment after the game focuses on the impact and the results. Eseryel et al. (2011) differentiate between external and internal assessment. The external assessment is carried out through interviews outside the game process, the internal assessment takes place in the context of the game and—at least in the case of digital games—does not lead to an interruption of the game flow (Eseryel et al., 2011). Dynamic feedback within game-based learning environments is mentioned to be a reliable and valid assessment tool. Ifenthaler et al. (2012) differentiate between game scoring, i.e., the points achieved or the time required, external assessment, e.g., through surveys before, during, and after the game, and embedded assessment of game-based learning, i.e., feedback implemented through clickstreams.

Since the *Happy Life Game* is an analog board game, embedded assessment is hardly possible. For this reason, the pilot study focused on the usability assessment as its main objective. Game scoring has not yet been examined in detail. As a result, the pilot study is largely based on external assessment.

#### 4.3.2.2 Sample

Testing was done with five young adults (18–27 years, target group of the game). This was a sufficiently high number to identify most of the usability problems. It is unlikely that using more testers would lead to better findings as saturation has already occurred (Jacobsen & Meyer, 2019, p. 189; Sarodnick & Brau, 2011, p. 174). The test persons played the game in three rounds. In the first two rounds with one respondent and the interviewer, in the third round, there were three respondents and one interviewer. The interviewer explained the game and played it along at the beginning of each round.



The average age was 26 years (min = 24; max = 27), the sample consisted of two female and three male participants. With regard to the highest educational qualifications attained, one participant possessed an intermediate school leaving certificate (Realschulabschluss), two had the general higher education entrance qualification (Abitur), one had a Bachelor's, and one a Master's degree. Two test persons were doing an apprenticeship while the remainder were students.

#### 4.3.2.3 Usability Testing

The pilot study was conducted in December 2019. The evaluation materials, as well as the procedure, were pilot-tested in advance with two additional test persons belonging to the target group. The methodology proposed of Moreno et al. (2012)—a Serious Game Usability Evaluator (SeGUE)—was chosen for testing as it takes into account the specifics of serious games. It is a structured approach that records and categorizes events and the player's reactions. The trigger for coding an event is the emergence of a problem or the display of a negative or positive reaction. Events are coded using event category definitions provided by Moreno et al. (2012). In addition to the positive, negative, and neutral information, greater detail on the specific form of the emotional reaction is coded, linked in each case to an interface/design area.

The SeGUE categories are further divided into interface and game design. Interface comprises six subcategories with items like content, user interface, and technical errors. Game design includes the subcategories like game flow and functionality. Examples of emotional reactions and states shown by the users could be learning, reflecting, satisfied/excited, pleasantly frustrated, frustrated, confused, annoyed, unable to continue (fatal), nonapplicable, or suggestion/comment. Each of the reactions is assigned a negative, neutral, or positive valence. In this application of SeGUE for the pilot study, the category N/A (non-applicable) was added to cover events that could not be accurately assigned to an existing category.

The Thinking-Aloud method (Ericsson, 1993) was employed to collect data during the game rounds. This method is suitable for detecting usability problems and also provides insights into whether a test person is captivated by the game (Knoll, 2018).

Furthermore, a questionnaire consisting of two parts was used to record the test subjects' perceptions of the factors such as playability and learnability immediately after the game. Since the flow experience is suitable for assessing playability (Procci, 2012), the first 10 items of the first section of the questionnaire formed the 7-step short scale by Rheinberg (2003), which showed reliability of  $0.8 < \alpha < 0.9$  in previous tests (Rheinberg & Vollmeyer, 2003). Based on the performed factor analysis, the first section forms the scale *Flow* (items 1–10) which can be additionally divided into two sub-scales *Absorbedness* (items 1,3,6,10) and *Smooth automated progression* (items 2,4,5,7,8,9).

The second section consists of self-developed items with a 7-step Likert scale and items with open answer options which refer to *Concern and Fear* (items 11–12) as well as *Usability*, *Playability*, and *Learnability* (items 13–22). Items 14–15

(*Request and Ability*) have been used for the level of requirements and items 16–17 for the players' subjective learning effect (*Learnability*). Items 18–20 concentrated on playability in terms of the concept of *Fun*. With item 21, reasons why the game was not fun, and 22, general suggestions for improvement (usability) were obtained from users. The reliability of the scales was determined with Cronbach's Alpha ( $\alpha_c$ ). For the two scales *Concern* and *Request and Ability* the Spearman-Brown-Coefficient ( $\alpha_s$ ) was additionally determined. In addition, demographic and socio-economic data of the test persons were collected. The participants filled out the questionnaire directly after ending the game.

## 4.4 Results

Using the SeGUE method, 202 events were identified. Of those, 67 (33.2%) were classified as negative, 62 (30.7%) as positive and 73 (36.1%) as neutral events. Regarding the type, 102 (50.5%) related to the interface and 100 (49.5%) to the design of the game. The negative events were mostly annoyance and confusion with the layout or the user interface, content, and game flow, e.g., when the players had to pay standard expenses and overdraft interest or when they had to sit out several rounds due to unemployment. Among the positive events, the reactions to the game flow stand out, especially satisfaction and excitement such as increases in asset values after market adjustments or extra spending that brought happiness points. The neutral events came mainly from comments on the layout/user interface, content, and functionality. Furthermore, there were no technical errors or events that interrupted the game flow. With regard to the negative and neutral events, there were suggestions for improving usability, such as swapping two fields on the game board and removing various small ambiguities in the game instructions. These could be easily addressed. Figure 4.3 (Results of SeGue) gives an overview of the assigned events.

With regard to the questionnaire, the following evaluation results were obtained (Table 4.1).

The results show that the scales *Flow*, including the subscales *Absorbedness* and *Smooth automated progression*, and *Fun* are highly rated—considering values above the mean value of four. Average values were obtained for the scales *Request and Ability* (3.9) and *Learnability* (3.8), whereas the scales *Concern* (2.6) and *Level of difficulty* (2.8) resulted in values below average.

The answers to the open question (item 17) revealed a greater awareness for circumstances that could impact the player's financial situation in real life ("Ich wurde sensibilisiert für Dinge, die im Leben passieren können, und welche Auswirkungen sie auf die eigene finanzielle Situation haben."). The participants also stated that they had learned, which factors can influence financial decisions ("Ich habe gelernt, welche Faktoren bei finanziellen Entscheidungen eine Rolle spielen können."), that it is necessary to take precautions against unexpected negative events ("Man muss echt vorsorgen, falls etwas Unerwartetes eintrifft.") and the

	Interface			Design		N/A	Total
	Content	Layout/UI	Technical Error	Gameflow	Functionality		
Negative	Annoyed	8	1	11	3		23
	Confused	10	23	3	5		41
	Frustrated		1	2			3
	Unable to continue						0
Positive	Pleasantly frustrated	1		5	2		8
	Reflecting			8	3		11
	Satisfied/excited	1	2	14	3		20
	Learning	4	7	6	6		23
Neutral	N/A		2	2	1		5
	Suggestion/Comment	15	27	9	17		68
Total		39	63	0	60	40	202
		102			100		

**Fig. 4.3** Results of SeGUE

importance of insurance (“Versicherungen sind so wichtig!”). They also became aware of the influences of chance and luck (“Der Einfluss von Zufall und Glück ist heftig.”).

Taking into account the answers to item 21, the participants stated that the game simulation led them to think about their own choices in life and they recognized situations relevant to their own during the course of the game (“Man fängt an, sich während des Spielens über seinen eignen Lebensweg Gedanken zu machen und identifiziert sich dabei ein wenig mit dem Spielverlauf.”). They also found themselves getting emotionally involved and found the game exciting and also very entertaining, especially when they were successful (“Man wird quasi emotional mitgerissen. In dieser Hinsicht, ist es sehr spannend, aber auch sehr unterhaltsam, wenn man Erfolge vorweisen kann.”). They rated the game as something new compared to other board games (“Verglichen mit anderen “typischen” Brettspielen war es etwas Neues.”) and found the game fun (“Macht Spaß, besonders das Durchdenken von Alternativen!”).

The answers on *Usability* (item 22) pointed ways to make the game even more realistic, e.g., introducing the opportunity to throw the dice in case of unemployment. The participants rated the situation as unrealistic that they would not be able to take any action while unemployed (“Bei Arbeitslosigkeit sollte man zwar keine Einnahmen mehr bekommen, aber dennoch die Möglichkeit haben zu Würfeln. Es ist unrealistisch, dass man bei Arbeitslosigkeit gar keine Handlungsmöglichkeit mehr hat.”). One participant criticized the game design (“Ein anderes Design des Spielbretts wäre schöner.”) and the layout of the forms used during game (“Die Übersichtlichkeit der Zettel ist verbesserungswürdig.”).

**Table 4.1** Results of the questionnaire (*n* = 202 assigned events)

Test person	Flow	Absorbed-ness	Smooth automated progression	Concern	Level of difficulty	Request and Ability	Learn-ability	Fun	Graduation degree
	Item 1–10	Item 1, 3, 6, 10	Item 2, 4, 5, 7, 8, 9	Item 11, 12	Item 13	Item 14, 15	Item 16	Item 18–20	
	M	M	M	M	M	M	M	M	
1	4.7	4.75	4.67	4.5	2	3	6	7	Bachelor
2	6.1	5.5	6.5	1	1	4	5	6	Master
3	5.3	5.25	5.33	2	5	4.5	4	6	Abitur
4	6	6.5	5.67	3	2	4.5	1	6.67	Realschule
5	4.8	4.5	5	2.5	4	3.5	3	6	Abitur
Mean	5.38	5.3	5.43	2.6	2.8	3.9	3.8	6.33	
SD	0.58	0.696	0.63	1.16	1.47	0.58	1.72	0.42	
Reliability $\alpha$	0.874	0.811	0.843	0.729		0.824		0.90	
$\alpha$ s				0.928		0.866			

## 4.5 Discussion, Limitations, and Conclusion

In this study, a board game was developed to convey relevant financial literacy competencies to young adults. In particular, the game was designed to promote mathematical and decision-making competencies in accordance with the competency model of Aprea and Wuttke (2016).

In addition, the game design considered the findings of happiness research in its evaluation of choices about how to appropriately spend money. This may appear contradictory to the premise of financial literacy as the supposed pursuit of happiness of the target group could be seen as one driving force behind excessive consumption. Nevertheless, studies have shown that being happy in their lives and being able to look back on a happy life are defining characteristics of the youth cohort in question (Sect. 4.3.1). For this reason, the objective of the game was not to maximize money, but happiness points, which in turn requires responsible use of money.

An important message conveyed by the game rules was that one should not buy too much happiness because that will undermine the financial basis for security and pleasant living conditions and the player's situation will no longer be financially viable. For a person of the target group, it could be important to become aware of these factors as they relate the feeling of happiness, to balance them out, and to learn how this could be achieved through an adequate implementation of financial literacy. A game can make these interrelationships tangible—and thus learnable—which an intervention based purely on financial literacy focused on financial knowledge cannot do.

Although digital serious games are a trend, using a board game to foster financial literacy competencies brings several advantages. Firstly, the interdependencies between the facets of financial literacy are clearer and more transparent. Secondly, a player has more time for reflection between the moves and can observe and discuss the strategies of the other players. Finally, the players have to calculate their money transactions and have to structure their cashflows independently.

The results of the pilot study show that the average test person attained a flow state while playing the game. They had fun and dealt actively with relevant financial literacy objects in a stimulating state of high concentration, absorption, motivation, and commitment. Furthermore, they could name subjective learning effects in retrospect. These facts permit the interpretation that the game is a very good fit for the target group.

Nevertheless, there are some limitations. Although saturation was achieved, the sample was rather small and the participants were well-educated (Abitur, Realschule). Additionally, the game still has to be tested with younger students (18–25 years) and groups having lower levels of education (Hauptschulabschluss; no graduation). The piloting also revealed some opportunities for improvement which will be included in a second edition.

The game strongly reduced the number of investment opportunities within the most diverse asset classes and the most diverse products within these, as well as the

most diverse forms of financing. It did the same regarding the abundance of different insurance policies and the different ways of accessing credit in real life. Nor can every eventuality in life be represented. Personal tragedies such as divorce or the death of a partner were ignored in the design.

As the game was designed to increase financial literacy, it would additionally be important to test the game's effectiveness at doing just that. In a further study, the learning effects will be tested by means of an intervention study. Keeping in mind that long-term learning effects strongly decrease over time (see Sect. 4.1), the study will capture financial knowledge and financial behavior at three points in time (before playing the game, shortly after, and a longer period after the intervention). This approach will allow better conclusions on whether the game is suitable for a long-term and sustainable promotion of financial literacy.

## References

- Alan, S., & Ertac, S. (2018). Fostering patience in the classroom: Results from randomized educational intervention. *Journal of Political Economy*, 126(5), 1865–1911. <https://doi.org/10.1086/699007>
- Annetta, L. (2010). The “I’s” have it: A framework for serious educational game design. *Review of General Psychology*, 14(2), 105–112. <https://doi.org/10.1037/a0018985>
- Aprea, C., & Leumann, S. (2016). Financial Literacy aus Sicht von Lehrpersonen an beruflichen Schulen in der Schweiz. *Zeitschrift für ökonomische Bildung Nr. 4*, 36–64.
- Aprea, C., & Schultheis, J. (2019). Entwicklung und Validierung eines Schmas zur Evaluation von Serious Games im Kontext von Financial Literacy. In E. Wittmann, D. Frommberger, & U. Weyland (Eds.), *Jahrbuch der berufs- und wirtschaftspädagogischen Forschung 2019* (pp. 91–108). Opladen.
- Aprea, C., Schultheis, J., & Stolle, K. (2018). Instructional integration of digital learning games in financial literacy education. In T. L. Cooter (Ed.), *Financial Literacy for Children and Youth* (pp. 69–88). Lang. <https://doi.org/10.1787/9789264208094>
- Aprea, C., & Wuttke, E. (2016). Financial literacy of adolescents and young adults: Setting the course for a competence-oriented assessment instrument. In C. Aprea, E. Wuttke, K. Breuer, N. K. Koh, P. Davie, B. Greimel-Fuhrmann, & L. J. S (Eds.), *International handbook of financial literacy* (pp. 397–414). Springer.
- Aprea, C., Wuttke, E., Leumann, S., & Heumann, M. (2015). Kompetenzfacetten von Financial Literacy: Sichtweisen verschiedener Akteure. In J. Seifried, S. Seeber, & B. Ziegler (Eds.), *Jahrbuch der berufs- und wirtschaftspädagogischen Forschung 2015* (pp. 11–22). Verlag Barbara Budrich.
- Asarta, C. J. (2014). The features and effectiveness of the keys to financial success curriculum. *International Review of Economics*, 16, 39–50. <https://doi.org/10.1016/j.iree.2014.07.002>
- Bandura, A. (1997). *Self-efficacy*. W.H. Freeman & Company.
- Baumeister, R., & Leary, M. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497–529. <https://doi.org/10.1037/0033-2909.117.3.497>
- Berland, M., & Lee, V. (2011). Collaborative strategic board games as a site for distributed computational thinking. *International Journal of Game-Based Learning*, 1(2), 65–81. <https://doi.org/10.4018/ijgbl.2011040105>

- Blanchflower, D., & Clark, A. (2019). Children, Unhappiness and Family Finances: Evidence from One Million Europeans. *NBER Working Paper No. w25597*. doi: <https://doi.org/10.3386/w25597>.
- Bover, O., Hospido, L., & Villanueva, E. (2018). The impact of high school financial education on financial knowledge and choices: Evidence from a randomized trial in Spain. *IZA Discussion Papers, No. 11265*, 1–40. <https://doi.org/10.2139/ssrn.3116054>
- Boyle, E., Hailey, T., Conolly, T., Gray, G., Earp, J., Ott, M., Lim, T., Ninaus, M., Ribeiro, C., & Pereira, J. (2016). An update to the systematic literature review of empirical evidence of the impacts and outcomes of computer games and serious games. *Computers & Education, 94*, 178–192. <https://doi.org/10.1016/j.compedu.2012.03.004>
- Broadbent, E., Gougoulis, J., Lui, N., Pota, V., & Simons, J. (2017). *What the world's young people think and feel*. Generation Z. Retrieved from <https://www.varkeyfoundation.org/media/4487/global-young-people-report-single-pages-new.pdf>
- Brophy, J. (2013). *Motivating students to learn*. Routledge. <https://doi.org/10.4324/9780203858318>
- Brüggen, E. C., Hogreve, J., Holmlund, M., Kabdayi, S., & Löfgren, M. (2017). Financial Well-being: A conceptualization and research agenda. *Journal of Business Research, 79*, 228–237. <https://doi.org/10.1016/j.jbusres.2017.03.013>
- Bruhn, M., Souza Leao, L. D., Legovini, A., Marchetti, R., & Zia, B. (2018). The Impact of High School Financial Education: Evidence from a Large-scale Evaluation in Brazil, Experimental Evidence from Peru. *IDB Working Papers Series No. IDB-WP-871*, 1–52. doi: <https://doi.org/10.1257/app.20150149>
- Bucher-Koenen, T., & Lusardi, A. (2011). Financial literacy and retirement planning in Germany. *Journal of Pension Economics and Finance, 10*(4), 565–584. <https://doi.org/10.1017/S1474747211000485>
- Buckley, P., Doyle, E., & Doyle, S. (2016). Game on! Students' Perceptions of gamified learning. *Educational Technology & Society, 20*(3), 1–10. <https://doi.org/10.1016/j.compedu.2010.09.001>
- Cameron, M. P. (2014). Factors associated with financial literacy among high school students in New Zealand. *International Review of Economics Education, 16*, 12–21. <https://doi.org/10.1016/j.iree.2014.07.006>
- Cardinot, A., & Fairfield, J. (2019). Game-based learning to engage students with physics and astronomy using a board game. *International Journal of Game-Based Learning, 9*(1), 42–57. <https://doi.org/10.4018/IJGBL.2019010104>
- Chiarello, F., & Castellano, M. (2016). Board games and board game design as learning tools for complex scientific concepts: Some experiences. *International Journal of Game-Based Learning, 6*(2), 1–14. <https://doi.org/10.4018/IJGBL.2016040101>
- Claessen, S. K. (2017). Asset prices and macroeconomic outcomes: a survey. *BIS Working Papers No 676*. doi: <https://doi.org/10.2139/ssrn.3079156>.
- Cole, S., Paulson, A., & Shastry, G. (2015). High school curriculum and financial outcomes: The impact of mandated personal finance and mathematics courses. *The Journal of Human Resources, 51*, 656–698. <https://doi.org/10.3368/jhr.51.3.0113-5>
- Cziksentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. Harper & Row.
- Davies, P. (2015). Towards a framework for financial literacy in the context of Democracy, *Journal of Curriculum Studies, 47*(2), 300–316.
- Dunn, E., Aknin, L., & Norton, M. (2008). Spending money on others promotes happiness. *Science, 319*, 1687–1688. <https://doi.org/10.1037/xge0000082>
- Elliott, S. (2009). Boosting financial literacy a click at a time. Ohio University Outlook: Retrieved from <https://www.ohio.edu/outlook/08-09/February/359.cfm>
- Ericsson, K. A. (1993). *Protocol analysis: Verbal reports as data*. MIT Press.
- Erner, C. G.-M., & Oberste, M. (2016). Financial literacy of high school students: Evidence from Germany. *The Journal of Economic Education, 47*(2), 95–105. <https://doi.org/10.1080/00220485.2016.1146102>



- Eseryel, D., Ifenthaler, D., & Ge, X. (2011). Alternative assessment strategies for complex problem solving in game-based learning environments. In K. P. D. Ifenthaler (Ed.), *Multiple perspectives on problem solving and learning in the digital age* (pp. 159–178). Springer. [https://doi.org/10.1007/978-1-4419-7612-3\\_11](https://doi.org/10.1007/978-1-4419-7612-3_11)
- Eseryel, D., Law, V., Ifenthaler, D., Ge, X., & Miller, R. (2014). An investigation of the interrelationships between motivation, engagement, and complex problem solving in game-based learning. *Journal of Educational & Society*, 17(1), 42–53. <https://doi.org/10.1016/j.learninstruc.2010.08.004>
- Esteves, A., Hove, E. v., & Oakley, I. (2013). Physical games or digital games? Comparing support for mental projection in tangible and virtual representations of a problem-solving task. Conference: Proceedings of the 7th International Conference on Tangible, Embedded and Embodied Interaction. doi:<https://doi.org/10.1145/2460625.2460651>.
- Fernandes, D. L. (2014). Financial literacy, financial education and downstream financial behaviors. *Management Science*, 60(8), 1861–1883. <https://doi.org/10.1287/mnsc.2013.1849>
- FINRA Investor Education Foundation. (2016). Financial Capability in the United States.
- Firebaugh, G., & Schroeder, M. (2009). Does your neighbor's income affect your happiness? *AJS*, 115(3), 805–831. <https://doi.org/10.1086/603534>
- Förster, M., Happ, R., & Walstad, W. (2019). Relations between young adults'. *Empirical Research in Vocational Education and Training*, 11(2), 1–21. <https://doi.org/10.1186/s40461-019-0077-z>
- Frieze, F. (2010). Schneeballsysteme. In M.-A. Casasola Merkle, C. Conrad, F. Frieze, A. Meyer, H. Poehl, & A. Wetter (Eds.), *Spiele entwickeln 2010* (pp. 80–98).
- Frisancho, V. (2018). The impact of school-based financial education on High School students and their teachers: Experimental evidence from Peru. *IDB Working Papers series No. IDB-WP-871*, 1–52. doi:<https://doi.org/10.18235/0001056>.
- Fürstenau, B., & Hommel, M. (2019). Developing financial competence about mortgage loans by informal learning using banks' online calculators. *Empirical Research in Vocational Education and Training*, 11, 1–33. <https://doi.org/10.1186/s40461-019-0085-z>
- Geuting, M. (2000). Soziale Simulation und Planspiel in pädagogischer Perspektive. In D. Herz & A. Blätte (Eds.), *Simulation und Planspiel in den Sozialwissenschaften* (pp. 15–61). Lit.
- Glass, D., & Singer, J. (1972). Behavioral aftereffects of unpredictable and uncontrollable aversive events: Although subjects were able to adapt to loud noise and other stressors in laboratory experiments, they clearly demonstrated adverse after effects. *American Scientist*, 60(4), 457–465.
- Gobet, F., Voogt, A. d., & Retschitski, J. (2004). *Moves in mind: The psychology of board games*. Psychologie Press. <https://doi.org/10.4324/9780203503638>
- Gonzales, M., & Byron, G. (2010). *The mindful investor: How a calm mind can bring your inner peace and financial security*. Wiley.
- Granic, I., Lobel, A., & Engels, R. C. (2014). The benefits of playing video game. *American Psychologist*, 69(1), 66–78. <https://doi.org/10.1037/a0034857>
- Greifender, E., & Markey, K. (2008). Designing and testing a web-based board game for teaching information literacy skills and concepts. *Library Hi Tech*, 26(4), 663–681. <https://doi.org/10.1108/07378830810920978>
- Haidt, J. (2018). Die Glückshypothese - was uns wirklich glücklich macht, 6. Auflage. In *Kirchzarten*.
- Hamari, J. K. (2014). Does Gamification Work? —A Literature Review of Empirical Studies on Gamification. *Proceedings of the 47th Hawaii International Conference on System Sciences*. doi:<https://doi.org/10.1109/HICSS.2014.377>.
- Harris, M. (2008). Keeping up with the Joneses: A field study of the relationships among. *Journal of Applied Psychology*, 93(3), 665–673. <https://doi.org/10.1037/0021-9010.93.3.665>
- Harter, C., & Harter, J. (2010). Is financial literacy improved by participation in a stock market game. *Journal for economic Educators*, 10(1), 21–32.
- Hastings, J., & Mitchell, O. (2011). *How financial literacy and impatience shape retirement wealth*. NBER Working Paper 16740. doi: <https://doi.org/10.3386/w16740>.

- Hinojosa, T., Miller, S., Jung, P., Miezio, K., Carlson-Oehlers, V., & Cohen, B. (2010). The Impact of The Stock Market Game on Financial Literacy and Mathematics Achievement: Result as from a National Randomized Controlled Trial. *Conference Abstract Template* (pp. 1–9). Society for Research on Educational Effectiveness. doi: <https://doi.org/10.2307/2291629>.
- Hira, T. (2012). Promoting sustainable financial behaviour: Implications for education and research. *International Journal of Consumer Studies*, 36, 502–507. <https://doi.org/10.1111/j.1470-6431.2012.01115.x>
- Howell, R. T., Kurai, M., & Tam, L. (2013). Money buys financial security and psychological need satisfaction: Testing need theory in affluence. *Social Indicators Research: An International and Interdisciplinary Journal for Quality-of-Life Measurement*, 110(1), 17–29. <https://doi.org/10.1007/s11205-010-9774-5>
- Ifenthaler, D., Eseryel, D., & Ge, X. (2012). Assessment for game-based learning. In D. Ifenthaler, D. Eseryel, & X. Ge (Eds.), *Assessment in game-based learning. Foundations, innovations, and perspectives*. Springer. <https://doi.org/10.1007/978-1-4614-3546-4>
- Jacobsen, J., & Meyer, L. (2019). *Praxisbuch Usability & UX: Was jeder wissen sollte, der Websites und Apps entwickelt*. Rheinwerk Computing.
- Jebb, A., Tay, L., Diener, E., & Oishi, S. (2018). Happiness, income satiation and turning points around the world. *Nature Human Behaviour*, 2, 33–38. <https://doi.org/10.1038/s41562-017-0277-0>
- Kaiser, F.-J., & Kaminski, H. (2012). Methodik des Ökonomieunterrichts - Grundlagen eines handlungsorientierten Lernkonzepts mit Beispielen. Bad Heilbrunn.
- Kaiser, T., & Menkhoff, L. (2018a). Does financial education impact financial literacy and financial behavior, and if so, when? *Policy Research Working Paper 8161*.
- Kaiser, T., & Menkhoff, L. (2018b). Financial education in schools: A meta-analysis of experimental studies. CESifo Working Paper No. 7395, 1–35.
- Kamann, R., Farry, M., & Herbison, P. (1984). The analysis and measurement of happiness as a sense of Well-being. *Social Indicators Research*, 15, 91–115. <https://doi.org/10.1007/BF00426282>
- Kaminski, H., & Friebe, S. (2012). *Arbeitspapier "Finanzielle Allgemeinbildung als Bestandteil der ökonomischen Bildung"*. Institut für Ökonomische Bildung an der Universität Oldenburg.
- Karbownik, M., Wiktorowska-Owczarek, A., Kowalczyk, E. K., Mokros, L., & Pietras, T. (2016). Board game versus lecture-based seminar in the teaching of pharmacology of antimicrobial drugs - a randomized controlled trial. *FEMS Microbiology Letters*, 363(7), fnw45. <https://doi.org/10.1093/femsle/fnw045>
- Kim, B. (2012). Harnessing the power of game dynamics - why how to, and how not to gamify the library experience. *College & Research Libraries News*, 73(8), 465–469. <https://doi.org/10.5860/crln.73.8.8811>
- Kim, B., Park, H., & Baek, Y. (2009). Not just fun, but serious strategies: Using meta-cognitive strategies in game-based learning. *Computers & Education*, 52(4), 800–810. <https://doi.org/10.1016/j.compedu.2008.12.004>
- Knoll, T. (2018). The think-aloud protocol. In P. M.-B. A. Drachen (Ed.), *Games user research* (pp. S189–S202). University Press. <https://doi.org/10.1093/oso/9780198794844.003.0012>
- Koehler, M. J., Greenhalgh, S. P., & Boltz, L. O. (2016). Here We Are, Now Entertain Us! A Comparison of Educational and Non-Educational Board Games. *Conference Paper*, 567–572.
- Koslowsky, M., Kluger, A., & Reich, M. (1995). *The plenum series on stress and coping. Commuting stress: Causes, effects, and methods of coping*. Plenum Press. <https://doi.org/10.1007/978-1-4757-9765-7>
- Kumar, A., Killingsworth, M., & Gilovich, T. (2014). Waiting for merlot: Anticipatory consumption of experiential and material purchases. *Psychological Science Online First*, 1–8. <https://doi.org/10.1177/0956797614546556>
- Landers, R. N. (2014). Developing a theory of gamified learning: Linking serious games and gamification of learning. *Simulations and Games*, 45(6), 752–768. <https://doi.org/10.1177/1046878114563660>

- Langer, E., & Rodin, J. (1976). The effects of choice and enhanced personal responsibility for the aged: A field experiment in an institutional setting. *Journal of Personality and Social Psychology*, 34(2), 191–198. <https://doi.org/10.1037/0022-3514.34.2.191>
- Lee, J., & Hammer, J. (2011). Gamification in education: What, how, why bother? *Academic Exchange Quarterly*, 15(2), 146–155.
- Liu, C., Franklin, T., Shelor, R., Ozercan, S., Reuter, J., Ye, E., & Moriarty, S. (2011). A learning game for youth - financial literacy education in the teen grid of second life three-dimensional virtual environment. *American Journal of Business Education*, 4(7), 1–18. <https://doi.org/10.19030/ajbe.v4i7.4670>
- Lührmann, M., Serra-Garcia, M., & Winter, J. (2018). The impact of financial education on Adolescents' intertemporal choices. CESifo Working Paper No. 4925, 1–20.
- Lusardi, A., & Mitchell, O. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature*, 52(1), 5–44. <https://doi.org/10.1257/jel.52.1.5>
- Lusardi, A., Mitchell, O., & Vilsa, C. (2009). Financial Literacy Among The Young: Evidence and Implications for Consumer policies. *NBER Working Paper 15352*.
- Mandell, L., & Schmid-Klein, L. (2009). The impact of financial literacy education on subsequent financial behavior. *Journal of Financial Counseling and Planning*, 20(1), 15–24.
- Mania, E., & Tröster, M. (2015). Kompetenzmodell Finanzielle Grundbildung. Umgang mit Geld als Thema der Basisbildung. *Magazin Erwachsenenbildung.at*, 25, 1–10.
- Manz, M. (2011). Financial education: Rolle und internationale Entwicklungen. *Die Volkswirtschaft*, 6, 57–60.
- Markowitz, H. (1952). Portfolio selection. *Journal of Finance*, 7, 77–91.
- McClarty, K., Orr, A., Frey, P., Dolan, R., Vassileva, V., & McVay, A. (2012). A literature review of gaming in education (research report). *Gaming in Education*.
- Mishra, P., & Foster, A. (2007). The claims of games: A comprehensive review and directions for future research. In R. Carlsen, K. McFerrin, J. Price, R. Weber, & D. Willis (Eds.), *Proceeding of the 18th International Conference of the Society for Information Technology & Teacher Education*. Association for the Advancement of Computing in Education (AACE).
- Moreno, P. J., Hsieh, Y., & Lester, W. (2012). Usability testing for serious games: Making informed design decisions with user data. *Advances in Human-Computer Interaction*, 2012(2), 1–14. <https://doi.org/10.1155/2012/369637>
- Myers, D. (2000). The funds, friends, and faith of happy people. *American Psychologist*, 55(1), 56–67. <https://doi.org/10.1037/0003-066X.55.1.56>
- OECD. (2011). Compendium of OECD Well-being indicators.
- OECD. (2014). *PISA 2012 results. Students and money: financial literacy skills for the 21st century*.
- OECD. (2017). *PISA 2015 (volume IV) – Students' financial literacy*. OECD Publishing.
- Pchelin, P., & Howell, R. T. (2014). The hidden cost of value-seeking: People do not accurately forecast the economic benefits of experiential purchases. *The Journal of Positive Psychology*, 322–334. <https://doi.org/10.1080/17439760.2014.898316>
- Peng, T. C., Bartholomae, S., Fox, J. J., & Cravener, G. (2007). The impact of personal finance education delivered in high school and college courses. *Journal of Family and Economic Issues*, 28(2), 265–284. <https://doi.org/10.1007/s10834-007-9058-7>
- Perotta, C. (2013). Game-based learning: Latest evidence and future directions. In *NFER Research Programme: Innovation in Education*. NFER.
- Pfändler, A. M. (2021). in preparation, Entwicklung eines kompetenzorientierten Curriculums zur Förderung von Financial Literacy. *Zeitschrift für ökonomische Bildung*.
- Prensky, M. (2001). *Digital game-based learning*. McGraw-Hill.
- Procci, K. C. (2012). Usability in serious games: A model for small development teams. *Computer Technology and Applications*, 3(4), 315–329.
- Remmele, B. (2017). Playing against the game. *International Journal of Game-Based Learning*, 74–82. <https://doi.org/10.4018/IJGBL.2017070107>

- Remmele, B., & Seeber, G. (2012). Integrative economic education to combine citizenship education and financial literacy. *Citizenship, Social and Economics Education*, 11(3), 189–201. <https://doi.org/10.2304/csee.2012.11.3.189>
- Remmele, B., Seeber, G., Speer, S., & Stoller, F. (2013). *Ökonomische Grundbildung für Erwachsene. Ansprüche – Kompetenzen – Grenzen*. Wochenschau.
- Renkl, A. (1996). Träges Wissen. *Psychologische Rundschau*, 47, 78–92.
- Retzmann, T. (2011). *Finanzielle bildung in der Schule*. Mündige Verbraucher durch ökonomische Bildung.
- Retzmann, T., & Seeber, G. (2016). Financial education in general education. In E. W. Carmela Aprea (Ed.), *International handbook of financial literacy* (pp. 9–24). Springer.
- Rheinberg, F., & Vollmeyer, R. (2003). Flow-Erleben in einem Computerspiel unter experimentell variierten Bedingungen. *Zeitschrift für Psychologie / Journal of Psychology*, 211, 161–170. <https://doi.org/10.1026/0044-3409.211.4.161>
- Rheinberg, F. V. (2003). Die Erfassung des Flow-Erlebens. In J. Stiensmeier-Pelster (Ed.), *Diagnostik von Motivation und Selbstkonzept (Tests und Trends N.F. Bd. 2)* (pp. 261–279). Hogrefe.
- Ross, B. (2013). Effects of participation in a simulation game on marketing students' numeracy and financial skills. *Journal of Marketing Education*, 35(3), 259–270. <https://doi.org/10.1177/0273475313482928>
- Rudeloff, M. (2019). *Der Einfluss informeller Lerngelegenheiten auf die Finanzkompetenz von Lernenden am Ende der Sekundarstufe I (Economics Education und Human Resource Management)*. Gabler Springer.
- Ryan, R., & Deci, E. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and Well-being. *American Psychologist*, 55(1), 68–78. <https://doi.org/10.1037/0003-066X.55.1.68>
- Sánchez-Macías, A., Azuara-Pugliese, V., & Martinez-Cerda, M. (2018). Estrategia Didáctica Basada En La Lúdica Para La Adquisición De Competencias Financieras En Estudiantes De La Licenciatura En Administración. *European Scientific Journal*, 14(7), 69–89. <https://doi.org/10.19044/esj.2018.v14n7p69>
- Sarodnick, F., & Brau, H. (2011). *Methoden der Usability Evaluation: Wissenschaftliche Grundlagen und praktische Anwendung*. Wirtschaftspsychologie in Anwendung. Huber.
- Schell, J. (2012). Die Kunst des Game Designs - Bessere Games konzipieren und Designen. .
- Schlösser, H. J., Neubauer, M., & Tzanova, P. (2011). Finanzielle Bildung. *APuZ Aus Politik und Zeitgeschichte*, 21–27.
- Seeber, G., Retzmann, T., Remmele, B., & Jongbloed, H. C. (2012). *Bildungsstandards der ökonomischen Allgemeinbildung. Kompetenzmodell – Aufgaben*. Wochenschau.
- Sembill, D. (2010). Emotionen - Auslöser, Begleiter und Ziele individuellen und sozialen Handelns. In R. Nickolaus, G. Pätzold, H. Reinisch, & T. Tramm (Eds.), *Handbuch der Berufs- und Wirtschaftspädagogik* (pp. 80–84). Klinkhardt.
- Shanklin, S., & Ehlen, C. (2017). Extending the use and effectiveness of the monopoly® board game as an in-class economic simulation in the introductory financial accounting course. *American Journal of Business Education*, 10(2), 75–80. <https://doi.org/10.19030/ajbe.v10i2.9916>
- Shanklin, S. B., & Ehlen, C. R. (2007). The monopoly board game as an in-class economic simulation in the introductory financial accounting course. *Journal of College Teaching & Learning*, 4(11), 65–72. <https://doi.org/10.19030/tlc.v4i11.1525>
- Shute, V., & Ke, F. (2012). Games, learning, and assessment. *Assessment in Game-Based Learning*, 43–58. [https://doi.org/10.1007/978-1-4614-3546-4\\_4](https://doi.org/10.1007/978-1-4614-3546-4_4)
- Smith, T., Richards, K., & Shelton, V. (2015). Mindfulness in financial literacy. *Journal of Human Behavior in the Social Environment*, 26(2), 154–161. <https://doi.org/10.1080/10911359.2015.1052914>
- Sohn, S.-H., Joo, S.-H., Grable, J. E., Lee, S., & Kim, M. (2012). Adolescents' financial literacy: The role of financial socialization agents, financial experiences, and money attitudes in shaping

- financial literacy among South Korean youth. *Journal of Adolescence*, 35(4), 969–980. <https://doi.org/10.1016/j.adolescence.2012.02.002>
- Tan, L., Hasselt, W. v., & Collison, T. (2015). *The Pursuit of Happiness - Creating Meaningful Brand Experiences for Millennials*. Retrieved from [https://www.zenithmedia.com/wp-content/uploads/2015/10/4\\_ThePursuitOfHappiness.pdf](https://www.zenithmedia.com/wp-content/uploads/2015/10/4_ThePursuitOfHappiness.pdf)
- Tang, N., & Peter, P. C. (2015). Financial knowledge acquisition among the young: The role of financial education, financial experience, and parents' financial experience. *Financial Services Review*, 24, 119–137.
- Treher, E. (2011). Learning with board games - tools for learning and retention. The learning key - transforming learning into action. Retrieved from <https://thelearningkey.com/>
- Union Investment. (2017). Finanzbildung in Deutschland Wissensstand – Defizite – Handlungsfelder.
- Walstad, W. B. (2010). The effects of financial education on the financial knowledge of high school students. *The Journal of Consumer Affairs*, 44(2), 336–357. <https://doi.org/10.1111/j.1745-6606.2010.01172.x>
- Weinert, F. E. (2001). Leistungsmessungen in Schulen. Weinheim und Basel.
- Wilson, A., Hainey, T., & Connolly, T. (2013). Using scratch with primary school children: An evaluation of games constructed to gauge understanding of programming concepts. *International Journal of Game-Based Learning*, 3(1), 93–109.
- Wilson, S., Engler, C., Black, J., Yager-Elorriaga, D., Thompson, W., McConnell, A., ... Terry, R. (2017). Game-based learning and information literacy: A randomized controlled trial to determine the efficacy of two information literacy learning experiences. *International Journal of Game-Based Learning*, 7(4), 1–21.
- Wouters, P., van Nimwegen, C., van Oostendorp, H., & van der Spek, E. D. (2013). A meta-analysis of the cognitive and motivational effects. *Journal of Educational Psychology*, 1–17.
- Yoon, B., Rodriguez, L., Faselis, C., & Liappis, A. (2014). Using a board game to reinforce learning. *The Journal of Continuing Education in Nursing*, 45(3), 110–111. <https://doi.org/10.3928/00220124-20140224-14>
- Zagal, J. P., Rick, J., & Hsi, I. (2006). Collaborative games: Lessons learned from board games. *Simulation & Gaming*, 37(1), 24–40. <https://doi.org/10.1177/1046878105282279>
- Zhan, M., Anderson, S., & Scott, J. (2006). Financial knowledge of the low-income population: Effects of a financial education. *Journal of Sociology and Social Welfare*, 53–74.