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Gamification as an innovative method in user experience design

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Abstract

The growing research field of gamification promises new insights and innovative methods for the active design of user experience. This article examines the extent to which gamification complements the established methods of user experience design in the context of product development. To this end, assessment criteria are proposed that can be used to evaluate human-centred design methods. A qualitative comparison is then used to determine the added value of the innovative field of gamification for future user experience design in consumer products.

Keywords: gamification, user experience design, user-centred design, design methods

1. Introduction

Consumer products usually require interaction between the user and the product to get the job done. Human-system interaction and its target-oriented design therefore is an important task of product design, especially in the area of more complex products and machineries. Human centred design (HCD) describes a discipline from product development, that focuses on the needs of users during the design of interactive systems. The fulfilment of user requirements regarding the usability of product systems is a central aspect here. The HCD processes have been standardized in the ISO 9241-210 (International Organization for Standardization, 2019). One specific aspect of HCD is how the user's experience with the product is designed by intent. In this paper, we refer to this topic as "user experience design" (short: UXD). From the perspective of UXD, the development of new products has to deal not only with the fulfilment of technical specifications but furthermore product designs also do intent a certain experience by the user. According to this approach, new product generations can be interpreted as an attempt to respond better to needs of the users in terms of product experience. In the past, various frameworks, processes and methods have been developed to address this problem in a structured manner throughout the product development process (Pahl *et al.*, 2007). Within the field of user experience research, gamification recently has gained popularity as a innovative method to motivate, engage and increase user's activities in various application fields. The success of gamification strategies in the context of user motivation is leading to more and more applications in business areas ranging from HR to work organization, work psychology and marketing (Rodrigues *et al.*, 2019). Nevertheless, gamification as a method has not been applied as a standardized UXD method in the context of physical product development until today. Therefore, the presented research in this paper aims to compare conventional UXD methods with a methodological gamification design approach to evaluate the potential of gamification in future UXD application within development processes of consumer oriented products.

2. Related work

2.1. User experience design

“User experience design” (UXD) focusses on designing intended interactions and experiences of users with a product. UXD is part of the “user centred design” which describes the design of all direct interactions of a product with a user. "Human centred design" also includes indirect interactions, such as the consideration of passive safety aspects without direct interaction (International Organization for Standardization, 2019).

According to Norman, user centred design enables product designers to adopt their products to specific users (Norman and Draper, 1986). He describes a change in the design of products. It is no longer expected that users will purchase products based on their functionality and come to terms with the framework conditions, but that the designers will adapt the framework conditions of the product to the needs of the users. Norman defines good and bad product design by the fulfilment of the following core requirements "simplification of the task structure, making things visible, correct assignment, exploiting the forces of constraint, fault tolerance and explanation of the possibilities".

One of the most promising theories in UXD in the fields of innovation and marketing is the 'Job to be Done' (JTBD) theory, introduced by Clayton Christensen. This theory suggests that customers 'hire' products to fulfill specific tasks in their lives. The theory emphasizes customer progress over product attributes and includes key concepts such as functional, social, and emotional jobs. It is important to conduct contextual inquiry to understand the circumstances surrounding customer decisions.

Innovation can benefit from the JTBD theory by providing disruptive solutions that address unmet needs. This theory guides product development by aligning offerings with customer needs. In marketing, it aids segmentation by understanding the diverse jobs customers seek to fulfill. Crafting messaging and positioning around the value proposition for specific jobs enhances marketing effectiveness.

However, accurately defining the job and addressing contextual complexities can be challenging. Critics argue for a more nuanced understanding of decision-making processes. Despite these challenges, the theory's adoption underscores its value in guiding businesses towards customer-centric approaches (Christensen, 2016).

In the past decades, various methods have been found within the design methodology research to solve the contest of identifying and conceptualizing product usage requirements in terms of UXD. These methods systematize and refine the user centred design basics approach and offer product developers concrete tools and instructions for mastering the tasks of UXD. The most common methods in the opinion of the authors are presented below, without any claim to completeness. As these methods are not normally used throughout the entire product design process, they are assigned to the "Empathize, Define, Ideate, Prototype and Test" phases according to the Design Thinking approach (Hasso-Plattner-Institut, 2022).

2.1.1. Conjoint analysis (Define)

Conjoint analysis is a method from marketing developed in 1964 by Luce and Turkey to capture user desires and predict buying behaviour (Luce and Tukey, 1964). To find out customer’s preferences, surveys are conducted on the characteristics of the product in various forms. The aim is to identify target group preferences and then to design the corresponding product features. For example, in the development of a fully automatic coffee machine, the features "price", "materials used", "milk frother available" and "brewing time" could be compared in different characteristics. To do this, several fictitious prototypes are put together (e.g. variant A: 900€, stainless steel, with milk frother, 45 seconds and variant B: 400€m, polyethylene, without milk frother, 60 seconds), which the target group must then evaluate. Based on the ratings, conclusions can then be drawn for the implementations of the product features.

2.1.2. User persona (Empathize)

A persona is a method of product development and marketing. It depicts a fictitious person from the target group with their preferences, daily routines or characteristics. Basically, there are no fixed

specifications as to how a persona must be designed, but depends on the use case. Commonly integrated information may include: name, age, gender, marital status, occupation, photo, personality characteristics, hobbies, daily routines, work life routines and many more. The goal of a persona for product development is to put oneself in the shoes of the target group and thus support user-oriented development (Nielsen, 2013).

2.1.3. Mood boards (Ideate)

A mood board is a tool for creating a certain atmosphere related to a defined target group. A mood board consists of a collage of images of objects, situations, materials or colors, usually without text. The images are intended to convey a sensual impression of the target customer group in terms of preferences for e.g. colors, materials or quality standards. In product planning, mood boards are intended to reflect the feelings of a customer group in order to integrate the product design concept harmoniously in the target group's living environment (Godlewsky, 2008).

2.1.4. User journey (Define)

A User journey is a marketing tool that can be used in engineering design processes as well. Here, a customer journey refers to a fictitious or real person who will interact with the product in the future. Following a typical routine (e.g. daily routine, work routines) or the product's lifecycle (e.g. market entry, advertising, services, recycling), different interaction points of the users with the product are mapped. The user journey can reveal specific customer requirements, user needs and application scenarios. A common application of user journey technique can also be found in online marketing, where customer journeys are used to optimally place advertisements. In engineering design, this tool primarily is used for target group and usage analysis in the product planning phases (Endmann and Keßner, 2016).

2.1.5. Scenario planning method (Define/Ideate)

Scenario planning is the systematic analysis and forecasting of different possibilities of a system behaviour. By combining different factors, fictitious scenarios are to be created. These are to be evaluated and subsequently conclusions are to be derived from them. To achieve this goal, first all potential influencing factors are discovered. The factors are then evaluated with regard to their influence and possible interdependencies to future scenario developments. By clustering the factors in terms of combabilities and influences, specific future scenarios are designed. The scenarios are mostly classified in terms of their criticality. Usually, there is at least one best-case scenario and one worst-case scenario. The average development between these two extrema is called the trend scenario. For the development of products, requirements for the user experience can be derived from these scenarios, e.g. how products should behave in certain situations or which products are generally needed in certain situations from the customers perspective (Schoemaker, 1995).

2.1.6. Use cases and user stories (Empathize/Define)

Use cases and user stories are methods for analysing and predicting the behaviour of products within specific usage situations. User stories form a short description of a situation according to fixed formulation rules. The formulation rules correspond to predefined sentence structures or templates which result in specific usage situations of various roles with a desired outcome (Cohn, 2015). User stories are often used in agile product development to include the user's perspective. Use cases describe a more detailed user story or a bundle of user stories with regard to a defined goal. Here, the context of the usage is considered more intense (e.g. Environmental influences). According to Jacobson et al., the use-cases can be ordered hierarchically according to their influence (enterprise level to component level) and then be linked to obtain a system representation of an object (Jacobson *et al.*, 1991). The goal is to represent all possible use cases and thus requirements for the further product development.

2.1.7. Empathy map (Empathize)

An empathy map is a method for visualizing and identifying possible product usage requirements in early phases of product development. By putting oneself in the position of the product user in a structured way, possible interactions are to be identified. Specific categories, e.g. "seeing, doing, thinking and feeling", are used to focus on different interaction aspects. Empathy with the user's perspective is then intended to collect requirements as early as possible for product development purposes. Further developments of the Empathy Map contain additional categories, such as "Hearing", "Saying" or "Pains and Gains" (special desires and advantages). The classification in the application of the method is free and can be chosen according to the necessity in the individual application case (Hampshire *et al.*, 2022).

2.1.8. Hooked - How to build habit-forming products (Ideate/Prototype)

Nir Eyal's Hooked model is a phase-based model for product design. Based on findings from psychology about addictions and habits, Eyal designs a model of four interaction phases that a product must contain in order to motivate users to continue using it. In a negative interpretation, one can also speak of addiction generation. The four phases, arranged within a constantly repeating cycle, are "External Trigger", "Action", "Reward" and "Investment".
The external trigger refers to becoming aware of the product, for example through advertising. The second phase is the first interaction with the product, which should consist of a low-threshold action. The lower the effort required for the action, the more likely it is to be completed. The effort is defined by the resources "time, money, physical effort, psychological effort, distance to the social norm and distance to the personal routine". The action performed is followed by the reward in the third phase. According to Eyal, rewards play a decisive role in the development of successful products, since people fundamentally strive for rewards. Now follows in phase 4 the "investment". The investment is an action comparable to phase 2, but without direct reward. Through the investment, a later reward is expected, which then restarts phase 1, this time through an internal trigger: the memory of the investment and the expectation of a reward. By purposefully designing this sequence of interaction phases for a product, motivated or addictive behaviors can be elicited from the users. (Eyal and Hoover, 2014).

2.1.9. Fogg Behavior Model and Behavior Grid (Empathize/Define)

The Fogg Behavior Model describes an approach for the analysis and design of human decisions, including the Behavior Grid for the classification of human behavioural changes (Fogg, 2009).
Fogg describes different behaviours depending on their temporal length (punctual, time span, permanent) and their direction (change) (e.g. perform new behaviour, perform familiar behaviour, reinforce behaviour, reduce behaviour, stop behaviour). Using a matrix, existing behaviours can be systematically ordered and analysed. Consequently, a desired future behaviour change can be related to them. The Behavior Model consists of a mathematical relationship that can be represented in a coordinate system. Fogg describes the dependency of people's behaviour in a defined situation (Behaviour = B) as a product of the factors motivation (M), ability (A) and incentive (P). Thus, if people are to perform a certain action, they need a certain degree of motivation to do so and the ability to perform the action. Now, if an incentive of sufficient magnitude is provided, the action will be performed. Fogg describes this relationship as: B = M x A x P.
According to Fogg, there are three ways to successfully motivate a user's action:

- The correct setting of the incentive (signal),
- The use of action facilitating methods (facilitators), which are defined by the elements of simple action. These elements are: Time, Money, Physical Effort, Cognitive Effort, Social Conformity, Deviation from Routine. The lower the expression of the elements, the easier it is for people to perform an action.
- The use of methods to increase motivation (sparks).

Motivation is described by the scales "pleasure and pain", "hope and fear" and "recognition and rejection".

2.1.10. Laws of UX (Ideate/Prototype)

Yablonski defines principles and heuristics that support a positive design of the user experience of products (Yablonski, 2021). He derives the principles in part from psychological and physical phenomena. The principles are presented with brief descriptions of the specific effects, practical tips, information on their origins, and links to other methods from product development, such as user persona or user journey. Yablonksi also provides an action guide for applying the principles, which is mainly based on a visualization and a divergence-convergence application in the context of workshops. In addition, a deck of cards with 54 psychological principles supports more practical applicability. The Laws of UX provide a way of considering psychological principles to optimize the user experience during product development.

2.1.11. Design with intent (Ideate/Prototype)

Lockton assumes that by applying nudging, products or services and interactions can be designed in such a way that people's behaviour is steered in a certain direction (Lockton *et al.*, 2010). Lockton identifies 101 design lenses in pattern form in the eight categories: Architecture, Error proofing, Persuasive, Ludic, Visual, Cognitive, Machiavelli and. Security.
With the help of patterns, corresponding systems elements are designed, based on a user analysis or a target behaviour. Lockton defines three different user types and eleven target behaviours, to which the patterns are assigned. The Design Lenses contain a provocatively posed question and an application example, which should facilitate the transfer to the own use case.

2.2. Gamification

Gamification describes the “use of game design-elements in non-game contexts” and is a modern method of motivational design (Deterding *et al.*, 2011). It aims to motivate people to perform desired actions in a specific context. According to Morschheuser et al., development of successful gamification strategies requires a consistent, systematic approach including context and user analysis, mechanics ideation and design, implementation and evaluation (Morschheuser *et al.*, 2018).
Hamari and Huotari refer to gamification as "a process of enhancing a service with opportunities for playful experiences to support overall user value creation" (Huotari and Hamari, 2017). To summarize, gamification focusses on the enhancement of a product or service in connection with the playful experience of the users.
A UX-driven design method for building gamification systems has been proposed, focusing on the nature, process, and interface levels of user experience (Ning, 2018). However, the potential of gamification in user experience design is not without its limitations and ethical concerns (Marache-Francisco and Brangier, 2014).
Tondello mentions that further research is needed in gameful design to investigate both outcomes and methodologies used. The increasing emphasis on personalized approaches demonstrates ongoing attempts to comprehend and customize gameful designs according to individual motivations and personalities. Gamification offers a broad potential to enhance user engagement (Tondello, 2016).
Hence, adopting gamification to product design with a consistent process offers an innovative way to understand product usage behaviour in the context of user experience design.

2.2.1. "How to design gamification" - Process according to Morschheuser

To apply gamification in the field of product development, Morschheuser et al. describe a design process they developed based on a comprehensive literature review of gamification design methods (Morschheuser *et al.*, 2018) . Their integrated process focusses on the development of gamified software, but also offers a basic approach to gamification design. The process consists of seven phases:

1. **Preparation:** The preparation phase serves to define and verify the goals and requirements, as well as to answer the question: Is gamification usefully applicable within the present context? The result of the phase is the "Go Decision" and the requirements list.

2. **Analysis:** The analysis includes both a context and a user analysis. The context must be understood and then be provided with success metrics. The user analysis consists of defining the target users with identified usage needs and motivations. The result is a persona of the target users.
3. **Ideation:** The ideation phase consists of brainstorming and the subsequent consolidation of ideas for the gamification of the context. For brainstorming, reference is made to various methods and frameworks, such as design thinking.
4. **Design:** The design phase corresponds to iterative rapid prototyping. Designing, developing and evaluating are repeated until the concept goal is achieved. The result is the development plan of the product including specifications and budget.
5. **Implementation:** The implementation of the final product also takes place in iterative phases. After deciding whether to develop the product internally or outsource it, a loop of design implementation and playtesting with feedback is created. Once the goal is achieved, a pilot of the final gamified product is created. A gamification expert accompanies the process to ensure correct implementation.
6. **Evaluation:** Based on the success metrics defined in the preparation phase, the success of the gamified context is quantitatively evaluated. In addition, further evaluation methods from the literature, as well as interviews with test users are referred to.
7. **Monitoring:** After the release of the product, targeted observations can be made at the request of the client with continuous improvement of the gamification concept.

3. Methods

The aim of the presented research approach is the qualitative evaluation of gamification as a suiting method in the context of UXD. The gamification design process according to Morschheuser et al. is compared with a selection of well-known and established working methods. The comparison is made within the comparison set of methods and not against an ideal but imaginary best solution. For evaluation purposes, the authors use the following criteria acc. to (Kessing):

- Objectivity: How independent is the methodology from the users?
- For successful UXD it is necessary that both users and developers do not have subjective influence on the results. Accordingly, the methods must ensure that the user experience can be determined objectively, without dependence on the user or developer.
- **Results focus: How much interpretation effort is required for further use of the results?**
- In engineering, high practical relevance is crucial for the transfer of research results to industry. Therefore, the derivation of concrete, directly applicable results is necessary.
- **Process consistency: How consistently do the sub steps build on each other?**
- The consistency of a method also results from the practical application perspective. For consistent use and complete understanding of the methodology, it is essential that all steps build logically on one another and that input and output parameters are coordinated to ensure implementation in practice.
- **Effort/benefit: How does the effort compare to the benefit?**
- Methods should generate as moderate an outlay as possible and fit seamlessly into the existing day-to-day work and existing corporate processes. The effort involved must also be less than the benefit in order for an application to make economic sense.
- **Exploravity:** Do the methods allow for an expansion of existing knowledge?
- UXD should be able to enable new perspectives on the use of products in order to create a modern and future-oriented user experience. To achieve this, it is necessary to expand the existing state of knowledge about product usage by applying the methods.

To qualify the degree of fulfilment of each criterion by the specific methods, the so-called Harveyballs are used. The evaluation logic is shown in the following table:

Table 1. Definition of the meaning and range of the evaluation criteria

Criterion	◯(no fulfillment)	● (full compliance)
Objectivity	Results are defined dependently and directly by the users.	Results arise completely independent of the users through the application of the method.
Result focus	Results cannot be implemented or can only be implemented with considerable interpretation effort.	Results can be used directly for the development of product features.
Process consistency	The methodology does not provide guidance on the process or how to apply it in practice.	Individual steps of the method build on each other consistently. Input, output and activities are clearly described.
Effort/ benefit ratio	The essential benefit of the methodology is achieved only with disproportionate effort.	A very high benefit is achieved with manageable effort.
Explorativity	Substeps designed to enable new perspectives do not exist.	Concrete steps are used specifically to support new perspectives on the product.

The qualitative evaluation of all UXD methods, including gamification, is performed as an inductive research approach via the expert opinions of the authors. In order to make the specific evaluations more transparent, the specific argumentations are first described in detail in Chapter 4, followed by a final overview of the qualitative method evaluation.

4. Results

In this chapter, the authors present a summary of the expert opinions based on logical argumentation concerning each individual evaluation decision. Then, a qualitative evaluation comparison is presented.
A conjoint analysis depends on the selected trait characteristics of the developers and can therefore never be perfectly objective; the result is a weighting of possible characteristics. The process is variable and interdependencies of the characteristics and normalizations must be considered. The effort is high due to the user surveys, but the benefit is significant. Since only known product characteristics are assumed, there is no explorativity.
Personas are not very objective, since they are mostly created by the developers themselves. The further use of the persona is open-ended and not bound to specifically defined suiting design processes. The effort to create a persona is relatively low, the benefit can be high. Since it does not systematically go beyond existing knowledge boundaries, explorativity is hardly present here either.
Mood boards are a subjective representation of the emotional world and are not tied to results. The creation is roughly linked to a process, the benefit can be high for the product design, the effort relatively low. Through the representation of emotions and the associated elaboration of these, a certain explorativity is present.
User journeys are also created by developers alone and are therefore only partially objective. It is difficult to derive concrete results, but there are guidelines for the creation process. Extensive results can be created, but the effort required increases accordingly. User journeys are at least partially explorative due to the holistic view of the users.
The scenario planning method is also subjective, but due to its characteristic to consider explicit situations, the explorativity can be estimated higher than with other methods. The results are not clearly defined despite the partial presence of a process. The benefit can be significant while the effort is manageable.
Use cases and user stories are not very objective, since they are created by the developers themselves. The concrete derivation of results is partially available, and a process for creating them exists in the form of a template. The effort is moderate compared to the potential high benefit. Explorativity is present through the consideration of individual user scenarios.
An empathy map is an open-ended, subjective assessment of the beneficiaries with rough process guidance and little effort. Due to the empathic classification of the user's perspective, there is at least a small degree of explorativity.

The Hooked Model is a process model, but with a clear one-dimensional outcome as the goal. Objectivity is not present due to the lack of external influence. The benefit is definitely present in relation to the effort, even if relatively restrictive framework conditions are set. Exploravity is not found.
The Fogg Behavior Model and Behavior Grid is an objective tool for evaluating possible beneficiary decisions. Concrete results are not decisively derived and only a rough process exists for orientation. The effort/benefit ratio is reasonable and by presenting the different behavior patterns, actions can be developed in an explorative way.
The Laws of UX by Yablonski are an objectively usable pattern library with simple process instructions. The results are not directly usable, a creative translation into product features is necessary. A process for application is not available, the benefit can be high with very low effort for use. A basic exploravity is promoted by the pattern representation of basic psychological principles and the possible application to products.
The Design with Intent framework offers an objective pattern collection analogous to the Laws of UX. However, due to the practical examples, as well as a simple process description and a usage typology, the focus on results and the process consistency are higher. The effort is very low and the benefits can be very high due to the proven use cases. Exploravity is also present in principle, but uncontrolled.
The adopted gamification design process supports objectivity by assigning discrete elements to collected analysis results. Gamification has specific product features as goal of application, which is why the focus on results is rated very high. The process consistency is rated also very high compared to the UXD models due to the continuity of the phases with transitional results. If specific product features are actually developed, the benefits are comparatively high. However, the effort involved is also significantly higher than with the UXD methods, which is why a medium overall value is selected for the effort/benefit ratio. The exploravity is also rated very high due to the innovative usage of the analogy to video games, which enables new perspectives on product usage and user experience.
The final results of the qualitative evaluation are shown in table 2.

Table 2. Results of the evaluation of UXD-methods and the adapted gamification design process of Morschheuser et al. regarding the previously defined criteria (Design Thinking Phases: E=Empathize, D=Define, I=Ideate, P=Prototype, T=Testing)

							Evaluation Criteria					
		Design Thinking Phase					Objectivity	Result Focus	Process Consistency	Effort / Benefit Ratio	Exploravity	Degree of Fulfilment
Human Centered Design Methods	Conjoint-Analysis	E	D	I	P	T	◑	◑	◕	◔	○	40%
	User Persona	E	D	I	P	T	◔	◔	◑	◕	◔	40%
	Mood-Board	E	D	I	P	T	◔	◔	◑	◕	◑	45%
	User Journey	E	D	I	P	T	◔	◔	◑	◕	◑	45%
	Scenario Planning Method	E	D	I	P	T	◔	◔	◕	◕	◕	50%
	Use-Cases and User Storys	E	D	I	P	T	◔	◔	◑	●	◑	50%
	Empathy Map	E	D	I	P	T	◔	◔	◑	◑	◔	35%
	Hooked-Model	E	D	I	P	T	○	◑	◕	◑	◔	40%
	Fogg Behavior Model and Behavior Grid	E	D	I	P	T	●	◔	◔	◑	◑	50%
	Laws of UX	E	D	I	P	T	●	◔	○	◕	◔	45%
	Design with Intent	E	D	I	P	T	●	◕	◔	◕	◔	60%
	Average Degree of Fulfilment						◑	◔	◑	◕	◔	◑ /48,5%
	Adapted Gamification Design Process	E	D	I	P	T	◕	●	●	◑	◕	◕ /80%

5. Discussion

Overall, it can be seen that all existing methods have recognizable strengths and weaknesses. Objectivity is either present or absent due to the nature of the method. Individual application by the developers lead to subjective results. A specific result focus is present only with few methods. This is certainly justified in the intention of the broad applicability of methods. With many methods, the application in form of a process description is not present or only very limited. In contrast, most methods have a significant benefit in relation to the required application effort, since they are methods that are widely used in industry. The explorativity is basically a weak point of most methods, since they mostly rely on existing or trivial knowledge. Design with Intent has the highest criteria fulfillment here (60%), but also offer potential for improvement in process consistency and explorativity criteria.

The evaluation of the adopted gamification design process initially looks disproportionately high, but must be considered in the context of the investigation. In particular, the focus on results and process consistency are significantly higher for obvious reasons. The gamification process is a multi-stage phase model with a targeted result and intermediate results. In contrast, the existing UXD models usually only address part of the overall design process, which, however, does not diminish the quality of the results. Nevertheless, the scope of gamification can be seen as an advantage in the context of UXD, even if the effort involved is considerably higher than with the other models. The areas of objectivity and explorativity in particular form a potential advantage of the gamification process and enable a previously unused perspective on user experience design. Specific disadvantages can be found in the scope of the method, which is significantly more complex than the presented traditional approaches.

Based on the results, the future application of the gamification design process in UXD should be considered. In order to justify the longer implementation time and at the same time exploit the full potential of the method, gamification should be used in the early phases of product development in particular. It remains to be mentioned that the present analysis is a subjective assessment of the authors based on their expert knowledge and an objective confirmation should be part of future research.

The adopted gamification design process for UXD has already been successfully validated twice in an industrial and a student's project by the authors. The industrial project focussed on the development of innovative features to improve the user experience of the German Corona-Warning-App based on a comprehensive survey (Kessing *et al.*, 2022). Exemplary results are test-result countdowns, withheld sharing options and personalized display of information, which were realized in the Germany Corona-Warning-App after the project. The student's project focused on the development of features for innovative mobility concepts. The students successfully developed a narrative around their concept to support human-machine interaction (Kessing).

6. Conclusion

In the presented research, the gamification design process according to Morschheuser et al. is adapted for product development and the potential for user-centred design is compared with existing UXD methods in order to evaluate the suitability of gamification as an innovative method of UXD. The aim was to identify the characteristics of the adapted gamification design process in its application to product development.

According to the evaluation, the gamification design process is very well suited for use in UXD. The method covers a large part from the analysis to the design of product features, which enables an innovative perspective on UXD. On the other hand, the approach is associated with an enormous effort. Future research should focus on the specific adaptation of the gamification design process for product development, in particular UXD, and possibly strive to reduce the complexity. A promising approach could be the combination with the Job-to-be-done theory.

References

Christensen, C.M. (2016), *Competing Against Luck: The Story of Innovation and Customer Choice*, HarperCollins Publishers, New York.

Cohn, M. (2015), *User stories applied: For agile software development, Addison-Wesley signature series*, Twentieth printing, Addison-Wesley, Boston.

Deterding, S., Dixon, D., Khaled, R. and Nacke, L.E. (2011), *From Game Design Elements to Gamefulness: Defining "Gamification"*, ACM, New York, NY. https://dx.doi.org/10.1145/2181037.2181040.
Endmann, A. and Keßner, D. (2016), "User Journey Mapping – A Method in User Experience Design", *i-com*, Vol. 15 No. 1, pp. 105–110.
Eyal, N. and Hoover, R. (2014), *Hooked: How to build habit-forming products*, Portfolio/Penguin, New York, New York.
Fogg, B.J. (2009), "A behavior model for persuasive design", in *Proceedings of the 4th International Conference on Persuasive Technology - Persuasive '09, New York, New York, USA*, ACM Press, New York, New York, USA. https://dx.doi.org/10.1145/1541948.1541999.
Godlewsky, T. (2008), "Mood Board", in Erlhoff, M. and Marshall, T. (Eds.), *Design Dictionary, Board of International Research in Design*, Birkhäuser Basel, Basel, p. 266. https://dx.doi.org/10.1007/978-3-7643-8140-0_173.
Hampshire, N., Califano, G. and Spinks, D. (2022), "Empathy Mapping", in Hampshire, N., Califano, G. and Spinks, D. (Eds.), *Mastering Collaboration in a Product Team*, Apress, Berkeley, CA, pp. 36–37. https://dx.doi.org/10.1007/978-1-4842-8254-0_18.
Hasso-Plattner-Institut (2022), "Was ist Design Thinking?", available at: https://hpi.de/school-of-design-thinking/design-thinking/was-ist-design-thinking.html (accessed 10 October 2023).
Huotari, K. and Hamari, J. (2017), "A definition for gamification: anchoring gamification in the service marketing literature", *Electronic Markets*, Vol. 27 No. 1, pp. 21–31.
International Organization for Standardization (2019), *Ergonomics of human-system interaction: Human-centred design for interactive systems* No. 9241-210, available at: https://www.iso.org/standard/77520.html (accessed 8 November 2023).
Jacobson, I., Christerson, M., Jonsson, P. and Övergaard G. (1991), *Object-oriented software engineering*, ACM / Association for Computing Machinery.
Kessing, D., "Methodik zur Gamification-basierten Identifikation von Nutzungsanforderungen und Konzeption von Produktmerkmalen", Dissertation, in *Product Safety and Quality Engineering, University of Wuppertal*, 6 (in press).
Kessing, D., Katzwinkel, T. and Löwer, M. (2022), "Integration of Gamification Methods to Improve Design-to-Customer in Product Development. Use Case – The German Corona-Warning App", in Alkhatib, G., Rine, D., Bernardes, O., Amorim, V. and Moreira, A.C. (Eds.), *Handbook of Research on Gamification Dynamics and User Experience Design, Advances in Web Technologies and Engineering*, IGI Global, pp. 250–272. https://dx.doi.org/10.4018/978-1-6684-4291-3.ch012.
Lockton, D., Harrison, D. and Stanton, N.A. (2010), "The Design with Intent Method: a design tool for influencing user behaviour", *Applied ergonomics*, Vol. 41 No. 3, pp. 382–392.
Luce, R. and Tukey, J. (1964), "Simultaneous conjoint measurement: A new type of fundamental measurement", *Journal of Mathematical Psychology*, Vol. 1 No. 1, pp. 1–27.
Marache-Francisco, C. and Brangier, E. (2014), "The Gamification Experience", in Dwivedi, A., Blashki, K. and Isaias, P. (Eds.), *Emerging Research and Trends in Interactivity and the Human-Computer Interface, Advances in Human and Social Aspects of Technology*, IGI Global, pp. 205–223. https://dx.doi.org/10.4018/978-1-4666-4623-0.CH010.
Morschheuser, B., Hassan, L., Werder, K. and Hamari, J. (2018), "How to design gamification? A method for engineering gamified software", *Information and Software Technology*, Vol. 95, pp. 219–237.
Nielsen, L. (2013), *Personas - User Focused Design*, Vol. 15, Springer London, London. https://dx.doi.org/10.1007/978-1-4471-4084-9.
Ning, B. (2018), "A UX-Driven Design Method for Building Gamification System", in Marcus, A. and Wang, W. (Eds.), *Design, User Experience, and Usability: Theory and Practice, Lecture Notes in Computer Science*, Vol. 10918, Springer International Publishing, Cham, pp. 112–124. https://dx.doi.org/10.1007/978-3-319-91797-9_9.
Norman, D.A. and Draper, S.W. (Eds.) (1986), *User centered system design: New perspectives on human-computer interaction*, Lawrence Erlbaum, Hillsdale, N.J.
Pahl, G., Beitz, W., Feldhusen, J. and Grote, K.-H. (2007), *Engineering design: A systematic approach*, 3th ed., Springer, London. https://dx.doi.org/10.1007/978-1-84628-319-2.
Rodrigues, L.F., Oliveira, A. and Rodrigues, H. (2019), "Main gamification concepts: A systematic mapping study", *Heliyon*, Vol. 5 No. 7, e01993.
Schoemaker, P.J. (1995), "Scenario Planning: A Tool for Strategic Thinking", *MIT Sloan Management Review*.
Tondello, G.F. (2016), "An introduction to gamification in human-computer interaction", *XRDS: Crossroads, The ACM Magazine for Students*, Vol. 23 No. 1, pp. 15–17.
Yablonski, J. (2021), *Laws of UX*, 1st edition, Upfront Books.