



# Design and Evaluation of a Digital Gamified Learning Platform for 3D Software Education

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zur Erlangung des akademischen Grades

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# Design and Evaluation of a Digital Gamified Learning Platform for 3D Software Education

DIPLOMA THESIS

submitted in partial fulfillment of the requirements for the degree of

**Diplom-Ingenieur**

in

**Media and Human-Centered Computing**

by

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Registration Number 0425844

to the Faculty of Informatics

at the TU Wien

Advisor: Assistant Prof. Dr.rer.nat. René Christian Röpke, BSc MSc

Vienna, January 26, 2026

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# Kurzfassung

Diese Masterarbeit untersucht Strategien zur Gestaltung und Implementierung einer digitalen, gamifizierten Lernplattform zur Vermittlung von Umgang von 3D-Software sowie die wahrgenommene Auswirkung des Kurs- und Gamification-Designs auf Motivation, Beteiligung und Lernergebnisse von SchülerInnen der Sekundarstufe. Im Rahmen der Studie wurden eigens entwickelte Lehrinhalte erstellt und in einen gamifizierten Kurs innerhalb des Lernmanagementsystems Moodle integriert, der auf Erkenntnissen aus der Instruktions- und Motivationstheorie basiert.

An der Studie nahmen insgesamt 30 SchülerInnen der ersten Klasse der Animationsabteilung der HTBLuVA Spengergasse in Wien teil, die über einen Zeitraum von vier Wochen in acht Einheiten zu jeweils 100 Minuten mit dem Kurs arbeiteten. Die Datenerhebung erfolgte mittels zweier Fragebögen, einer Fokusgruppengespräch mit den SchülerInnen sowie mehrerer leitfadengestützter Interviews mit Lehrpersonen.

Trotz der berücksichtigten Limitationen zeigen die Ergebnisse, dass das Kurs- und Gamification-Design von den Teilnehmenden positiv wahrgenommen wurde. Die SchülerInnen berichteten von einem deutlichen positiven Einfluss digitaler Spielelemente und Personalisierungsfunktionen auf ihre Lernerfahrung. Diese Ergebnisse liefern nicht nur wertvolle Erkenntnisse zur Unterstützung zukünftiger Kurs- und Gamification-Konzepte, sondern leisten auch einen Beitrag zur bestehenden Forschung zu Gamification im Bildungsbereich, insbesondere in den bislang wenig untersuchten Bereichen der Vermittlung komplexer Software sowie der Anwendung gamifizierter Methoden in der Sekundarstufe.



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# Abstract

This thesis examines strategies for the design and implementation of a digital gamified learning platform for teaching the use of 3D computer graphics software, as well as the perceived impact of course and gamification design on secondary school students' motivation, engagement, and learning outcomes. The study involved the development of custom educational content, which was integrated into a gamified course within the Moodle learning management system and informed by instructional and motivational theory.

A total of 30 first-year students from the Animation Department at HTBLuVA Spengergasse in Vienna participated in the study, engaging with the course across eight 100-minute sessions over four weeks. Data were collected via two surveys, a student focus group, and multiple semi-structured interviews with instructors.

Despite acknowledged limitations, the results show that the course and gamification design were perceived positively by students, who reported a substantial positive impact of digital game elements and personalization features on their learning experience. These results not only provide insights to support future course and gamification design but also contribute to the existing body of research on gamification in education, particularly in the underexplored areas of teaching complex software and applying gamified methods in secondary education.



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# Introduction

Education, as the transmission of knowledge across generations, can be regarded as one of the defining features of human culture. Although deeply rooted in our history, teaching methods have continuously evolved alongside advances in our understanding of the psychological and behavioral foundations of learning, as well as with the emergence of new educational technologies. Gamification, often defined as the “use of game elements in non-game contexts” [SDN11], lies at the intersection of these developments, drawing on insights from both domains to enhance student engagement, motivation, and learning outcomes.

This thesis investigates how first-year students of the animation program at HTBLuVA Spengergasse, an Austrian Federal Higher Technical College in Vienna, perceive a gamification- and personalization-based learning intervention. The intervention consist of a gamified course designed to teach the fundamentals of “Maya” by Autodesk<sup>1</sup>, a 3D software application used for creating digital assets such as models, animations, and renderings. Implemented within the “Moodle” learning management system (LMS), the course guides students through basic software concepts while integrating game elements to support and motivate learning.

## 1.1 Requirement Determination

The initial step in designing the course involved identifying areas within the existing teaching strategies at HTBLuVA Spengergasse that offered significant potential for improvement, allowing the intervention to target these specific aspects. To this end, semi-structured interviews were conducted with three educators from the animation program at the institution. The interviewees were selected based on their extensive

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<sup>1</sup><https://www.autodesk.com/de/products/maya> 27.12.2025

teaching experience, each having taught for over ten years, and their primary focus on instruction involving complex software applications.

From these interviews, three key areas for potential improvement in current software teaching practices at HTBLuVA Spengergasse were identified. Generally, software instruction at the institution consists of two main phases: one focused on demonstrating specific software functions and having students reproduce predefined examples, and another centered on open-ended projects in which students, individually or in teams, apply their knowledge to create products that meet certain requirements while allowing for creative freedom. In simplified terms, the structure alternates between instructional input phases and creative work phases.

The educators agreed that while student motivation during creative work phases is generally satisfactory, the input phases show considerable potential for enhancement in terms of engagement and motivation. The second area of concern identified was the lack of differentiation in learning pace. According to the interviewees, the current approach sufficiently challenges only a subset of students; less experienced learners often feel overwhelmed, whereas more advanced or motivated students tend to lose interest due to the slow progression of the class. A third issue that emerged from the interviews was that feedback and rewards are predominantly linked to final results rather than the learning process itself, which may reduce intrinsic motivation and result in lower-quality outcomes.

### 1.2 Problem Statement and Research Gap

Based on insights from interviews with educators in the animation program at HTBLuVA Spengergasse, it can be concluded that there is significant unused potential in the teaching of complex software at this institution. The current approach to instructional delivery does not sufficiently account for differences in students' learning pace, and the emphasis on final outcomes, without acknowledging students' engagement with the learning process, may undermine their motivation to invest time and cognitive effort.

Reviewing the existing literature to address these issues reveals that, while substantial research has been conducted on the use of gamification in education, relatively few peer-reviewed publications focus on the application of gamified methods and concepts to the teaching of complex software, particularly software used for computer graphics. While this review does not claim to be exhaustive, a systematic search of the literature revealed only three studies directly relevant to this context [DDJ<sup>+</sup>12, Han15, VFRD14]. One of these examines the use of game-based learning for teaching image editing software [DDJ<sup>+</sup>12], whereas the remaining two focus specifically on the instruction of 3D software tools [Han15, VFRD14]. Of these two studies, one employs an approach related to, but distinct from, gamification [Han15], while the other uses a substantially different strategy, aiming to increase motivation through cooperative, scenario-driven assignments [VFRD14]. In addition, both studies are exclusively concerned with university students, further highlighting the gap in current research.

## 1.3 Aim of the Work

As mentioned above, the focus on results can decrease engagement and instructors must accommodate varying learning speeds, which can slow overall course progression and demotivate more advanced students who would benefit from a faster-paced learning environment. Delivering learning materials through a gamified course offers students, among other potential benefits, the opportunity to influence their own pace of progress which may help mitigate these issues. This study investigates the potential of gamification to enable a more open and personalized approach, while enhancing students' perceived learning experience in the context of 3D software training. Also, by addressing the research gap, it aims to provide insights into effective course design and contribute to the broader field of gamified learning in software education. To address this aim, the study will be guided by the following research questions:

- **RQ1:** What is the perceived impact of utilizing a digital gamified learning platform on students' engagement, motivation, and learning outcomes in the context of 3D software education?
- **RQ2:** How do students evaluate their experience and satisfaction with the overall course design, particularly the gamification and personalization elements?

## 1.4 Methodological Approach

This section aims to clearly describe the methods used to collect data, with two primary goals in mind. The first goal is to provide sufficient context to enable an informed evaluation of the validity and scientific basis of the findings. The second goal is to offer a detailed account of the data collection process, ensuring that it can be easily replicated and thereby enhancing the academic credibility and significance of this work. The methods are presented in chronological order to clarify the sequence in which they were applied during the research.

As outlined in Section 1.1, the first step involved examining the current methods for teaching complex software at HTBLuVA Spengergasse to identify areas with the greatest potential for improvement through alternative instructional approaches. To gain a comprehensive understanding of this potential from multiple perspectives, three semi-structured interviews were conducted with lecturers at the institution. Interviewees were selected based on their substantial teaching experience of over ten years and their expertise in subjects directly relevant to the study, with each primarily instructing the use of complex software. Insights from these interviews informed the formulation of the two research questions (see Section 1.3) and contributed to defining the overarching objective of a gamified Moodle course.

After the course structure was implemented and the content developed, the entire course was extensively tested by the author along with two volunteer colleagues who were familiar with the Moodle LMS but not with the subject matter of 3D software. Following

this testing phase, several final refinements were made, including the creation of level icons and the addition of animated GIFs to enhance the visual appeal of the course.

Subsequently, a 40-minute introductory presentation was prepared and delivered immediately before the start of the course. This presentation covered an introduction of the author, whom the participants had not met beforehand, an overview of key gamification concepts, the rationale behind the chosen thematic scenario, and detailed instructions on how to navigate the course and use its features. The presentation concluded with a brief preliminary survey administered to all participating students. In accordance with ethical guidelines, consent for participation in this survey, as well as in the broader study, was obtained from the parents or legal guardians of all participating students. The preliminary questionnaire assessed students' prior experience with computers, complex software, particularly 3D software, as well as their general interest in the use of gamification methods and concepts in education. Immediately following the survey, the first of the eight scheduled sessions commenced, with a second session held later that same day and the remaining sessions conducted over the subsequent three weeks, each lasting 100 minutes. In total, 30 first-year students of the animation department at HTBLuVA Spengergasse participated in the course. The day after the final session, a more detailed survey was conducted to evaluate students' perceived impact of the course on their motivation, engagement, and learning outcomes.

As this second questionnaire represents arguably the most significant component of the data collection process of this study, considerable thought and research were devoted to its design. Several established survey design tools and models were reviewed to assess their suitability. Among these were the EGameFlow scale [FSY09a], which, while well-established, was found to be overly focused on serious games and therefore not applicable to this context, and the Gamification Inventory [Bro17], a robust instrument for evaluating gamification designs that was deemed unsuitable due to its emphasis being more on comparing different gamification approaches rather than assessing users' experiences of engaging with a single design. The GAMEX scale [EBK18] and its successor, GamefulQuest [HHW19], were also considered. Although these instruments are widely recognized, they were ultimately found to be too extensive for this context and too academically oriented for the age group targeted in this study. Following these considerations, a custom questionnaire was developed based on Keller's ARCS model (Attention, Relevance, Confidence, Satisfaction) [Kel87] (see Section 2.6). This design was heavily inspired by a similar approach adopted in a 2017 study by Ahmed Deif [Dei17]. This approach enabled the creation of a survey tailored to the specific requirements of this study while maintaining a strong foundation in established instructional theory.

The survey was then followed by a focus-group discussion with four volunteer participants to obtain a more in depth, quantitative perspective on the experience of participating in this course. As the final step in data collection, semi-structured interviews were conducted with the two instructors who supported the course sessions, providing insights into their experiences accompanying the students throughout the course.

# Theoretical Background and Related Work

This chapter reviews the existing literature on digital game-based learning, with a particular focus on gamification, as well as relevant instructional and motivational theories. Together, these bodies of work provide the conceptual foundation required to contextualize and support the arguments developed in this thesis. It begins by defining key domain-specific terminology and outlining a potential taxonomy of gamification elements as they are applied in the context of this work. The chapter then explores both theoretical contributions that address the broader dimensions of gamification and empirical studies that have implemented gamification strategies and digital learning platforms in real-world settings. These studies are examined to identify the opportunities, limitations, and potential challenges inherent in the use of gamification and digital learning technologies. Subsequently, relevant literature on instructional and motivational theories is examined to establish a robust foundation for the design process. Overall, the objective of this review is to analyze the characteristics of various gamification implementations as well as the related theoretical background in order to inform the overall study, gamification and course design.

## 2.1 Definition of Terms

There are numerous types of digital learning platforms (DLPs) [FKLM19]; however, this study focuses specifically on Learning Management Systems (LMS) such as Moodle (see Figure 2.1). These systems are characterized as “activity-based and content-oriented and give only a closed group of participants’ access to the platform“ [FKLM19]. LMS platforms generally facilitate communication between students and instructors and support the distribution of teaching materials.

## 2. THEORETICAL BACKGROUND AND RELATED WORK

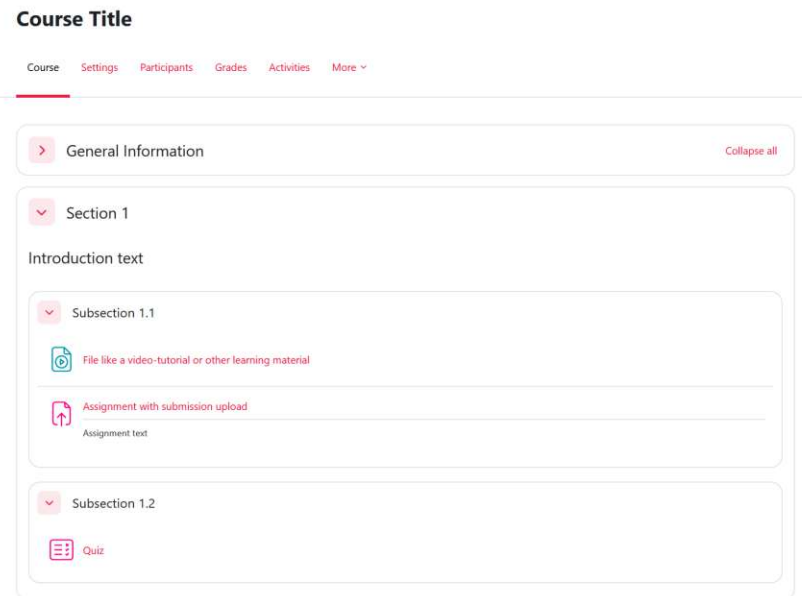


Figure 2.1: Example of a typical course structure in Moodle

While many studies use the terms “digital learning platform” and “learning management system” consistently without discussing their specific characteristics [FKLM19] [WKUAH15] [AA23], definitions of “gamification” remain highly contested [Wer14]. Moreover, there are several related concepts, such as serious games and game-based learning, often exhibiting substantial conceptual overlap [SAF23] (see Figure 2.2).

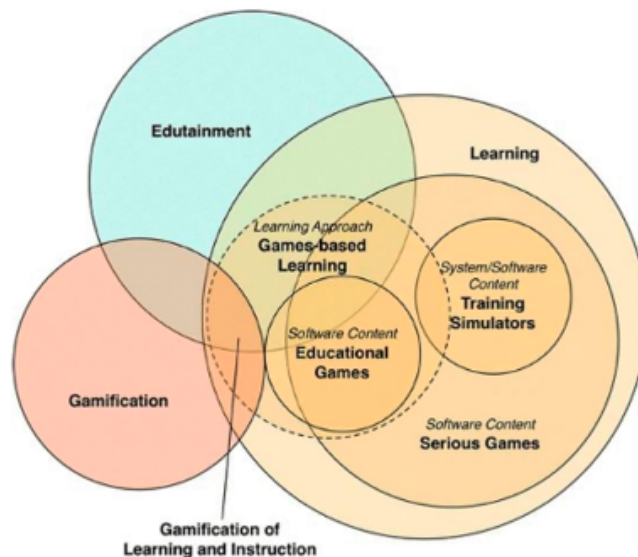


Figure 2.2: Relationship between GBL, gamification, and edutainment [SAF23]

It seems the first known occurrence of the term "gamification" being used was in the year 2002 by the game designer Nick Pelling who used it to describe "applying game-like accelerated user interface design to make electronic transactions both enjoyable and fast".[Pel11] Influenced by his work at the time, this definition was the starting point for the concept but evolved to a more generalized understanding of gamification. Deterding et al. offer a clear and concise definition of "gamification" as "the use of game design elements in non-game contexts." [SDN11] Importantly, while this is broader than the first definition, it still diverges from the understanding of the term by the lay person, which often confuses gamification with learning through playing games. Instead, it explicitly excludes games themselves from the concept.

According to the definition proposed by Deterding et al., gamification centers on how specific elements within (video) games influence user behavior and attitudes toward content and media. This definition also attempts to distinguish "gamification" from "serious games," a term referring to fully developed games designed for non-entertainment purposes [SDN11]. However, this distinction remains inherently ambiguous, as it is "empirical, subjective, and social." The blurriness arises because games are structured systems with explicit rules and objectives [SDN11], and individuals or groups could define such rules and goals for any gamified system, effectively transforming it into something resembling a serious game. Additional challenges in clearly delineating the boundaries between gamification and serious games stem from the fact that these concepts are often combined to design engaging, technology-driven learning environments [TVI18].

Costa-Tébar et al. critically examine this and other definitions of gamification, proposing an expanded definition: "the use of game mechanics in a non-game context to achieve specific goals and create engagement." [CTGL24] This definition attempts to reduce ambiguity by emphasizing the necessity of specific goals. However, by doing so, it arguably complicates the differentiation between "gamification" and "serious games." Furthermore, it limits the application of gamification solely to fostering engagement, excluding other potential uses of game elements. While engagement is a dominant objective, game elements could also be employed to achieve alternative goals, such as shaping the attitudes of individuals already participating in a non-gamified system. Kevin Werbach mentions the pragmatic view that "a good definition should cover the systems that are generally understood to involve gamification, and exclude those that aren't" [Wer14].

Werbach argues that the important question is not whether a definition is "right" in an abstract sense, but whether the distinctions and boundaries it creates are "useful" and arrives at the definition that gamification is "the process of making activities more game-like" [Wer14]. For the purposes of this work, this definition, together with Deterding et al.'s definition of gamification as "the use of game elements in non-game contexts" [SDN11], is adopted, as it aligns with common usage in HCI research and is sufficiently broad to encompass all relevant applications of gamification discussed herein. Additionally, the term "digital gamification," as used in the context of this thesis, refers to gamification frameworks that incorporate digital components, whether implemented through software

or tangible electronic devices. Consequently, gamification frameworks that rely solely on analog elements, such as physical scoreboards or traditional board games, are deliberately excluded from this discussion.

### 2.2 Taxonomy of Game Elements

It is crucial for this study to closely examine how the term “game elements” is defined and how these game elements are commonly categorized within the contexts of human-computer interaction (HCI) and gamification. One key reason is that the term forms the foundation of the arguably most popular [Wer14] definition of gamification itself, “using game elements in non-game contexts” [SDN11], as discussed in Section 2.1. Additionally, this focus aligns with the research goal of implementing game element based interventions in the context of 3D software education and assessing their perceived impact.

Unfortunately, not only is there a lack of a common definition in gamification of what a game element is, there is also often ambiguity in their usage with inconsistencies between concepts and designations.[HAK<sup>+</sup>23] Halifax et al. published a scoping review of 280 research papers in November 2023 that tries to improve upon the situation by comparing definitions and usages and providing a framework representing a “common ground” between previous studies [HAK<sup>+</sup>23]. Based on the scope of this review, combined with its recentness, it seems to be a valid foundation for how the term “game element” is used and how these elements are categorized in this paper.

Building on the initial coinage of the term by Deterding et al as “elements that are characteristic to games, elements that are found in most (but not necessarily all) games” [SDN11], Halifax et al. provide the definition of a “game element” as a “a building block providing structure by explaining the rules and objectives, which aims to increase the user experience by satisfying the basic psychological needs of competence, choice, and relatedness, through the use of rewards, specific completion requirements, customization, and choice as well as means of socializing.” [HAK<sup>+</sup>23]

Subsequently, the game elements identified by Halifax et al. will be presented alongside brief, simplified version of their descriptions. More detailed explanations will be provided in the following sections as necessary. A total of 15 game elements were identified and categorized into three groups. The first group comprises elements characterized by "a strong cohesive definition," defined as having two or more properties present in at least 50% of the definitions[HAK<sup>+</sup>23]. These elements include:

- **Achievements:** Specific goals that reward the user when completed.
- **Avatar:** A (in many cases customize-able) representation of the user.
- **Narrative:** Game elements that engage the user by using context or story.
- **Points:** Simple numeric rewards.

- **Stages:** Provide a sense of progression to the user by breaking content or activities into sections.

The second category represents gaming elements that "weaker but still commonly agreed upon definition (i.e. at least one property present in at least 50% of the definitions)" [HAK+23]

- **Badges:** Rewards for users that often provide specific goals and in a lot of cases, have a visual aspect.
- **Competition:** A social game element with users often competing with each other.
- **Experience Points:** An often numerical reward representing user progression.
- **Leaderboards:** Game elements providing a form of ranking between users.
- **Levels:** Provide the users with a form of progression, often based on experience points.
- **Quest/Challenge/Goals:** Game elements that give the users specific tasks.
- **Time:** A game element that provides a time limit before a task is failed.

The third and final category includes two items that "did not show cohesive definitions (i.e., no properties present in over 50% of the definitions)". [HAK+23]

- **Feedback:** Often provides users with information about their performance.
- **Social:** Often groups users into teams and encourages interaction and cooperation.

## 2.3 Related Application of digital Gamification in Education

Enhancing student motivation has long been, and continues to be, a central concern in educational research [DD17]. Given this, it is both relevant and necessary to investigate methods and technologies that hold promise for improving student experience in this area. One such approach is gamification, which has seen rapid growth in educational and professional training contexts [CEO14]. As Caponetto et al. (2014) note, "gamification practices adopted to support learning processes enacted in the education and professional training sectors [constitute] a rapidly growing phenomenon" [CEO14].

Although a substantial body of literature has emerged on the use of gamification in education, its overall effectiveness remains underexplored, largely due to the multidisciplinary nature of the concept and the diversity of its applications across contexts [DD17]. While

the overall number of publications on this topic has steadily increased in recent years [TGS25], empirical studies specifically focusing on the implementation of gamification techniques within the Moodle platform remain relatively limited [PL19].

Nonetheless, Moodle appears to be the LMS most frequently employed by researchers investigating gamification [DK23] and it offers a wide array of tools that support gamified learning, illustrated by the existence of a dedicated book focused entirely on their application [Den15]. Among Moodle’s native features, the badge system stands out as the only functionality explicitly designed to support gamified teaching practices. However, other built-in tools can also be adapted to incorporate game mechanics, and numerous third-party plugins have been developed to enable the application of gamification strategies within Moodle-based courses. Badges, can be awarded as incentives for completing individual or collaborative activities, as demonstrated by Petroulis in their 2019 study [PTP19]. Additionally, badges can serve to communicate tiers of achievement, such as bronze, silver, gold, and platinum, based on student performance, as implemented by Raharjo et al. in 2021 [RHP21].

Several Moodle features not originally intended for gamification can also be repurposed effectively. These include conditional activity completion and content visibility settings, which can be used to guide learners through predefined paths that resemble game-like progression systems [PCMC<sup>+</sup>15]. Additionally, text and media blocks can be employed to construct a narrative framework that enhances the instructional experience.

In terms of plugins specifically designed to embed gamification into Moodle, there is a diverse selection available. For instance, the “Completion Progress” block<sup>1</sup> provides a visual representation of students’ progress, while “The Stash” plugin<sup>2</sup> introduces an item-collection mechanic within the Moodle environment [DK23]. One plugin in particular, “Level Up XP”, has gained notable popularity, with multiple studies utilizing it in empirical research [PL19][HNV19] or recommending it for educational use [PTP19][PCMC<sup>+</sup>15]. Overall, the gamification elements most frequently discussed in the context of Moodle are badges, [experience] points, and leaderboards [DK23].

The application of game-based methods or concepts for teaching complex software remains relatively underexplored in the existing literature. Nonetheless, several noteworthy examples exist. Dong et al., for example, employed a “jigsaw puzzle”-style challenge to facilitate discovery-based learning of Adobe Photoshop<sup>3</sup> [DDJ<sup>+</sup>12]. Similarly, Han et al. utilized in-game editors to introduce students to 3D modeling [Han15], while Villagrasa et al. implemented a scenario-based approach to foster collaboration among learners while teaching the use of 3D software [VFRD14]. By incorporating strong thematic elements based on LEGO toys (see Figure 2.3), the designed quests and challenges encouraged students to work together and produce relatively complex artistic creations.

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<sup>1</sup>[https://moodle.org/plugins/block\\_completion\\_progress](https://moodle.org/plugins/block_completion_progress) 01.01.2026

<sup>2</sup>[https://moodle.org/plugins/block\\_stash](https://moodle.org/plugins/block_stash) 01.01.2026

<sup>3</sup><https://www.adobe.com/at/products/photoshop.html> 01.01.2026

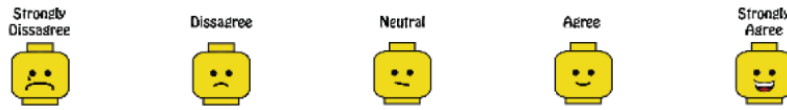


Figure 2.3: LEGO-themed Likert scale by Villagras et al. [VFRD14]

## 2.4 Opportunities of Gamification in Education

There is strong evidence supporting the potential positive impact of gamified methods and concepts in educational contexts. Multiple relatively recent systematic reviews of existing studies have concluded that gamification can be beneficial for learners [MLCLG<sup>+</sup>21][BHH20]. For example, Manzano-León et al. reviewed 198 publications and selected 14 for in-depth analysis, concluding that "the use of gamification can be beneficial at different educational levels, from school to university" [MLCLG<sup>+</sup>21]. The most frequently implemented elements in these studies included points, medals, rankings, and narrative components [MLCLG<sup>+</sup>21]. The authors reported improvements in student motivation, engagement, and academic achievement as a result of these gamified strategies. Similarly, Bai et al. analyzed 30 interventions reported across 24 publications, grouped them by the frequency of game elements (see Figure 2.4) and found a "significant overall positive effect" [BHH20] on students' academic performance. Key contributing factors identified included goal setting, the need for recognition, and performance feedback [BHH20]. As in the review by Manzano-León et al., the combination of badges, leaderboards, and points emerged as the most commonly employed gamification elements [BHH20].

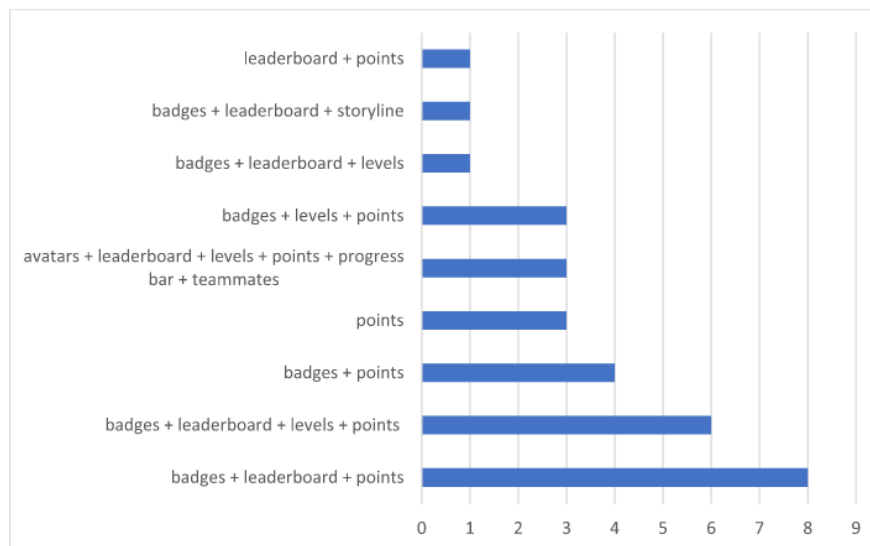


Figure 2.4: Frequency of game elements in meta-analysis by Bai et al.

Not only do these systematic reviews cover a wide range of studies in the diverse field of gamification in education, their results also appear promising. For more closely related research, the 2023 study by Dimitrov and Kovatcheva provides both recent and highly relevant insights into the potential impact of a gamified Moodle course [DK23]. Using A/B testing in a UX Design course with a test group of 65 students and a control group of 125 students, the authors were able to link the use of gamification to increased student motivation and engagement, lower attrition rates, and a significantly improved success rate [DK23]. Notably, Dimitrov and Kovatcheva suggest that their findings indicate gamified education may be more effective for the current generation of students than for the previous one, as it aligns more closely with what they describe as their “natural academic habitat” [DK23]. If this hypothesis is supported by further research, it could point to an even stronger positive impact of gamified methods and concepts in education than has been suggested by studies focused on earlier student groups.

Raharjo et al. used the Moodle-based Student Centered e-Learning Environment (SCeLE) to create a gamified learning platform at the Faculty of Computer Science, University of Indonesia [RHP21]. Although arguably limited in terms of gamification design due to a fragmented system where the leaderboard was implemented on an external site, a point system that could not be modified from the existing framework, and only four badges that merely signified general success levels, Raharjo et al. still reported improvements in active learning and participation [RHP21] suggesting that even limited gamification implementation may positively impact educational frameworks. In a 2019 study involving 41 graduate-level students (MSc and Ph.D.), Hasan et al. incorporated experience points, levels, and progress bars into the Moodle LMS for a Management Information Systems course at a university in Northern Cyprus [HNV19]. They found a clear positive effect of gamification on student engagement in the online discussion environment, arguing that progress bars, levels, and leaderboards played a key role in this outcome [HNV19]. Additionally, students reported that the gamified discussion environment was more enjoyable and exciting compared to traditional formats, and that it had a strong positive effect on their academic performance [HNV19].

Also in 2019, Poondej and Lerdpornkulrat conducted a study involving 104 first-year undergraduate students in an Information Literacy Skills course, implementing experience points, badges, and leaderboards within the Moodle platform [PL19]. Their results show that students were highly satisfied with the gamification features in Moodle and reported high levels of engagement [PL19]. The authors concluded that Moodle is a suitable platform for implementing gamified e-learning [PL19].

With regard to the use of gamification concepts in teaching complex software, all three studies introduced in Section 2.3 report positive outcomes [Han15][DDJ<sup>+</sup>12][VFRD14]. While the approach taken by Dong et al. may be classified more accurately as a “serious game” rather than traditional gamification, given the use of a jigsaw puzzle-like game along with elements such as leaderboards and user feedback, it is still noteworthy that the researchers found these features to be helpful in creating a supportive environment for discovery-based learning [DDJ<sup>+</sup>12]. However, the study’s small sample size of only 11

participants, combined with its relatively loose alignment with conventional gamification definitions, limits the general applicability of the findings.

Han’s 2015 publication is also highly relevant to this thesis [Han15]. It describes the application of “gamified pedagogy,” a concept based on gamification principles, to teach the 3D software 3DS MAX<sup>4</sup> [Han15]. Although the approach involves the use of the MMO “Second Life” and its editor, an actual game environment, rather than game elements embedded in a non-game context, there is considerable overlap with gamification, particularly in the area of user autonomy, which is central in gamification research [Det14a]. Compared to a more traditionally taught version of the course, Han reported a marked increase in both time spent on the course and student interest in learning [Han15].

The 2013 article by Villagrasa and Duran [VD13] and its 2014 follow-up study [VFRD14] are arguably the most directly relevant to this thesis among the reviewed publications. They present the implementation of gamification concepts in the Moodle LMS to support a learning platform designed for teaching 3D software to students in the Multimedia program at La Salle Campus Barcelona, Ramon Llull University [VD13]. The authors propose a scenario-driven learning approach in which students assume the role of an employee at a fictional toy company. The course emphasizes quests and collaboration, using experience points as a form of payment [VD13]. In the follow-up study, Villagrasa et al. present results from applying the approach proposed in their earlier work [VFRD14]. They concluded that students’ strong academic performance could be attributed in part to the use of gamification, the learning-by-doing methodology, and quest-based learning. Furthermore, the students expressed high levels of motivation and appreciation for working with 3D tools in a gamified environment [VFRD14].

## 2.5 Limits and Critique of Gamification

While a substantial number of the publications reviewed thus far support the argument that gamification holds significant potential to be beneficial in educational contexts, several areas of critique also emerge. A widely cited article in this regard is the 2017 review by Dichev and Dicheva, which analyzed 51 studies on gamified education [DD17]. In their review, the authors found that a considerable portion of the studies offered inconclusive evidence (64%) regarding the positive effects of gamification, and a notable number even reported negative effects (10%) [DD17] (see Figure 2.5). They argue that many empirical studies in this field lack a solid theoretical foundation and that the practice of gamifying education has outpaced researchers’ understanding of the underlying mechanisms and methods [DD17]. Furthermore, they point out that the wide variation in study focus, outcomes, and methodological approaches limits our understanding of how to tailor gamification effectively to specific educational contexts [DD17]. The authors conclude that higher-quality empirical evidence is needed, with greater attention to the psychological concept of motivation, more targeted research questions than simply

<sup>4</sup><https://www.autodesk.com/de/products/3ds-max/overview> 01.01.2026

whether “gamification motivates students, improves learning or increases participation,” and more practical guidelines for integrating game design principles into educational experiences [DD17].

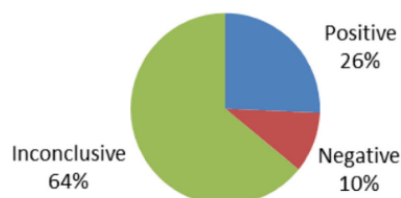


Figure 2.5: Gamification outcomes reported in the literature (Dichev & Dicheva) [DD17]

In 2018, Toda et al. conducted a review of 220 papers, from which 17 were selected for close analysis to examine the potential negative effects of gamification in education [TVI18]. While most of the studies reported mixed outcomes, both positive and negative impacts from the implementation of gamification, it is significant that in 12 of the 17 studies, students exhibited a decline in performance. Attempts to link these negative effects to specific game elements were inconclusive, likely due to the common practice of combining elements in varying configurations [TVI18]. As a result, Toda et al. highlight the importance of studying these components individually [TVI18]. They conclude that the frequently used approach of applying points, badges, and leaderboards (PBL) as a “template” may be problematic if not supported by sound instructional and motivational design theories [TVI18].

Another line of critique stems from gamification’s association with persuasive design and the ethical concerns inherent in influencing user behavior. Potential risks include threats to personal autonomy and privacy, as well as more extreme outcomes such as compulsive behavior or dependency [Roz24]. In his provocatively titled article “Why Gamification is Bullshit,” Ian Bogost even advocates for replacing the term “gamification” with “exploitationware,” claiming that this term more accurately reflects the intentions of many of its proponents [Bog15]. While this rather radical stance appears to target the use of gamification in commercial contexts, it remains relevant to consider the ethical implications of employing persuasive technologies and behavior-influencing design in education.

Kim and Werbach respond to such concerns by proposing a framework for the normative evaluation of gamified systems. They note that “gamification is not per se exploitative, manipulative, harmful, or detrimental to character, but neither can any of those objections be dismissed out of hand” [KW16].

On a broader conceptual level, Sebastian Deterding argues that it is problematic that gamification is frequently framed as “driving any desired activity by tracking it and adding a feedback layer of points, badges, leaderboards, and incentives on top” [Det14a]. He warns that such “tacked-on” game elements fail to meaningfully engage with the psychological and sociological foundations of game enjoyment [Det14a]. In his 2011

Google Tech Talk [Det11] (see Figure 2.6), still available on the video-sharing platform YouTube at the time of writing, Deterding elaborates on this critique, identifying three core psychological needs often overlooked in gamification design: meaning, mastery, and autonomy [Det11]. He argues that to foster game-like engagement, the underlying activity must be meaningful in itself and only enhanced by game design elements. Additionally, it should support the development of skill and offer users the freedom to shape their interaction with the system [Det11].



Figure 2.6: 2011 Google TechTalk by Sebastian Deterding [Det11]

In his 2014 article, Deterding provides a striking example of a failed gamification implementation: laundry staff at Disneyland hotels were ranked against each other on a leaderboard based on their working speed [Det14a]. Rather than increasing motivation, the system created pressure and stress, with workers referring to the leaderboard as an “electronic whip” [Det14a]. The notion that the freedom to engage voluntarily is essential for enjoyment is further supported by evidence showing that professional video game players often report decreased enjoyment [Det14b].

These concerns underscore the challenges of designing gamified courses, combined with the notion that educators often report a significant increase in time and effort required to create gamified learning content and frameworks compared to more traditional teaching approaches [VFRD14].

## 2.6 Instructional and Motivational Design Theories

As outlined in Section 2.5, a major point of criticism concerns the lack of a solid theoretical foundation in many studies implementing gamification within educational contexts [TVI18] [DD17]. Consequently, it appears highly advisable to draw on findings from research in the fields of motivational and instructional design to inform the development of the course discussed in this thesis. Among motivational theories, Self-Determination Theory (SDT) by Ryan and Deci [RD00] is arguably the most frequently cited in the context of gamification [Zar22]. In their 2000 article introducing SDT, Ryan and Deci argue that, with regard to intrinsic motivation, “conditions supportive of autonomy and competence reliably facilitated this vital expression of the human growth tendency,

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whereas conditions that controlled behavior and hindered perceived effectance undermined its expression” [RD00]. Notably, this emphasis on autonomy and competence aligns closely with Sebastian Deterding’s argument in his 2011 Google TechTalk [Det11].

A well-established framework for understanding learning motivation is the ARCS model (Attention, Relevance, Confidence, and Satisfaction), originally introduced by Keller in 1984 to “improve the motivational appeal of educational material” [Kel87]. Over its more than forty years of existence at the time of writing, the model has been applied extensively across numerous studies and in a wide range of countries [LK18]. The ARCS model comprises four key dimensions (see Figure 2.7). Attention involves maintaining learners’ curiosity, attentiveness, and concentration; Relevance focuses on helping students understand the personal significance and practical value of the content being taught; Confidence addresses strategies that help learners believe in their ability to succeed through effort and collaboration; and Satisfaction emphasizes the importance of reinforcing a sense of accomplishment and pride in learning outcomes [LK18].



Figure 2.7: Four dimensions of the ARCS model [Clo24]

Importantly, the model also integrates elements related to learner autonomy. The third dimension, Confidence, initially termed Expectancy, encompasses “several areas of research that are concerned with people’s self-confidence and their feelings of control over their lives and environment” [Kel87]. Although student demographics and educational technologies have evolved considerably since the model’s introduction, a 2018 review by Keller and Li reaffirmed its continued relevance, concluding that there are still “evidences that the ARCS model can be applied into different learning environments, to different levels of students, and in different countries” [LK18].

Another highly relevant contribution is Csikszentmihalyi’s widely cited 1990 paper (9,993 citations at the time of writing) based on his 1975 book [Csi75] on the psychological state known as “flow,” which he describes as “a state of joy, creativity and total involvement, in which problems seem to disappear and there is an exhilarating feeling of transcendence” [Csi90]. Since then, multiple researchers have examined this concept in relation to gamification and motivation [LAC17][APK<sup>+</sup>17], with findings suggesting that gamification

may contribute to a more engaging and stimulating learning environment [APK<sup>+</sup>17].

In a 2019 article, Klock et al. propose the “User-Centered Approach,” which builds on the idea of tailoring gamification based on users’ individual characteristics [KGP19]. This approach appears promising, as the authors report that “the user-centered gamification was able to increase the students’ interaction, engagement and satisfaction in e-learning systems” [KGP19]. Subsequent work, such as Nadja Zaric’s “PeGaM (Personalized Gamification Design Model),” further develops this perspective and highlights that “learning tendencies are important factors to consider when designing and targeting gamification” [Zar22]. However, this study can only address these findings superficially, primarily due to the significant effort required to obtain such detailed user information and the scope limitations of this master’s thesis. Thus, while a user-centered design will not be implemented, the insights offered by these approaches remain valuable and are taken into account in the overall gamification strategy.

## 2.7 Summary

This chapter provides a comprehensive overview of the use of digital gamified methods and concepts within the educational domain. It demonstrates that the term gamification is contested in contemporary research and concludes that, for the purposes of this thesis, Werbach’s argument, that a definition does not need to be “right” but rather useful [Wer14], is a reasonable stance. Furthermore, it is argued that the most commonly cited definition by Deterding, which describes gamification as “the use of game design elements in non-game contexts” [SDN11], when combined with Werbach’s definition of gamification as “the process of making activities more game-like” [Wer14], provides a particularly suitable conceptual foundation for this work.

The chapter then proceeds to examine efforts to define game elements and presents the taxonomy proposed by Hallifax et al. This analysis illustrates that there is a varying degree of consensus regarding the definition of individual game elements, with some elements exhibiting weak or no cohesive definitions [HAK<sup>+</sup>23].

In addition, prior applications of gamification in comparable educational contexts are reviewed to assess both opportunities and limitations [Han15][DDJ<sup>+</sup>12][VFRD14]. This review reveals that the Moodle Learning Management System (LMS) is not only well suited for the implementation of gamified courses but is also the most frequently used platform in this context [DK23]. The examination of previous studies on the use of digital gamified methods and concepts in education further provides strong evidence for their potential positive impact on learning outcomes [MLCLG<sup>+</sup>21], [BHH20]). However, Dichev and Dicheva’s 2017 review indicates that a substantial proportion of studies report inconclusive (64%) or even negative effects (10%) [DD17].

The work of Sebastian Deterding is particularly influential for this thesis. Deterding argues for an increased focus on the often-overlooked psychological needs of meaning, mastery, and autonomy in the context of gamification [Det11], and he provides cautionary

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examples illustrating the potential misuse of gamification concepts [Det14a]. Another critique relevant to this thesis is offered by Toda et al., who argue that there is insufficient understanding of the effects of individual game elements due to the widespread practice of combining multiple elements in varying configurations [TOK<sup>+</sup>19].

Dichev and Dicheva further highlight a lack of theoretical grounding in many of the studies they reviewed [DD17], which motivates the final section of the chapter. This section introduces several models from instructional and motivational theory, including Self-Determination Theory (SDT) by Ryan and Deci [RD00] and Keller’s Attention, Relevance, Confidence, and Satisfaction (ARCS) model [Kel87]. These models, among other contributions, support Deterding’s emphasis on autonomy and meaning. Additionally, the concept of flow, introduced by Csikszentmihalyi [Csi90], is discussed in relation to its potential positive effects in gamified educational contexts [APK<sup>+</sup>17].

# Design of the Gamified Moodle Course

The goal of this chapter is to present the design of the course and the rationale behind the decisions that led to its finalized implementation, with respect to content, structure, and gamification design. This description is intended not only to facilitate the evaluation of the resulting data but also to provide guidance for educators seeking to develop similar LMS-based learning platforms. Consequently, the chapter addresses both the elements successfully implemented in the final course and those that did not achieve the intended functionality, with the aim of helping future course designers avoid similar pitfalls.

## 3.1 Structure of the Course

Reducing cognitive load was a key design goal for the course, therefore it was essential to achieve a high level of visual and structural clarity in its design. In general, Moodle is structured such that each course is hosted on a single page comprising multiple sections. These sections typically contain various types of learning materials such as videos, texts, and quizzes, as well as assignments that enable students to upload their submissions (see Figure 2.1). A recently introduced feature in Moodle 5.0, subsections, implemented at HTBLuVA Spengergasse shortly before the course design phase, proved particularly valuable, as it enabled the nesting of content sections and thus supported a clear and hierarchical organization of materials.

The course was structured around five main components: Materials, Basic Tutorials, Advanced Tutorials, Final Exam, and a Help section (see Figure 3.1). The Materials section contained all necessary resources for completing assignments, including Maya project files (e.g., 3D objects for manipulation), image assets for texturing, and links to required software installations. The Basic section, divided into three subsections

### 3. DESIGN OF THE GAMIFIED MOODLE COURSE

corresponding to the three levels of the course's gamified design (see Section 3.2.1 for details), provided the foundational knowledge required to progress through the course. It introduced essential functions of Autodesk Maya, such as scene navigation, file management, and the creation and manipulation of simple objects using primitive shapes.

The Advanced section also comprised three subsections, focusing on Modeling, Rendering, and Animation. The Final Exam section included the description of the culminating assignment, the successful completion of which represented the main learning goal of the course.

Finally, the Help section provided a range of student support materials, including video tutorials addressing common issues, a shortcut glossary, and a video library containing non-interactive versions of all completed tutorial videos.

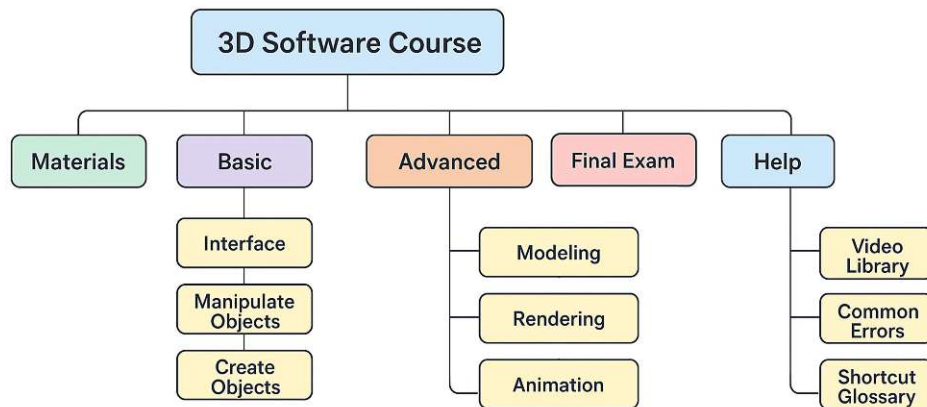


Figure 3.1: Visualization of the course structure

In alignment with the gamification system of experience points and levels (see Section 3.3), the course content was designed to unlock in a carefully orchestrated sequence. This structure was implemented using the level-based system provided by the Level Up XP plugin, in combination with native Moodle features such as activity completion tracking and conditional access requirements. Upon first entering the course, students were presented with only a limited amount of content to prevent cognitive overload. The five main subsections defining the overall structure of the course were visible from the beginning, but no content was initially unlocked except for the first interactive video tutorial within the initial subsection of the Basic topics.

Subsequent instructional materials became available progressively as students completed interactive video tutorials. The Basic section followed a predominantly linear progression, aside from a few optional videos covering more advanced topics, while the Advanced section allowed for greater flexibility, enabling students to select topics of personal interest.

This design choice reflected the pedagogical structure in which the Basic section provided the foundational knowledge necessary for all three Advanced topics, each of which focused on distinct functionalities of the 3D software. Similarly, the Materials and Help sections were configured to unlock dynamically, ensuring that relevant resources became available precisely when needed.

To discourage students from skipping through the instructional videos, forwarding functions were disabled, and interactive elements were embedded at the end of each tutorial using the H5P content type available in moodle. These interactions included single- and multiple-choice questions, true/false items, and simple “match connected elements” challenges, all designed to reinforce the key concepts presented in the videos. To prevent this interactivity from making later review cumbersome, a Video Library was included within the Help section. This library provided standard, non-interactive versions of each video with full playback control, unlocked once the corresponding interactive version had been completed. This structure effectively minimized cognitive overhead while ensuring that all necessary materials became accessible precisely when they were pedagogically relevant.

One notable aspect of the course structure was the inclusion of an additional grading point system alongside the experience points. Since the course was part of the first-year curriculum, it was necessary to provide a means of assessing individual student performance. Accordingly, each assignment awarded grading points based on the quality of the submission. While the experience points earned through course engagement determined progression, the accumulated grading points defined the final grade upon course completion. It is important to note that the grading approach was intentionally designed to be highly lenient: full points were granted as long as all assignment requirements were met, even if only minimally. This strategy aimed to maintain the course’s motivational focus as intrinsically driven as possible. Although the course comprises nine levels in total, the completion criterion was passing the final exam, which became available at level 6 and awarded sufficient experience points to progress by one level. As a result, the final two levels could only be reached through engagement with optional content. This structure was intentionally designed to provide a clear and attainable goal for students with less prior experience or a slower learning pace, while still offering engaging and challenging opportunities for more advanced or highly motivated participants.

#### 3.1.1 Basic Tutorial Section

As outlined above, the basic tutorial section is organized into three levels that follow a largely linear progression, as the material provides a general foundation for working with the 3D software. This section includes three types of elements: interactive H5P video tutorials, assignments that require students to upload a submission, and text fields containing supplementary information, for example, notifications about important files becoming available in the course’s materials section.

The course uses an unlock system in which content remains hidden until specific criteria are met, a deliberate design choice intended to reduce cognitive load. Consequently, when students first enter the course, the basic tutorial section displays only a single subsection (Level 1) containing one item: the first video tutorial (1.1). Completing this tutorial by submitting an answer within the interactive content triggers multiple actions (see Table 3.1 for an overview of the unlock structure of the first level). The “To do” label next to the video title turns green and changes to “Done,” the next video tutorial (1.2) becomes visible and unlocked (see Figure 3.2), and students receive both grade points and experience points (see Section 3.3 for details on the gamification design). In addition, a “regular” version of the tutorial, featuring full playback controls and no interactive elements, is added to the library in the help section for review.



Figure 3.2: Basic tutorial section of the course after completing the first tutorial

Following this structure, completing the second video tutorial (1.2) unlocks and reveals video tutorial 1.3. At the same time, the corresponding entry in the video library becomes visible, and the student receives both grade points and experience points. Because the library updates and point allocations occur consistently for all video tutorials (with variations only in the amount of experience points awarded; see table 3.6), these actions will not be explicitly reiterated in the remainder of this description. Completing video 1.2 also reveals the first assignment, although it initially appears in a locked state (see Figure 3.3).

H-P Videotutorial Level 1.1 - Visuelle Hilfe für die Lernvideos ✓ Erledigt

H-P Videotutorial Level 1.2 Ordner anlegen für Projekte ✓ Erledigt

H-P Videotutorial Level 1.3 Screenshots erstellen für Abgaben ★ Zu erledigen

📁 ABGABE Level 1.3 Screenshot: Screenshot-Ordner

Aufgabe ist es einen Screenshot zu erstellen auf dem der Screenshot-Ordner zu sehen ist (siehe Bild unten) und hier hochzuladen.

Benennung der Datei: **Nachname\_ScreenshotOrdner.jpg**

Figure 3.3: Basic tutorial section of the course after completing the second tutorial

Completion of video tutorial 1.3 unlocks the assignment, indicated by a star icon appended to its title (see Table 3.5 for an overview of the assignments). It also adds a new entry to the shortcut glossary, documenting the screenshot shortcut introduced in the video. In addition, a text field summarizing the content of the first three tutorials appears, along with video tutorials 1.4, 1.5, and 1.6. Because the content of these three interactive videos is mutually exclusive, they may be completed in any order, thereby supporting learner autonomy. A deliberate design decision was made to avoid requiring assignment completion for unlocking further content within a level, although progressing to the next level is not possible without completing all assignments. This approach ensures that students using mobile devices can continue engaging with the interactive video content, even when they are temporarily unable to work directly with the 3D software.

Completing video tutorial 1.4 unlocks tutorial 1.7, the optional tutorial 1.4a, the first help-section video addressing common issues related to the presented content, and the first item in the materials section, a Maya scene file required for subsequent assignments. The other two tutorials in this sequence (1.5 and 1.6) each unlock their corresponding

### 3. DESIGN OF THE GAMIFIED MOODLE COURSE

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assignments, again indicated by the star icon.

Completion of video tutorial 1.7 unlocks tutorial 1.8, which in turn unlocks its associated assignment as well as the final video tutorial of level 1 (1.9). Completing tutorials 1.7 and 1.9 also reveals additional help-section videos that address typical problems connected to their respective content.

Table 3.1: Overview of the video tutorial structure of level 1

Number	Content	Requirements	Mandatory	Section
1.1	Visual Support in Videos	–	Yes	Basic 1
1.2	Windows Folder Structure	1.1	Yes	Basic 1
1.3	Creating Screenshots	1.2	Yes	Basic 1
1.4	Maya Main Menu	1.3	Yes	Basic 1
1.4a	Menu "Hotbox"	1.4	No	Basic 1
1.5	Settings	1.3	Yes	Basic 1
1.6	Workspace	1.3	Yes	Basic 1
1.7	Opening Maya Files	1.4, 1.5, 1.6	Yes	Basic 1
1.8	Navigating Virtual 3D Space	1.7	Yes	Basic 1
1.9	Panel Menu	1.8	Yes	Basic 1

Once all mandatory content in this section has been completed, the next section (level 2) becomes available (see Table 3.2 for an overview of the unlock structure of the second level). At this point, the first two tutorial videos of that level (2.1 and 2.2), the section's initial assignment, and additional materials and help resources are unlocked. To support a course structure that maximizes learner autonomy while still ensuring that related materials are accessed in an appropriate sequence, completing tutorial video 2.1 unlocks tutorial 2.3, additional resources, and another assignment. Completing this interactive video tutorial then provides access to all remaining mandatory content in level 2, including tutorials 2.4 and 2.5 and accompanying materials, while leaving optional video 2.5a and the subsection's final assignment locked until video tutorial 2.5 is completed.

Table 3.2: Overview of the video tutorial structure of level 2

Number	Content	Requirements	Mandatory	Section
2.1	Move Tool	Level 2	Yes	Basic 2
2.2	Undo	Level 2	Yes	Basic 2
2.3	Rotate/Scale Tool	2.1	Yes	Basic 2
2.3a	World/Object Axes	2.3	No	Basic 2
2.4	Import Objects	2.3	Yes	Basic 2
2.5	Duplicate and Combine	2.3	Yes	Basic 2
2.5a	Context Menu	2.5	No	Basic 2

Finishing all required components of this subsection reveals level 3 and unlocks all associated tutorial videos (3.1, 3.2, 3.3, and 3.4), as well as the first assignment for this level, thereby further increasing non-linearity and enhancing learner autonomy (see Table 3.3 for an overview of the unlock structure of the third level). The second and final assignment of the basic section becomes available once tutorial 3.4 is completed. Completion of these materials concludes the basic portion of the course and unlocks all three subsections of the advanced section.

Table 3.3: Overview of the video tutorial structure of level 3

Number	Content	Requirements	Mandatory	Section
3.1	Create Polygon Primitives	Level 3	Yes	Basic 3
3.2	Grouping and Parenting	Level 3	Yes	Basic 3
3.3	Channelbox and Layers	Level 3	Yes	Basic 3
3.4	Attribute Editor and Object Color	Level 3	Yes	Basic 3

### 3.1.2 Advanced Tutorial Section

With the basic course providing the essential foundations for navigating the virtual 3D environment and using the software's core functions, the advanced course could be structured in a more open and flexible manner (see Table 3.4 for an overview of the unlock structure of the advanced part of the course). The advanced section is divided into three subsections, each containing five mandatory and two optional interactive video tutorials, as well as two assignments, amounting to a total of 21 videos and six assignments. Although certain sequencing constraints within each subsection were unavoidable, and are discussed in this subchapter, the course was intentionally designed to maximize student autonomy. Learners could select from the available tutorials and assignments, provided they completed at least four assignments and the ten mandatory tutorials required to unlock the final exam. All remaining content then became optional.

As in the basic course, the sequencing constraints arose from content dependencies, with later material building on concepts introduced earlier. In the modeling subsection, for example, the first video (M.1), which introduces object components, had to be completed before any other mandatory tutorial. This requirement ensured that students possessed a foundational understanding of component-level object manipulation, which underpins the remainder of the subsection. The only tutorials not unlocked by completing M.1 were the optional videos (M.2a and M.5a). These became available only after completing their corresponding mandatory tutorials (M.2 and M.5), as they present advanced concepts that extend the material covered in the required videos.

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Table 3.4: Overview of the advanced video tutorial structure

Number	Content	Requirements	Mandatory	Section
M.1	Object Components	Level 4	Yes	Modeling
M.2	Soft Select	M.1	Yes	Modeling
M.2a	Hidden Primitives	M.2	No	Modeling
M.3	Extrude Tool	M.1	Yes	Modeling
M.4	Object History	M.1	Yes	Modeling
M.5	Instert Edgeloop/Smooth Preview	M.1	Yes	Modeling
M.5a	Tool Options	M.5	No	Modeling
R.1	Light Sources and Rendering	Level 4	Yes	Rendering
R.2	Directional Lights	R.1	Yes	Rendering
R.3	2-Point Light Setup	R.2	Yes	Rendering
R.3a	3-Point Light Setup	R.3	No	Rendering
R.4	Arnold Material Presets	R.1	Yes	Rendering
R.4a	Texturing and UV-Mapping	R.4	No	Rendering
R.5	Render Setting	R.1	Yes	Rendering
A.1	Animation Workspace and Settings	Level 4	Yes	Animation
A.2	Create and Edit Keyframes	A.1	Yes	Animation
A.2a	Autokey Function	A.2	No	Animation
A.3	Create Playblasts	A.2	Yes	Animation
A.4	Eases and Linear Animation	A.2	Yes	Animation
A.4a	Graph Editor	A.4	No	Animation
A.5	Working with Character Rigs	A.2	Yes	Animation

Access to assignments was intentionally more restricted (see Table 3.5 for an overview of the unlock structure of the assignments). The first assignment was unlocked only after students completed the first two mandatory tutorials, while the second became available only after the completion of all mandatory content in the subsection. This structure ensured that students had engaged with the instructional material necessary to successfully complete the associated practical tasks.

Although the course did not include formally designated optional assignments, the advanced module required students to complete only four assignments of their choice, effectively making the remaining two optional. Tables 3.1-3.5 provide an overview of the course's video and assignment structure. Note that each assignment number corresponds to the highest-numbered video tutorial that must be completed to unlock that assignment.

Table 3.5: Overview of the assignment structure

Number	Assignment	Required	Section
1.3	Create a Screenshot	1.2, 1.3	Basic 1
1.5	Set Maya Preferences	1.3, 1.5	Basic 1
1.6	Setup the Workspace	1.3, 1.6	Basic 1
1.8	Open a Scene	1.7, 1.8	Basic 1
2.1	Use the Move Tool	2.1	Basic 2
2.3	Use the Rotate- and Scale-Tool	2.2, 2.3	Basic 2
2.5	Use Duplicate	2.2, 2.3, 2.5	Basic 2
3.1	Create an Object from Primitives	3.1	Basic 3
3.4	Create a Colored Figure	3.1, 3.4	Basic 3
M.2	Sculpt a Landscape	M.1, M.2	Modeling
M.5	Create a Magican-Home	M.1, M.3, M.5	Modeling
R.3	Light a scene	R.2, R.3	Rendering
R.5	Create a Rendering of a Golden Object	R.3, R.4, R.5	Rendering
A.2	Create an Animation	A.1, A.2	Animation
A.5	Create a Video of a Rig-Animation	A.2, A.3, A.5	Animation
–	Final Exam (see Section 3.2.3 for Details)	Level 6	Final Exam

## 3.2 Course Content

The course was designed to be conducted during the first four weeks of the first-year program at HTBLuVA Spengergasse and was therefore developed under the premise that students possessed no prior knowledge of 3D software such as Autodesk Maya. The selection of course content was informed by the author's professional background in the field of 3D animation, over a decade of experience teaching 3D software to beginners, and feedback from colleagues with comparable teaching expertise.

The finalized course content can be categorized into five main sections. The first and shortest section provided a general introduction to foundational skills external to the 3D software itself, such as taking screenshots for assignments and organizing project files within appropriate folder structures. The second section introduced core functions related to general software usage, including the underlying interface philosophy, file management (saving, loading, and importing), navigation within the virtual 3D space and basic object creation.

### 3. DESIGN OF THE GAMIFIED MOODLE COURSE

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The remaining three sections focused on the primary application areas of 3D software taught at HTBLuVA Spengergasse: 3D modeling, image rendering, and 3D animation. In this context, 3D modeling refers to the creation of polygonal models based on so-called primitive shapes through their combination and modification using modeling tools and component-level manipulation [Ghu23]. Image rendering, in turn, will be divided into three key subcategories necessary for producing a rendered 3D image for the purpose of this thesis: shading (the design of surface properties of virtual objects), lighting (the creation and adjustment of virtual light sources and their attributes), and render settings (the configuration of parameters determining the balance between image quality and rendering speed, as well as output format definition). Figure 3.4 presents an example of a rendered image of a 3D model created using Autodesk Maya. Finally, 3D animation involves creating and manipulating the movement of 3D objects within the virtual space and, in the context of this course, includes generating video files to enable the submission and sharing of animated results as assignments.



Figure 3.4: Example of a render created in Autodesk Maya [Aut]

An early decision was made to structure the course content around the minimum level of instruction necessary for students to creatively produce content. As a result, certain elements typically introduced in early lessons were deliberately excluded. These included best practices such as naming conventions, potential errors relevant primarily to more advanced workflows, and tools emphasizing precision. This approach was intended to maximize the potential for fostering intrinsic motivation among participants, as these omitted elements were frequently reported by students to reduce enjoyment.

In addition to the core instructional material, a substantial collection of supplementary video tutorials and glossary entries was developed to address commonly encountered issues

and challenges. The intention was to enable students to independently resolve difficulties and continue their learning outside of scheduled class sessions without encountering obstacles that might hinder their progress.

In total, 57 video tutorials with a combined runtime of three hours, nineteen minutes, and forty-six seconds (03:19:46) were produced. This collection included 42 instructional videos featuring interactive components (03:08:33) and 15 shorter videos designed to assist with common errors and difficulties (00:11:12). These interactive components included multiple-choice, single-choice, and true/false questions, as well as challenges in which participants were asked to match related terms, such as software functions and corresponding keyboard shortcuts (see Figure 3.5 for an example of an interactive element being shown). These interactive elements were designed not only to increase engagement but were also required at a technical level to enable video completion tracking by the Moodle LMS and the "Level Up XP" plug-in.

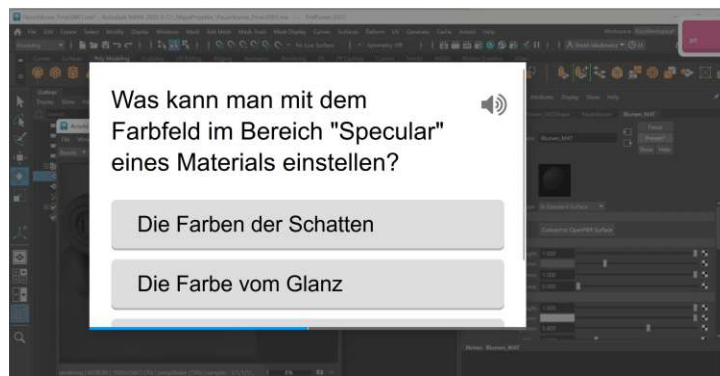


Figure 3.5: Example of a tutorial video with interactive elements

In addition, a total of 15 assignments were developed to allow students to apply the skills introduced in the tutorial videos. These assignments are not numbered sequentially; instead, each is named after the video tutorial that unlocks it upon completion. While most assignments were designed to be relatively straightforward, requiring students to apply the functions demonstrated in the tutorials while allowing some room for creative exploration, there is one notable exception. The final assignment in the basic section marks a midpoint in the course and requires participants to use all tools and techniques learned up to that point to create a multicolored figure, granting them considerable creative freedom in both design and subject matter. Notably, these assignments did not permit the reuploading of submissions. This decision was made deliberately to enable the swift grading of submissions and the timely delivery of feedback.

Separate from these 15 assignments is the final exam. Although closely related to the general assignment structure, it occupies a distinct position within the course for several reasons. First, because its completion represents the primary objective of the course, it holds particular importance. Second, the exam must account for multiple possible

progression paths through the course, requiring it to accommodate a range of skill sets. Third, due to its unique role, it is not included in either the basic or advanced sections but constitutes its own dedicated section. An overview of all assignments, including the final exam, is provided in Table 3.5. A detailed discussion of the final exam’s implementation and design is presented in Section 3.2.3.

#### 3.2.1 Basic Tutorial Section

As outlined above, the introductory tutorial section is divided into three subsections. The first subsection primarily addresses essential prerequisite information, file management, and the general user interface of the software. During the production of the tutorial videos, a program called Keystro<sup>1</sup> (see Figure 3.6) was utilized to enhance visual clarity. This software provides various options for visualizing keyboard inputs and mouse interactions, thereby improving the comprehensibility of screen-captured demonstrations of digital workflows.

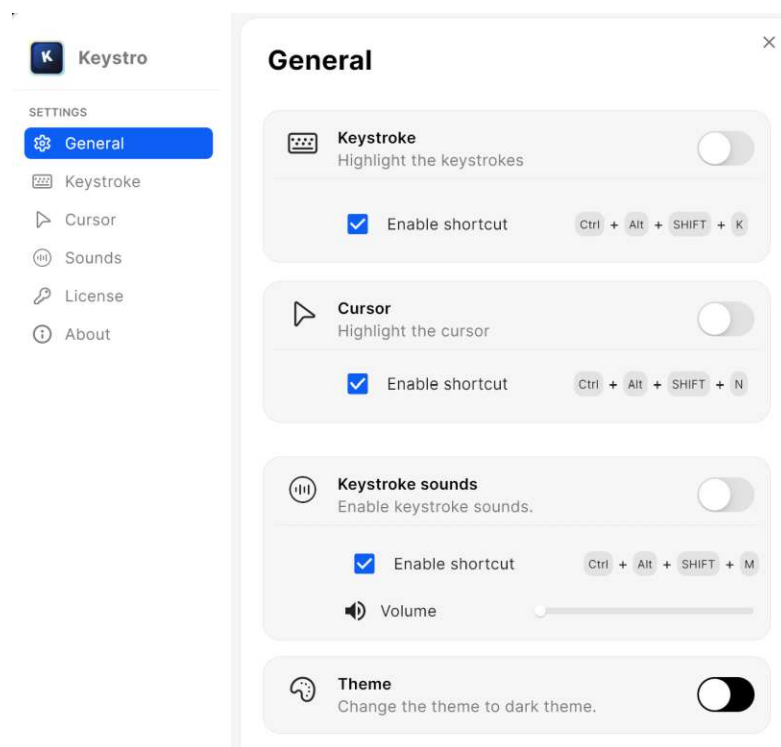


Figure 3.6: Keystro app used as visual aid in the video tutorials

To familiarize participants with this setup, the first interactive video of the course (1.1) introduces Keystro and explains how it was employed in the creation of the tutorial materials. For instance, it demonstrates the color coding used to distinguish different

<sup>1</sup><https://keystro.app/> 27.12.2025

mouse button presses. The second tutorial video (1.2) guides learners through creating the recommended folder structure within Windows for working with Autodesk Maya in the context of the course. Establishing this structure is important because special characters common in the German language (such as “Ä,” “Ö,” and “ß”) can cause issues if they appear in project paths. Since Maya uses the user directory as the default project path, problems may occur when the username contains these special characters. The third interactive tutorial (1.3) explains how to capture and save screenshots, which are frequently required for assignment submissions.

After covering these preparatory topics, the actual software training begins. The subsequent tutorial (1.4) provides an overview of the main menu and highlights the interface sections relevant to the course (see Figure 3.7). An optional video (1.4a) then introduces the “Hotbox,” an advanced feature that enables faster access to menu items. Tutorial video 1.5 focuses on disabling certain default settings in Maya’s preferences that, based on years of teaching experience, tend to cause difficulties for beginners. These include the “ViewCube,” a navigational aid that can unintentionally restrict 3D perspective control and confuse novice users, the zoom function assigned to the mouse scroll wheel, which lacks precision compared to the standard method and may malfunction with certain mice, and the “Hold Shift to Extrude” shortcut (see Section 3.2.2 for an explanation of the Extrude Tool), which, while useful for experienced users, often leads to unintended geometry errors when triggered accidentally by beginners.

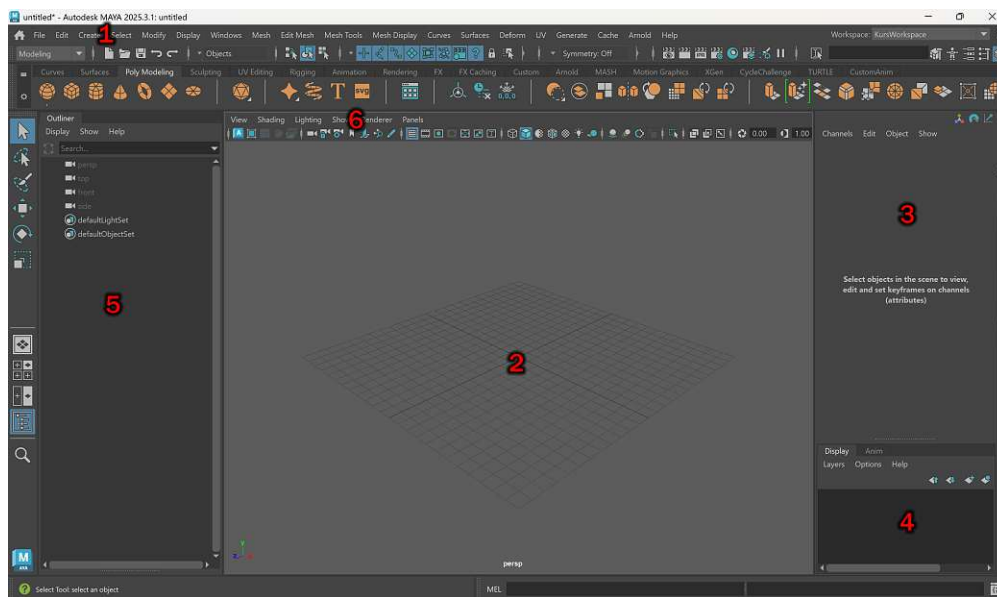


Figure 3.7: Autodesk Maya UI showing Menu (1), Perspective View (2), Channelbox (3), Layer Editor (4), Outliner (5), and Panel Menu (6)

The next tutorial (1.6) introduces the key areas of the user interface and demonstrates how the layout can be customized. It also guides learners in creating and saving a

personalized interface configuration optimized for the remainder of the course. Tutorial video 1.7 then explains how to open a Maya scene file, preparing users for the subsequent discussion on navigating within the virtual 3D space. This includes focusing on selected objects and switching between perspective and orthographic views (front, side, and top), which are covered in detail in video 1.8. The final interactive tutorial video of this introductory section (1.9) addresses the panel menu, located at the top of each view panel, and explains its functions related to layout, content, and visibility options of panels.

The topics covered in the second section can be broadly summarized under the theme of object manipulation. The first tutorial video (2.1) introduces the Move tool, which allows users to adjust the position of objects, while the second tutorial (2.2) explains how to undo previous actions. Tutorial 2.3 then covers the Rotate and Scale tools, which are used to modify the orientation and proportions of objects along one or multiple axes. This is followed by an optional tutorial (2.3a) that provides a more detailed explanation of transformation axes in Maya, specifically local and global transformations, illustrating how to switch between these modes and when each is most appropriate.

The next tutorial (2.4) expands on the file management principles introduced in tutorial 1.7 by explaining the import function, which allows users to integrate an existing Maya scene file into an open project. It also discusses saving scene files, outlining the differences between the two available formats (.ma for ASCII-based files and .mb for binary files) and provides an overview of the Maya project folder structure. Tutorial 2.5 demonstrates how individual objects or object groups can be duplicated, combined into single entities, and subsequently separated again. An optional video (2.5a) introduces the “Context Menu,” a more advanced yet efficient method for accessing these functions, comparable to the optional “Hotbox” tutorial from the first section (1.4a).

The third and final subsection of the basic tutorial series focuses primarily on object-level creation of 3D models. It begins with tutorial 3.1, which demonstrates how to create 3D primitives which are fundamental geometric objects available in Maya’s preset library (e.g., spheres, cubes, cylinders). This video also covers deleting and duplicating objects, including duplication methods that apply transformations to rapidly construct more complex shapes. The next tutorial (3.2) introduces hierarchical relationships between objects, such as parent-child structures and grouping. It further explains how to modify an object’s pivot point, the central reference point used for transformations such as rotation and scaling and presents the Outliner, an editor that displays the contents of the current scene in a folder-like hierarchical structure.

Tutorial 3.3 then introduces the Channel Box, an editor providing precise control over individual transformation parameters, and explains the Layer System, which, similar to layer management in software such as Adobe Photoshop, enables users to control object visibility. This tutorial also demonstrates the mirroring of objects, a feature explicitly included based on recommendations from colleagues during the planning phase, as it had been frequently requested by students.

The final interactive tutorial of this subsection, and therefore of the entire basic tutorial series, video 3.4, explains how to assign shaders to objects, adjust their colors, and use the Attribute Editor to modify basic shader properties.

The overarching goal of this foundational section is to equip learners with all the skills necessary to create colored 3D models composed of basic geometric primitives, as illustrated by students' results shown in Figure 3.8.

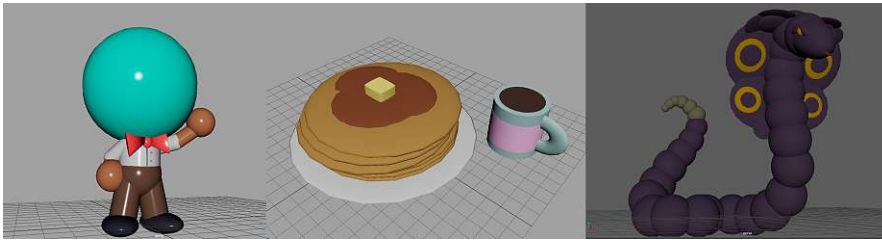


Figure 3.8: 3D Models created by students after completing the basic sections

### 3.2.2 Advanced Tutorial Section

As outlined earlier, the advanced section of the course comprises three subsections. Unlike the basic sections, these are not designed to be completed in a fixed sequence; instead, students are encouraged to select topics based on their individual interests (see Chapter 3.1 for details on the course structure). Consequently, the order in which the following content is presented is arbitrary and does not necessarily reflect the order of student engagement or progression. The three subsections are organized thematically: one focuses on advanced 3D modeling, another on creating rendered images and editing shaders, and the third on 3D animation.

In the modeling subsection, the first interactive video tutorial (M.1) introduces object components and component-level editing of 3D meshes. This is followed by a tutorial (M.2) that demonstrates how to increase the component resolution of objects and how to employ the Soft Select Tool, which enables the manipulation of components within an area of influence defined by a falloff curve. An optional tutorial (M.2a) further illustrates how adjusting resolution settings can be used to create primitive objects that are otherwise unavailable, for example, reducing the side resolution of a cone to four sides can produce a pyramid-like shape. Tutorial M.3 introduces the Extrude Tool, a versatile function that, when applied to one or more polygons, generates a new loop of polygons around the selected area (see Figure 3.9). This allows for the movement of surfaces without distorting the surrounding geometry, thereby facilitating the creation of a wide range of complex forms.

As various tools and functions are applied, their effects are recorded sequentially within Autodesk Maya as part of a feature known as Object History, which is explored in Tutorial M.4. Video M.5 presents another fundamental tool for component-level editing, the Insert Edge Loop Tool, which enables users to split polygons in a continuous loop

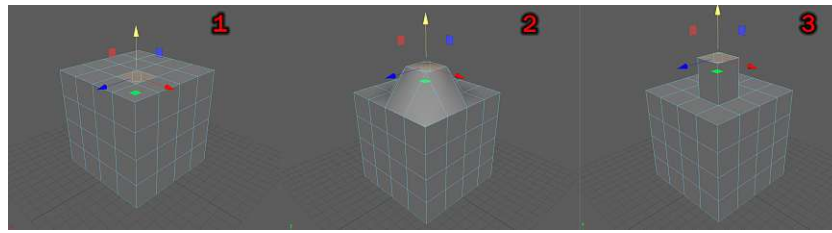


Figure 3.9: A selected polygon (1) being moved without (2) and with (3) using the Extrude Tool

by adding vertices at intersection points, an essential step for adding geometric detail. The tutorial also introduces the concept of organic modeling, one of the two primary modeling disciplines (the other being hard surface modeling), and demonstrates how built-in functions can be used to transform objects into smooth, rounded, and more natural shapes. The final lesson in the advanced modeling subsection (M.5a) is optional and focuses on how adjusting tool settings can streamline an artist’s workflow. For instance, it demonstrates how to create multiple equidistant edge loops simultaneously, improving efficiency and precision in modeling tasks.

The subsection on animation begins with a video tutorial introducing the necessary restructuring of the user interface (A.1), prompted by the need to control temporal parameters in order to create movement. Specifically, the “Timeline”, “Time Slider” and “Range Slider” are added and explained (see Figure 3.10). The Timeslider defines the current position in time by positioning it on the Timeline, whereas the Range Slider specifies the segment of the animation’s total duration that is displayed within the Timeline. The tutorial also clarifies that playback speed must be configured in the preferences. By default, Maya adjusts playback speed according to the machine’s computation rate, an approach useful for simulations but problematic when precise evaluation of animation timing is required.



Figure 3.10: Maya UI showing the Timeline (1) Timeslider (2) and Range Slider (3)

After these prerequisites are addressed, the second video (A.2) demonstrates how to set and edit keyframes, an animation concept referring to the recording of transformation values at selected frames, which the software then interpolates to produce motion. An optional tutorial (A.2a) describes how users can refine their control over keyframes by setting and editing keys on individual transformation channels. It also explains the “Autokey” function, which automatically inserts keyframes for any channel whose value is modified at the current frame. Video A.3 then introduces “Playblasts,” Maya’s method for generating preview videos of animations, and explains their creation. Although the basic procedure is straightforward, the tutorial highlights important considerations

related to quality settings and encoding (specifically using the H.264 codec).

As described above, Autodesk Maya's keyframe system, similar to nearly all 3D animation software, relies on storing values at specific frames and interpolating between them. Several mechanisms exist for controlling this interpolation, but the most commonly used and most flexible is the "Graph Editor". This tool represents channel values over time as weighted Bézier splines (see Figure 3.11). By adjusting the weights and tangents of keyframes, users can sculpt these spline curves to influence movement characteristics, such as acceleration and deceleration, between two values. Although powerful and intuitive for experienced users, this curve-based representation is often difficult for beginners to understand, especially because transformations in 3D space are decomposed into three separate curves, one for each axis. Consequently, the tutorial explaining the Graph Editor is provided as an optional resource (A.4a). A simpler but less flexible method for controlling speed through additional keyframes is presented in A.4. The final video tutorial explains "character rigs" (systems to animate more complex, multi-part models) in the context of 3D animation and how to use them in Autodesk Maya.

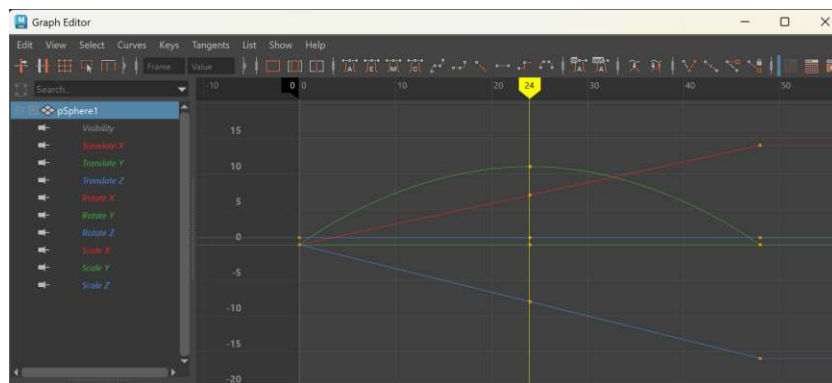


Figure 3.11: Graph Editor with curves representing a simple "ball bounce" animation

The third part of the advanced tutorial section covers the concepts required to render an image from a Maya scene using the Arnold renderer<sup>2</sup> bundled with Autodesk Maya. The first tutorial (R.1) demonstrates how to initiate a render and how to add a light source, an essential step, as the absence of virtual light results in a completely black image. Although the information in this tutorial suffices to generate a basic render, achieving visually appealing results requires additional skills. One of these is controlling light properties. Accordingly, tutorial R.2 introduces the directional light type and explains how to modify its attributes, including direction, color, intensity, shadow casting, and shadow quality (e.g., softness). Tutorial R.3 then demonstrates how these properties can be used to create a traditional two-point studio lighting setup. In this configuration, a primary "main light," typically warmer in color, is complemented by a cooler "fill light" that prevents shadowed regions from becoming uniformly dark. A common extension

<sup>2</sup><https://www.autodesk.com/de/products/arnold/overview> 01.01.2026

of this setup is the three-point arrangement, which adds a high-intensity “rim light” positioned behind the focal object to produce a bright edge that enhances depth and separation from the background. This technique is covered in the optional tutorial R.3a.

The next tutorial, R.4, introduces shading through the use of virtual materials. While these materials include numerous parameters representing physical and visual properties, discussing them in detail exceeds the scope of the course. Therefore, the tutorial focuses on applying one of Arnold’s material presets and demonstrates how these presets can be combined, accompanied by only minimal discussion of their settings. A crucial component of material creation is texturing, which involves using image files to control material attributes. Although texturing is frequently used to apply color information, it can also affect transparency, specular, roughness, and many other characteristics. Despite its importance, mapping 2D textures onto complex 3D geometry is a challenging process requiring various tools and techniques. For this reason, texturing is included only as an optional tutorial (R.4a), paralleling the treatment of the Graph Editor in the animation section.

With lighting and materials introduced, the final video in this subsection (R.5) explains the settings of the Arnold renderer, including how to balance rendering time and image quality, and how to specify the desired output format.

#### 3.2.3 Final Examination

Because completing the final examination assignment constituted the primary objective of the course, considerable thought and effort were devoted to its design. Given that a substantial portion of the instructional content, particularly in the advanced section, was optional, developing a final exam suitable for all participants was not straightforward. Of the three advanced topics (modeling, rendering, and animation), students were required to complete only two to unlock the final assignment. Consequently, the final exam needed to accommodate every possible combination of two topics. To achieve this, three distinct challenges were created.

One assignment required students to use component-level modeling to create one or more “magic tools,” such as cauldrons, a witch’s broom, or a magic staff, and to produce a rendered image using a two-point lighting setup (see Section 3.2.2 for details). This task relied on skills acquired from the modeling and rendering tutorials. Another assignment asked students to model both a witch’s broom and a ring-based parkour, then animate the broom flying through the rings, drawing on skills from the modeling and animation subsections. The third assignment combined skills from the animation and rendering materials by asking students to animate a provided character rig interacting with an object and to produce two rendered images of the resulting scene.

Despite the fact that these three assignments would have been sufficient, two additional, more demanding challenges were introduced. The first, titled “The Challenge,” was recommended only for students who had completed all six advanced-section assignments (rather than the four required to unlock the final exam). It required students to model

a magic staff, a shelf, and several magical utensils, then animate a provided character magically placing the utensils on the shelf, producing both a video and a lit rendering of the scene. This challenge thus integrated techniques from all three advanced topics. The second, titled “The Ultimate Challenge,” was designed for students who had completed all instructional content, including all optional videos (see Figure 3.12 for an overview of all five variants). While similar in structure to “The Challenge,” it introduced three additional requirements: at least one utensil had to be created using organic modeling (smooth preview) techniques, at least one object needed to incorporate an image texture, and the final rendering had to use a three-point lighting setup, including a rim light.

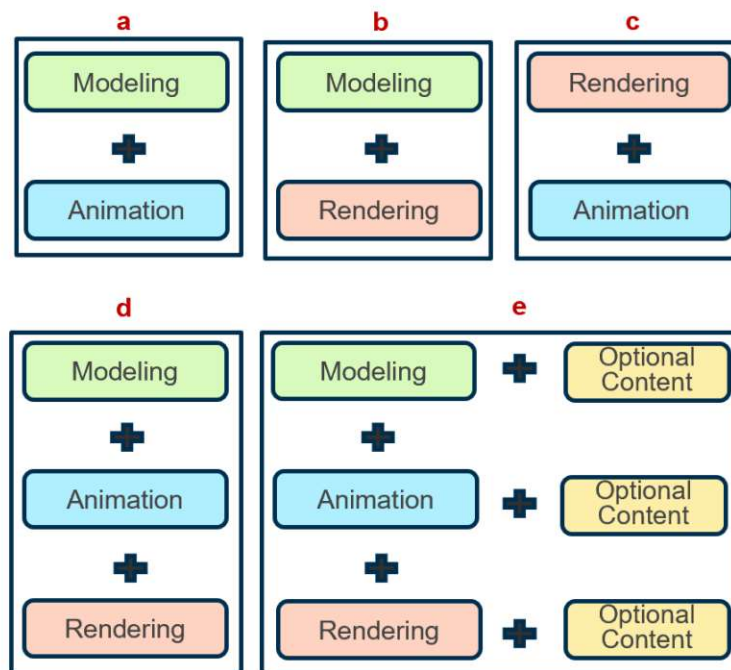


Figure 3.12: The five variants of the final exam

Although these “challenge” assignments demanded significantly more skills, time, and effort, they awarded the same number of experience and grade points as the simpler variants, a fact clearly communicated in the final exam description. This design aimed to leverage students’ intrinsic motivation, enabling those who wished to take on a more ambitious task to invest substantially more resources in demonstrating the competencies they had developed throughout the course.

### 3.3 Gamification Design

The design of the gamification elements in this course was primarily informed by two factors: the literature review summarized in Chapter 2 and the results of the interviews conducted during the requirement analysis phase discussed in Section 1.1. Early in the course design process, the decision was made to implement a system based on experience points and levels. This approach aimed to address two major challenges identified by interview participants regarding traditional lecture formats at HTBLuVA Spengergasse, namely, varying learning speeds among students and the lack of rewarding mechanisms for engagement with course content. During a later phase of the course design, a decision was made to incorporate a magic-themed narrative scenario in order to provide an additional dimension of meaning to the learning experience.

#### 3.3.1 Points and Progression System

By introducing a point-based progression system, students were able to advance through the course at their own pace while receiving immediate feedback and a sense of achievement upon completing each element. This design aligns with the emphasis on autonomy found in both gamification research [Det14a] and instructional and motivational theory [Kel87][RD00]. To implement this progression system within the Moodle LMS, an external plugin called "Level Up XP" was utilized (see Figure 3.13).

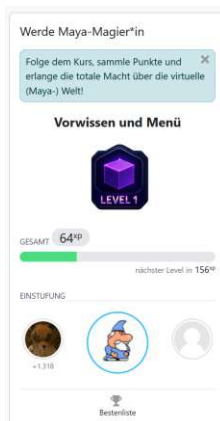


Figure 3.13: "Level Up XP" Moodle Block showing Level and Experience Points

In addition to the experience point system implemented via the "Level Up XP" plugin, the course also employed the grade point system native to the Moodle LMS (see Table 3.6 for an overview of the point distribution). Whereas experience points were automatically awarded for interacting with course materials and continuously aggregated by "Level Up XP", grade points were partially assigned manually. A small number of grade points could be earned automatically by completing interactive videos; however, points for assignment submissions were allocated based on how well each submission met the requirements specified in its description.

Because this approach required between 14 and 16 graded submissions per student, the total number of assignment submissions reached up to 480, representing a substantial manual grading effort. To manage this workload, assignments were intentionally designed to be graded quickly and efficiently through two complementary strategies. First, whenever possible, required submission formats were limited to screenshots in .jpg format, which could be viewed directly in Moodle, rather than Maya project files that required opening in external software. Second, assignment requirements were formulated such that completion could be reliably assessed from these screenshots. Since students required minimal supervision during course sessions, grading could be carried out immediately after they submitted their work, supporting the gamification design goal of providing prompt feedback to sustain engagement.

To reinforce participants' sense of progression within the leveling system, both the grade points and experience points awarded for interactions increased substantially from level to level. In the first part of the basic section, completing an interactive video tutorial granted 12 experience points, while assignment completion yielded 28 points, resulting in a total of 220 points needed to advance to part two. This requirement increased considerably in part two: tutorial videos were worth 30 points and assignments 160 points, raising the threshold to 850 points. In part three, tutorials awarded 40 points and assignments 300 points, bringing the level-up requirement to 1610 points.

Upon reaching level 4, the three advanced sections were unlocked, where video tutorials awarded 50 points and assignments 625 points. Progressing through the next two levels required an additional 1500 experience points each. Reaching level 6 unlocked the final exam, itself worth 2000 experience points and resulting in immediate advancement to level 7. Therefore, students who completed the mandatory content reached at least level 7 with a total of 6610 experience points. Completing all advanced content aside from the strictly optional tutorials (marked with a flame icon) increased the total to 8810 experience points, corresponding to level 8. Achieving the ninth and final level required an additional 372 points, which could be obtained by completing the optional tutorial videos, bringing the total possible experience points in the course to 8482. This distribution was deliberately designed to ensure not only a heightened sense of progression, but also to prevent students from bypassing core structural elements, for example, by leveling up without completing mandatory content or unlocking the final exam prematurely.

Although simpler, the grade point system followed a similar logic by increasing the number of points awarded for assignments of greater complexity, while the five-point reward for completing each video tutorial remained constant across the course. Assignments were valued at 10 points in the first basic section, 20 in the second, 30 in the third, and 50 points in the advanced section, culminating in a 500-point final exam. Unlike experience points, these grade point values represent maximum possible scores, with the actual points awarded dependent on the quality of the submission. In addition to supporting the perception of increasing rewards, this structure emphasized the importance of the final exam, making it difficult, though not impossible, for students to achieve a passing grade without completing it.

Table 3.6: Distrubution of experience and grade points

Type	XP	Grade Points
Basic Section 1 Video Tutorial	12	5
Basic Section 1 Assignment	28	10
Basic Section 2 Video Tutorial	30	5
Basic Section 1 Assignment	160	20
Basic Section 3 Video Tutorial	40	5
Basic Section 3 Assignment	300	30
Advanced Sections Video Tutorial	50	5
Advanced Sections Assignment	625	50
Final Exam	2000	500

### 3.3.2 Leaderboard and Narrative Scenario

Although the "Level Up XP" plugin includes options for a comprehensive leaderboard, it was intentionally configured to limit visibility to only adjacent ranking positions. This restriction was introduced primarily for social and ethical reasons, as a precautionary measure given the age of the participants.

While the course overall was designed to maintain low structural and cognitive complexity, including in its gamified elements, the literature's emphasis on the importance of meaningful engagement in gamified systems [Det11] informed the addition of a light narrative framework to the course structure. This narrative component aimed to enhance student motivation and foster a stronger sense of purpose within the learning experience.

The narrative scenario was framed around the metaphor of becoming a "sorcerer's apprentice" (see Figure 3.14 and Figure 3.15 for examples). This theme was considered particularly appropriate, as students progressively learned to create digital objects "from nothing" and to manipulate virtual environments, mirroring the actions of an apprentice learning the art of magic, albeit within a computational rather than mystical domain. The metaphor also aligned closely with the advanced course content: modeling could be interpreted as the creation of matter from nothing, rendering as the summoning of light, material definition as a form of alchemy (transforming base substances into valuable ones, such as turning stone into gold), and animation as the act of bringing lifeless objects to life.

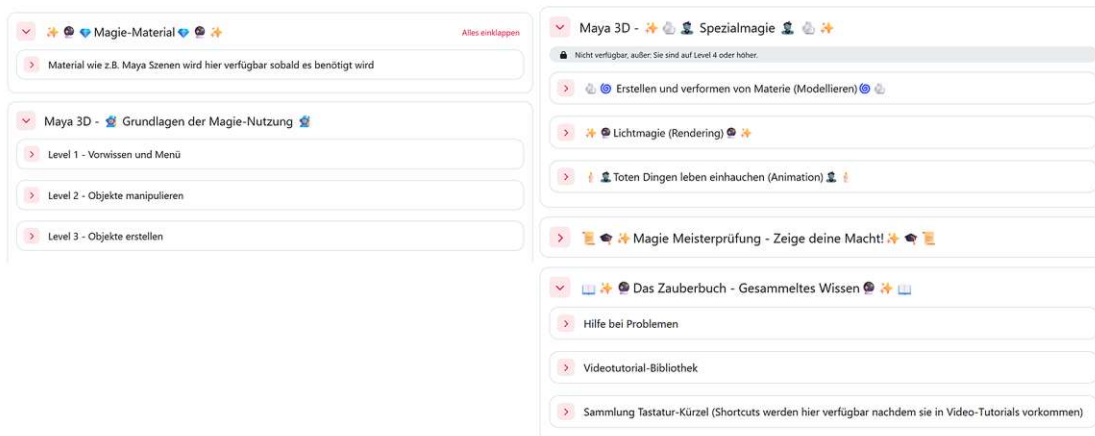


Figure 3.14: Course structure mapped to the “sorcerer’s apprentice” narrative theme

Furthermore, the image of a sorcerer gaining strength and mastery through learning provided an engaging and relatable framework for students, reinforcing their identification with the learning process.

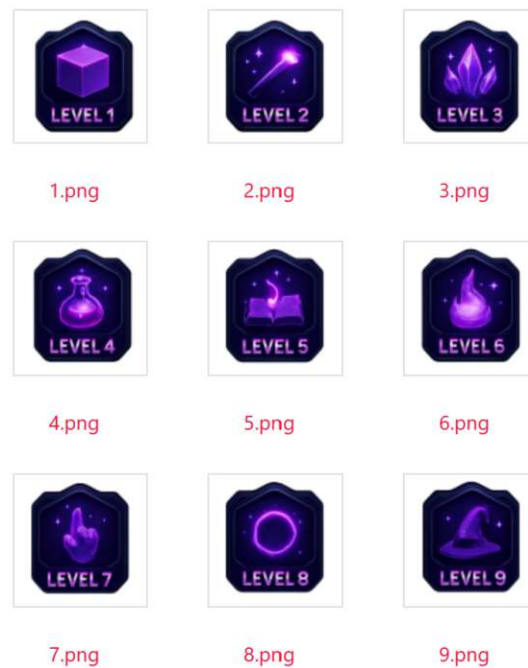


Figure 3.15: Magic-themed Icons representing the User Level

The potential inclusion of a gamification element in the form of badges was also explored. However, it was ultimately excluded to reduce the complexity of the gamification design and to maintain focus on the central objective of fostering student agency.

## 3.4 Challenges of Designing the Course

The purpose of this section is to outline the practical difficulties and challenges encountered during the design and implementation of the course within the Moodle LMS, with the aim of supporting educators who intend to integrate similar frameworks into their own teaching. Conceptual challenges and broader study limitations are discussed separately in Section 5.2.

The challenges encountered can be grouped into several areas, which are outlined in the following sections.

- **Coordination with Moodle administration**

As an educator at a comparatively large public institution with over 2,500 students, the initial challenge involved coordination with the department responsible for Moodle administration. This was necessary to adjust course-specific settings and install the "Level Up XP" plugin, which enabled the progression system. Several additional configurations were required: increasing the maximum permitted file size, activating the H5P content type for interactive videos and modifying the maximum grading points to ensure proper weighting of the final exam assignment. Moreover, alongside "Level Up XP", an additional plugin called "Level Up XP Activity"<sup>3</sup> was needed to enable content unlocking based on a learner's current level. The process of implementing and testing these features, identifying potential errors, and awaiting administrative responses was highly time-consuming. Therefore, it is strongly recommended that communication with system administrators begin early in the planning process, with all necessary parameters and tools clearly defined from the outset.

- **Creation of course content and point distribution rules**

Another major time investment was the creation of the 57 custom video tutorials as well as the implementation of the course content within Moodle. While interactive video elements could be efficiently replicated by creating one properly configured instance and then duplicating it, a highly recommended approach, each copy still required adaptation. This involved replacing video content, designing new interactive components, and setting up the required dependencies to support the content unlocking structure. Given the number of interactive videos (42 in total), this represented a substantial workload. Other course elements, such as file downloads, text fields, and glossary entries, were implemented in a similar manner by duplicating and adapting existing templates. Unfortunately, a comparable workflow was not supported by the "Level Up XP" plugin (at least in the free version), which required 58 individual rules to be manually defined (see Figure 3.16). Each rule governed how students earned experience points for engaging with specific course elements, further adding to the overall implementation effort.

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<sup>3</sup>[https://moodle.org/plugins/availability\\_xp](https://moodle.org/plugins/availability_xp) 08.1.2026

## Werde Maya-Magier\*in

The screenshot displays the Moodle course configuration for 'Werde Maya-Magier\*in'. The 'Punkte' (Points) tab is active, showing the 'Eventregeln' (Event Rules) section. A rule is configured to award 12 experience points when all conditions are met. The conditions are: 'Die Aktivität oder das Material ist Videotutorial Level 1.1 - Visuelle Hilfe für die Lernvideos' and 'Das Ereignis ist H5P: mod\_hvp: attempt submitted'. The interface also includes a sidebar with 'Eventregeln', 'Abschluss', 'Bewertungsre...', 'Drops', and 'Import' options, each with an 'XP+' icon. A '+ Eine Regel hinzufügen' (Add a rule) button is visible at the bottom of the rule configuration area.

Figure 3.16: One of the 58 Rules for awarding Experience Points

- **Design of the final examination**

Another challenge in developing the course stemmed directly from its emphasis on learner autonomy in the course design. Because students were granted substantial freedom in selecting instructional content, particularly in the advanced portion, there was no consistent set of skills that could be assumed upon course completion. To address this, five distinct assignment options were introduced for the final examination, each drawing on different combinations of skills that students could acquire throughout the course (see Section 3.2.3 for details).

- **Technical challenges regarding Moodle and "Level Up XP"**

During the design of the course logic, two technical challenges emerged, both related to the functionalities of Moodle and the "Level Up XP" plugin. The first issue arose from the fact that Moodle does not provide a native mechanism for tracking whether a standard video file has been viewed to completion. This is problematic in this context, as video completion served as a condition for awarding experience points. To address this limitation, H5P interactive videos were employed (as described in Section 3.1). This format allowed Moodle to track the submission of interactive responses as a completion condition, thereby enabling the intended reward mechanism. The second challenge involved preventing students from repeatedly earning experience points from the same activity. Moodle does not natively restrict the number of submissions for an element, nor does the "Level Up XP" plugin provide an option to award experience points only once per activity. Without intervention, students could have repeatedly triggered the same reward,

undermining the intended progression structure of the course. This issue was resolved through the "Level Up XP" "cheat guard" feature, which allows limitations on consecutive interactions within a specified timeframe. By setting this timeframe to a duration exceeding the total length of the course, the number of possible rewarded interactions per element was effectively restricted to one. Although the plugin documentation explicitly notes that this feature was not designed for such extended timeframes, the workaround functioned reliably in this implementation.

- **Maintaining clarity during course setup**

Another challenge was maintaining a suitable level of clarity while setting up the Moodle course. An unexpectedly effective strategy during the setup was the use of a clear and consistent naming convention. Each element's designation began with a numerical prefix reflecting its position within the course structure, complemented by the selective use of emojis to denote elements of particular importance, such as optional content or videos that unlocked subsequent assignments upon completion. These strategies proved highly beneficial, as selecting the correct element from dropdown menus occurred frequently during the setup process. Including such visual and structural cues in element names is therefore strongly recommended to improve clarity and efficiency.

- **Testing and quality assurance**

Once the implementation of all course elements was completed, the testing phase became crucial to ensure the absence of technical issues, the correct functioning of the progression structure, and the intuitiveness of user interactions. However, this process posed a challenge, as the course was designed to take approximately 16 hours to complete, making comprehensive testing a time-consuming endeavor. To mitigate this issue, a dedicated test version of the course was created by duplicating the original implementation and enabling a feature that allowed skipping ahead for each of the interactive videos. A complete run-through of the course was then performed, followed by partial test sessions conducted by voluntary colleagues who provided valuable feedback. While these strategies ultimately led to the desired outcome, the testing process remained time-intensive. This factor should therefore be carefully considered during future course design and planning stages.

## 3.5 Summary

This chapter describes the design and implementation of the digital gamified learning platform developed for this thesis within the Moodle Learning Management System (LMS). This description serves not only to provide the contextual information required for a comprehensive assessment of the associated empirical study, but also to ensure the transparency and reproducibility expected of a diploma thesis.

The first part of the chapter outlines the overall structure of the course, including all interactive video tutorials and assignments. It details the individual elements of the course and their interdependencies, thereby making the possible pathways through the learning material comprehensible. In essence, the course is organized into two primary instructional areas, basic and advanced, each consisting mainly of tutorial videos and assignments. In addition, the course includes a final examination assignment, a help section, and a materials section that provides the data required for student work, such as Maya scene files. A general illustration of this structure is presented in Figure 3.1 with a more detailed overview given in Tables 3.1, 3.2, 3.3, 3.4, and 3.5.

The second section focuses on a detailed examination of the instructional content of the course while providing sufficient contextual information to enable understanding without substantial prior knowledge of 3D computer graphics. The main topics addressed include navigation within the Maya user interface, the creation and editing of polygonal models, lighting, shading, and rendering of objects, as well as the fundamentals of character animation. This section concludes with a detailed description of the final examination, allowing for an assessment of the overall scope of the digital gamified course.

Subsequently, the chapter presents an in-depth discussion of the gamification design, including the specific game elements employed as well as insights into their intended purpose and implementation. The primary game-related concepts applied in this course are an experience-point-based level progression system and a narrative scenario, supplemented by limited competitive elements. The progression system was implemented using the "Level Up XP" plugin, which also provided functionality for the competitive components, in combination with features native to the Moodle LMS.

Building on the descriptions of the course structure, instructional content, and gamification design, the final section of the chapter addresses the most significant challenges encountered during the design and implementation of the digital gamified learning platform. Particular emphasis is placed on insights and lessons learned that may facilitate future implementations in comparable educational contexts.



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# Evaluation

Following the implementation of the course, the data required to address the research objectives of this study were collected. In total, 30 first year students of the Animation department of HTBLuVA Spengergasse participated in the study. This chapter outlines the design of the data collection process and presents the gathered data, providing a foundation for evaluating the perceived impact of the implemented interventions, which is discussed in Chapter 5.

## 4.1 Study Design

As outlined in this section, the study has a primary focus on participants' perceptions of the impact of the implemented interventions. Although a more quantitative approach, such as one aligned with common A/B testing practices was initially considered, it was ultimately deemed unsuitable for several reasons. Organizational challenges included the need to divide participants into two groups despite constraints related to room availability and concerns about separating existing social groups. More importantly, ethical considerations played a central role in the decision. After investing substantial effort in designing a potentially improved course, withholding access to it from half of the class was considered ethically problematic, particularly given that the participants were minors.

Although the overarching goal to evaluate the potential for improving the teaching of complex software was defined from the outset, three interviews with instructors were first conducted to identify specific areas with meaningful opportunities for enhancement, as outlined in Section 1.1. Once the problem space had been defined, the next step involved administering a prerequisite survey to participants before the course began. This pseudonymized survey aimed to capture students' general expectations regarding gamification in education, their prior experience with complex software, and their interest in 3D software.

While the first survey provided only preliminary insights, a second, more comprehensive survey was administered after course completion and played a central role in addressing the research questions. Because this follow-up questionnaire focused primarily on participants' perceptions of the course and the digital gamification elements, established gamification assessment instruments were considered. One of the first tools reviewed was the "EGameFlow Framework" by Fu et al. [FSY09b]. Although the framework initially appeared promising due to its emphasis on user experience, it ultimately proved less suitable because it is geared primarily toward serious games rather than gamified systems.

Another tool considered was the "Gamification Inventory" by Jan Broer [Bro17]. As the name suggests, it focuses on assessing gamification within systems. However, upon closer examination, it appeared unsuitable for the intended application in this study. Although it provides a robust framework for evaluating gamification in learning management systems (LMSs), its results are oriented toward comparing different gamified systems rather than assessing their impact on users.

The Gameful Experience Questionnaire (GAMEFULQUEST) [HHW19] and the Gameful Experience Scale (GAMEX) [EBK18], which builds on it, are appropriate instruments for collecting the required data. Nevertheless, both are extensive and highly academic, making them less suitable for use with minor participants.

Ultimately, a custom-tailored survey based on Keller's ARCS framework [Kel87] (see Section 2.6) was developed, inspired by a similar approach taken by Deif in 2007 [Dei17]. This approach combined a strong grounding in motivational and instructional theory with a format accessible to the target audience and capable of capturing the necessary data. To align the survey with the four ARCS dimensions attention, relevance, confidence, and satisfaction, the questions were grouped thematically to gather information specific to each construct and to support the evaluation of the course.

Reflecting the qualitative emphasis of the study, the questionnaire was followed by a focus group session with four volunteers. The aim was to gain deeper insights into participants' perceptions of the course and its gamification design, particularly regarding engagement, motivation, and learning outcomes. Lasting approximately 30 minutes, this session was intentionally conducted in a conversational manner to better understand students' views on the discussed topics.

To incorporate the instructors' perspectives, semi-structured interviews were conducted with both teachers involved in delivering the course. One of the teacher had attended all eight, the other four of the course sessions. These interviews sought to capture notable observations regarding student behavior and engagement during the course.

## 4.2 Preliminary Survey Results

As outlined in Section 1.4, the first step following the definition of the problem space and the implementation of the course was to have participants complete a preliminary survey. This questionnaire aimed to achieve three main objectives: (1) to assess participants' general interest in video games and animated content, (2) to determine the extent of their experience with operating systems and more complex software, such as Adobe Photoshop and 3D applications in particular, and (3) to gauge their overall interest in and expectations of a gamified 3D software course. It should be noted that the results were expected to be positively skewed relative to demographically comparable groups, due to the rigorous entrance examination for the animation department at HTLBUVA Spengergasse. Regarding the first objective, the results indicated a generally high level of interest in video games and other animation-related content, as illustrated in Figure 4.1 and Figure 4.2.

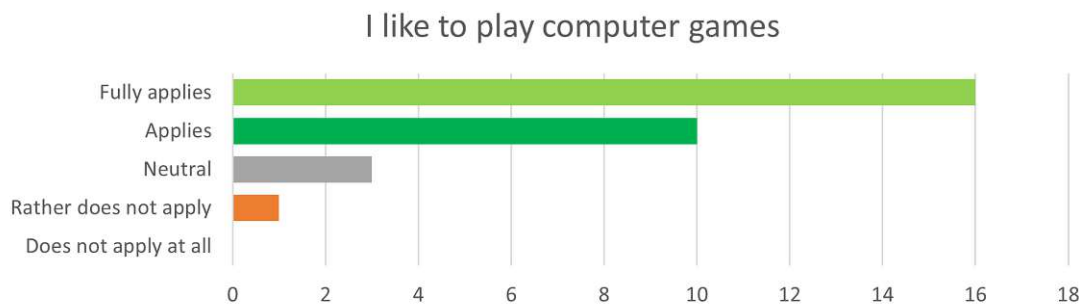


Figure 4.1: General interest in computer games

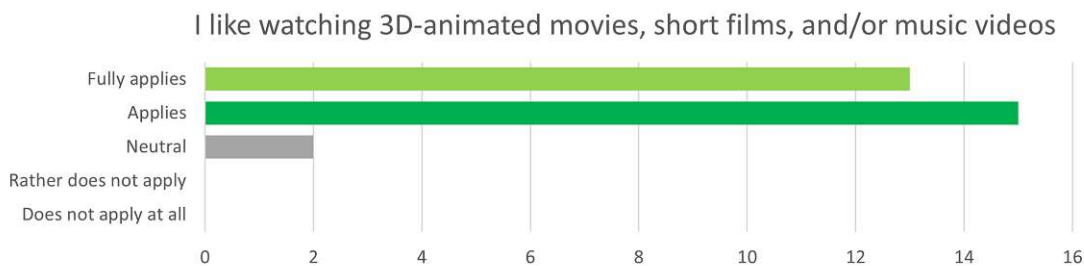


Figure 4.2: General interest in animation related content

The participants' reported prior experience with operating systems and complex software was somewhat more varied. While most students indicated having "good" proficiency with Windows or MacOS, their confidence in using more complex software, particularly 3D applications, was noticeably lower (see Figures 4.3-4.5).

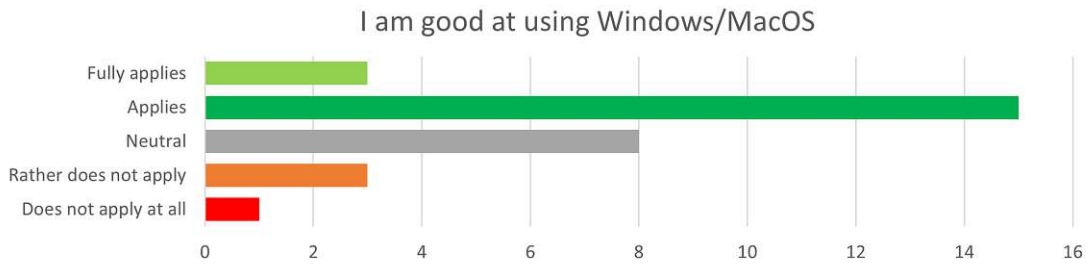


Figure 4.3: General ability to use the operating system

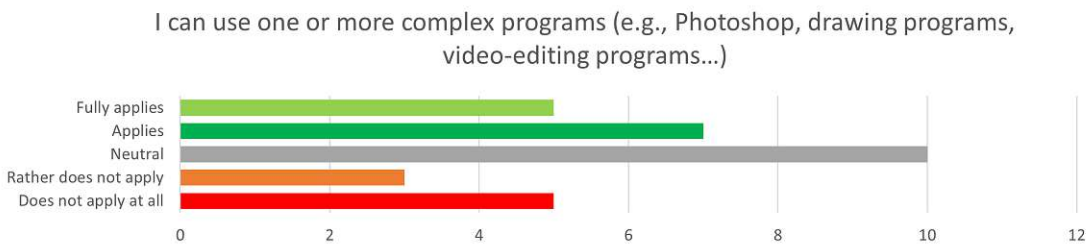


Figure 4.4: Preliminary skill in complex software usage



Figure 4.5: Preliminary skill in 3D software usage

In the final section of the survey, which aimed to assess participants' overall expectations and interest in a gamified course for learning 3D software (see Figures 4.6-4.13), the results indicated a generally high level of optimism and enthusiasm. A substantial majority of participants anticipated that the course would be both enjoyable and engaging, that the gamified elements would effectively support motivation and facilitate learning, and that they themselves would be capable of achieving the expected learning outcomes.

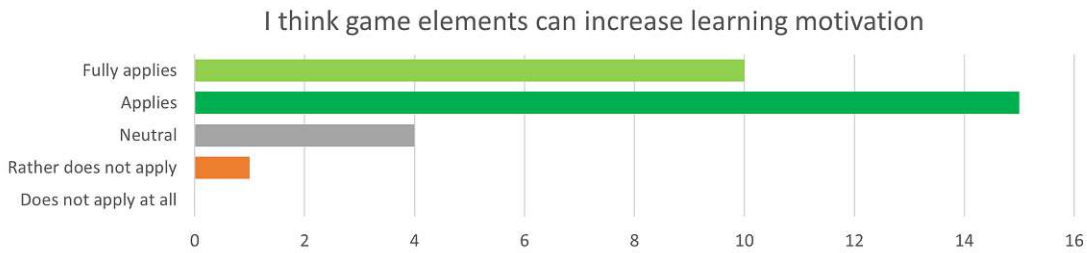


Figure 4.6: Expectations of game element impact on motivation

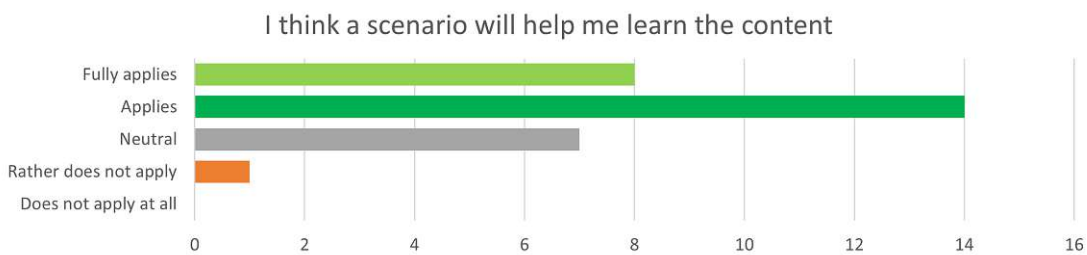


Figure 4.7: Expectations of the scenarios impact on learning results

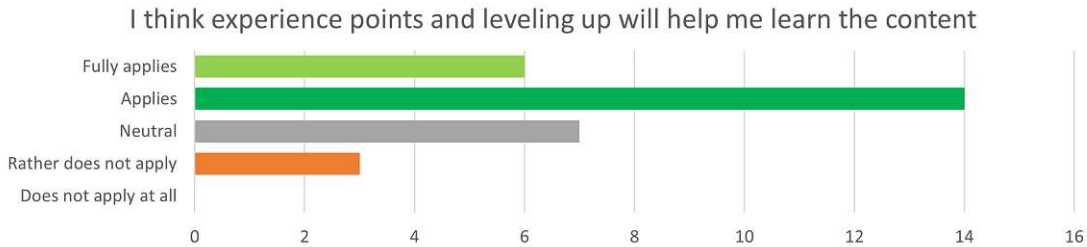


Figure 4.8: Expectations of experience points' impact on learning results

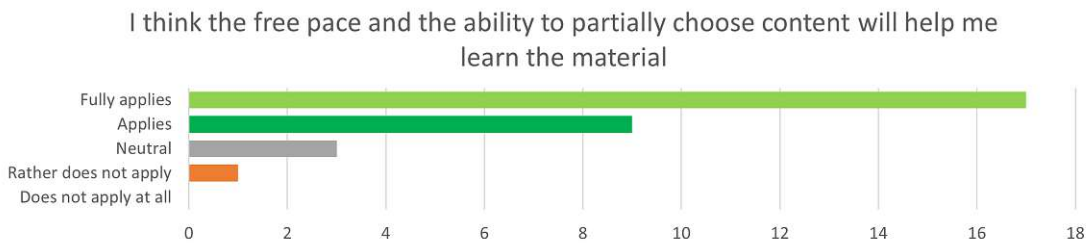


Figure 4.9: Expectations of the course designs impact on learning results

## 4. EVALUATION

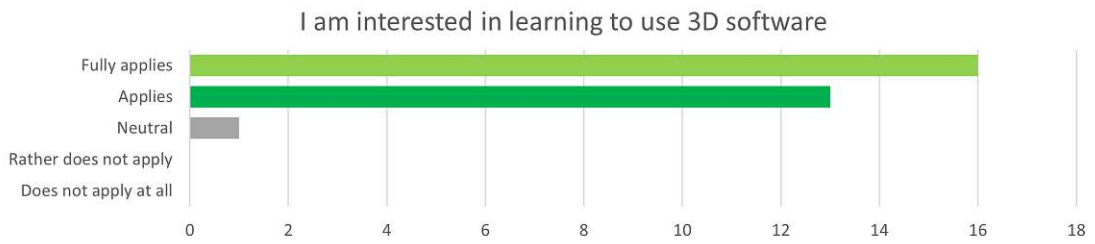


Figure 4.10: Interest in learning 3D software



Figure 4.11: Expected difficulty of following the course

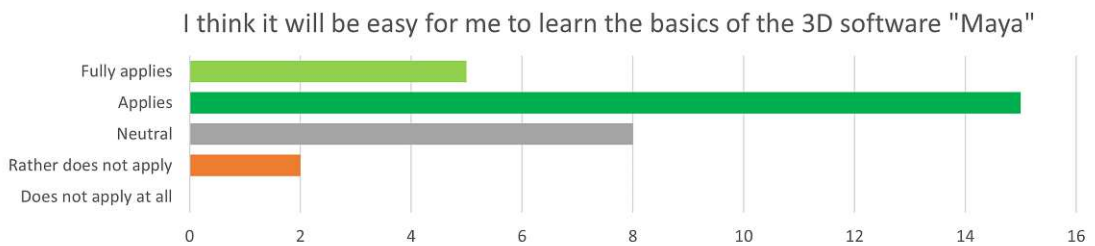


Figure 4.12: Expected difficulty of learning 3D software



Figure 4.13: Expected enjoyment of participating in the course

### 4.3 Assessing the Perceived Impact of the Course

Out of the 30 participants enrolled in the course, 26 successfully completed it by achieving a sufficiently competent result on the final exam and earning more than half of the points available from the mandatory assignments. This outcome is notably positive when compared to more traditional assignments of similar complexity, and it becomes even more impressive considering that the quality of many students' submissions often far exceeded the threshold for full credit.

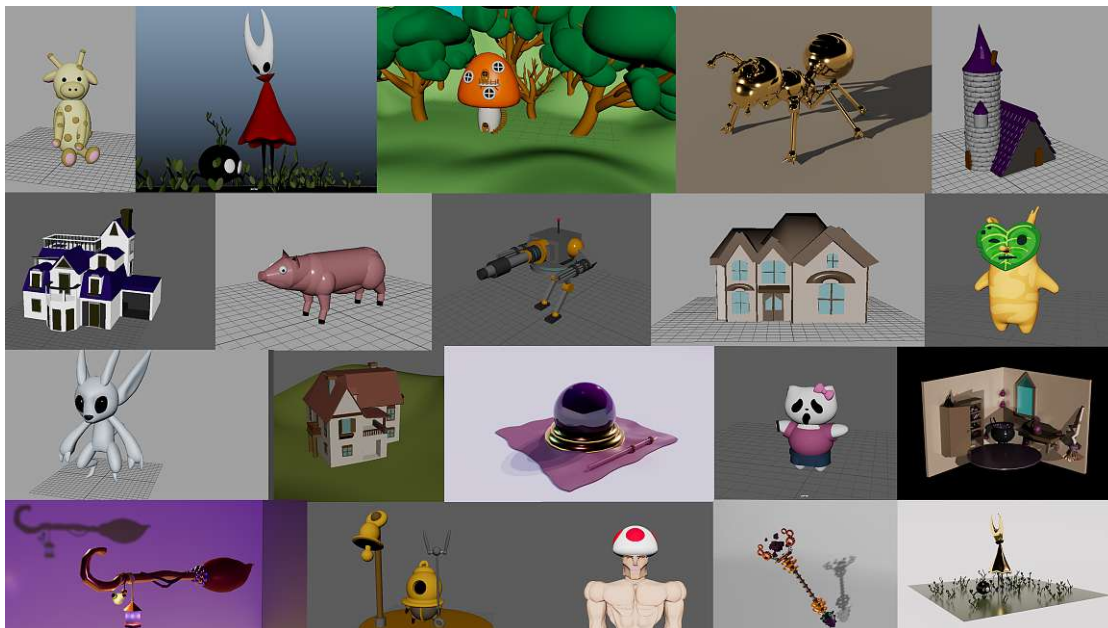


Figure 4.14: Examples of assignment results submitted by students

As is illustrated by Figure 4.14, the results are impressive considering they were generated during a four-week course by students who largely had little or no prior experience with 3D software (as shown in Figure 4.5).

The high rate of success is also clearly reflected in the grading point distribution (see Figure 4.15): all students who completed the course surpassed the point threshold for a “Sehr gut” (A grade). For context, a total of 1,110 points could be earned through interactive video submissions and assignment completions, of which 960 points corresponded to full credit for all mandatory assignments, with an additional 150 points obtainable through optional activities. The grading scheme was based on the 960 points from mandatory work, with a passing grade set at just over half of these points and the remaining grades distributed linearly.

## 4. EVALUATION

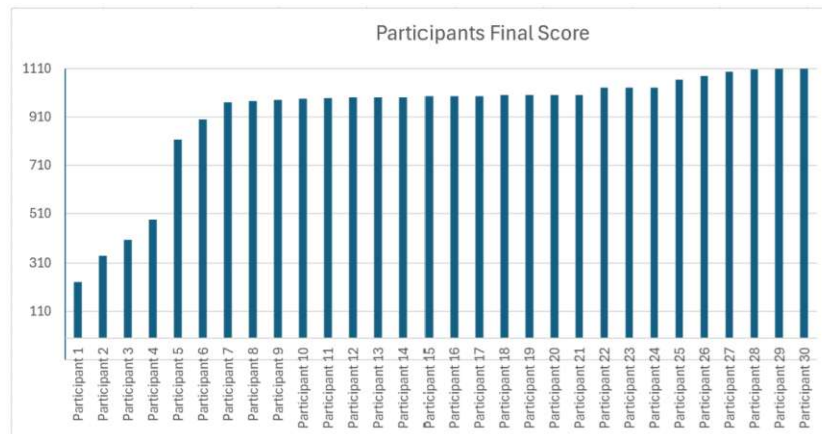


Figure 4.15: Final grading-point distribution of the participants

Consequently, all students who completed the course achieved at least 801 points, the threshold for a “Sehr gut” (A grade), and many exceeded the maximum possible from mandatory content by engaging with optional activities. Three students even completed all optional content and reached the final level (level 9) while also completing the most challenging version of the final examination. These findings align with the survey results collected after the course (see Section 4.1 for details on the survey design), in which 23 of the 25 participants, corresponding to 92%, reported having completed the course and at least some of the optional content (see Figure 4.16) and three participants answering that they completed all optional content.

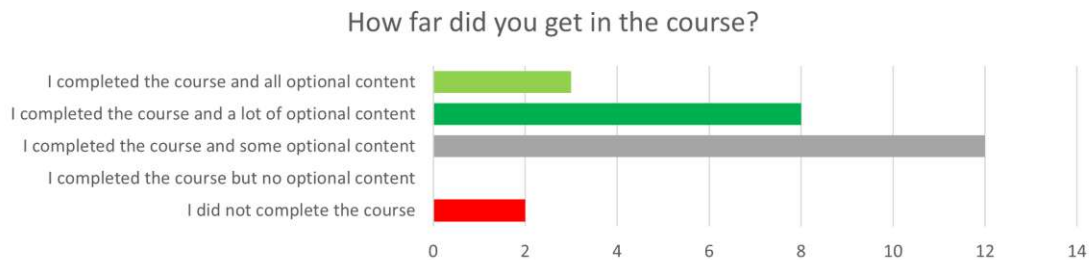


Figure 4.16: Course completion and optional content

The discrepancy between the completion rate seen in Figure 4.16 (two participants not completing the course) and the data presented in Figure 4.15 (four participants not completing the course) arises from the fact that Figure 4.15 represents all 30 students in the study, as it is based on data directly extracted from Moodle, whereas the self-reported numbers reflect only the 25 students who completed the survey. Given that the survey was structured according to Keller’s ARCS model [Kel87](see Section 2.6), it is appropriate to organize and present the survey results using the same four dimensions: Attention, Relevance, Confidence, and Satisfaction. It should be noted that a considerable number

of questions discussed in this section are associated with dimensions other than those originally specified in the survey. This reassignment resulted from a reevaluation, which indicated that the current structure provides a more appropriate framework. Nevertheless, a significant degree of overlap and subjectivity in the mapping of questions to the ARCS dimensions appears unavoidable.

#### 4.3.1 Survey Results Related to the ARCS Dimension of Attention

Attention can be considered a central dimension in the context of this study, given that many interventions targeting it are designed to enhance motivation and engagement by stimulating student curiosity. When asked whether they engaged with the course out of curiosity about which content would be unlocked next, 68% of participants responded affirmatively, with all remaining responses except one being neutral (see Figure 4.17).

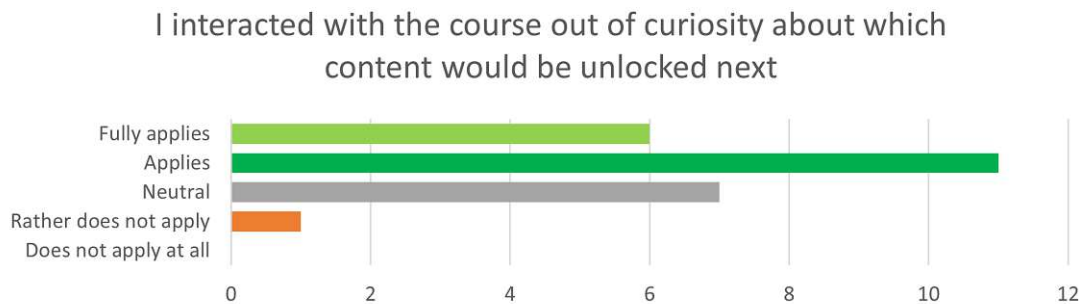


Figure 4.17: Engagement through unlock system

Regarding the question of whether the level system motivated them to continue, 76% of participants indicated “Applies” or “Fully applies,” while three responses (12%) were negative (see Figure 4.18).

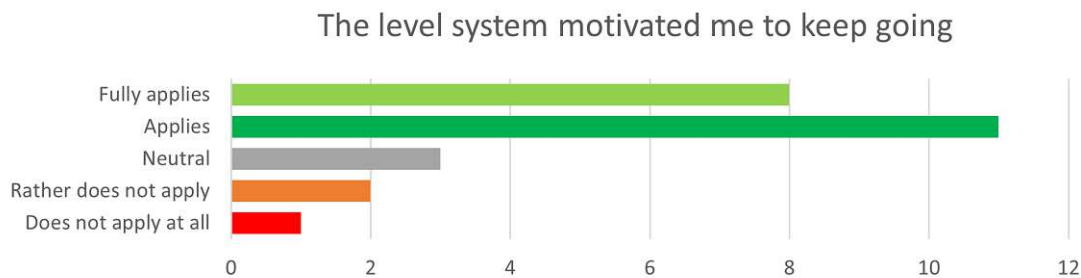


Figure 4.18: Motivation through the level system

Additionally, 48% of participants reported that the level system increased the time they spent on the course, whereas 16% stated that this did not or rather not applied (see Figure 4.19).

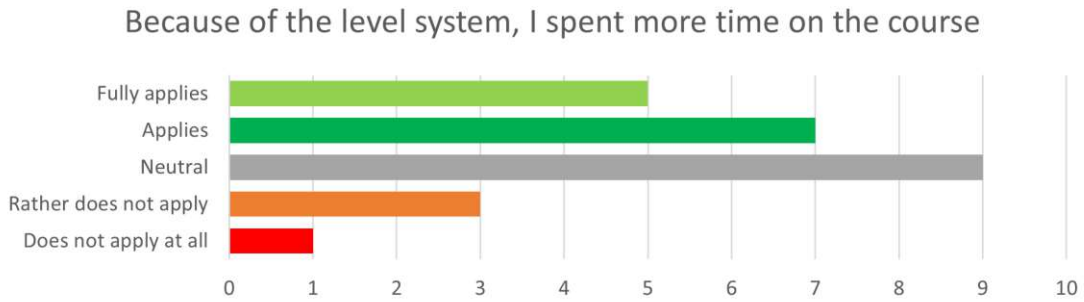


Figure 4.19: Engagement through the level system

In a similar vein, 60% of respondents felt that the narrative scenario (magic) motivated them to keep going, with 20% providing negative responses (see Figure 4.20).

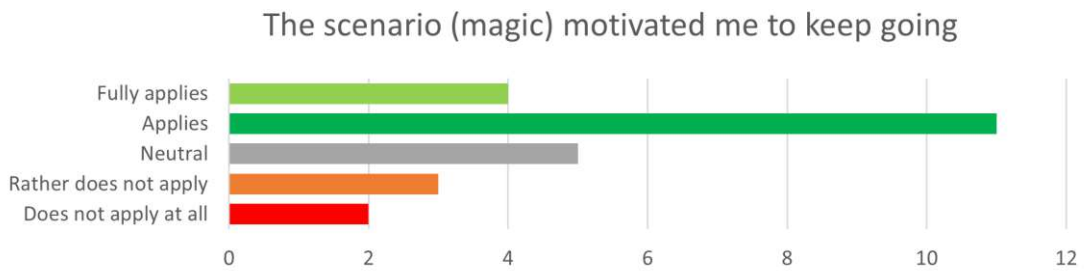


Figure 4.20: Motivation through scenario

Regarding the scenario’s influence on participants’ engagement with the course, the reported effect was positive, though to a lesser extent: 32% indicated that the scenario increased their engagement (“Applies” or “Fully applies”), 20% responded negatively (“Does not apply” or “Does rather not apply”), and the largest proportion, 48%, remained neutral on this item (see Figure 4.21).

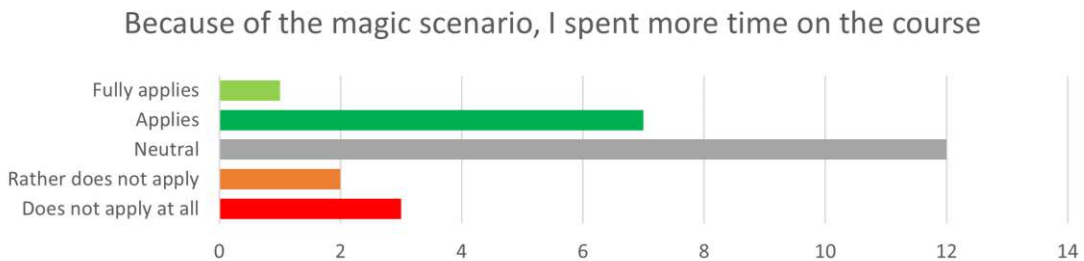


Figure 4.21: Engagement through scenario

Concluding this subsection on the attention dimension, the question regarding whether students were interested in learning more about 3D software aimed to assess the extent to which the course successfully sparked ongoing curiosity about the broader topic and related concepts. The majority of participants (68%) reported a high level of interest, responding “Fully applies,” with no negative responses and only two participants (8%) indicating a neutral stance (see Figure 4.22).

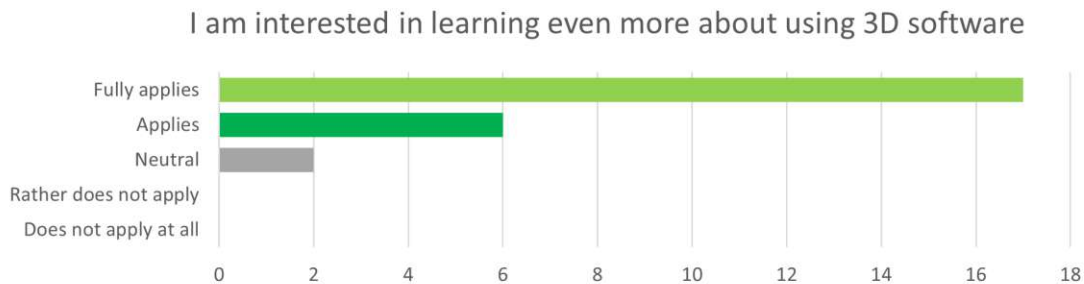


Figure 4.22: Reported interest in continued 3D software learning

#### 4.3.2 Survey Results Related to the ARCS Dimension of Relevance

Relevance, understood as learning motivation arising from the anticipated real-world application of acquired skills or knowledge [Kel87], can be directly linked to Deterding’s discussion of embedding meaning into gamification design to create substantial connections to real-life experiences [Det11]. In the context of this course, relevance operates along two parallel dimensions.

The first dimension is the more straightforward one: establishing relevance by ensuring that the course content has practical value in the students’ future lives. Although not all students will ultimately work in roles where these specific skills are required, the knowledge acquired in this course will remain applicable throughout the remainder of their school curriculum, which spans at least five years. Because 3D software plays a prominent role in the curriculum each year, mastering the course content inherently holds meaningful relevance within the students’ current educational context.

The second dimension is more constructed and “virtual” in nature, namely, the attribution of meaning through the narrative scenario. The commonly used gamification element of a narrative framework was employed primarily to reinforce perceived relevance by providing the course with an additional, playful layer of significance. In this way, the course gains both real-world relevance and thematic meaning within the scenario, enhancing students’ engagement and motivation. Furthermore, the ARCS dimension of relevance encompasses elements of course design that support student autonomy, enabling participants to enhance the perceived meaningfulness of the material by exercising freedom of choice. Nevertheless, in the context of this section, the primary focus of relevance is on how the

course and gamification design facilitated the acquisition of skills that are applicable to students' forthcoming real-life situations.

In terms of the overall assessment, it can be noted that an overwhelming majority of students rated the course as highly relevant: 96% indicated that the course was suitable for learning the content (applicable or fully applicable) and also reported that it provided a solid introduction to the 3D software (see Figure 4.23 and Figure 4.24).

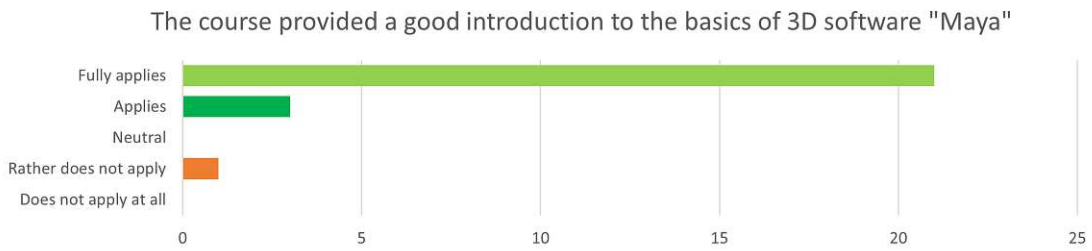


Figure 4.23: General reported assessment of the course



Figure 4.24: Reported course suitability in regards to learning success

Students also rated positively the course design elements intended to enhance relevance through increased autonomy, particularly the ability to progress through the course at their own pace, which received 96% positive responses. While the option to select course content to a limited degree was also appreciated, it was considered somewhat less influential, with 68% of students indicating “applies” or “fully applies”, although it must be noted that all but one remaining answer where "neutral" (see Figure 4.25 and Figure 4.26).

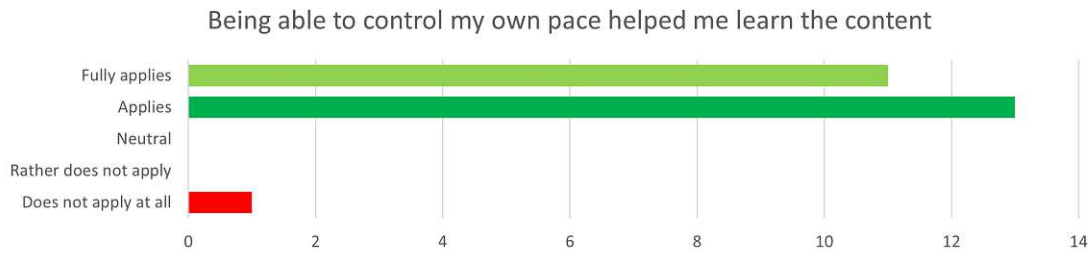


Figure 4.25: Reported impact of flexible learning pace on learning success

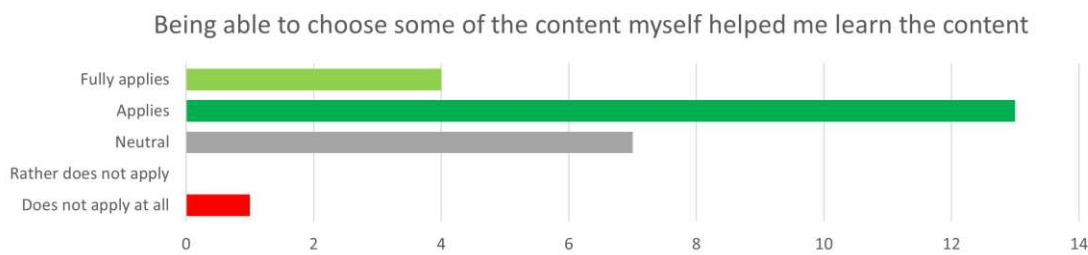


Figure 4.26: Reported impact of flexible content selection on learning success

The final four items of the survey related to relevance all addressed the impact of gamification elements on students' perceived success in learning the course content. While most elements were rated positively, the results related to the competitive elements were less positive. The gamification feature of leaderboards appeared to have the least influence on students' perceptions, with only 20% indicating that it supported their learning ("applies" or "fully applies"), whereas 48% reported little or no impact ("does not apply" or "rather does not apply", see Figures 4.27-4.30).

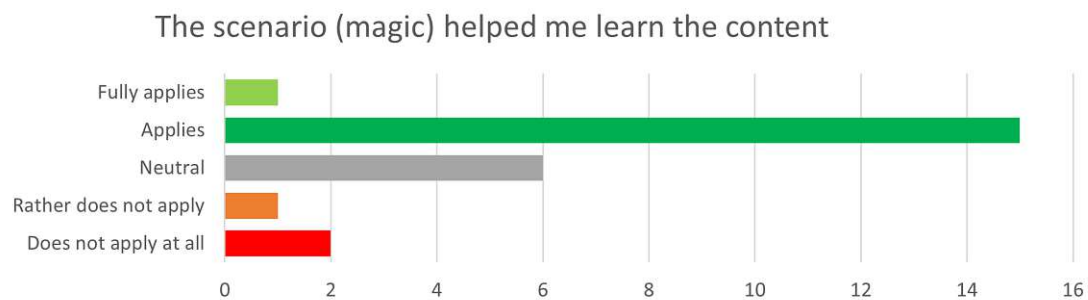


Figure 4.27: Reported impact of the scenario on learning success

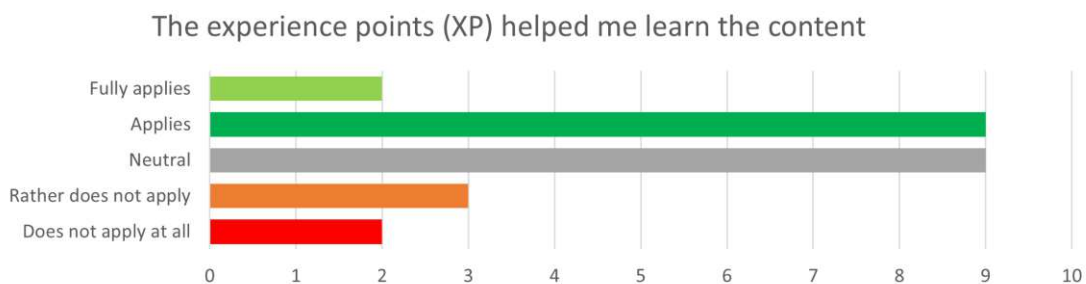


Figure 4.28: Reported impact of experience points on learning success

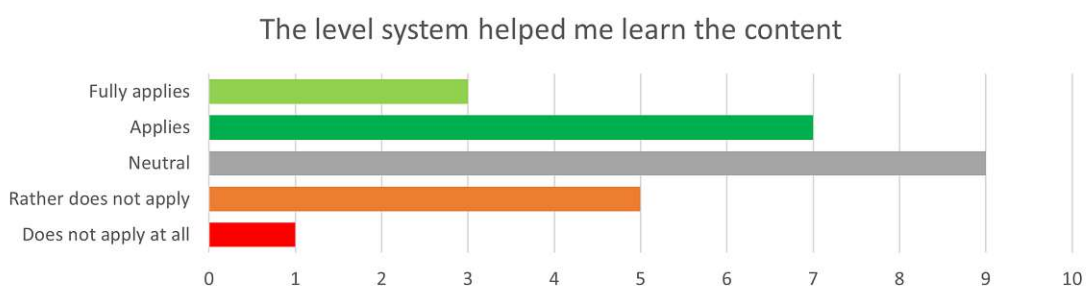


Figure 4.29: Reported impact of the level system on learning success

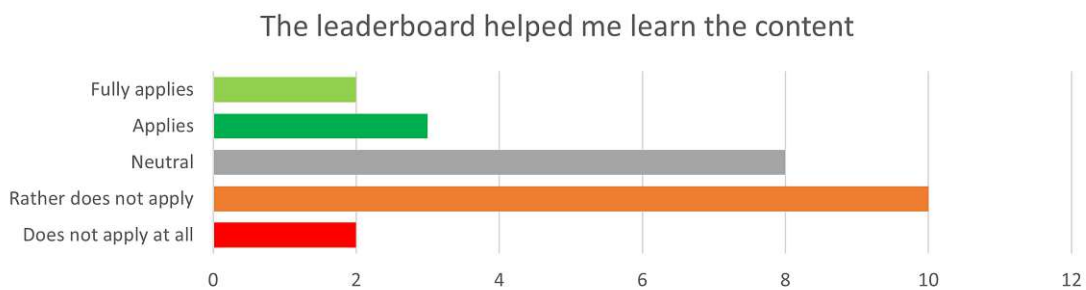


Figure 4.30: Reported impact of the leaderboard on learning success

### 4.3.3 Survey Results Related to the ARCS Dimension of Confidence

This subsection presents survey responses concerning the influence of moments of students' achievement and perceived agency within the course context. These aspects can be linked to Csikszentmihalyi's flow theory [Csi90] (see Section 2.6), which proposes that motivation derived from mastery emerges from the satisfaction of overcoming suitable challenges. To fully leverage this effect, the level of challenge must be appropriately matched to the learner's skill. The results indicate that the course performed strongly in this regard: only one of the 25 respondents reported that the course was too difficult ("applies"), while four felt that it was too easy (see Figure 4.31 and Figure 4.32).

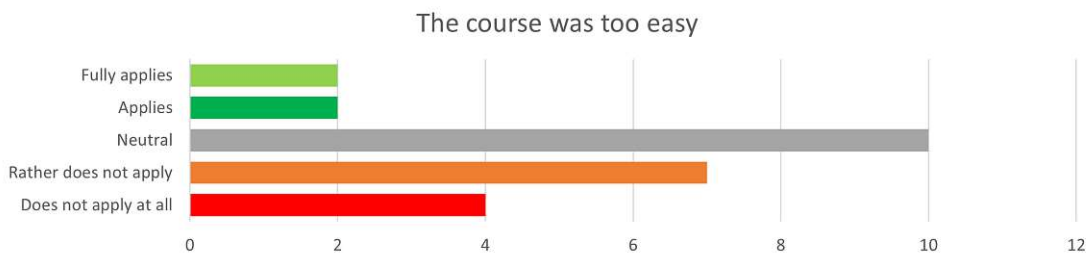


Figure 4.31: Reported perceptions of the course being too easy

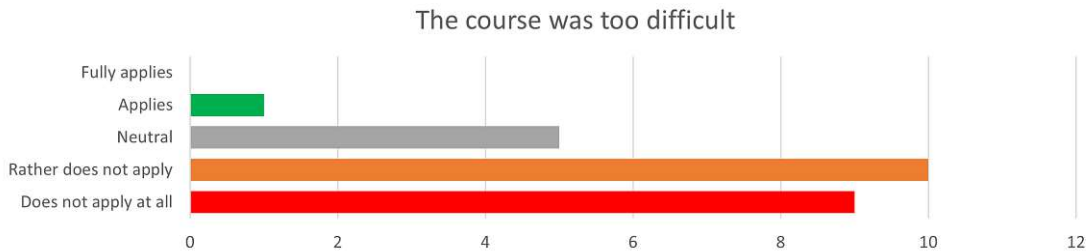


Figure 4.32: Reported perceptions of the course being too difficult

Designing educational challenges that appropriately match the skill levels of a diverse student group is inherently difficult, as learners often vary widely in both competence and engagement. This course sought to mitigate these differences by incorporating flexibility by offering optional content and allowing students to work through the material at their own pace. The survey results suggest that this approach was positively received: 72% of respondents reported that the opportunity to choose at least some of the content enhanced their motivation and engagement. Moreover, the ability to learn at a self-directed pace appeared to be an even stronger influence, with 88% indicating a positive effect on engagement and 90% on motivation (see Figures 4.33-4.36).

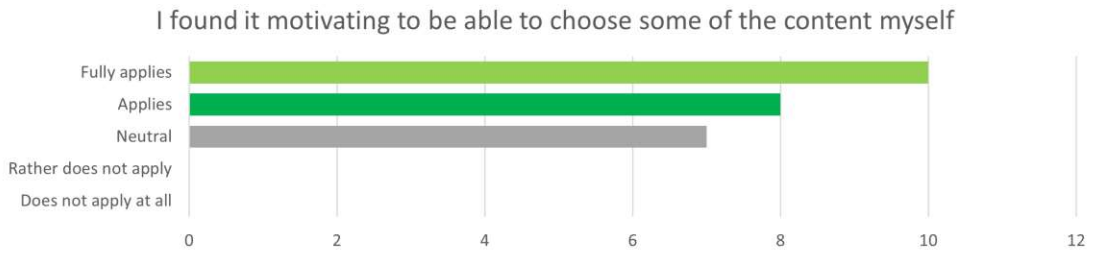


Figure 4.33: Reported impact of flexible content selection on motivation

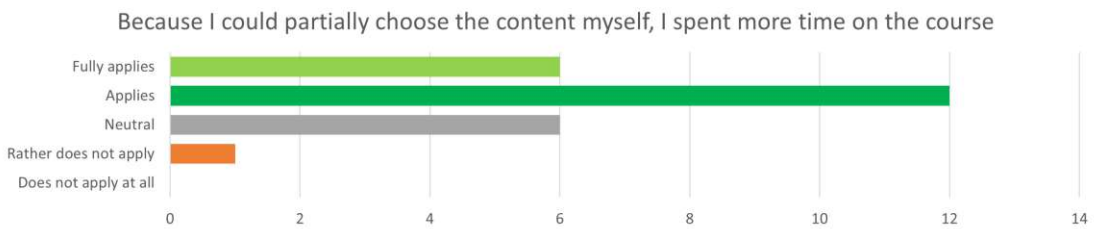


Figure 4.34: Reported impact of flexible content selection on engagement

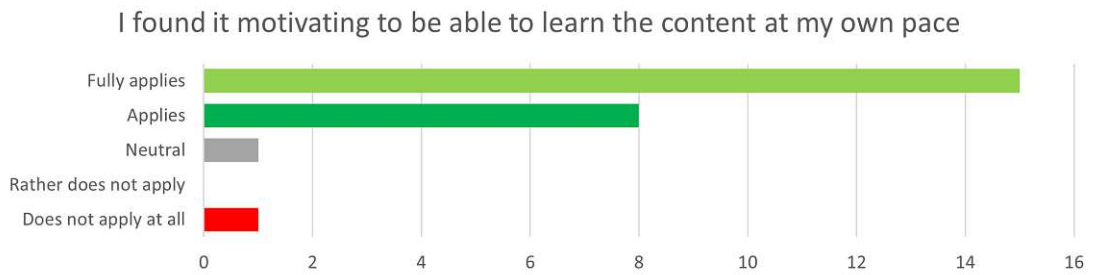


Figure 4.35: Reported impact of flexible learning pace on on motivation

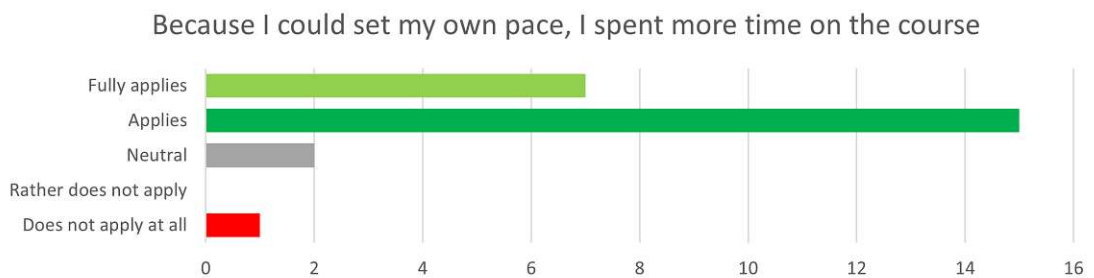


Figure 4.36: Reported impact of flexible learning pace on on engagement

Another crucial factor when designing educational challenges is the additional complexity that may emerge from their contextual framing. Translating this into the course design meant ensuring that students could navigate the material effortlessly, understand the underlying logical structure, and have sufficient time to achieve the expected outcomes. The first two goals were addressed by maintaining a clear and intuitive course structure, along with consistent rules, avoiding exceptions to the system established at the outset.

Estimating an appropriate timeframe proved more difficult; however, this was partially mitigated through open-ended assignments, enabling students who required more time to focus on producing simpler outcomes. Survey responses indicate that these measures were largely effective: 92% of participants reported that the course was easy to follow, 88% found the game mechanics easy to understand, and 76% felt that the mandatory content was achievable within the allotted timeframe (see Figures 4.37-4.39).

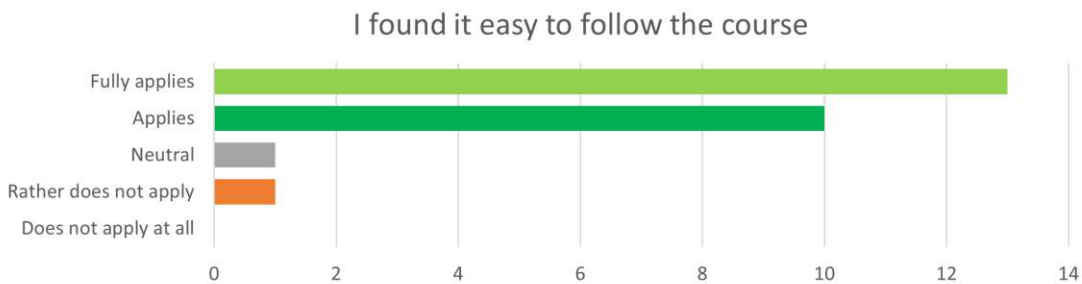


Figure 4.37: Reported ease of following the course

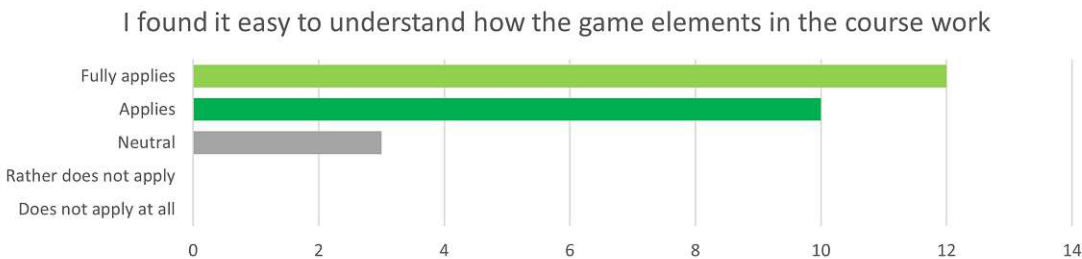


Figure 4.38: Reported ease of understanding the game elements

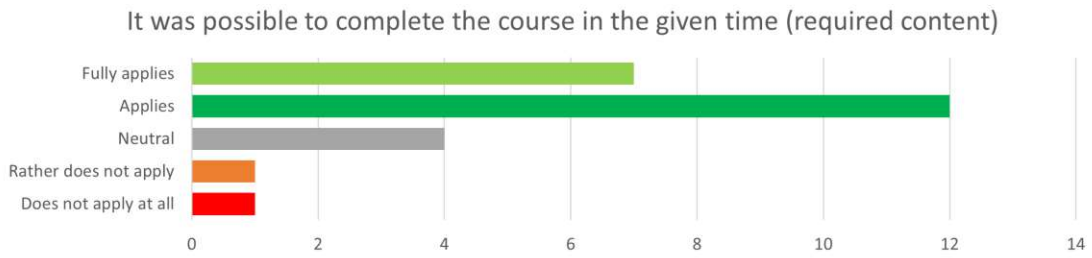


Figure 4.39: Reported appropriateness of the given time frame

#### 4.3.4 Survey Results Related to the ARCS Dimension of Satisfaction

The final group of findings concerns interventions that enhance learning by eliciting positive emotional responses. Such responses may be evoked directly through extrinsic rewards, such as earning points or unlocking new content, or more broadly through an overall sense of enjoyment when interacting with the course. In this latter respect, the course appears to have been highly effective, with 96% of participants indicating that they found it enjoyable (“applies” or “fully applies”) (see Figure 4.40).



Figure 4.40: Reported enjoyment of the course

This pattern extends, albeit with varying intensity, to participants’ enjoyment of specific course elements: 92% reported that unlocking content through leveling was enjoyable, 76% found the scenario engaging, 64% appreciated receiving experience points, and 56% enjoyed the more competitive aspects of the course (see Figures 4.41-4.44).

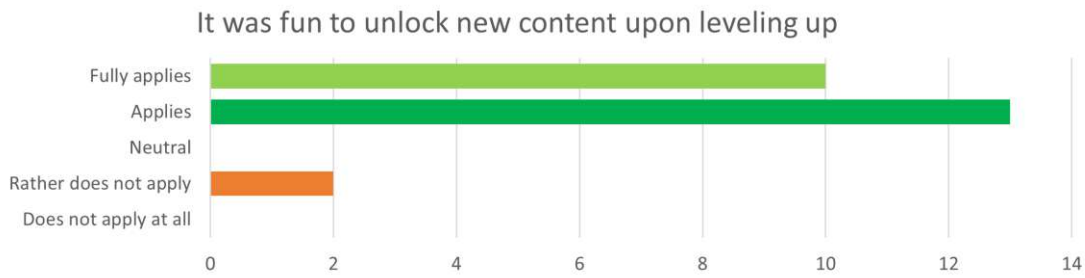


Figure 4.41: Reported enjoyment of the level and unlock system

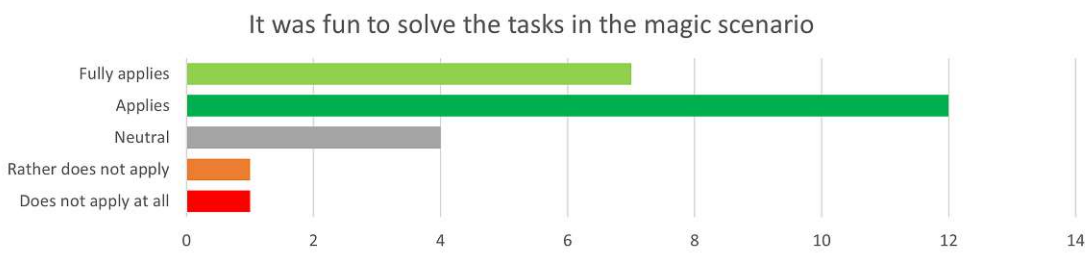


Figure 4.42: Reported enjoyment of the scenario

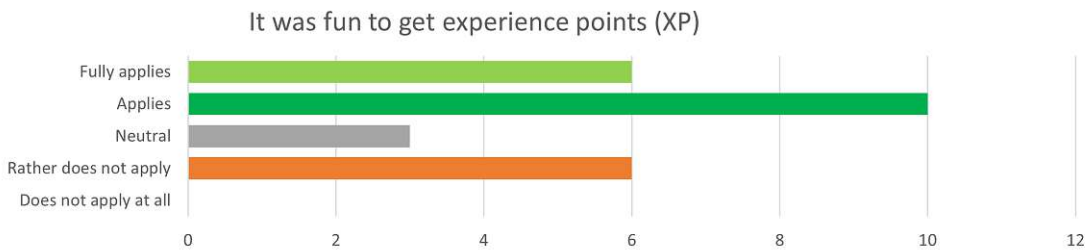


Figure 4.43: Reported enjoyment of receiving experience points

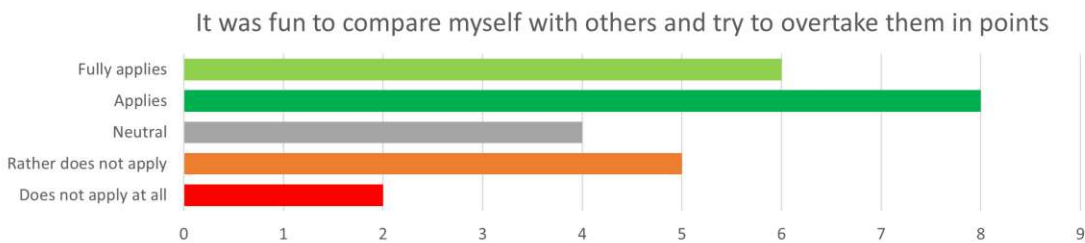


Figure 4.44: Reported enjoyment of competitive aspects

The influence of experience point rewards on motivation was also perceived positively, with 68% responding “applies” or “fully applies” to the corresponding item. Competitive elements were likewise viewed as motivating, though to a lesser extent: 44% rated them favorably, while 28% reported little or no motivational impact (see Figure 4.45 and Figure 4.46).

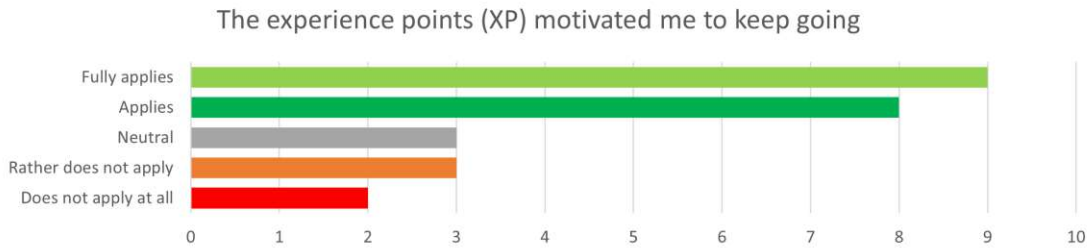


Figure 4.45: Reported impact of experience points on motivation

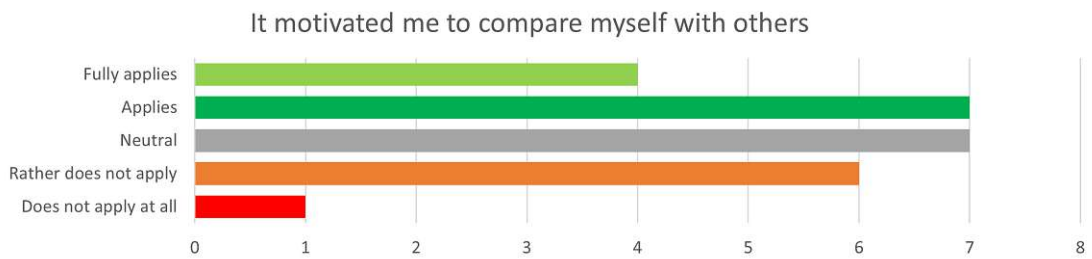


Figure 4.46: Reported impact of competitive aspects on motivation

Regarding whether these elements positively influenced the amount of time students invested in engaging with the course, the results suggest that they generally did, with the notable exception of the competitive features. Specifically, 72% of participants reported interacting with the course to reach the next level, and 44% indicated that the experience point system had a positive impact on their engagement, compared to 20% who perceived little or no effect. In contrast, only 28% felt that the leaderboards promoted engagement, while 36% reported that these competitive aspects had little or no influence on the time they spent in the course (see Figures 4.47-4.49).

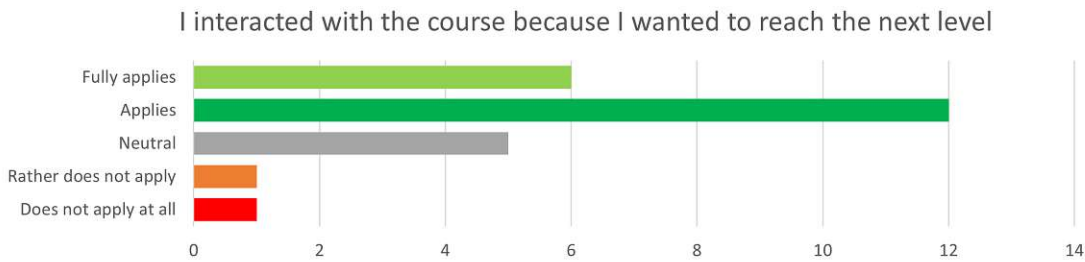


Figure 4.47: Reported impact of the level system on engagement

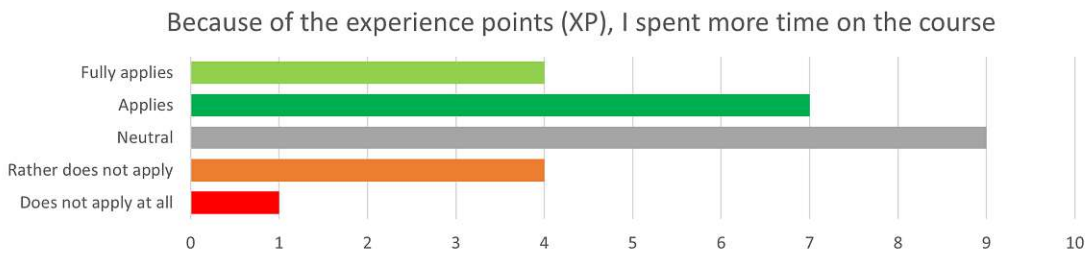


Figure 4.48: Reported impact of experience points on engagement

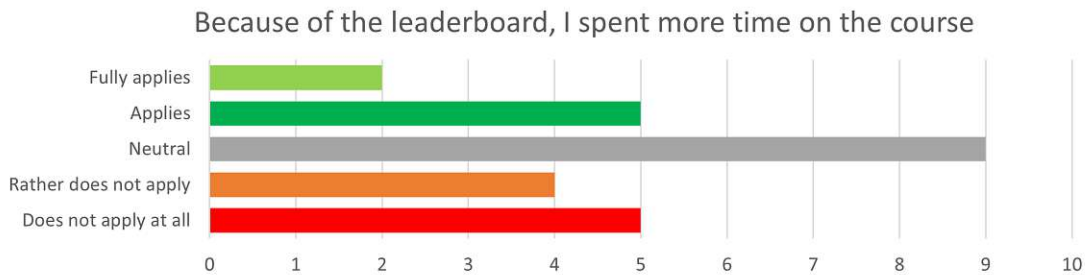


Figure 4.49: Reported impact of the leaderboard on engagement

Overall, the results indicate that participants generally perceived the gamification-based interventions targeting the ARCS dimension of Satisfaction positively, a view further supported by the fact that 84% of students expressed a desire for more courses to incorporate similar video game elements (see Figure 4.50).

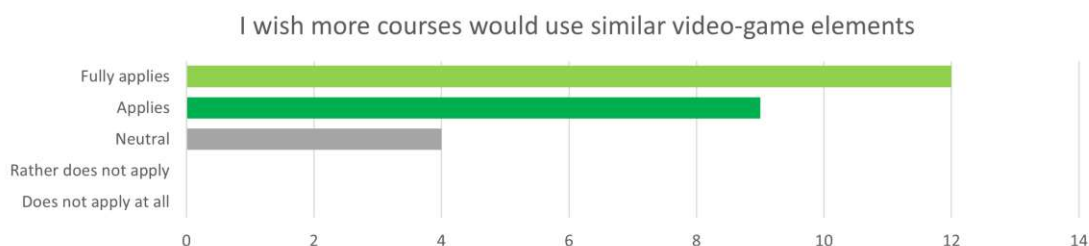


Figure 4.50: Reported interest in gamification in other courses

## 4.4 Results of the Open Questions

The closing survey administered to students after the completion of the course included three open-ended questions. Although responding was entirely optional, a substantial number of participants provided answers. The responses were subsequently analyzed and coded using thematic analysis, allowing common themes to be identified (see Tables 4.1-4.3 for an overview).

For the first question, “What did you particularly like about the learning platform with scenarios, XP, and levels?”, 21 of the 25 respondents provided answers. The majority (15 participants) highlighted their enjoyment of gamification-related features. The most frequently mentioned element was the thematic scenario, which was explicitly praised by seven students, followed by four participants noting the competitive elements. Five students emphasized the course’s support for student autonomy, with three specifically appreciating the ability to progress at their own pace. Additionally, one student mentioned enjoyment of the volume of knowledge acquired, while another highlighted a particular assignment as especially engaging.

Table 4.1: “What did you particularly like about the learning platform with scenarios, XP and levels?”

Category	Number of Participants
Gamification related (Scenario)	7
Gamification related (Competitive Elements)	4
Gamification related (Other)	4
Autonomy strategies related (Flexible progression tempo)	3
Autonomy strategies related (Other)	2
Assignment related	1
Related to learning progress	1

The second question, “In your opinion, what could be improved in the course?”, also received 21 responses. The majority (12 students) offered critiques of the course design.

Common areas for improvement included the handling of video playback, specifically the inability to fast forward (three participants), and the clarity of the course structure (three participants).

Two students suggested enhancing information transparency: one recommended displaying the experience points awarded for activities in advance, and the other requested information on estimated completion times for assignments. Three further responses provided general suggestions, including more challenging videos, additional time to complete the course and placing greater emphasis on assignments rather than video tutorials. Notably, the second-largest group (eight students) indicated that they had no suggestions for improvement. The remaining three responses addressed perceived technical shortcomings in the tutorial videos, particularly regarding sound quality.

Table 4.2: “In your opinion, what could be improved in the course?”

Category	Number of Participants
Nothing to improve	8
Structure clarity	4
Technical quality of the videos	3
Video playback abilities	3
Course transparency	2
Course design (Question difficulty)	1
Course design (More time)	1
Course design (Ratio between input and assignments)	1

The third open question, “Is there anything else you would like to say about the course?”, although deliberately broad, elicited a notable degree of consistency in responses. Twenty students answered, with sixteen using the opportunity to offer praise. The most commonly mentioned aspect was the perceived learning gained over the four weeks (five participants), followed by appreciation for the ability to progress at their own pace (three participants) and the enjoyment experienced during the course (two participants). Four students stated they had nothing further to add, while three provided critical feedback. One critique, suggesting the inclusion of the videogame Minecraft, seems to be intended humorously. The remaining two critiques were more substantive: one student, who missed the first session, noted a lack of information regarding the course’s structure and the other felt occasionally overwhelmed by the course’s difficulty. Both, however, also expressed positive feedback regarding the course overall. In summary, while participants provided valid and valuable criticisms, the majority of responses indicate a generally positive experience, consistent with other survey findings.

Table 4.3: “Is there anything else you would like to say about the course?”

Category	Number of Participants
Praise (Learning outcome)	5
Praise (Autonomy)	3
Praise (Fun)	2
Praise (Other)	6
Nothing to add	4
Critique (Information availability)	1
Critique (Difficulty level)	1
Critique (No Minecraft)	1

## 4.5 Results of the Focus Group

The focus group session took place immediately after the survey, following the conclusion of the four-week course the previous day. This timing was intentionally selected to allow participants a short period for reflection while ensuring that their experiences remained sufficiently fresh. Participation in the focus group was voluntary, resulting in four students electing to take part. Notably, and likely due in part to the self-selection approach, all four participants belonged to the highly motivated subgroup who completed most, if not all, optional course activities. This is relevant to mention here, as it should be considered when interpreting the results, a more detailed discussion of possible implications is provided in Section 5.2.

Overall, and consistent with the survey findings, the group expressed highly positive perceptions of the course. When asked for a general opinion, one student responded immediately with “Voll cool!” (English: “Very cool!”), with the others indicating clear agreement. One participant, who repeated the class after failing the year before, stated that they felt they had learned as much during these four weeks as during the entire first semester of the traditional approach in the previous year. Another student echoed this sentiment, explaining that despite having attended 3D modeling classes for two years at a prior institution, the amount learned was comparable to what was covered within this course.

Regarding the interventions designed to enhance perceived autonomy, participants reported appreciating the ability to choose content to some extent; however, most stated that they generally followed the order in which modules were presented, and believed this to be the case for most peers. In contrast, flexibility in pacing was strongly valued. Students noted that in traditional classroom settings they often completed their tasks early and subsequently lacked further activities, whereas the course’s structure allowed them to progress continuously at their own pace. Similarly, one student emphasized the benefit of not being required to perform tasks at specific times, explaining that if motivation was low during a session, they could continue later, potentially from home,

when they felt more focused. All gamification elements were perceived positively, with particular enthusiasm expressed for competitive components, including leaderboards and informal comparison of experience points outside the platform. This appeared especially motivating for the students who completed all optional activities and competed for the highest leaderboard rankings. The magic-themed narrative was also well-received, both for its contribution to a more creative visual environment and for the satisfaction students experienced when unlocking new level icons.

Although the overall response to the course design and gamification elements was highly favorable, one key point of critique concerned the interactive H5P video components. Students were allowed unlimited attempts to complete the embedded tasks, including the option to reveal the correct answer, yet received the same number of points regardless of performance. Participants argued that this system negatively impacted their motivation and proposed that after two unsuccessful attempts the correct answer should be displayed, but without awarding full points. Additionally, the unlocking of new videos in the video library was praised as “really very helpful” by some, while others reported not noticing the feature at all and suggested that greater visibility or communication about its availability would have been beneficial. Participants also expressed a desire for bonus rewards when choosing more challenging options in the final examination, suggesting that additional incentives could better acknowledge increased effort. Perspectives on future expansion of the gamification system varied. One student cautioned that adding further elements could introduce unnecessary complexity, while another proposed an avatar-based system in which learners model a character and unlock accessories through achievements.

In sum, participants reported a high degree of satisfaction with the course design, its implementation, and the integration of gamification elements. They described increased motivation, engagement, and perceived learning outcomes, with one student even noting daily interaction with the system. Collectively, the group expressed interest in similar formats for other topics, suggesting that such an approach could be particularly well-suited for learning additional complex software applications, such as Adobe Photoshop<sup>1</sup> or Adobe After Effects<sup>2</sup>.

## 4.6 Perspective of the Instructors

As described in 1.4, two interviews were conducted with the instructors who supported the associated course sessions following the course’s conclusion. One instructor attended all eight sessions, while the other supported four sessions. The purpose of these interviews was to investigate how the instructors experienced teaching the gamified course on the fundamentals of 3D software Maya, and to assess their perception of the impact of the various gamification measures on student engagement, motivation, and learning outcomes.

The interviews were structured into three main sections. First, the instructors were asked about their general impressions of how the course was conducted. This was followed

<sup>1</sup><https://www.adobe.com/at/products/photoshop.html> 27.12.2025

<sup>2</sup><https://www.adobe.com/at/products/aftereffects.html> 27.12.2025

by a discussion of the results of the closing survey, and finally, they were asked to compare these results with their personal observations and experiences. Both instructors expressed distinctly positive attitudes toward the use of gamification, noting that they would “definitely” incorporate similar approaches in future teaching. They observed that the classroom atmosphere during the sessions was not only very positive but also remarkably focused, with students demonstrating high levels of concentration on the material. Minimal conversation or distraction between students was noted, and one instructor emphasized that, across the four weeks of the course, they did not observe any student resentment.

While such a concentrated atmosphere is generally desirable for a course of this type, one instructor correctly noted the difficulty of disentangling the effects of the course and gamification design from the general attitude of the class, particularly since the course was conducted in the first weeks of the students’ first year and the instructors had no prior experience with them. Nevertheless, both instructors agreed that all gamification interventions were clearly perceived positively and that the course design functioned remarkably well.

Although both instructors were already enthusiastic about the course and its gamification approach prior to reviewing the study results, they expressed surprise at the overwhelmingly positive survey responses, highlighting the importance of continuing to use the course in future years. One instructor particularly praised the ability to allow students to catch up on material they had missed, which is often a challenge in more traditional teaching formats.

The instructors reported no significant negative aspects in their observations. The only minor issue was a technical malfunction in which experience points were not awarded despite the corresponding activity being marked as “completed.” While this could be easily rectified by manually awarding points, it is noteworthy that the cause of the problem remained unidentified. Other constructive feedback included: the use of German in some instances, where English terminology might be preferable (e.g., for 3D model names), potential improvements in the visual clarity of the course structure and navigation and the decision not to allow students to resubmit assignment results. Additionally, one instructor suggested providing incentives for performance that exceeds the basic requirements, as completing the minimum already yielded full rewards. A thorough discussion of this valuable feedback can be found in Section 5.2.1. The generally enthusiastic response of both instructors is aptly summarized by one of their closing remarks: “absolutely repeat it.”

## 4.7 Summary

Before presenting the results derived from the various data collection methods employed in this thesis, this chapter provides a detailed description of the study design. The first step in chronological order consisted of a series of semi-structured interviews with instructors from the Animation department at HTBLuVA Spengergasse, aimed at identifying areas with potential for gamification-related interventions. This was followed by a preliminary student survey designed to assess participants' general interest in software-generated 3D content, their prior experience with different categories of software, and their expectations of a digital gamified learning platform.

Following the completion of the course, 25 of the 30 participating students completed a post-course survey evaluating their experiences. The design of this questionnaire was based on Keller's Attention, Relevance, Confidence, and Satisfaction (ARCS) model [Kel87]. The chapter discusses the rationale for this choice, the structure of the questionnaire, and the decision to omit other established instruments due to their perceived limitations in the context of this study.

The subsequent section presents the results of the preliminary survey, accompanied by charts to visualize the data. A similar approach is applied to the analysis of the post-course questionnaire, which is structured according to the ARCS model that informed its design. This analysis also incorporates findings from a thematic analysis of the three open-ended questions included in the survey. Additional data collection methods comprised a focus group session with four volunteer students and semi-structured interviews with the two instructors who supported the course throughout its duration. The final two sections of this chapter synthesize the key statements from the focus group and instructor interviews that are relevant to the study context, thereby concluding the presentation of the collected data.



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The approved original version of this thesis is available in print at TU Wien Bibliothek.

# Critical Reflection

This chapter provides a critical examination of the data presented in Chapter 4. It begins by contextualizing the results and interpreting them in relation to the research questions and relevant literature, integrating insights from the various data sources. The chapter then addresses the study's limitations, allowing the findings to be appropriately situated within the broader scientific landscape and supporting an assessment of their applicability to course design and gamification in educational contexts. Finally, the chapter concludes with a discussion of this work's contribution to the existing body of research, highlighting its relevance to studies on gamification in educational contexts.

## 5.1 Discussion of the Results

The purpose of this section is to interpret the raw data obtained through the various methods applied in this study. This is achieved not only by critically examining each dataset but also by cross-referencing findings across methods and situating them within the research questions and relevant literature. Insights that emerge from this analytical process have the potential to inform the existing body of research and support future work in the development of digital learning platforms.

The results from the different data collection methods indicate that the digital gamified learning platform was perceived as having a positive influence on students' engagement, motivation, and learning outcomes. Regarding learning success, this perception is supported by several sources: the instructors' generally enthusiastic attitudes toward the course implementation, the survey, in which only one out of 25 participants indicated that the course was not suitable for learning the content as well as the focus group results. In the focus group session, two students compared their learning success with other instructional formats, one referring to the traditional approach used at HTLBUVA Spengergasse and the other to previous studies at a different institution, and both described the gamified learning platform as significantly superior in terms of learning

outcomes. This impression is further echoed in the open-ended survey responses, where five students explicitly highlighted their perceived learning progress, making it the most frequently mentioned positive aspect. As no statements contradicting these findings were recorded across any method, it appears reasonable to assume a broad consensus among participants that the digital gamified platform had a distinctly positive impact on their learning outcomes. Notably, survey responses indicate that the ability to control their own pace while progressing through the course was perceived as having the strongest influence on learning success. Additionally, all implemented interventions were viewed positively except for the leaderboard mechanic, which only five out of 25 respondents found helpful for learning the course content.

There is also strong evidence that students perceived a substantial improvement in their engagement with the learning material. Again, both the survey data and the focus group discussion support this conclusion. Mirroring the pattern observed for learning outcomes, progressing at an individualized pace was rated as the most influential factor contributing to time spent with the course. As with the findings on learning success, all interventions were rated favorably except the leaderboard. Although not as pronounced as in the domain of learning outcomes, more students reported no or only limited influence of the leaderboard on their engagement compared to those who viewed it positively. Especially the substantial perceived impact the interventions had on engagement is also supported by the results of the focus group session: one participant mentioned working from home outside scheduled sessions, and another described interacting with the course daily. It is noteworthy that, for these participants, high engagement was strongly supported by the competitive elements. A further, though academically weaker, indicator of engagement may be the high number of students who answered the optional open-ended survey questions were 21 participants responded to two of these questions, and 20 responded to all three.

Multiple data points also suggest that students perceived a substantial positive impact on their motivation while using the platform, with all interventions being evaluated favorably. While the ability to control the pace of progression again received the highest number of positive responses (“applies” or “fully applies”), it is noteworthy that the other autonomy-related intervention, allowing students to choose, to some degree, the content they wished to engage with, was the only intervention that did not receive any negative responses, although seven students selected a neutral option. In contrast to their perceptions of learning outcomes and engagement, a majority of participants reported a positive influence of the competitive elements on their motivation. Although these elements were rated least favorably overall, three of the four focus group participants described the leaderboard and the comparison of experience points as their most motivating factors.

While this group appears to be in the minority, their statements suggest that competitive elements, although positively affecting fewer students than other interventions, can have a particularly strong motivational impact on those who respond well to them. This interpretation is supported by four students mentioning competitive elements in the open-ended question about what they particularly liked about the course, the second

most frequently mentioned aspect after the thematic scenario. The narrative scenario was not only the most frequently mentioned intervention in the open-ended responses but also in the focus group. Combining this with the survey results, which suggest that other aspects of the course were rated more favorably overall, indicates that, similar to competitive elements, though to a lesser extent, the narrative scenario may not have had universal appeal, yet those who found it impactful were especially enthusiastic about it. The high perceived positive influence of the platform on motivation is further reflected in the reported enjoyment of the course. No student provided negative responses regarding whether they had fun in the course, and many expressed enjoyment in the open-ended questions. This aligns with the “satisfaction” dimension of Keller’s ARCS model [Kel87] and thereby further supports the interpretation of high student motivation.

Regarding the first research question, “What is the perceived impact of utilizing a digital gamified learning platform on students’ engagement, motivation, and learning outcomes in the context of 3D software education?”, the analysis presented in this chapter provides strong evidence that students perceived a substantial positive impact across all three dimensions. Furthermore, the findings also support the assumption that, in relation to the second research question, “How do students evaluate their experience and satisfaction with the overall course design, particularly the gamification and personalization elements?”, a clear majority of participants expressed a high degree of satisfaction with the overall course design, the incorporated gamification elements, and especially the personalization features.

## 5.2 Discussion of the Limitations of the Course and the Study

Although the results presented in Section 4.3 appear largely unambiguous, it is essential to interpret them in light of the limitations related to both the course- and study-design as well as its implementation in order to draw scientifically sound conclusions. Some of these limitations can be attributed to less effective design decisions, while a substantial portion results from technical constraints and the scope limitations of this thesis.

### 5.2.1 Limitations Related to Course Design and Implementation

One limitation arising from suboptimal planning concerns the late decision to introduce a narrative scenario into the course. This decision was made at a stage when content production had already begun, rendering the option of discarding or substantially revising existing materials infeasible. Consequently, the introductory section of the course contains comparatively little narrative-themed content, particularly with regard to assignment design and instructional videos. While integrating narrative framing from the outset might have strengthened these elements, the results presented in Section 4 and the arguments in Section 5.1 strongly suggest that the eventual incorporation of a narrative was nevertheless a beneficial decision that enhanced the overall effectiveness of the gamification design.

In terms of technical constraints associated with implementing the course within the Moodle learning management system (LMS), several limitations were inherent to the platform itself. These included long loading times for H5P content compared to regular videos, the inability to color-code course sections or use background images to achieve clearer visual differentiation between segments, and the lack of support for pop-up notifications to inform participants of important events, such as newly unlocked content. Such features could have contributed positively to user experience and orientation, especially in terms of user feedback. Additional limitations resulted from restricted administrative control over the LMS due to limited editing permissions. Although the institutional Moodle support team was highly cooperative, minor requests, such as modifying the icons used for H5P elements, were assigned low priority. While this is understandable in the context of a large institution, greater control over the platform during the implementation phase would have been desirable.

Another limitation relates to the use of the free, community version of the gamification plugin employed in this study, "Level Up XP". This choice was made deliberately, despite the availability of paid alternatives, in order to minimize barriers to future reuse of the course or its components in public school contexts, where securing funding for licensed software is often challenging. While this decision did not affect the core elements of the course or its gamification design, certain minor features such as customizable level-up messages or more flexible rules for distributing experience points were unavailable. While access to these features was not necessary for the intended design, it could have simplified the setup process and further strengthened the implementation.

Participants also repeatedly noted limitations concerning the technical quality of the video content. Although there were no reports indicating that students were unable to understand the material, improvements in visual quality and, in particular, audio clarity would have been desirable. However, these considerations must be balanced against the possibility of increased file sizes resulting in longer loading times, especially given the often unstable technical infrastructure found in public school settings. Still, with additional time and financial resources, it would likely be possible to optimize recording equipment and production workflows to enhance clarity without significantly increasing file sizes.

A notable limitation of the focus group was the participant selection process. As described in Section 4.5, the session involved four volunteer students, meaning that no control was exerted over who participated. Consequently, the focus group consisted of highly motivated students who completed most, if not all, optional course content. While their feedback was highly valuable, these participants were not necessarily representative of the broader student population. Therefore, suggestions regarding the perceived lack of challenge in the interactive videos or the need for bonus rewards for optional activities may not generalize to all students.

Nonetheless, the absence of incentives for performance beyond the basic requirements was also highlighted by one of the instructors. Although this aspect of the course design was intentional, aimed at assessing intrinsic motivation, it may be worth reconsidering in

future iterations to enhance engagement and learning outcomes. During the interviews, one interviewee also discussed the decision to use German not only as the course language but also for asset names, submissions, layers, and similar elements. While they agreed that English is commonly regarded as the industry standard, they agreed that reducing complexity was more important in the context of this course. Another point of critique was the inability to resubmit assignments, a design choice intended to allow timely instructor feedback. One instructor suggested retaining the current approach while allowing students to upload corrections in a dedicated section of the course in case of mistakenly submitted files. Although this would slightly increase course complexity, it might improve the overall user experience.

Responses to the open-ended questions in the main survey included a suggestion to increase course transparency by displaying the points awarded for completing course elements. The decision not to show these points beforehand was deliberate, intended to limit the information presented and reduce cognitive load. Survey participants also expressed a preference for a more assignment-focused approach in future courses. While students' motivation for phases involving creative expression supports this suggestion, shifting the course focus in this direction would conflict with the primary goal of enhancing the teaching of instructional content, as outlined in Section 1.1 ("Requirement Determination").

Another limitation identified by a survey participant was that certain critical information was not presented within the course itself but only during the introductory presentation. This approach was problematic both for students who missed the presentation and for those who might have benefited from repeated exposure to key information. Although not explicitly stated, participant feedback suggests that this may have led to some students lacking a sufficient understanding of the course structure needed to navigate it efficiently. Both open-ended survey responses and focus group discussions indicated that several students were unaware that they could freely choose content from all three subsections of the advanced part of the course. Additionally, one focus group participant reported being unaware of the video library and therefore repeatedly re-watched interactive videos in which fast-forwarding was disabled. The frequent criticism regarding the lack of functional playback controls in the closing survey further suggests that this section was overlooked by several participants, thereby negatively affecting user control and freedom. While all of this information was clearly communicated during the introductory presentation, the findings indicate that this approach was insufficient to ensure comprehension across the entire participant group.

### 5.2.2 Limitations Related to the Study Design and Implementation

While many of the limitations related to the course design and implementation arose from technical constraints, a substantial amount of limitations concerning the study design are attributable to the restricted scope inherent to a master's thesis. As noted in Chapter 4, the study involved only a single class. This limited sample size, combined with the absence of information regarding how this group compares to other students in terms of baseline motivation and skill levels, introduces uncertainty when interpreting the extent to which observed outcomes can be attributed to the course and its gamification design. These uncertainties are further increased by the intentional decision not to include a control group. Although this choice is discussed and justified in Section 4.1, it results in a higher degree of subjectivity in the findings. Consequently, the results primarily reflect participants' perceived outcomes rather than allowing for more robust causal interpretations. This, in turn, restricts the potential for generalizing the findings beyond the studied group.

An additional limitation arises from the exclusive use of self-reporting methods, such as surveys and interviews, for data collection. As all data were gathered through these instruments, the findings are based on participants' subjective assessments of their experiences and outcomes, rather than on objective performance measures.

The relatively short duration of the study represents a further limitation. While this was partly dictated by the scope of a master's thesis, it was also influenced by the course design. The primary objective of this work was the implementation and evaluation of an introductory course for 3D software usage. Moreover, prior work by Dichev and Dicheva indicates that "insufficient high-quality evidence exists to support the long-term benefits of gamification in educational contexts" [DD17]. Although this observation points to a relevant research gap, investigating long-term effects was beyond the intended scope of the present study.

In addition to these general methodological considerations, certain limitations stem directly from the context in which the study was conducted. In particular, there is substantial interest in the animation classes, resulting in registration numbers that significantly exceed available capacity. Consequently, students are subject to a selection process in which their qualifications are assessed. In addition, participation requires access to suitable hardware capable of running 3D software, with recommended devices representing a considerable financial investment. These factors are likely to influence the demographic composition of the participant group and suggest that the sample does not represent a random selection of students within this age range. Taking these limitations into account is essential for a careful and informed interpretation of the findings reported in Section 5.1.

## 5.3 Reflection on the Contribution to the Existing Body of Research

As discussed in Section 1.3, this thesis pursues two complementary objectives. On the one hand, it aims to provide concrete and practical guidance for educators seeking to design gamified courses for teaching complex software, particularly in the domains of 3D modeling, animation, and image rendering. On the other hand, it seeks to contribute to the existing body of academic research in this area.

Accordingly, the thesis is grounded in the research gap that largely motivated its study design. As outlined in Section 1.2, although a substantial body of research exists on the use of digital gamification concepts and methods in educational contexts, the majority of these studies focus on university students [DD17]. While no peer-reviewed studies were identified that explicitly explain this imbalance, it is reasonable to assume that conducting empirical studies with primary or secondary school students poses significantly greater challenges than studies conducted at universities. Given that such research is often situated within academic education, university students are more readily accessible as participants. Moreover, working with students who are not yet of legal age introduces additional complexities, including language-related challenges with English-language content or evaluation instruments for non-native speakers, as well as legal and ethical requirements involving guardians or parents. A further research area with considerable potential is the application of gamification to the teaching of complex software. Although some studies have addressed this topic [Han15][DDJ<sup>+</sup>12][VD13], their number remains limited and their scope relatively narrow. By addressing both the educational level and the instructional domain, this thesis is positioned to help bridge gaps in the current academic literature.

This contribution is further strengthened by the explicit intention to respond to prevailing criticisms of digital gamification research. One prominent critique, articulated by Dichev and Dicheva, is that “the majority of the studies reviewed in the previous sections lack a theoretical underpinning” [DD17]. In response, substantial effort was devoted to grounding both the course design and the gamification strategy in established theoretical frameworks. In particular, Keller’s Attention, Relevance, Confidence, and Satisfaction (ARCS) model [Kel87] provided a comprehensive framework for integrating motivational considerations across all design dimensions. Additionally, the Self-Determination Theory (SDT) by Ryan and Deci [RD00], with its emphasis on learner autonomy and competence also directly informed the course structure.

Furthermore, by incorporating multiple points of critique raised by Deterding [Det11], this thesis adopts design measures intended to increase learner autonomy and feedback, and, in particular, to imbue the course and its gamification elements with a strong sense of meaning. Through these efforts, the thesis aims to position itself as a progression of prior work at the intersection of gamification, education, and human–computer interaction.

Finally, in order to contribute as meaningfully as possible to the existing body of research within the scope of a master's thesis, this work takes into account Dichev and Dicheva's observation that questions such as "whether gamification motivates students, improves learning, or increases participation" are overly broad [DD17]. Consequently, the study seeks to provide more fine-grained insights by examining the perceived impact of specific design interventions on motivation, engagement, and learning outcomes.

Taken together, these arguments demonstrate that this thesis makes a contribution to the existing body of research across three key dimensions: the target group, through the inclusion of secondary school students; the instructional domain, by focusing on the teaching of complex software; and the theoretical grounding, by addressing and building upon commonly voiced criticisms in the academic literature.

# Summary and Future Work

The aim of this chapter is to provide a concise summary of the thesis, including its motivation, the approach taken to course and gamification design, and the key results. This chapter also outlines potential directions for future research and, building on the discussion of challenges presented in Section 3.4 offers practical guidance for educators seeking to integrate gamification and personalization into the teaching of complex software. By presenting an integrated overview of these aspects, the chapter seeks to support a comprehensive understanding of the study's limitations, as well as the opportunities for further refinement and improvement.

## 6.1 Overview of the Thesis

As outlined above, this thesis pursued two primary objectives. First, it aimed to derive insights from the design and implementation of a digital gamified learning platform that may inform future projects of comparable scope and application. Second, it sought to contribute to the existing body of research on digital gamification and personalization in educational contexts. These objectives were motivated by the limited number of studies exploring the use of gamified methods for teaching complex software, particularly at the secondary school level, as well as by challenges identified in the current teaching practice at HTBLuVA Spengergasse. Interviews with instructors from the animation department further helped to define this problem space and contextualize the research. Addressing these gaps was guided by the following research questions formulated in Section 1.3:

- **RQ1:** What is the perceived impact of utilizing a digital gamified learning platform on students' engagement, motivation, and learning outcomes in the context of 3D software education?
- **RQ2:** How do students evaluate their experience and satisfaction with the overall course design, particularly with regard to the gamification and personalization elements?

To answer these questions, the research began with a review of relevant literature to define key concepts, examine comparable applications of gamification in education, identify opportunities and common critiques of gamified approaches, and situate the work within established instructional and motivational theories. Insights from the literature, combined with findings from three interviews with animation instructors, informed the design of both the course and the accompanying study. Central design goals included supporting student autonomy, emphasizing engagement over performance-based rewards, and embedding learning activities within meaningful and coherent contexts.

Following implementation, an introductory presentation familiarized students with the underlying concepts and they subsequently engaged with the course content through eight sessions of 100 minutes each over four weeks. Data were collected through multiple instruments, including a preliminary survey prior to course participation, a post-course survey, a student focus group, and interviews with the two instructors who supported the course. Analysis of these data indicates that students perceived a substantial positive impact of the digital gamified learning platform on their engagement, motivation, and learning outcomes. Moreover, students reported high levels of satisfaction with the course design, particularly regarding the gamification and personalization elements. Only the competitive elements were rated less favorably by the majority; however, focus group results indicate that they had a substantial impact on a specific subgroup.

While the limitations discussed in Section 5.2 must be considered, most notably the absence of a control group, which introduces a degree of subjectivity, the clarity and consistency of the results provide strong evidence that students perceive gamified methods and concepts as effective for learning complex software. Additionally, the data suggest that addressing common critiques of gamification positively influenced students' perceived experience. Collectively, these findings not only contribute meaningfully to the research on digital gamification and personalization in education but also offer valuable guidance on opportunities, challenges, and best practices for the design of future courses and gamified learning environments.

## 6.2 Outlook

As discussed above, future work has the potential to build upon the findings of this thesis in two key areas: the validity and generalizability of the results, and the quality of the course and gamification design in the current implementation.

### 6.2.1 Expanding and Strengthening the Study

Regarding the first aspect, the validity and generalizability of the results, several measures could be taken to enhance the robustness of the findings. A relatively low-effort approach would be to replicate the study, potentially multiple times, with different classes. This would help mitigate the influence of characteristics specific to individual classes. Although replicating the study could raise ethical concerns if the gamified course proved less effective

than traditional instruction at HTBLuVA Spengergasse, the findings indicate that the digital platform was appropriate, mitigating such concerns. Conducting the study with groups differing in demographic composition could further enhance the generalizability of the results. While this may require adjustments to the course and gamification design, it would provide insights into how the platform performs across diverse student populations, particularly given the multiple factors that influenced participation selection, as discussed in Section 5.2.

A further strategy to improve the objectivity of the results would be the use of experimental designs incorporating a control group, such as A/B testing. While this approach could substantially strengthen the evidence, it would also greatly expand the scope of the study and raise potential ethical concerns, as one group of students would be denied access to what may constitute a higher-quality form of instruction. Future studies could additionally consider different learning styles, similar to the approach taken in the dissertation by Alma Zaric [Zar22], and adapt course versions accordingly. The mixed findings regarding competitive elements suggest considerable potential for tailoring gamification features to subgroups of students for whom these elements are most effective.

Finally, while it was possible to log students' interactions with the course during this study, the data were limited in their usefulness. A significant portion of students' time was spent working within the 3D software to complete assignments, which was not captured by the course logging system. Implementing a system capable of tracking time spent within the 3D software would provide an additional dimension of engagement data and enable a more comprehensive analysis of student interaction with the platform outside of scheduled sessions.

### 6.2.2 Enhancing Course and Gamification Design

Several strategies could be employed to further improve the course and gamification design, both at a conceptual and a technical level. While some of these measures were considered but not implemented due to the limited scope, others directly stem from the findings of this thesis.

One such example concerns the narrative scenario used in the course. As discussed in Section 5.2, the decision to introduce a narrative framework was made at a relatively late stage of development, when a substantial portion of the course had already been implemented. As a result, the scenario could only be integrated to a limited extent. In light of the findings indicating a positive perceived impact of this game element, a stronger and earlier integration of the narrative scenario appears likely to further enhance the participant experience. This could be supported by the creation of custom visual assets aligned with the thematic setting, thereby improving graphical cohesion throughout the course.

Several additional game elements were suggested by students (see Section 4.5). While ideas such as a currency system with purchasable items appear likely to increase cognitive load to a degree that could be counterproductive to the didactic goals of the course,

particularly by introducing a third point-based system alongside experience and grade points, other suggestions seem more promising. In particular, the proposal to include the creation of a custom avatar as an assignment warrants further consideration. This task would align closely with the course content, as students were already required to model a multicolored figure, and it would also introduce a well-established game element discussed in HCI research: customizable avatars as a means of self-representation [HAK<sup>+</sup>23].

Beyond gamification elements, there is also room for improvement in how the course structure and features are communicated. During the course, critical information, such as the availability of a video library or the flexible content selection in the advanced section, was conveyed through external means, including an introductory presentation. This approach proved problematic, suggesting that future iterations should communicate the course structure and functionality in a more self-contained manner within the learning environment itself. Related to this issue, instructors noted in post-course interviews that many navigation-related challenges encountered by participants were not perceived as flaws in the course design. Instead, they were attributed to a lack of prior experience with the Moodle learning management system among a substantial portion of the students. This observation indicates that integrating introductory instructional content on basic Moodle usage at the beginning of the gamified course could help mitigate such issues.

On a technical level, participants criticized the instructional videos, particularly with regard to visual fidelity and audio clarity. Although no student reported that these issues hindered comprehension of the content, improvements in production quality could positively influence the overall user experience. Achieving this would likely require improved technical equipment, such as a dedicated high-fidelity microphone and a higher-resolution display for screen capture. However, the resulting increase in file size must be carefully considered, as longer loading times could limit or even counteract potential improvements in user experience. Additionally, future iterations of the course could enhance accessibility features, such as providing captions for images or subtitles for videos. Although these aspects were considered during the course design, their implementation was beyond the scope of this thesis due to the additional workload it would have required.

Finally, the design of the assignments represents another area for potential improvement. While no explicit criticism was voiced by participants, several ideas aimed at making challenges more engaging and meaningful were excluded during development due to scope limitations. Given that the Moodle LMS supports the reuse of individual course elements as well as entire courses, systematically revisiting and iteratively refining assignment design appears particularly valuable. This would enable future implementations to incrementally incorporate and reassess many of the suggestions outlined in this section.

### 6.2.3 Impact of the Thesis on Teaching at HTBLUvA Spengergasse

As outlined in Section 1.3, the primary goals of this thesis were to contribute to the existing body of research and to support educators in designing future courses and gamification strategies. A valuable side effect, however, is that the insights gained can be directly applied to teaching at HTBLUvA Spengergasse. One example, noted in the previous section, is the potential for reusing and iteratively refining the digital gamified Moodle course for future classes. While the design and implementation of this course required a substantial investment of time, reproducing it in its entirety for different subjects is unlikely. Nevertheless, smaller, self-contained courses employing similar methods and concepts to teach specific topics appear feasible. Additionally, certain elements, such as the unlock structure and optional content designed to enhance student autonomy, could be incorporated into more traditional teaching methods with a reasonable level of effort.

Although a formal presentation of the results at the institution had not yet taken place at the time of writing, informal feedback regarding the course's impact on students' perceived motivation, learning outcomes, and enjoyment of the material has already generated considerable enthusiasm among colleagues and the head of the department. This enthusiasm led to a request to organize a SCHÜLF seminar ("Schulübergreifende Lehrerfortbildung"), a program in Austrian schools that enables teachers to share their expertise with interested colleagues from multiple schools.

By conducting this seminar, the findings of this thesis could not only enhance teaching quality at HTBLUvA Spengergasse but also directly benefit multiple schools across Vienna, and potentially, throughout Austria. Taken together, these outcomes illustrate how the insights from this thesis not only advance understanding of gamified learning in Human-Computer Interaction (HCI) but also provide tangible guidance for improving both course design and student learning experiences in real educational contexts.



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The approved original version of this thesis is available in print at TU Wien Bibliothek.

# Overview of Generative AI Tools Used

While no textual content of this thesis was generated with the assistance of generative AI tools, such tools contributed to multiple aspects of this study. The primary tool employed was OpenAI Chat-GPT, version GPT-4 up until the 7th of August 2025 and GPT-5 mini afterwards. Below, an extensive list of all use cases is provided, including the corresponding prompts. All AI-generated modifications were carefully reviewed for content accuracy, and, in many cases, manually edited.

- **Rephrasing all thesis text for clarity and readability** Prompt: “Rephrase the following text for a master’s thesis in Human-Computer Interaction. Improve clarity, readability, and academic tone to match that of a native English-speaking researcher, without changing the original meaning or content.” (Multiple times between Jul 16 2025 and Jan 10 2026)
- **Translation to English** Applied to the *Acknowledgements* section as well as all study and course materials originally created in German, including survey questions, course assignments and video descriptions. Prompt: “Translate to English without changing content or intent.” (Multiple times between Okt 1 2025 and Dec 21 2025)
- **Translation to German** Applied to the *Abstract* and *Overview of Generative AI Tools Used* section. Prompt: “Translate to German without changing content or intent.” (Dec 21 2025)
- **Generation of magic-themed level icons for the gamified Moodle course (see Figure 3.15).** (Aug 17 2025)
- **Creation of Figure 3.1 (Moodle course structure diagram)** (Nov 4 2025)

Additionally, the AI tool Elicit was employed to retrieve relevant literature for this master's thesis. While Elicit does not publicly provide version numbers, the following presents a comprehensive list of prompts along with their corresponding dates.

- Opportunities and Limitations of Gamification in Education (Nov 4 2025)
- Impact of Game-Based Learning in Education (Oct 16 2025)
- Gamification in Learning Complex Software (Oct 16 2025)
- ARCS Model in Teacher Training (Sep 30 2025)
- Gamification in Education Survey for Adolescents (Aug 15 2025)
- Gamification Design: Meaning, Mastery, Autonomy (Jul 31 2025)
- Gamification in Education: A Meta-Analysis of Contexts (Jul 30 2025)
- Gamified Learning Platforms Analysis (Jul 24 2025)
- Definition of Digital Learning Platforms (Jul 23 2025)
- Gamifying 3D Software Education (Apr 22 2025)
- Impact of Open Learning on Education (Apr 3 2025)
- Gamification in Education Research Trends (Apr 1 2025)
- Gamification in Education: A Meta-Study (Apr 1 2025)
- Gamification in Software Education (Mar 20 2025)

# Übersicht verwendeter Hilfsmittel

Obwohl kein Textinhalt dieser Arbeit mit Unterstützung generativer KI-Tools erstellt wurde, haben derartige Tools in mehreren Aspekten zu dieser Studie beigetragen. Das primär verwendete Tool war OpenAI Chat-GPT, Version GPT-4 bis zum 07. August 2025, danach in der Version GPT-5 mini. Nachfolgend wird eine ausführliche Liste aller Anwendungsfälle einschließlich der entsprechenden Prompts dargestellt. Alle KI-generierten Änderungen wurden sorgfältig auf inhaltliche Richtigkeit überprüft und in vielen Fällen manuell bearbeitet.

**Umformulierung des gesamten Textes der Arbeit zur Verbesserung von Klarheit und Lesbarkeit** Prompt: „Rephrase the following text for a master’s thesis in Human-Computer Interaction. Improve clarity, readability, and academic tone to match that of a native English-speaking researcher, without changing the original meaning or content.“ (Mehrere Male zwischen 16. Jul. 2025 und 10. Jan. 2026)

**Übersetzung ins Englische** Angewendet auf den *“Acknowledgements”*-Abschnitt sowie alle Studien- und Kursmaterialien, die ursprünglich auf Deutsch erstellt wurden, einschließlich Umfragefragen, Kursaufgaben und Videobeschreibungen. Prompt: „Translate to English without changing content or intent.“ (Mehrere Male zwischen 01. Okt. 2025 und 21. Dez. 2026)

**Übersetzung ins Deutsche** Angewendet auf den *“Abstract”*- und *“Overview of Generative AI Tools Used”*-Abschnitt. Prompt: „Translate to German without changing content or intent.“ (21. Dez. 2025)

**Erstellung von Level-Icons mit Magie-Bezug für den gamifizierten Moodle-Kurs (siehe Abbildung 3.15).** (17. Aug. 2025)

**Erstellung von Abbildung 3.1 (Diagramm der Moodle-Kursstruktur)** (04. Nov. 2025)

Zusätzlich wurde das KI-Tool Elicit eingesetzt, um relevante Literatur für diese Masterarbeit zu recherchieren. Elicit gibt öffentlich keine Versionsnummern an. Im Folgenden ist eine umfassende Liste der verwendeten Prompts zusammen mit den jeweiligen Daten dargestellt.

- Opportunities and Limitations of Gamification in Education (4. Nov. 2025)
- Impact of Game-Based Learning in Education (16. Okt. 2025)
- Gamification in Learning Complex Software (16. Okt. 2025)
- ARCS Model in Teacher Training (30. Sep. 2025)
- Gamification in Education Survey for Adolescents (15. Aug. 2025)
- Gamification Design: Meaning, Mastery, Autonomy (31. Jul. 2025)
- Gamification in Education: A Meta-Analysis of Contexts (30. Jul. 2025)
- Gamified Learning Platforms Analysis (24. Jul. 2025)
- Definition of Digital Learning Platforms (23. Jul. 2025)
- Gamifying 3D Software Education (22. Apr. 2025)
- Impact of Open Learning on Education (3. Apr. 2025)
- Gamification in Education Research Trends (1. Apr. 2025)
- Gamification in Education: A Meta-Study (1. Apr. 2025)
- Gamification in Software Education (20. Mär. 2025)

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# Appendix A - Translations

<b>Preliminary Survey Questions (DE)</b>	<b>English Translation</b>
Ich spiele gerne Computerspiele	I like to play computer games
Ich schaue gerne 3D animierte Filme, Kurzfilme und/oder Musikvideos	I like watching 3D-animated movies, short films, and/or music videos
Ich kann gut mit Windows/MacOS umgehen	I am good at using Windows/MacOS
Ich kann mit einem oder mehreren komplexeren Programm(en) umgehen (z.B. Photoshop, Zeichenprogramm, Videoschnittprogramm...)	I can use one or more complex programs (e.g., Photoshop, drawing programs, video-editing programs...)
Ich habe bereits Erfahrung mit 3D Software	I already have experience with 3D software
Ich denke, Spielelemente können Lernmotivation erhöhen.	I think game elements can increase learning motivation
Ich denke ein Szenario wird mir helfen, die Inhalte zu erlernen.	I think a scenario will help me learn the content
Ich denke Erfahrungspunkte und Level-Aufstieg werden mir helfen, die Inhalte zu erlernen.	I think experience points and leveling up will help me learn the content
Ich denke das freie Tempo und die Möglichkeit, Inhalte teilweise auszuwählen wird mir helfen, die Inhalte zu erlernen.	I think the free pace and the ability to partially choose content will help me learn the material
Ich interessiere mich dafür, den Umgang mit 3D Software zu lernen	I am interested in learning to use 3D software
Ich denke es wird mir leicht fallen, einem digitalen Selbstlern-Kurs zu folgen.	I think it will be easy for me to follow a digital self-learning course
Ich denke es wird mir leicht fallen, die Grundlagen der 3D Software "Maya" zu erlernen.	I think it will be easy for me to learn the basics of the 3D software "Maya"
Ich denke, der Kurs wird mir Spaß machen.	I think the course will be fun for me

<b>Main Survey Questions (DE)</b>	<b>English Translation</b>
Wie weit bist du im Kurs gekommen?	How far did you get in the course?
Das Szenario (Magie) hat mich motiviert, weiter zu machen.	The scenario (magic) motivated me to keep going
Ich habe mit dem Kurs interagiert aus Neugierde, welche Inhalte als nächstes freigeschalten werden.	I interacted with the course out of curiosity about which content would be unlocked next
Ich fand es motivierend mir die Inhalte in meinem eigenen Tempo aneignen zu können.	I found it motivating to be able to learn the content at my own pace
Die Erfahrungspunkte (XP) haben mich motiviert weiter zu machen.	The experience points (XP) motivated me to keep going
Ich fand es motivierend die Inhalte zumindest teilweise selbst auswählen zu können.	I found it motivating to be able to choose some of the content myself
Ich habe mit dem Kurs interagiert, weil ich das nächste Level erreichen wollte.	I interacted with the course because I wanted to reach the next level
Es hat mich motiviert, mich mit anderen zu vergleichen.	It motivated me to compare myself with others
Das Level-System hat mich motiviert, weiter zu machen.	The level system motivated me to keep going
Wegen dem Szenario (Magie) habe ich mehr Zeit mit dem Kurs verbracht.	Because of the magic scenario, I spent more time on the course
Wegen den Erfahrungspunkten (XP) habe ich mehr Zeit mit dem Kurs verbracht.	Because of the experience points (XP), I spent more time on the course
Wegen dem Level-System habe ich mehr Zeit mit dem Kurs verbracht.	Because of the level system, I spent more time on the course
Wegen der "Bestenliste" habe ich mehr Zeit mit dem Kurs verbracht.	Because of the leaderboard, I spent more time on the course
Weil ich mir das Tempo frei einteilen konnte habe ich mehr Zeit mit dem Kurs verbracht.	Because I could set my own pace, I spent more time on the course
Weil ich mir teilweise die Inhalte frei aussuchen konnte habe ich mehr Zeit mit dem Kurs verbracht.	Because I could partially choose the content myself, I spent more time on the course
Der Kurs hat einen guten Einstieg in die Grundlagen der 3D Software "Maya" geboten	The course provided a good introduction to the basics of 3D software "Maya"
Ich interessiere mich dafür, noch mehr über den Umgang mit 3D Software zu lernen	I am interested in learning even more about using 3D software
Ich fand den Kurs gut geeignet um die Inhalte zu lernen	I found the course suitable for learning the content
Das Szenario (Magie) hat mir geholfen, den Lernstoff zu erlernen.	The scenario (magic) helped me learn the content
Die Erfahrungspunkte (XP) haben mir geholfen, die Inhalte zu erlernen.	The experience points (XP) helped me learn the content
Das Level-System hat mir geholfen, die Inhalte zu erlernen.	The level system helped me learn the content
Die Bestenliste hat mir geholfen, die Inhalte zu erlernen.	The leaderboard helped me learn the content
Ich fand es leicht, dem Kurs zu folgen	I found it easy to follow the course

Main Survey Questions (DE)	English Translation
Ich fand gut nachvollziehbar, wie die Spielelemente im Kurs funktionieren.	I found it easy to understand how the game elements in the course work
Es war gut möglich den Kurs in der gegebenen Zeit abzuschließen (verpflichtende Inhalte).	It was possible to complete the course in the given time (required content)
Der Kurs war zu einfach.	The course was too easy
Der Kurs war zu schwierig.	The course was too difficult
Mein eigenes Lerntempo zu bestimmen hat mir geholfen, die Inhalte zu erlernen.	Being able to control my own pace helped me learn the content

# Appendix B - Tutorial Progression Structure

Number	Content	Requirements	Mandatory	Section
1.1	Visual Support in Videos	–	Yes	Basic 1
1.2	Windows Folder Structure	1.1	Yes	Basic 1
1.3	Creating Screenshots	1.2	Yes	Basic 1
1.4	Maya Main Menu	1.3	Yes	Basic 1
1.4a	Menu "Hotbox"	1.4	No	Basic 1
1.5	Settings	1.3	Yes	Basic 1
1.6	Workspace	1.3	Yes	Basic 1
1.7	Opening Maya Files	1.4, 1.5, 1.6	Yes	Basic 1
1.8	Navigating Virtual 3D Space	1.7	Yes	Basic 1
1.9	Panel Menu	1.8	Yes	Basic 1
2.1	Move Tool	Level 2	Yes	Basic 2
2.2	Undo	Level 2	Yes	Basic 2
2.3	Rotate/Scale Tool	2.1	Yes	Basic 2
2.3a	World/Object Axes	2.3	No	Basic 2
2.4	Import Objects	2.3	Yes	Basic 2
2.5	Duplicate and Combine	2.3	Yes	Basic 2
2.5a	Context Menu	2.5	No	Basic 2
3.1	Create Polygon Primitives	Level 3	Yes	Basic 3
3.2	Grouping and Parenting	Level 3	Yes	Basic 3
3.3	Channelbox and Layers	Level 3	Yes	Basic 3
3.4	Attribute Editor and Object Color	Level 3	Yes	Basic 3
M.1	Object Components	Level 4	Yes	Modeling
M.2	Soft Select	M.1	Yes	Modeling
M.2a	Hidden Primitives	M.2	No	Modeling
M.3	Extrude Tool	M.1	Yes	Modeling
M.4	Object History	M.1	Yes	Modeling
M.5	Instert Edgeloop/Smooth Preview	M.1	Yes	Modeling
M.5a	Tool Options	M.5	No	Modeling
R.1	Light Sources and Rendering	Level 4	Yes	Rendering
R.2	Directional Lights	R.1	Yes	Rendering
R.3	2-Point Light Setup	R.2	Yes	Rendering
R.3a	3-Point Light Setup	R.3	No	Rendering
R.4	Arnold Material Presets	R.1	Yes	Rendering
R.4a	Texturing and UV-Mapping	R.4	No	Rendering
R.5	Render Setting	R.1	Yes	Rendering
A.1	Animation Workspace and Settings	Level 4	Yes	Animation
A.2	Create and Edit Keyframes	A.1	Yes	Animation
A.2a	Autokey Function	A.2	No	Animation
A.3	Create Playblasts	A.2	Yes	Animation
A.4	Eases and Linear Animation	A.2	Yes	Animation
A.4a	Graph Editor	A.4	No	Animation
A.5	Working with Character Rigs	A.2	Yes	Animation

# Appendix C - Student Responses to the Open Survey Questions

<b>Was hat dir an der Lernplattform mit Szenario, XP und Levels besonders gefallen?</b>
Competition, Vibe, Theme
Das man in seinem eigenen Tempo arbeiten konnte und dass die Reihenfolge, in der man die Videos freigeschaltet hat, sehr gut war.
Am meisten gefiel mir, ein Objekt, Tier oder etwas Ähnliches zu erstellen.
Es ist etwas Neues und lässt das Lernen weniger wie eine Hausaufgabe aussehen, was mir persönlich geholfen hat, von selbst weiterzumachen.
Das durchgehende Thema (Magie) in den Aufgaben.
Dass es so kreativ gestaltet war.
Die Gestaltung und das Szenario haben mir sehr gut gefallen; es hat sehr geholfen und war super lustig, alles nach einem Thema zu haben.
Mir hat gefallen, dass ich einen Levelaufstieg hatte und einfach immer das machen konnte, was ich wollte; ich konnte optionale Sachen machen oder auch nicht.
Der Beste zu sein.
Die Szenarien waren cool; auf die XP-Punkte habe ich nicht so sehr geachtet wie auf die Levels, weil sie keine Art von Belohnung hatten.
Ich habe es ehrlich gesagt ziemlich ignoriert. Praktisch waren nur die Levels, weil man Live-Feedback bekommen hat.
Das Selbermachen.
Die Möglichkeit, sich im eigenen Tempo zu bewegen und gut von zu Hause aus zu arbeiten.
Dass die Levels so klar gegliedert waren und neue Inhalte freigeschaltet haben. Auf die XP habe ich nicht wirklich geachtet, aber ich finde sie gut. Das Szenario mochte ich sehr gerne; durch die Spielelemente hat es sich weniger nach Schule angefühlt und ich habe lieber gelernt.
Dass man motiviert war, zum nächsten Level zu kommen.
Das Szenario mit Magie und Videospielelementen hat mir sehr viel Spaß gemacht.
Dass man im eigenen Tempo arbeiten konnte.
Es war mir eigentlich komplett egal, aber Videospielelemente als Beispiele zu verwenden ist schon ganz gut.
Ich war eher motiviert, etwas zu lernen, anstatt XP zu bekommen.
Es hat mir gefallen, dass ich jederzeit nachsehen konnte, wer ungefähr so weit war wie ich. Ich bin eher langsam, und es hat mich beruhigt zu wissen, dass ich nicht die Einzige bin, die eher langsam ist.
Mir hat die Bestenliste sehr gut gefallen, ich fand sie sehr motivierend!

<b>Was könnte man deiner Meinung nach an dem Kurs verbessern?</b>
Nichts, außer dass man mehr solche Kurse machen soll.
Die Audioqualität der Videos hätte ein bisschen besser sein können.
Es gibt nicht wirklich etwas, was ich verbessern würde, es ist alles gut beschrieben im Kurs gestanden.
Vielleicht könnte man bei jedem Level angeben, wie viele Punkte man dazu bekommt, um Kinder noch ein wenig mehr zu motivieren, da ich oft nicht wirklich verstanden habe, ob gewisse Übungen überhaupt Punkte brachten.
Die Videobibliothek übersichtlicher machen.
Ich würde die Fragen ein bisschen schwieriger machen, man hat die Antworten meist schon gewusst, ohne das Video überhaupt gesehen zu haben.
Die Gestaltung noch ein wenig weiter ausbauen, die Videos ein wenig qualitativ besser machen (vor allem mit dem Audio hatte ich öfters Probleme).
Ich persönlich habe noch nie mit 3D gearbeitet und bin deswegen ein bisschen lost. Wenn ich Sachen wiederholen wollte, musste ich immer das ganze Video neu schauen und konnte nicht einfach zur Stelle springen, die ich nicht verstanden habe.
Nichts wirklich.
Dass man mehr Zeit hat und vielleicht die Videos nicht so lang macht.
Ich fand es sehr cool eigentlich. Habe aber ehrlich gesagt bis zum Ende nicht wirklich verstanden, dass es nicht linear geht und man sich die "Spezial Magie"-Teile frei aussuchen kann.
Weniger Videos, ein bisschen mehr Arbeiten.
Es ist möglich, die ungefähre Zeit anzugeben, die zum Abschließen einer bestimmten Aufgabe benötigt wird. +-
Dass man die Videos vor- und zurückspulen kann.
Evtl. dass man vorspulen kann, wenn man das Video schon gesehen hat. Im Nachhinein Dinge nachschauen war leider etwas mühsam. Das Zeitlimit hat mich etwas gestresst, obwohl ich in meinem Tempo lernen sehr mochte, und vielleicht wäre eine Art Einschätzung, ob man jetzt gut in der Zeit ist oder nicht, praktisch (die Bestenliste war aber auch in der Art nützlich).
Videoqualität und längere Videos in 2 kleine aufteilen.
Ich bin eigentlich sehr zufrieden mit dem Kurs und habe nichts zu jammern.
Ich will noch Rigger lernen und ich weiß zwar nicht, wie man das machen könnte, aber mit der Zeit habe ich manche Basic-Funktionen, die man am Anfang gelernt hat, wieder vergessen.
Nichts.
Mir würde nichts einfallen, das man noch verbessern müsste.
Es gibt nicht viel, was ich verbessern möchte, außer vielleicht eine separate App für den Kurs, da es auf Moodle manchmal etwas verwirrend sein kann.

Gibt es sonst noch etwas, das du zu dem Kurs sagen möchtest?
Mehr solche Kurse würden helfen. Man lernt viel mehr in kurzer Zeit als mit allgemeinem Unterricht.
War ein sehr tolles Erlebnis.
Der Kurs war absolut cool!
Es war viel angenehmer und nicht zu leicht, aber auch nicht zu schwer. Im eigenen Tempo zu arbeiten ist durchaus eine gute Methode zum Lernen, jedoch muss trotzdem klargemacht werden, bis wann man den Kurs abschließen soll, weil manche Kinder wohlmöglich, als sie krank waren, nicht mitbekommen haben, bis wann die Deadline ist.
Nein.
Hat sehr viel Spaß gemacht und mich wirklich weitergebracht.
Generell auf jeden Fall sehr gut und ein schneller Weg, Maya zu lernen, aber für mich manchmal ein wenig überfordernd.
Ich fand es gut, die anderen zu überholen und der Beste zu sein.
Es war cool, aber keine Minecraft-Referenz dabei >:( sonst aber war cool :).
Ich fand es sehr angenehm mit dem eigenen Tempo und der Möglichkeit, Inhalte nochmal zu wiederholen.
Er war sehr gut.
Ich finde, dieser Kurs ist ein wirklich cooler Einstieg in die Arbeit mit Maya.
Nicht wirklich.
Ich habe am Kurs sehr gerne teilgenommen und hatte sehr, sehr viel Spaß, Maya zu lernen. Vor allem, dass man in seinem eigenen Tempo lernen kann, hat mich sehr motiviert. Ich hätte tatsächlich noch gern mehr in dieser Art gemacht.
Man hat viel Neues gelernt.
Ich bin leider nicht fertig geworden, da ich öfteres Migräne bekommen habe. Dennoch hat mir der Kurs sehr gefallen, danke!
Ne, war super, aber Rigger wurde leider nur kurz erwähnt und nicht zumindest auf dem komplett Basic-Level gezeigt, wie man's selbst macht.
Bitte mehr.
Ich habe nichts anderes zu sagen.
Nein, nicht wirklich!

# Appendix D - Interview and Focus-Group Guides

## Interview mit Lehrenden zur Erfassung der Problemstellung

### Thema des Interviews

Der Zweck dieses Interviews ist es, Einblicke in die Lehrerfahrungen von PädagogInnen der Abteilung für Kunst und Design an der HTBLuVA Spengergasse zu gewinnen, um den Problemraum für eine Masterarbeit zu definieren. Zentrale Themen sind die Unterrichtsqualität, Herausforderungen, denen Lehrkräfte gegenüberstehen, potenzielle Verbesserungsmöglichkeiten sowie die Unterschiede zwischen Tagesklassen (Alter 14–20) und Abendkursen (Alter 17+). Für diese Interviews wurden Lehrkräfte ausgewählt, die sowohl in Tages- als auch in Abendklassen an der HTBLuVA Spengergasse unterrichten, um eine umfassende Perspektive auf das Angebot der Abteilung zu gewährleisten.

### Interview Guideline

#### Vorbereitung

- Den Beginn markiert eine kurze Vorstellung des Interviewenden und eine kurze Erklärung zum Zweck dieses Interviews.
- Betone, dass der/die Befragte nichts falsch machen kann, die ehrliche Meinung ist für uns wichtig und er/sie möge komplett frei handeln und reden während des Interviews.
- Einverständnis und Aufnahme: Erwähne, dass das Gespräch vertraulich behandelt wird und ausschließlich zu Forschungszwecken genutzt wird. Übergebe die Einverständniserklärung und bitte darum, diese sorgfältig durchzulesen. Danach frage nach, ob er/sie noch Fragen irgendeiner Art hat, bevor das Interview startet.

#### Aufnahme starten!

## 1.) Einleitung

1.1) „Möchtest du dich kurz vorstellen?“

1.2) „Könntest du bitte ein wenig auf deine Erfahrungen und Qualifikationen in Bezug auf Unterrichten eingehen?“

## 2.) Allgemein

2.1) Wie würdest du meinen, ganz generell gesprochen, funktioniert der gestalterische Fachunterricht im Rahmen unserer Ausbildung?  
*(Etwaige Folgefragen zu erwähnten Problemen)*

2.2) Wo gibt es im gestalterischen Fachunterricht deiner Meinung nach Verbesserungspotential?

2.3) Gibt es dabei deiner Ansicht nach Unterschiede zwischen der Tagesform und dem Abendkolleg?

2.4) Gibt es bei SchülerInnen Unterschiede in Hinblick auf Aufnahmefähigkeit bei den Fachinhalten?  
*Folgefragen bei „Ja“:*

2.4.1) Was meinst du sind die Ursachen dafür, dass sich „schwächere“ SchülerInnen in der Tagesform schwerer tun, die vermittelten Kompetenzen zu erlangen?

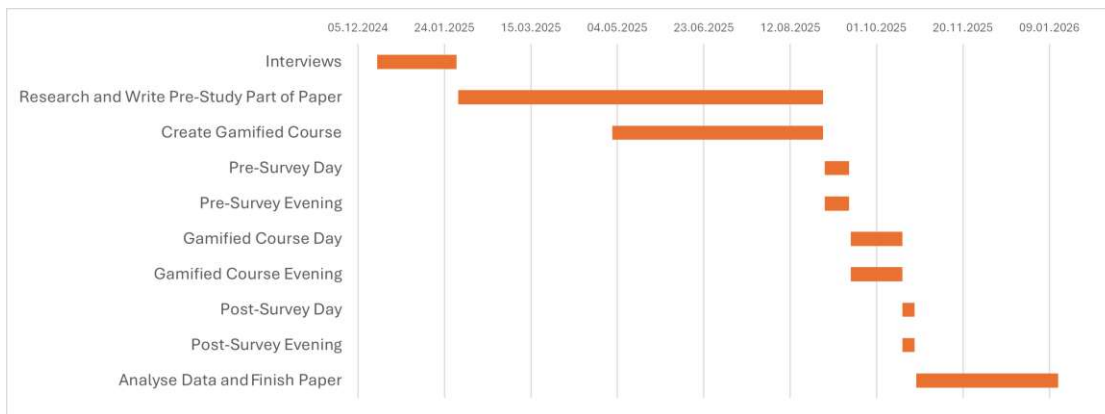
2.4.2) Sind die Ursachen im Abendkolleg die gleichen oder gibt es da aus deiner Sicht Unterschiede?

2.5) Denkst du, es gibt SchülerInnen, die sich mangels Motivation zu wenig mit den Unterrichtsinhalten auseinandersetzen und deswegen Probleme haben, dem Unterricht langfristig zu folgen?  
*Folgefragen bei „Ja“:*

2.5.1) Hast du Ideen, wie man diese Motivation erhöhen könnte?

2.5.2) Gibt es dabei Unterschiede zwischen Abendkolleg und Tagesform?

## Vorstellung des Masterarbeitsthemas



### 3.) Fragen mit direktem Bezug

**3.1)** Was sind die ersten Gedanken, die dir zu dieser Studie in den Sinn kommen?

**3.2)** Denkst du, die im Rahmen der Studie geplanten Maßnahmen haben das Potential, sich positiv auf den Unterricht auszuwirken?

*Folgefragen bei „Nein“:*

**3.2.1)** Warum nicht?

*Folgefragen bei „Ja“:*

**3.2.2)** In welcher Form würdest du vermuten, können sie sich positiv auswirken?

**3.3)** Siehst du für diese Studie besondere potenzielle Schwierigkeiten, die du in der Planung berücksichtigen würdest?

**3.4)** Würdest du Gamification-Elemente im Unterricht nutzen, wenn sie sich im Rahmen der Studie als sinnvoll erweisen und Material dazu (z.B. Moodle-Kurs „Template“) zur Verfügung gestellt würde?

*Folgefragen bei „Nein“:*

**3.4.1)** Warum nicht?

### 4.) Abschließender Teil

**4.1)** Gibt es sonst noch irgendetwas, was dir generell zu dem ganzen Thema einfällt in Bezug auf diese geplante Studie?

Danke dem Befragten für den Beitrag zu dem Projekt und überreiche ein Mitbringsel als kleines Zeichen der Wertschätzung.

# Interview mit Lehrenden in Anschluß an den Kurs

## Thema des Interviews

Der Zweck dieses Interviews ist es zu erheben, wie betreuende Lehrpersonen den gamifizierten Kurs „Grundlagen der 3D Software Maya“ erlebt haben und wie sie den Impact der jeweiligen Maßnahmen auf Beteiligung, Motivation und Lernerfolg einordnen würden.

## Interview Guideline

### Vorbereitung

- Den Beginn markiert eine kurze Vorstellung des Interviewenden und eine kurze Erklärung zum Zweck dieses Interviews.
- Betone, dass der/die Befragte nichts falsch machen kann, die ehrliche Meinung ist für uns wichtig und er/sie möge komplett frei handeln und reden während des Interviews.
- Einverständnis und Aufnahme: Erwähne, dass das Gespräch vertraulich behandelt wird und ausschließlich zu Forschungszwecken genutzt wird. Übergebe die Einverständniserklärung und bitte darum, diese sorgfältig durchzulesen. Danach frage nach, ob er/sie noch Fragen irgendeiner Art hat, bevor das Interview startet.

### Aufnahme starten!

#### 1.) Einleitung

1.1) „Möchtest du dich kurz vorstellen?“

1.2) „Könntest du bitte ein wenig auf deine Erfahrungen und Qualifikationen in Bezug auf Unterrichten eingehen?“

#### 2.) Allgemein

2.1) Hast du dich im Vorhinein schon einmal mit Gamification befasst?

2.2) Denkst du grundsätzlich, dass Gamification Beteiligung, Motivation und Lernerfolg positiv beeinflussen kann?

#### 3.) Hauptteil

3.1) Hattest du den Eindruck, die Studierenden hatten Spaß beim Arbeiten mit dem Kurs?

- 3.2) Denkst du, der Kurs war gut geeignet, um die Inhalte zu vermitteln?
- 3.3) Wie haben sich deiner Meinung nach die Aspekte ausgewirkt, die die Autonomie erhöhen (freieres Lerntempo, Auswahl von Inhalten)?
- 3.4) Wie haben sich deiner Meinung nach die Spielelemente ausgewirkt? (Erfahrungspunkte, Level, Rangliste)
- 3.5) Hast du während des Kurses Dinge beobachtet, die dir (positiv oder negativ) aufgefallen sind?
- 3.6) Nach deinen Erfahrungen in der Begleitung dieses Kurses, würdest du Gamification-Elemente im Unterricht nutzen?
  - 3.6.1) Warum (nicht)?

#### 4.) Fragen zu den Umfrageergebnissen

##### \*\*\*Ergebnisse der Umfrage Präsentieren\*\*\*

- 4.1) Decken sich die Ergebnisse mit deinen Erwartungen?
  - 4.1.1) Warum (nicht)?
- 4.2) Gibt es an den Ergebnissen etwas, das dich überrascht?

#### 5.) Abschließender Teil

- 5.1) Gibt es sonst noch irgendetwas, was dir generell zu dem ganzen Thema einfällt in Bezug auf diese Studie?

Danke dem Befragten für den Beitrag zu dem Projekt und überreiche ein Mitbringsel als kleines Zeichen der Wertschätzung.

## Fokusgruppe – Diskussions-Leitfaden

### Ziel

Wargenommener Einfluss der einzelnen Interventionen auf Motivation, Beteiligung und Lernerfolg erheben.

### Hypothese

Die Interventionen hatten positiven Einfluss auf Motivation, Beteiligung und Lernerfolg.

### Willkommenstext

Hallo und danke schonmal, dass ihr euch für diese Fokusgruppe gemeldet habt. Im Grunde geht es nur darum zu besprechen, wie für euch der Kurs gelaufen ist und dazu habe ich ein paar Fragen als groben Leitfaden aufgeschrieben. Ich bitte euch um eure ehrliche Meinung, ihr könnt nichts falsch machen. Das Projekt rund um den Kurs ist nicht erfolgreich, wenn alle ihn möglichst gut finden, sondern wenn wir möglichst klar und wahrheitsgetreu herausfinden, was gut funktioniert hat und was nicht. Also dürft ihr euch auch sehr gerne kritisch äußern. Die Ergebnisse werden anonymisiert und haben keinen Einfluss auf die Bewertung.

### Hinweis zu Aufnahme

Aufnahmen werden nur für die Studie benutzt und danach gelöscht!

### Einführungsfragen

**Kurs:** Moodle Kurs (Aufbau und Inhalt) und wie er in der Unterrichtszeit betreut wurde.

- Wieviel von dem Kurs habt ihr abgeschlossen?
- Wie fandet ihr den Kurs?
- Inwiefern habt ihr das Gefühl, die Grundlagen von Maya gelernt zu haben?

## Hauptfragen

- Es gab in dem Kurs ja die Möglichkeit, sich das Tempo frei einzuteilen und teilweise auch Inhalte auszusuchen. Wie fandet ihr das?

- Welche Spielelemente sind euch in dem Kurs begegnet?

- In dem Kurs wurden einige Spielelemente benutzt: Erfahrungspunkte, Level, Freischalten von Elementen, das „Magie“-Setting und die Bestenliste. Wie fandet ihr das?

**XP:**

**Levels:**

**Szenario:**

**Bestenliste:**

- Wie haben die freiere Kursgestaltung und die Spielelemente beeinflusst, wieviel Zeit ihr mit dem Kurs verbracht habt?

- Wie haben die freiere Kursgestaltung und die Spielelemente beeinflusst, wieviel ihr im Kurs gelernt habt?

- Welche dieser Maßnahmen und Spielelemente haben besonders gut oder besonders schlecht für euch funktioniert?

- Gibt es Aspekte, die euch gefehlt haben?

## Schlussfragen

- Könntet ihr euch mehr Kurse in dieser oder ähnlicher Form in anderem Unterricht vorstellen? In welchen?
- Welche Aspekte wären schön, wenn sie in den regulären Unterricht übernommen werden könnten?
- Wenn wir den Kurs ausbauen würden, welche Spielelemente sollte man noch hinzufügen?
- Gibt es sonst noch etwas, was ihr zu dem ganzen Thema sagen möchtet?

# Appendix E - Survey Forms

## Preliminary Survey Form

# Pre-ARCS - Fragebogen vor dem Moodle Kurs "3D Software Maya - Werde Maya-Magier\*in"!

Diese Umfrage begleitet einen Kurs, bei dem **Spielelemente** benutzt werden um die Grundlagen der **3D Software "Maya"** zu lernen. Dabei werden **Erfahrungspunkte (XP)**, **Levelaufstieg** und ein **Szenario (Magie)** benutzt. Mit diesem Fragebogen wollen wir herausfinden, wie du **nacher** darüber denkst.

Es ist **anonym**, es gibt **keine falschen Antworten** und wir bitten dich **ehrlich** zu antworten.

\* Erforderlich

⋮

1. Bitte erstelle **einen eindeutigen Code** nach folgender **Anleitung** und trage ihn unter ein (**nur Zahlen und Kleinbuchstaben**): Nimm den **Tag deiner Geburt** (ohne Monat und Jahr) und die **ersten drei Buchstaben** des **Vornamens deiner Mutter** (Beispiel: Ich bin am 19.01.1984 geboren und meine Mutter heißt Romana --> mein Code lautet 19rom) \*

Das ist notwendig um die zwei **Fragebögen** miteinander zu **verbinden** und trotzdem **anonym** zu halten

2. Wie definierst du dein **Geschlecht**? \*

- Nicht-Binär
- Männlich
- Möchte ich nicht angeben
- Weiblich

3. Wie **alt** bist du? \*

4. Ich habe eine unterschriebene **Einverständniserklärung** abgegeben \*

- Ja
- Nein

## Vorwissen

Bitte gib an, wie sehr die folgenden Aussagen für dich zutreffen.

### 5. Vorwissen

	Trifft sehr zu	Trifft zu	Neutral	Trifft eher nicht zu	Trifft garnicht zu
Ich spiele gerne <b>Computerspiele</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich schaue gerne <b>3D animierte</b> Filme, Kurzfilme und/oder Musikvideos	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich kann gut mit Windows/MacOS umgehen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich kann mit einem oder mehreren <b>komplexeren Programm(en)</b> umgehen (z.B. Photoshop, Zeichenprogramm, Videoschnittprogramm...)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich habe bereits <b>Erfahrung mit 3D Software</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Erwartungen zum Kurs

Bitte gib an, wie sehr die folgenden Aussagen für dich zutreffen.

### 6. Erwartungen zum Kurs \*

	Trifft sehr zu	Trifft zu	Neutral	Trifft eher nicht zu	Trifft garnicht zu
Ich denke, <b>Spielelemente</b> können Lernmotivation erhöhen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich denke ein <b>Szenario</b> wird mir helfen, die Inhalte zu erlernen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich denke <b>Erfahrungspunkte und Level-Aufstieg</b> werden mir helfen, die Inhalte zu erlernen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich denke das <b>freie Tempo</b> und die Möglichkeit, <b>Inhalte teilweise auszu-suchen</b> wird mir helfen, die Inhalte zu erlernen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich <b>interessiere</b> mich dafür, den Umgang mit <b>3D Software zu lernen</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich denke es <b>wird mir leicht fallen</b> , einem digitalen Selbstlern- <b>Kurs zu folgen</b> .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich denke es <b>wird mir leicht fallen</b> , die <b>Grundlagen der 3D Software "Maya" zu erlernen</b> .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich denke, der Kurs <b>wird mir Spaß machen</b> .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

# Main Survey Form

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar  
The approved original version of this thesis is available in print at TU Wien Bibliothek.



# 1AHMNA ARCS - Fragebogen nach dem Moodle Kurs "3D Software Maya - Werde Maya-Magier\*in"

Diese Umfrage begleitet einen Kurs, bei dem **Spielelemente** benutzt werden um die Grundlagen der **3D Software "Maya"** zu lernen. Dabei werden **Erfahrungspunkte (XP)**, **Levelaufstieg** und ein **Szenario (Magie)** benutzt. Mit diesem Fragebogen wollen wir herausfinden, wie du **nacher** darüber denkst.  
Es ist **anonym**, es gibt **keine falschen Antworten** und wir bitten dich **ehrlich** zu antworten.

\* Erforderlich

1. Bitte erstelle **einen eindeutigen Code** nach folgender **Anleitung** und trage ihn unter ein (**nur Zahlen und Kleinbuchstaben**): Nimm den **Tag deiner Geburt** (ohne Monat und Jahr) und die **ersten drei Buchstaben des Vornamens deiner Mutter** (Beispiel: Ich bin am 19.01.1984 geboren und meine Mutter heißt Romana --> mein Code lautet 19rom) \*

Das ist notwendig um die zwei **Fragebögen** miteinander zu **verbinden** und trotzdem **anonym** zu halten

2. Ich habe eine **unterschiedene Einverständniserklärung** abgegeben \*

- Ja
- Nein

⋮

3. Wie definierst du dein Geschlecht? \*

- Möchte ich nicht angeben
- Männlich
- Nicht-Binär
- Weiblich

4. Wie alt bist du? \*

5. Wie weit bist du im Kurs gekommen? \*

- Ich habe den Kurs **nicht** abgeschlossen
- Ich habe den Kurs abgeschlossen aber **keine** optionalen Inhalte
- Ich habe den Kurs abgeschlossen und **manche** optionalen Inhalte
- Ich habe den Kurs abgeschlossen und **viele** optionalen Inhalte
- Ich habe den Kurs abgeschlossen und **alle** optionalen Inhalte

## Feedback zu dem Kursaufbau

### 6. Aufmerksamkeit \*

	Trifft sehr zu	Trifft zu	Neutral	Trifft eher nicht zu	Trifft garnicht zu
Das <b>Szenario</b> (Magie) hat mich motiviert, weiter zu machen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich habe mit dem Kurs interagiert aus <b>Neugierde, welche Inhalte als nächstes</b> freigeschalten werden.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich fand es motivierend mir die Inhalte in meinem <b>eigenem Tempo</b> aneignen zu können.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Die <b>Erfahrungspunkte (XP)</b> haben mich motiviert weiter zu machen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich fand es motivierend die Inhalte zumindest <b>teilweise selbst auswählen</b> zu können.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich habe mit dem Kurs interagiert, weil ich das <b>nächste Level erreichen</b> wollte.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es hat mich motiviert, mich mit anderen zu <b>vergleichen</b> .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Das <b>Level-System</b> hat mich motiviert, weiter zu machen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wegen dem <b>Szenario</b> (Magie) habe ich <b>mehr Zeit</b> mit dem Kurs verbracht.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wegen den <b>Erfahrungspunkten (XP)</b> habe ich <b>mehr Zeit</b> mit dem Kurs verbracht.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wegen dem <b>Level-System</b> habe ich <b>mehr Zeit</b> mit dem Kurs verbracht.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Trifft sehr zu	Trifft zu	Neutral	Trifft eher nicht zu	Trifft garnicht zu
Wegen der <b>"Bestenliste"</b> habe ich <b>mehr Zeit</b> mit dem Kurs verbracht.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Weil ich mir das <b>Tempo frei einteilen</b> konnte habe ich <b>mehr Zeit</b> mit dem Kurs verbracht.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Weil ich mir ich mit <b>teilweise die Inhalte frei aussuchen</b> konnte habe ich <b>mehr Zeit</b> mit dem Kurs verbracht.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Relevanz \*

	Trifft sehr zu	Trifft zu	Neutral	Trifft eher nicht zu	Trifft garnicht zu
Der Kurs hat einen <b>guten Einstieg</b> in die Grundlagen der 3D Software "Maya" geboten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich intessiere mich dafür, <b>noch mehr</b> über den Umgang mit 3D Software <b>zu lernen</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich fand den Kurs <b>gut geeignet</b> um die Inhalte zu lernen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Das <b>Szenario</b> (Magie) hat mir <b>geholfen</b> , den Lernstoff zu erlernen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Die <b>Erfahrungspunkte (XP)</b> haben mir <b>geholfen</b> , die Inhalte zu erlernen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Das <b>Level-System</b> hat mir <b>geholfen</b> , die Inhalte zu erlernen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Die <b>Bestenliste</b> hat mir <b>geholfen</b> , die Inhalte zu erlernen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 8. Sicherheit im Umgang \*

	Trifft sehr zu	Trifft zu	Neutral	Trifft eher nicht zu	Trifft garnicht zu
Ich fand es <b>leicht</b> , dem Kurs <b>zu folgen</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich fand gut <b>nachvollziehbar</b> , wie die <b>Spielelemente</b> im Kurs <b>funktionieren</b>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es war <b>gut möglich</b> den Kurs in der gegebenen <b>Zeit abzuschließen</b> (verpflichtende Inhalte).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Der Kurs war <b>zu einfach</b> .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Der Kurs war <b>zu schwierig</b> .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mein <b>eigenes Lerntempo</b> zu bestimmen hat mir <b>geholfen</b> , die Inhalte zu erlernen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Die Inhalte zumindest <b>teilweise selbst aussuchen</b> zu können hat mir <b>geholfen</b> , die Inhalte zu erlernen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. Zufriedenheit \*

	Trifft sehr zu	Trifft zu	Neutral	Trifft eher nicht zu	Trifft garnicht zu
Der Kurs hat mir <b>Spaß</b> gemacht.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es hat <b>Spaß</b> gemacht, die Aufgaben im <b>Szenario (Magie)</b> zu lösen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ich würde mir <b>wünschen</b> , dass <b>mehr Kurse</b> ähnliche <b>Videospiel Elemente</b> nutzen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es hat <b>Spaß</b> gemacht, <b>Erfahrungspunkte (XP)</b> zu bekommen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es hat <b>Spaß</b> gemacht, <b>neue Inhalte</b> bei Levelaufstieg <b>freizuschalten</b> .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Es hat <b>Spaß</b> gemacht, mich mit anderen zu <b>vergleichen</b> und zu versuchen, sie an Punkten zu <b>"überholen"</b> .	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Deine Meinung zählt!

10. Was hat dir an der Lernplattform mit Szenario, XP und Levels **besonders gefallen**?

11. Was könnte man deiner Meinung nach an dem Kurs **verbessern**?

12. Gibt es **sonst noch etwas**, das du zu dem Kurs sagen möchtest?