Textbook Gamification
Transforming Exercises into Playful Quests by using Webble Technology

Susanne Friedemann, Lisa Baumbach and Klaus P. Jantke

Fraunhofer Institute for Digital Media Technology, Children's Media Dept., Erich-Kästner-Str. 1a, 99094 Erfurt, Germany

Keywords: Gamification, Game Mechanics, Instructional Design, Language Learning, Webble Technology, Meme Media.

Abstract: While teachers are increasingly realizing that playing and learning belong together, first gamification approaches are being applied to education. But the current solutions lack a real connection to the learning materials with regard to the content. For this reason it is required to design playing experiences close to textbook exercises likely to foster learning processes. A textbook gamification concept is proposed that directly sets up game mechanics on a textbook using given exercises which are transformed into playful quests. Thus, appropriate learning elements and didactic structures are integrated in the gamification application. The concept is based on the decision oriented instructional design model (DO-ID) and the webble technology approach which is an interface technology tailored toward creative human-machine interaction processes.

1 MOTIVATION

Digital learning materials have become an inherent part of modern learning and teaching. Unfortunately, they often appear as a digital copy of already existing analog materials that enable teachers organizing their lessons and displaying their textbooks. In most cases only little interaction is offered–and beyond this–those digital textbooks often lack an appropriate usability as they are presented in double pages in style of conventional books. This does apply neither to interactive whiteboards nor to tablets. It rather prevents the development from tapping its enormous didactic potential that lies within the digitalization.

In the evolution of humans, playing and learning are closely related. However, playful learning was repealed with the institutionalization of education, and learning and play were separated. Nowadays, modern pedagogy finally discusses the advantages of transferring knowledge in an entertaining manner (Breuer, 2010). And the distribution of digital technology has led to the development of innovative learning methods. User-centered learning environments enable decentralized, flexible and individual learning.

There also have been made various efforts to establish game-based learning (GBL) in education, but providing proper games is always a matter of costs. The growing expertise about gamification and its common utilization in enterprises (Schulten, 2014) led to first attempts to apply gamification approaches in education (see chapter 2.3). Researchers do seek for possible solutions for implementations (Monterrat et al., 2014). But yet, these gamification approaches are mostly independent of the learning content and work through extrinsic motivation.

Didactic aspects are being considered in the design of a digital learning environment to significantly increase the learning outcomes (Broecker, 2011). But still, to avoid distraction and boredom, applications need to get even more motivating. According to researchers in fields of *German as a foreign language* at the Friedrich Schiller University Jena, Germany, the digitalization efforts run the risk of reducing the diversity of exercises to tasks like fill-in the gap, drag&drop, match, and right&wrong.[1]

To advance the positive aspects of the ongoing trend there is a need to develop gamification applications that work closely on existing learning materials and hold didactic methods. Therefore, a gamification concept is presented (i) that supports students' learning efficiency and motivation by means of gamification and (ii) that is using already existing materials in textbooks. As a possible technological solution for implementation the webble technology (cf. (Arnold et al., 2013), (Jantke and Fujima, 2015), (Jantke et al., 2012), (Kuwahara and Tanaka, 2010)) is examined in this paper. Features such as peeling-off and direct execution are useful for the interaction design.

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[1] www.alm.uni-jena.de/working-with-the-whiteboard [2015-02-04]

2 LEARNING AND GAMIFICATION

Digital games already belong to the everyday life of 80 percent of the German inhabitants who are younger than 30 years and to 44 percent of the inhabitants aged from 30 to 49 years.[2] Games primarily edutain their users, but they also form their collective and individual attitudes, knowledge, values, and behaviors (Wimmer, 2013). According to (Deterding et al., 2011) "[...] gamification is the use of game design elements in non-game contexts". It further is a "[...] process of game-thinking and game mechanics to engage users and solve problems" (Zichermann and Cunningham, 2011).

In contrast to the educational sector, gamification is already widely accepted in other areas of life. For the purpose of customer loyalty or staff motivation more and more game mechanics are applied by enterprises in everyday life concerns, e.g. in health, education or nutrition (Stampfl, 2012).

In comparison to GBL, gamification does not distract students so intensely, and it can be implemented–less laboriously–all over the lessons to raise attention and motivation. The integration of playful elements into digitalized textbooks causes motivation for learning. The aspect of stressful learning fades into the background (Kapp et al., 2014).

2.1 Benefits of Gamification in Education

The present topic of establishing gamification in education seems to be absolutely ironic, if you think about playing and learning being two sides of one and the same evolutionary medal (Crawford, 2013). Young animals as well as humans play to obtain skills. They use the trial-and-error principle in play, and – thanks to the existence of neurons–they can evaluate the results. Building connections between neurons is called learning.[3] Shortly spoken, playing is immediately followed by learning.

The advantage of playing is that it is mostly intrinsically motivated. Humans voluntarily take part in games and become active by themselves. The realistic setting of digital games stimulates players to take actions. In contrast to school exams, the error tolerance in games increases their self-confidence and encourages them to apply their knowledge, e.g. in a foreign language if it becomes necessary.

Learners shall be filled with enthusiasm as well as motivated for a longer and more intensive occupation with the learning material. Gamification makes it possible to transform boring or exhausting tasks into playful challenges. As a result users experience such challenges as funny and profitable adventures. The integration of game mechanics and the transformation of content into playful elements work like an effective trigger for users to cope with an appropriate challenge that will be rewarded in the end (Stampfl, 2012).

Gamification might be the right approach to direct attention especially to exercises that are necessary, but not motivating. Many current school systems are so much supporting extrinsic motivation by exams so that students do not learn for gaining knowledge–though for attaining grades. It now is a chance trying to get more intrinsic motivation into gamification and into the classroom.

2.2 Application of Gamification

In order to transform several exercises into playful quests, suitable gaming elements have to be identified for composing a textbook gamification concept.

Game Mechanics
With the ongoing development of digital games and the establishment of gamification, the number of theories explaining substantial game mechanisms increased a lot. There is a huge number of game mechanics, but according to gamification experts like (Kapp) and (Zichermann) the following five ones form a solid basis in most cases: points, levels, rankings, awards, challenge (cf. (Kapp, 2012), (Kapp et al., 2014), (Zichermann and Cunningham, 2011)). These mechanics are considered to be characteristic for games. They have got a positive impact on the subjective user experience and correspond with individual motives (Blohm and Leimeister, 2013).

Game Dynamics
Game dynamics are evoked by players' interactions with the game mechanics. It is sufficient to integrate a suitable selection of elements according to a certain situation to influence users' behavior.[4] The table provides an overview of common game mechanics and dynamics as well as related motives (see table 1).

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[2]cf. Bundesverband Informationswirtschaft, Telekommunikation und neue Medien e.V. (BITKOM) (2013): Gaming in Deutschland. www.bitkom.org/de/markt_statistik/77045_77024.aspx [2014-10-07]

[3]cf. Stöcklin, N. (2014). Kann Gamification intrinsische Motivation fördern? Online: www.nandostoecklin.ch/2014/05/kann-gamification intrinsische-motivation-foerdern.html [2015-02-04]

[4]cf. Technische Universität München (2013).
Die Rolle von Spielmechanismen und -dynamiken. Online: http://www.spielifizierung.org/rolle-vonspielmechanismen-und-dynamiken. [2014-11-13]

Table 1: Game mechanics and dynamics according to (Blohm and Leimeister, 2013).

Game mechanic	Game dynamic	Motive
points	collection	achievement
levels	gain of status	social acknowledgement
rankings	competition	social acknowledgement
rewards	collection, gain of status	achievement, social acknowledgement
challenges	difficulty	curiosity, cognitive stimulation

Relevance in Gamification Applications

In the following the identified game mechanics are explained according to their relevance to the textbook gamification approach presented in this paper.

- points:

  Points and scores are elementary mechanisms in games and form a common criteria for the evaluation of the user's success. They motivate for reaching rewards, competition, and challenge, but also serve as feedback and information system for the user.

  Collecting points is a strong motive and therefore essential in gamified applications (Zichermann and Cunningham, 2011) what makes them mandatory in the textbook gamification approach.

- levels:

  A level is a section of a game. The player tries to fulfill a defined goal by interacting and, thus, to reach the next stage. Levels allow drawing conclusions about the player's progress and state. Besides, level upgrades go along with raising the degree of difficulty. They are still a reasonable design element for content and feedback (Zichermann and Cunningham, 2011) because of representing the game progress as well as the development of the game character. Not least, they do function as motivational factor because users feel successful and self-confident after finishing a level.

  For these reasons textbook lessons should be designed as levels within the textbook gamification concept.

- rankings:

  Highscores or leaderboards are listings of participants and their scores in a compact, tabular form that provides a simple and quick comparison. This

stimulates competition and thus motivation when players are striving for honor and appreciation.

Rankings should be respected in textbook gamification mainly for the purpose of comparison, but also for illustrating feedback on the player's progress as a motivation.

- rewards:

  Rewards or badges signalize appreciation and status by using (graphical) symbols or goods like medals, money or unlocking additional modes. The rewards along with the social reputation serve as inducement for successfully passed challenges.

  It is reasonable to implement two kinds of rewards in gamification applications for educational purposes. Foreseeable badges after passing single lessons on the one hand, and surprising badges to reward certain actions like regular exercising.

- challenge:

  Digital games immediately confront users with challenges or problems that have to be solved by taking some efforts. If the player succeeds to identify the situation, dealing with the subject gets appealing. But it has to be considered that most of the users only deal with difficult challenges, if a solution seems achievable. The difficulty of challenge must be balanced to keep interest and tension, and not to cause boredom or stress (cf. flow theory by (Csikszentmihaly, 1990)).

  Within the textbook gamification approach the exercises will be taken from a given textbook and transformed to playful challenges. In this way a repetitive and didactically substantiated occupation with the learning material is ensured. The difficulty of quests should be raised analog to the textbook exercises.

2.3 Gamification in Use

Some first gamification applications are currently quite popular in the field of education.

For example, using *Class Dojo* a student can develop his or her own avatar. *Class Dojo*-points are added or deducted according to achievements in lessons like participation or punctuality. Teachers and parents can take correcting actions on the students' behavior that way (Schulten, 2014). Probably more than 35 million teachers, parents, and students are currently using the application.[5]

World of Classcraft is an approach to get students to involve in lessons by an online role playing gamification application. Students choose a character

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[5] www.classdojo.com [2015-02-04]

class and build teams. Similar to *Class Dojo*, experience points are collected when doing homework or collaborating in class. Developing one's character's skills is rewarded with benefits in the real world like eating during the lessons or using cheat sheets. *World of Classcraft* is integrating game mechanisms without having an impact on the course plan.[6]

Altogether, just like grades–these apps are another opportunity to rate the students' behavior. Arousing real interest in the learning content is yet neglected as these apps can be used all over the lessons and are not depending on specific materials.

Another main point of criticism about such gamification tools is the strong concentration on the merit design, which means using scores, rewards, leaderboards, etc.

Enjoyment of playing and intrinsic motivation will only happen successfully, if there is a balanced relationship with further game mechanics like challenge, as well as with the functional, aesthetic, and relational design components (Schulten, 2014).

(Kapp, 2012) even goes one step further and distinguishes two forms of gamification:

(i) structural gamification:

Playful elements are applied to a system without changing any content. This form of gamification mostly is implemented by using points, rewards, levels, and rankings.

(ii) content gamification:

There are direct changes of the learning content through an input of game elements and game thinking. This might be the implementation of a story concerning the course material or the starting a lesson with a challenge instead of a list, for example.

Regarding the textbook gamification concept, a combination of both types will work best: (i) The introduction of game mechanics will cause some attraction to playfully deal with the materials. (ii) The learning content will be slightly changed because of the transformation of exercises into mini-games, but the didactic fundament remains mainly the same.

3 INSTRUCTIONAL DESIGN MODELS AS BASIS OF GAMIFICATION CONCEPTS

Concept development of digital learning environments can be systematized by using instructional de-

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[6]www.classcraft.com/de/ [2015-02-04]

sign models. Even though there are many variations common phases of such processes are

- analysis,
- draft,
- production,
- implementation and use (Broecker, 2011).

The main goal of most games is providing pleasure or tension to their users. Further goals often are irrelevant. In the beginning, there is mostly the idea of a storyline or some topic that shall be realized. On the contrary, in gamification a clear goal is pursued whose achievement is very important for the success of the application, e.g., the transfer of knowledge or a certain impact on the users' behavior. For this reason it is proposed to apply instructional design theory to the conception of learning environments.

3.1 Benefits from Using ID-Models

Such theoretical design models enable the best possible consideration of learning aspects. This is of great importance to the success of the gamification application. The resulting learning effects are mainly dependent of a well-founded concept that is based on (i) a concrete goal, (ii) an analysis of the framework requirements, and (iii) design decisions. The coordination of these three factors in combination with an analysis of the users' requirements and their goals is essential to the concept elaboration. Otherwise, the intended learning goals might be missed. Instructional design models contain many recommendations that can be flexibly implemented in the final concepts.

3.2 Introducing the DO-ID Model

The Decision Oriented Instructional Design Model (DO-ID) (Niegemann et al., 2008) is one suitable model as a basis for the conception of gamification applications.

This model serves as a framework for the design process and describes a hierarchical classification of the design decisions. By using the DO-ID model the process of planning and developing a multimedia learning environment can be structurized and systematically justified. When planning a concept it is important to set a specific goal and to analyze the framework requirements. The core of the DO-ID model consists of six design decisions (see figure 1) according to the

- format:

What kind of learning environment shall be used?

- content structure:

  How will the content be classified and arranged?

- multimedia design:

  Which senses shall be addressed? Which symbolic systems will be applied?

- interaction design:

  How do the users interact with the system?

- motivational design:

  What drives the users?

- graphic design:

  How is the interface designed?

Finally, usability testings and a evaluation of the results are scheduled (Niegemann et al., 2008).
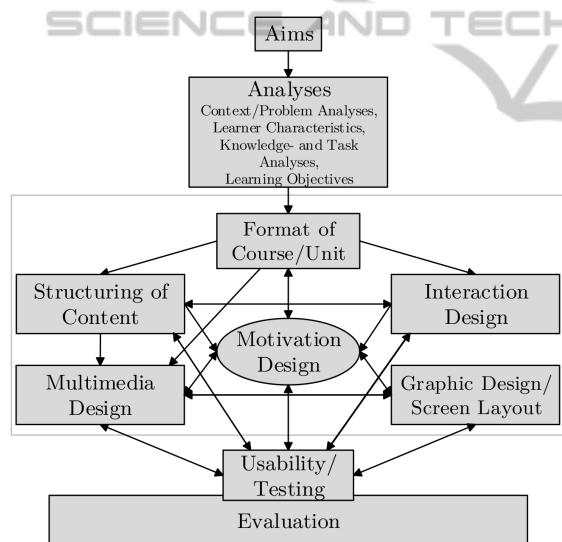

Figure 1: The DO-ID model by (Niegemann et al., 2008) serves as a frame for the design process.

Summing up, the DO-ID model is described very much in detail, and offers a plenitude of recommendations according to the several parts of conception. Hence, it serves as basis for the concept proposed in chapter 5. The design decisions according to the underlying DO-ID model are specified within the paragraphs of chapter 5.1.

What is presented in chapter 5 may be seen as an instance of a general process model aiming at more attractive and, thus, more effective textbooks. The gamification approach is general enough to be applied to a large number of presently available resources.

4 THE WEBBLE TECHNOLOGY APPROACH

In addition to the present papers' aim of contributing to a new generation of digital educational material, the authors intend to introduce an innovative interface technology particularly tailored toward creative human-computer interaction processes (exemplified in (Jantke and Fujima, 2015)).

As learning is one–maybe not just one, but a manifold collection–of the most creative human activities, the technology fits the present conceptual approach particularly well.

4.1 Webble Technology: The Essentials

Webble technology is one of the interesting rare cases in which information and communication technology has been inspired by philosophy. In his seminal book (Dawkins, 1976), Richard Dawkins discusses in much depth the field of non-biological evolution and coins the term *meme* to denote building blocks of evolution in areas such as architecture, fashion, and religion, e.g. (see (Blackmore, 1999) for a discussion of the reach of Dawkins' theory).

Yuzuru Tanaka took up the challenge and studied the fundamentals of carrying over Dawkins' ideas to the evolution of digital content (Tanaka, 2003).

Tanaka was driven by the intention to exploit the power of contemporary computer technology to speed up the evolution of human knowledge. His assumption is that human knowledge may be externalized in digital representations or, at least, what humans call knowledge representation (Brachman and Levesque, 2004) does somehow closely relate to human knowledge. Tanaka calls the building blocks of externalized digital human knowledge *meme media*.

So-called meme media technology as summarized in (Tanaka, 2003) and (Arnold et al., 2013) shall allow for the evolution of pools of meme media objects, i.e., for replication, cross-over, mutation, and extinction.

Implementations that make Tanaka's ideas come true exist already since (Tanaka and Imataki, 1989). The technology has changed over time (Kuwahara and Tanaka, 2010) until most recent versions based on HTML5, CSS and JavaScript support–at least, in principle–the evolution of meme media running in HTML5-enabled browsers on all terminal devices (Fujima, 2013).

The usage of the technology for educational purposes has recently attracted increasing attention (Arnold et al., 2012), (Fujima and Jantke, 2012), (Jantke, 2013a), (Jantke, 2013b). The stage is set for novel educational materials: *meme media textbooks*.

4.2 Webble Technology: Touch & Feel

The most recent meme media are called webbles and are build upon HTML5, CCS, and JavaScript as described in (Fujima, 2013). They run in browsers.

Every webble has a model-view-controller (MVC) architecture.

Human users manipulate webbles by moving them around on the screen and possibly connecting them. As a result, the users may get compound webbles with a functionality combining the functionalities of their constituents accordingly.

Roughly speaking, the webble's model determines its functionality. The view determines its appearance on the screen. And the controller manages the interaction with the human user and its potential effect on the behavior and appearance.

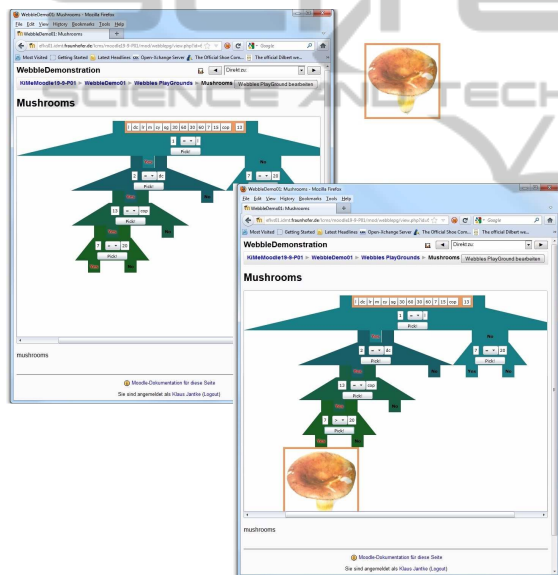Webbles allow for the quite intuitive explorations.

Figure 2: Webbles for Interactive Fungus Classification.

For illustration, figure 2 shows some webbles and how to manipulate them.

The object in the upper right part of the figure is a webble. Its view shows the picture of some fungus. Internally, this webble contains several slots characterizing the fungus by key data such lower and upper estimates of the length of the stem, whether there are gills or not, and so on. The decision trees on display in figure 2 are webbles, as well. When a human user drags the fungus webble over the decision tree in the left window and drops it there, the webble latches in the input slot of the tree, so to speak. The decision tree webble, which is a compound webble consisting of several smaller tree webbles, propagates the fungus data downwards through the tree. At the classifying

node at the bottom of the right window, the fungus appears classified as being edible, in this case.

4.3 Webble Technology in Education

Webble technology encourages exploratory learning, because it allows for manipulating digital knowledge containers and trying out effects. When topics of learning are involved, it is no surprise that learners make mistakes. The correction of own mistakes when writing down complex formulas, for instance, may be tedious and error-prone. In educational settings, the representation of knowledge is crucial. The use of inappropriate representations may result in boring, exhausting, and discouraging learning activities.

Webble technology has been demonstrated, first in (Fujima and Jantke, 2012) and subsequently in (Arnold et al., 2012), to be useful for learning even abstract content playfully in an exploratory manner.
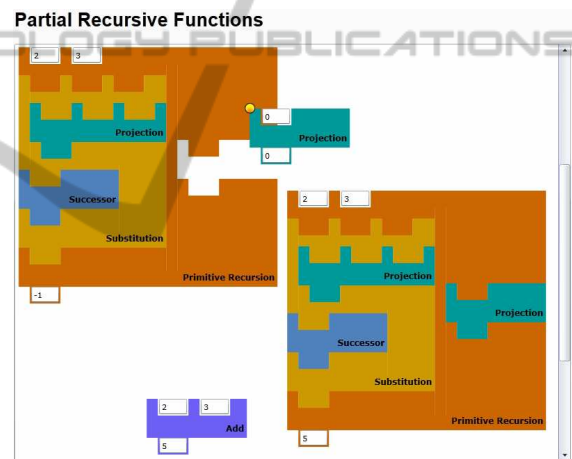

Figure 3: Exploratory Investigations of Recursive Functions.

The case study on display in figure 3 is borrowed from (Fujima and Jantke, 2012), p. 39. The theory of recursive functions (Rogers jr., 1967) is known to be a nightmare to many students of computer science. In the case study under consideration, building blocks of recursive function theory are wrapped by webbles. Those webbles may be plugged into each other, in this way simulating the operations of substitution and of primitive recursion. Whereas writing down senseless formulas is–unfortunately–always possible, syntactically incorrect combinations of webbles do not work.

Figure 3 shows in the upper left part how some learner drags a smaller webble over a larger one to plug it in; the result is on display on the right. Due to direct execution (Jantke, 2013a), the complete webble executes itself immediately allowing for inspection.

In addition to the many aspects discussed so far, the webble technology offers new opportunities of explicating pedagogical patterns and related didactic design (Jantke, 2013b).

5 TEXTBOOK GAMIFICATION CONCEPT

The early draft of a textbook gamification concept presented in this paper is based on a currently available textbook that is used for language courses in the field of *German as a foreign language* in adult education worldwide. The textbook *studio[21]. Das Deutschbuch. A1 (Unterrichtsmanager)* (see figure 4) represents the current state of digitalized textbooks with quite limited interaction features: navigating, change of view, taking notes/ highlighting/ covering, choosing audio/ video, and taking screenshots. No feedback is provided by the system.

Figure 4: The textbook *studio[21]. Das Deutschbuch. A1* by Cornelsen publishing deals as basis for the concept draft.

5.1 Textbook Gamification Prototype

The textbook gamification concept is based on the ideas of the DO-ID model by (Niegemann et al., 2008). The present prototype provides a first outline of the functionalities and a possible interface design of the gamification application. The *application* is meant to be an *additional gamification mode* that can be started upon the textbook while using it. The textbook itself remains the same. The gamification mode uses the already existing textbook exercises and provides them transformed into mini-games.

Goal
The gamification mode shall initiate a self-organized repetition and consolidation of skills that have been imparted during lessons. The learners' motivation for more frequently dealing with exercises is raised by the transformation of exercises into gamified tasks.

Figure 5: Textbook objects become part of the mini-games.

Context of Use
Because classroom training with a teacher will remain one substantial factor of language learning it is planned to use the gamification mode mainly in the leisure time for repetition or homework. Thus, the advantages of virtual and classroom training are combined like in blended-learning (Mandl and Kopp, 2006) approaches. The installation of the software on a PC or laptop[7] allows learners to play quite time- and location-independent.

Basic Preconditions
As the target group consists of adults of different social and cultural origin, the application should not be too much technology-dominated, but user-centered. All interactions must be intuitive to avoid misunderstandings because of language barriers. In order to sustainably adopt the didactic concept of the textbook the gamified quests follow the given exercises (see figure 5) This way, it is also intended to generate acceptance for the gamification application among teachers because of the direct link to the textbook. It should not be compulsory to use gamification in the lessons. Teachers should decide on their own, how to integrate the approach into their teaching.

The following conceptional decisions follow the guidelines of the DO-ID model (see figure 1); webble technology comes into play in interaction design.

Format
The application's goal is reached by a combination of structural and content gamification (cf. chapter 2.3) in relation with drill-and-practice exercises. Concerning structural gamification game mechanics like points, rewards, ranking, and levels are introduced. Points are gained by solving mini-games and

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[7]The basic textbook software is only available for operating systems on PCs and not yet for mobile devices like tablets or smartphones.

indicate the user's progress. A leaderboard stimulates competition.

Regarding content gamification several exercises will be transformed to mini-games of the type *quest - input - feedback* like in drill-and-practice applications (Niegemann and Strittmatter, 2000). First, knowledge transfer happens in the lesson, and afterwards some repetition is done by playing.

Content Structure

Structuring and sequencing the content defines its segmentation in appropriate units (Niegemann et al., 2008). According to gamification the subdivision in lessons is suitable. That is why the textbook lesson units are taken over equivalent to the gamification mode and become levels. The transformed exercises are characterized by a repeatedly, but varying treatment of the learning content. At the end of each level the learner's qualification is checked in a fitness test.

Multimedia Design

In language learning the usage of text is necessary. However, the formulations must be comprehensible and match the user's language competence. As the textbook *studio[21]* is developed for beginners, a very simple and concise language is to be used. The mini-games cause a repetition of vocabulary and rules learned in lessons. Furthermore, long texts should be avoided as reading on the screen will cause tiredness and laps in concentration (Niegemann et al., 2008).

One possibility to integrate dialogs is linking the text to already existing audio files coming along with the textbook. The learner can choose to listen with the help of hypertext. Sounds serve as language-independent feedback and indicate right or wrong solutions (Broecker, 2011).

Illustrations are very essential in language learning. Complex issues can be shown in a simple way by using video or pictures (Salzer and Schulz, 2011). The gamification mode makes use of pictures that students already know from the lessons. Reusing video material is also possible. A varied usage of computer-based media in combination with game mechanics will have motivating effects. Another advantage is the activation of different communication channels and, thus, learning styles (Salzer and Schulz, 2011).

Interaction Design

The interactions need to be intuitive and should be reduced to a minimum for not distracting the learner from learning. The webble technology uses the advantages of direct manipulation to transfer interpersonal interactions to interactions with the computer. In this way controlling the system is sim-

plified and cognitive load is reduced (Hawlitschek, 2013). This technology behind also encourages experimenting with alternatives. Because of the simple handling, e.g. via drag&drop, the user will be encouraged in finding variants of solutions which means explorative learning in the end. Monotonous exercises can be made playful by using compound webbles and the peeling-off functionality.

A hierarchical navigation is planned that starts from a home page (layer 1) that offers an overview and the choice between the lesson mode and the gamification mode. In the second layer (layer 2) the learner can access the levels, the profile, the rankings, and other functions. The third layer (layer 3) provides access to the submenues and the gamified exercises.

Motivational Design

Within the gamification mode interactive elements like crosswords, clozes, multiple-choice or matching tasks are connected to game mechanics (cf. chapter 2.2) in order to address human motives (see figure 5, 7, 8, and 9). Points and rewards give information on the progress in gaming. And the progress illustrates the personal language skills development process.

Challenge is provided through the lesson's difficulty as well as through time limits, deduction of points for wrong answers, and a limitation of trials. Originating the mini-games from the textbook exercises is a precondition for the right challenge and, thus, feelings of flow.

To enhance intrinsic motivation a pedagogical agent (Hawlitschek, 2013) shall be implemented who individually gives instructions and feedback to the user (see figure 5). This might be a well-known German personality, e.g. like *Goethe*, or a character that enables some kind of personal relationship.

Graphic Design

The *studio[21] Unterrichtsmanager* forms the basis of the layout and graphical user interface of the supplementary gamification mode. However, it requires the integration of new elements (see figure 6) that are graphically fitted into the existing application. The chosen game appears in a separate window in the middle of the screen. The colors of the game elements clearly stand out from the rest of the application. A control area contains links to profile and ranking. An information area provides details about the level points, the status, and the next reward.

Gamification and Game Play

The goal of the overall application is to finish levels with a maximum of points in order to enhance the status, to increase skills (see figure 7), and–in the end–
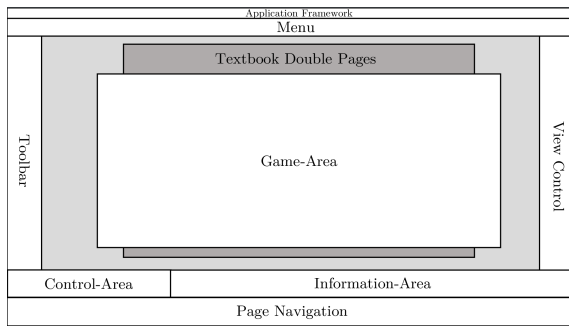
Figure 6: The structure of the gamification mode.

to result in an adequate level of language competence.

Figure 7: Overview of earned skills.

One level consists of five mini-games to be solved. For collecting at least 80 percent of the available points the user is allowed to finish a level completing a fitness test. The player is rated differently according the amount of points (see figure 8). In the following levels the difficulty is increased, e.g. by adding a time count down and a simultaneous reducing of points.

Figure 8: Overview of level progress.

The user profile can be individually created and functions socially reinforcing. Learners can present themselves and might find similarities with others. It is possible to establish contacts and socialize.

Figure 9: Overview of the user profile.

5.2 Potentials and Limitations

The strength of the textbook gamification concept presented in this paper lies in its close relation to textbooks in use. Precious didactic considerations taken from the originating textbook are reused in the gamification mode which provides a novel experience to the learners. By transforming exercises to mini-games and implementing an overall-gamification framework learning is getting more joyful.

Still, exercising on language matters is mainly extrinsically motivated in this concept. There is more work to be done in refining the concept and developing further gamification ideas. Besides training for repetition and consolidation of knowledge it is highly desirable to focus more on approaches regarding knowledge transfer. These would be very helpful for introducing new lessons and supporting curiosity and explorative learning.

Because of its functionality and modularity the webble technology is one approach that perfectly meets the requirements of such gamification applications. The countless possibilities of combining several functionalities lying within the memes opens up a playground for the development of even more creative gamification concepts.

6 CONCLUSIONS & OUTLOOK

Publishers are currently searching for solutions for next generation learning materials. There is a lot didactic knowledge in stock, but nowadays it is evident that learning urgently needs more play and challenge. Gamification approaches like this are only one first step towards future.

The concept presented serves as a first proposition. Continuing the development of suitable textbook gamification concepts is now indispensable. The approach shall be extended, for instance, to using different game mechanics to widen the concept regarding

motivational aspects and user preferences. User generated content might also be considered.

To conduct some further evaluations it is necessary to implement a functional prototype that uses the webble technology. There is already some ongoing project work in the field of webble standardization to advance the webble approach. Use cases like textbook gamification applications have to be further elaborated and tested.

It might be that one day textbooks will be replaced by different learning materials. Webble technology then is a flexible solution to cope with the digital elements in manifold ways.

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