Enhancing the learning of cinema: The development of a gamified prototype using design science

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Abstract

Enhancing the learning of cinema through gamification

The ways film can be studied are many. The academic area of film science is very fragmented due to a lack of unity in its consensus and the overarching understanding of what its field entails. This situation warrants the evaluation of alternative pathways and tools for students to better understand the field of film science. The usage of gamification, an alternative approach to academic study, was chosen for this work due to its growing in interest, potential and usage. The method used to determine the validity of this concept was based on principles and methodology found in design science. The produced prototype showcased the concept of a gamified platform for film students to use in their studies. The study performed was an interactive lesson and test of the prototype where twelve participants used and experienced its intended purpose, with additional data collected using qualitative interviews and a questionnaire. The results of this work found that gamified interfaces can aid students but cannot be the sole source for an academic course or program. Partial aspects were found to be effective, but more research is necessary to fully see the effects of its implementation.

Keywords

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1 Introduction

There are many methods and strategies differing academic institutions use in order to impart knowledge to their enrolled students. New approaches to more successfully impart knowledge are being conceived, tested and implemented continuously in these.

One of these approaches is the usage of gamified services to impart knowledge. The use of gamification in educational contexts has also been more welcoming by scholars, who believe its potential in that field is increasing (Robson et al, 2015).

Another area with different approaches is film, which contains various types of subfields. Approaches to teaching these are extremely diverse as they aim on vastly different practices such as production, theory and aesthetics.

1.1 Background

Film is a universal medium, being able to be accessed all over the world and uniting people in watching stories and events unfold on screen. As a result, its section of film science within the humanities of academic institutions is also a subject studied all over the world for both academic and frivolous purposes.

However, a matter that has been raised by scholars is that interest in the field is steadily decreasing (Brooks, 2010). Students who enrol have been found to be surprised by the methods of teaching, since they thought film studies simply meant "watching movies" (Liston and Renga, 2014).

Another aspect raised by Noël Carroll is that film studies were heavily influenced by its economic viability during the latter part of the 1900's and advertised as being similar to the popular film journals of the time and not for the field in itself (Carrol and Bordwell, 2009). What also complicates film sciences is its need to be multifaceted. This, because its field contains subfields such as its technical aspects, philosophical theories and theories regarding its effect on people from a psychiatric perspective (ibid., 2009).

Gamification is also considered not to have had extensive or fulfilling research performed assessing the area (Sailer, 2016). It is however gaining more traction as the growing success of the video game-industry has garnered interest in gamifying non-game interfaces (Robson et al, 2015). The generally shared definition amongst its community is that the practice of gamification is to apply gaming elements to non-game contexts (Sailer, 2016).

In the realm of education, a number of new web-based platforms have emerged where users can learn about certain subjects. One of the more popular alternatives focusing on linguistics, Duolingo, has shown to improve student's efforts after usage (Grego, J & Vesselinov, 2018). A form of gamification, Duolingos method is formed around ranking players based on their progress as well as offering incentives for continuing undertaking lessons and earning achievements. (Cunningham, 2015)

1.2   Aim & Focus

As previously stated, some students become surprised as they do not experience the current practice of film science to be what they thought such a curriculum would consist of. A potential solution for this would have to be very concise in what aspects of film science it would teach and convey. This, in order to improve and repair the previous sentiment from Carroll (Carroll and Bordwell, 2009) who believes the field to be extremely diverse and misconstrued.

An alternative approach for students to get acquainted with film science could be implemented using a digital medium. A web-based platform for this offers the best type of connectivity and accessibility today. Creating a more effective, web-based gateway into an academic field could help students understand and be more open to the theories of that field (Gal & Lewis, 2018). Moreover, students have been shown to embrace digital alternatives to learning more positively than traditional methods (Alabassi, 2017).

Today, LMS (Learning management Systems) is used in 99% of universities in America (Gal & Lewis, 2018). Due to this obvious forthcoming standard, a digital tool for learning film science seems both necessary and inevitable. Since a lot of students are disillusioned as to what studying film on the academic level entails, new ways for students to be introduced to the subject is needed. Gamification could perhaps be a helpful tool for students to engage with and understand the principles of film science, as studied today. A gamified approach could thus ease

the way into the academic aspects of film studies for its forthcoming or remaining students. Such a gamified interface could also increase and enhance the ability of its users to effectively learn the topical content (Sailer, 2016).

The aim of this work was to determine, through the development, testing and evaluation of an artefact in the form of a paper prototype, if a gamified platform could assist new or present students in the area of film studies as a viable option.

1.3   Research Question

To address the aim, the research question was formed around the development of an artefact. This artefact contained the fitting conceptual functions needed to see if a gamified platform where students can learn film science was appropriate for usage or not.

The research question this work aimed to answer was "*Can a digital platform using elements of gamification raise interest in and aid potential students' study of film sciences?*"

In order to answer the question, the artefact in the form of the paper prototype was developed, deployed and assessed by using principles and methodology from design science, prototyping and usability-centred testing.

1.4   Limitations

Limitations for this work included both technical and academic aspects. Limitations regarding technology existed since I majorly have a theoretical background in programming and prototyping. It was important for me to not overshoot the scope of the technology during this work but to focus on the conceptual quality, research and relevant findings that were produced throughout the work.

The academic limitations which challenged this project was the fact that I do not have a teaching background in the academic field. My background in film science is majorly as a student with some experience professionally. It was therefore important for me to understand the current curriculum of film literature & materials being used in film schools today.

1.5   Disposition

The introduction is followed by the chapter containing this works methodology and the discussion addressing it. Afterwards, the theoretical findings of film science (chapter 3.1), gamification (3.2), user-centred design (3.3), prototyping (3.4), design science (3.5), and enhanced digital learning (3.6) is presented. Following is the fourth and fifth chapters detailing the development, testing and data collection of the topical artefact. In the sixth chapter the data collected from the testing of the artefact is presented. The seventh and eight chapters discusses and concludes the work, based on the evaluation of the results compared with the theoretical findings that was presented.

2   Methodology

This chapter will detail and discuss the methodologies used to conduct the research, testing and assessment in order to answer the research question. First the different forms of methodology used will be showcased, with the specific framework by Peffers regarding the development of the artefact being explained. It is followed by a critical discussion of the methods used, so to be able to prevent common and recognized pitfalls in these.

2.1   Qualitative interviews

Qualitative interviews with the students from the body of film science will be interviewed to uncover how they experienced the strategy employed by their academic institution.

2.2   Prototyping

To uncover the research question, an artefact in the form of a prototype will be conceived, designed and deployed for individual testing with the previously mentioned set of students from appropriate fields of study. After defining the intended functions and goal of the artefact, the decision to utilize paper prototyping was made. This, since the goal with the prototype is to validate whether or not the idea of implementing a gamified application would be befitting.

2.3   Design Science

The methodological basis of this work follows the model by Peffer in creating and evaluating a form of design (O'Keefe, 2014).

Peffers methodology when conducting DSR (Design Research Science)
Problem identification and motivation
Define the specific research problem and justify a solution. Capture the complexity of the problem
Define the objectives for a solution
Objectives can be quantitative or qualitative, but should address the role of the artefact in the solution
Design and development
Create the designed artefact in which the research contribution is embedded in the design
Demonstration
Demonstrate use of the artefact
Evaluation
Observe and measure how well the artefact supports the solution of the problem. This may result in further development needed.
Communication
Communicate the problem solution, its utility and novelty, and the rigour of the design to relevant professionals

The design of the artefact in the phase of when it will be demonstrated to the participants will be based on theoretical findings of usability, gamification of non-game contexts and enhanced learning through digital mediums (Design and development).

The participants consist of twelve students. Eight who have previously studied at least a year of film science at the universities of Lund and Stockholm. Four participants have not studied film science prior. The range of age in the eight who have studied film science prior is wide, ranging from between 22 years old to 70 years old. This divide of different fields of background is to be able to evaluate and understand the concepts prospect from both those with experience studying the field and those who is not familiar with it.

2.4   Methodology discussion

2.4.1   Qualitative interviews

The benefits of using qualitative methods of data gathering is mainly that the data gathered is happening during direct contact. The chances of information not being included and/or given is

minimized due to the direct contact (Larsen et al, 2009). This, since a qualitative interview gives the interviewer the chance to ask follow-up questions, clear up misconceptions during the course of the interview and the possibility to gather extensive information aside from the dialogue through observations (ibid.,).

There are also limitations qualitative methods possess. The previously mentioned asset of being able to use observation to compliment the presented information can create complications. Specifically, if what is observed and what is being presented differs in a critical way (Lantz, 2007)

The qualitative method of interviewing usually mean that the total data gathered is large and very time-consuming to process and interpret (Larsen et al, 2009). What also complicates this gathering is that the levels of honesty from the respondent can be questioned. When being interviewed, the respondent can believe that there is a "right" way to answer the given question even though this method relies on an open and interpretable answer being given (ibid., 27).

Moreover, complications can also originate from the interviewer. A common example of this type of fault is the interviewer interpreting the answers given by the respondent against the interviewer's context and background (Lantz, 2007). This is a reason as to why it is so important for the data gathered to reflect the source as clearly as possible (ibid.,).

The fact that the respondent simply is being interviewed can also create changes in the response provided, since the respondent is aware what he or she says will be documented and/or recorded (Larsen et al, 2009)

2.4.2   Prototyping and Design Science

The requirements for what and how the artefact (i.e. prototype) will be designed and built should be based on the intended audience the concept is meant to reach. The knowledge of the intended audience will then help the designer make choices that best suits them. (Arnowitz & Berger, 2007)

When designing a prototype, it should be noted that graphical elements such as colour schemes and specific imaging should be avoided. This, since the participatory users can be influenced by their subjective taste and thus misjudge the functionalities of the concept overall (Yamazaki, 2009).

When testing with users, the context of the topical user is very important. He or she must understand why, how, and what the purpose of conducting the test is and entails. (Rubin & Chisnell, 2008)

While conducting user testing, facilitators must also understand what impact they have in general. Being present when the test is conducted can subconsciously create different state of minds for the user. It is thus important to be as objectively connected to the tasks the user is performing at hand. A common practice to avoid such situations is to encourage the participant that the act of "thinking aloud" when actively testing and experiencing the topical service/application is wanted from them, as they should draw from their own experiences and reactions instead of trying to project what an expert or anyone they consider more intelligent would react to. (Rubin & Chisnell, 2008)

Paper prototyping is the least costly of the methods. The method consists of using graphic representation in form of papers the ordained supervisor moves around depending on what the user testing the prototype chooses to do (Snyder, 2003).

Paper prototyping can be defined as being used for creating, testing and brainstorming user interfaces (ibid.,). Its proponents argue for its benefits in that it allows the developers of the topical prototype to focus on its concept at the early stage of the process (Martini et al., 2014) and also that it usually shows equally effective results when compared to high-fidelity methods (Olmsted-Hawala et al., 2009).

Moreover, the task of changing the prototype based on user feedback or lack of prospected resources is easy due to its low-fidelity nature (Still & Morris, 2010). It is considered effective since its development is fast if user feedback on the concept is required quickly (Gal & Lewis, 2018)

Critics of paper prototyping argues for the perspective that the paper prototype usually doesn't reflect the final product enough to advocate its usage (Still & Morris, 2010). They also argue that high-fidelity methods are better as they more can foresee forthcoming costs and resources that needs to be spent (Martini et al., 2014)

The methodology behind design science is usually called "design thinking", which discipline is for the designer to utilize available methods and techniques to satisfy the imperative human-centred demands the artefact needs to achieve for its goal (Brown, 2008) It is concerned with the knowledge of techniques and methods needed for tracking what specified demand is needed for the topical artefact through design and further contemplation (Vaishnavi, 2013). One of the more generally used methodological cycles of design is Peffers methodology (O'Keefe, 2014).

3   Theory

This chapter will detail the different subsections which constitutes this works theoretical findings. The first subsection below is going to highlight the problematic status film science has and currently is experiencing. Afterwards, it is followed by the defining principles and contexts gamification entails. Findings regarding the foundations of UX-Design and prototyping follows, after which the methodology of design science and the current status of digital learning is presented.

3.1   Film science and theory in university settings

Film sciences and their theories have since their conception been very fragmented. This is because of the parts which could constitute an academic approach within film differ so much in their nature and practice. (Miller, 2016) Even though film was invented in the final moments of the nineteenth century, any systematic theories regarding the field of film became the goal of scholars up until the seventies and eighties (Andrew et al., 2014). This is in part because of the continuing evolution of technology and innovative realisations forces film scholars to rethink ideas (Andrew, 2017).

Some of these differing parts of film includes the technical approach regarding cameras, visual effects and digital engineering, the philosophical approach regarding what the printing of movement on film means for our reality as people, or the aesthetic approach as to what constitutes as beauty on the screen. Many of the prominent film scholars throughout the twentieth century believes that learning film science can include many of these alternative routes (Andrew, 2014).

A large concern for the future of teaching film science and theory is the disillusion many students bring with them in the beginning of their academic career (Crafton, 2003). This could in part be attributed to that the field of film science usually is the first academic field novice film students engage in (Liston and Renga, 2014) Discussions instigated by these novice students usually boils down to personal taste and perspectives (Nichols, 2017) as well as the common misconception that the main theoretical practice of film science is "watching movies" (Liston and Renga, 2014). This misconception is usually the main reason as to why students abandon film studies (Liston and Renga, 2014). This traditional setting of study is considered to lead to a rigid and non-engaging experience of learning (ibid.,)

The contemporary understanding and future of the field has as an effect of being fragmented become very uncertain. (Miller, 2016) There are no "standardized" methods of teaching film science, as teachers and scholars continually seek out innovate and develop differing approaches of teaching (Richards and Johnson, 2017). This fragmentation also originated in that different countries and cultures also has differing approaches to film studies, as it as a new subject during the twentieth century drew from other academic fields and practices (Turner, 2008). Scholars within the film sciences finds it difficult to access and seek out differing methods and approaches to teaching film due to the previously mentioned fragmentation. (Richards and Johnson, 2017)

A growing concern among scholars is that the interest in film theory and science have decreased for students in favour of less philosophical areas of study in the same field (Brooks, 2010). In Australia, philosophers and doctors within film studies have found that interest among their academic peers have decreased. This, since statistics show more and larger grants is awarded if the research is labelled "cultural studies" instead of "film studies" (ibid.,).

Summary
- Film science is very fragmented due to the sampling of other fields and the various areas within the field to study
- Students are often disillusioned and surprised what studying film science actually entails
- This fragmentation, disillusion and lack of interests are evidence as to why film science has trouble maintaining its foothold in the academic world

3.2　Gamification

The definition of the term "gamification" is to apply elements from game design to non-gaming environments and products. (Nicholson, 2012) For example, the service Duolingo uses gamification in their purpose of enhancing the study of linguistics for their users. This, because depending on how well you're progressing in learning new words or grammar your score or level goes up accordingly. (Cunningham, 2015) The aim of gamifying a certain contextual environment is to increase the interest, engagement and learnability of it for students (Morschheuser et al, 2018).

Some scholars argue that gamification, in its practical nature, has always been a part of the living experience as all living things at some part in their life play in order to learn (Fuchs et al., 2014). It was not until the 2010s that interest in gamification significantly grew (Robson, 2018), in part of it being more commercially viable (Fuchs et al., 2014) and due to the continuing success of the video game industry in general (Sailer, 2016). It also grew in interest due to the possibility of developing systems for learning on a larger scale (Fuchs et al., 2014).

In order to thoroughly implement gamification into a service and/or product, it must include:

- Constructs
- Feedback
- Challenges (Kapp, Blair and Mesch, 2014)

Constructs in gamified concepts means to implement fabricated additions into the topical material (Kapp, Blair and Mesch, 2014) Examples of this include the scenarios the player navigates through, which could be the points gained or the levels that he or she progresses through (ibid.,). Successful attempts at gamification usually entails that awards must continually be given if ever introduced from the beginning (Nicholson, 2012).

Feedback is needed in some shape or form for the users to understand how well they are performing (Kapp, Blair and Mesch, 2014). Feedback can be given in two ways. The first is to give instant feedback to the user when accomplishing a task or criteria. This should be given for immediate action taken, such as answering one of several questions during a sequence. The other is to give the player more constructive, fuller feedback regarding their progress and achievements. This is more useful when the player has finished a larger section or sequence of a topical level. (Kapp, Blair and Mesch, 2014)

Creating challenges for the user can be implemented in a number of ways. This can be through increasing the difficulty when progressing to the next levels, creating longer sequences of play for each level or breaking the previously established rules to create difficulty. (Kapp, Blair and Mesch, 2014)

Implementing gamification into an existing context is considered to be hard, as that pre-existing context in itself usually have its own rules and laws that follows with its usage (Morschheuser et al, 2018). For successful implementation of gamification, the instructions as to how the user interacts with it must remain fairly easy and intuitive (Kapp, Blair and Mesch, 2014).

Unfortunately, research to face general challenges of successfully implementing gamification has not been extensive (Morschheuser et al, 2018). Some scholars also argue that it's not enough for a system to be considered "gamified" if only single game elements have been implemented (Sailer, 2016). Thus, a varied set of constructs, forms of feedback and challenges would be needed to be implemented for the system in question to be considered an example of gamification by the majority of its scientific community.

Gamification has also received criticism. Some scholars argue that gamification simply reduces the objective of learning and understanding the topical concepts to stimulus-response experience. (Fuchs et al., 2014) Moreover, some studies into its effectiveness have shown gamified interfaces are less motivating (Alabassi, 2017) Any universal consensus on successful gamification has not yet been agreed upon (Morschheuser et al, 2018)

Summary
- Gamification means to apply gaming elements to non-gaming situations and contexts
- Implementation of gamified elements in existing structures is more complicated
- Constructs, feedback and challenges are all implemented in some way for successful gamification

3.2.1 Gamification in academic learning

Gamification in learning has been traced back to being implemented as early as the sixties. (Sanchez-Mena & Marti-Parreño, 2017). One of the currently popular gamified services, Duolingo, helps users improve their language skills (Grego, J & Vesselinov, 2018). Duolingos usage of constructs such as points and badges (Cunningham, 2015) are a clear example of adding gamified elements into non-game contexts (Nicholson, 2012).

Advocates of gamifying learning highlight the practice as motivating student to learn. This, since gamification has been seen as motivating physiological states in the learner where the game elements reduces or eliminates the fear of failing when actively trying to learn. (Sanchez-Mena & Marti-Parreño, 2017). Studies done at universities have shown that gamified systems of learning are appreciated by students (Alabassi, 2017)

The gamification of learning has however shown varying levels of excitement in students, mainly due to the active participatory role they must take (Sanchez-Mena & Marti- Parreño,

2017) This is important to keep in mind as new learning technology can both enhance and damage that which it is applied on (ibid.,)

Summary

- Gamification in learning has actively been discussed and implemented in various ways since the sixties
- Gamification can trigger psychological states

3.3 UX-Design

Broadly speaking, user experience design can be summarized as the creation and design of elements that affects the behaviour and thoughts during the experience with the topical product/services purpose in mind. (Gal & Lewis, 2018)

There is no objectively clear answer regarding most issues and concerns of usability (Kreug, 2014). This is because any notion of successful design is at its core subjective. When developing and utilizing, the topical developer must understand these subjective needs, capabilities and limitations of the audience the service or product is being designed for must be in consideration (Hall, 2001).

Nielsen outlines three major areas that any entity with a satisfactory level of usability possesses:

- Efficiency: How much energy the user must spend on a certain task.
- Effectiveness: How effectively the user can perform and finish a task with a certain degree of quality.
- Satisfaction: How satisfied the user is with the system he or she interacted with. (Nielsen, 1993)

Furthermore, in the book "Designing Interactive Systems", David Benyon outlines principles of universal design created and compiled by members of the Centre for Universal Design at North Carolina State University:

- Equitable Use:
- Flexibility in Use:
- Simple, Intuitive Use:
- Perceptible Information:
- Tolerance for Error:

- Low Physical Effort:
- Size and Space for Approach and Use: (Benyon, 2004)

Summary:

- UX aims at influencing behaviour and experience
- There is no consensus on proper UX-design
- Parameters to consider in evaluating the artefact can be effectiveness, ease of use and user satisfaction

3.4   Prototype

A prototype can be defined as "a concrete representation of or part of an interactive system" It's a concrete artefact that does not need to be interpreted from a subjective perspective It is usually applied in creative fields to reflect on and define ideas and concepts. (Beudoin-Lafon and Mackay, 2002) Historically, the practice of using set methods for developing prototypes for testing new ideas and concepts have been around for more than one and a half century (Arnowitz & Berger, 2007).

There are numerous ways in which a prototype can be developed, deployed and tested. The two encompassing categories the development process of a prototype is high-fidelity- and low-fidelity prototyping. These are also called online and offline-prototypes in numerous fields respectively. (Beudoin-Lafon and Mackay, 2002)

The main methods used for when a prototype is tested and evaluated are:

- Wireframes
- Storyboard
- Paper prototyping
- Digital prototyping
- Blank model prototyping
- Video prototyping
- Wizard of Oz
- Coded prototyping (Yamazaki, 2009)

There are four dimensions all prototyping methods can be reflected and evaluated through:

- Representation

The representative dimension of the prototype entails the high-fidelity and low-fidelity forms they can take. (Beudoin-Lafon and Mackay, 2002)

- Precision

    A power possessed by the usage of a prototype is that it forces designers to display just how the interaction functions in a precise manner. This is important in regard to the intended purpose the overall project has, as the prototype is tailored to the level of precision the project requires. (ibid.,)

- Interactivity

    The interactive dimensions entail how the user will and should interact with the prototype. This quality is crucially dependent on how the user responds to and appreciate the interface he or she is given This dimension is also used to define the type of process the user navigates or is navigated through when using the prototype. Here, there are three major classifications; Fixed, fixed-paths- and open prototypes. (ibid.,)

If a prototype is fixed it means that the user can't physically or verbally interact with it. The usage and/or process of the prototype is instead displayed using videos or pre-rendered animation that navigates the users through the intended courses of actions, letting them instead be observers to understand the topical functions and purposes. (ibid.,)

A fixed-path prototype means the prototype is aided by a facilitator who adds, subtracts or rearrange the elements of the prototype depending on what action is to be taken or depending on what action the user takes. A normal representation of this classification is through low-fidelity prototyping. This form is effective when using scenarios to display the intended functions, as the facilitator can guide the user and rearrange the topical elements depending on what actions and events are needed to illustrate the prototypes purpose. (ibid.,)

An open prototype is generally one represented through high-fidelity methods of prototyping. This means that a system, with varying scale, has been developed the user can interact with through individual choices, not needing a facilitator or being reduced to an observer. (Beudoin-Lafon and Mackay, 2002, p 1009)

- Evolution

    The dimension of evolution entails the different types of processes the stages of the prototyping work go through. These are dependent on the end goal and purpose of how and

what the prototype is and is going to be used for. (ibid.,) The three major classifications of this are rapid, iterative and evolutionary prototyping.

Rapid prototyping is used when the prototype in question has a distinct, singular purpose. The prototype is discarded, destroyed or indefinitely stored after completing that purpose, since it was only necessary for that specific phase of the topical project. Iterative prototypes are when the prototype evolves through the different phases of the topical project. This means it explores alternatives to design as the prototype is successively revaluated and rethought through testing. Evolutionary prototyping means that the developed prototype is developed to be part of the final outcome of the project. (ibid.,).

Summary
- Prototyping is utilized to produce an artefact.
- usage in phases that involves user testing, defining concepts and evolving ideas
- There are low-fidelity and high-fidelity prototypes, and within those categories more subcategories related to scope, materials and purpose

3.5 Design science

The art and practice of design is concerned with creating a new artefact that is innovative in form and purpose from anything that has been created previously (Vaishnavi, 2013) (Gal & Lewis, 2018). In order to design and create an innovative artefact, research can be needed to bridge the gap between what exists as resources and what is the projected goal of the design (Vaishnavi, 2013).

Design has historically not been appreciated or valued highly. The aim that working with design should strive to innovate the topical entity was not popular, as the approach to innovation within design science has been subjugated to a mixture between the fields of decision theory and creative theory (Hatchuel & Masson, 2017)

It was during the former half of the 20th century only meant to beautify artefacts rather than to create innovation (Brown, 2008). Today it is very appreciated in a large number of fields (Hatchuel & Masson, 2017). The modern community of theorists that today argue for a higher standard of design thinking is considered to have been originated by the work of theorists Brown and Kelly (Kleinsmann et al., 2017).

The purpose of developing the artefact must also originate from a problem intended to be solved by its new, innovative design (O'Keefe, 2014). Such an artefact is created with the associated problems environmental context in mind (Vaishnavi, 2013). The artefact can take on any form possible, but must be rooted in some form of knowledge being able to be experienced or taken in (O'Keefe, 2014).

The previously mentioned artefact is in many cases the heart of evaluating what implementation and correction of a design is needed (ibid.,).

The fundamental theoretical basis of design is considered fragmented. This, due to the field being very diverse as practices entailing design is applied to numerous fields and practices (Hatchuel & Masson, 2017) Theorists have both argued for it to be either rooted in pragmatism or constructivism, with those arguing for the clear influence of pragmatism being in majority (O'Keefe, 2014). The most universal end goal theorists of design agree on is to better infuse generativity into the field of design (Hatchuel & Masson, 2017).

Summary
- Design science has during the last years grown in acclaim and scientific validity
- Its purpose, through "design thinking", is to solve a problem through choices of innovative design
- Central to design science is the creation of an artefact that both physically and theoretically can produce knowledge to solve this problem

3.6   Digitally enhanced and improved learning

Traditionally, universities on an international scale has promoted and worked from the method of "imparting knowledge" to the student (Laurillard, 2007). This is evident in part due to the traditional method relying heavily on centring the literature of the curriculum in university courses and programs (ibid.,). Imparting knowledge means to simple divulge and explain the knowledge to the student, and/or give students the accessibility to said knowledge (ibid.,). In recent years, students have shown disinterest and displeasure regarding this traditional method (Alabassi, 2017).

The research of student learning at a university level is regarded as being minimal in contrast to similar fields of study (Alabassi, 2017) (Laurillard, 2007). One reason for this is that passing of knowledge is dependent on that knowledge's content and context (Bower, 2017) (Laurillard, 2007). The students who study a certain course or program should have a positive attitude towards the strategy of learning the institution uses for it to be successful (Alabassi, 2017).

The advent and continued usage of digital technology is considered to be imperative in today's society (Bower, 2017). The usage of LMS (Learning Management Systems) is becoming widespread, as 99% of university schools in America has implemented them in some degree into their curriculum (Gal & Lewis, 2018). Educational institutions and governments overall embrace digital learning and is actively working on implementing it in all institutional levels of learning (Bower, 2017).

"Digital learning" has shown to supplement many important parts of the imparting of knowledge by today's academic standards (Ifenthaler et al, 2014) and continues to play a big part in shaping curriculum (Alabassi, 2017). It has also been shown that students are more satisfied with interactive systems of learning than traditional methods, no matter what format the system is deployed in (Gal & Lewis, 2018)

In order for an LMS to successfully integrate into any curriculum or educational context, it must be implemented with caution and an understanding to that it doesn't automatically reach or improve every student the same way. (Bower, 2017). Despite the apparent advent of the usage of LMS in universities, universities rarely update or replace them after implementation, causing a risk of the digital curriculum having outdated technology and learning methods (Gal & Lewis, 2018).

The previously mentioned understanding is due to a common misconception that today's students, being a "tech-savvy" generation, has the same capability and understanding of digital mediums to use those immediately. Both the educational institutions and those students enrolled in them come from diverse backgrounds with different levels of capability and personal experience with technology. (Bower, 2017)

Nonetheless, students appreciate the use of digital mediums better as a way of learning than the traditional methods (Alabassi, 2017). The issue is thus not digital mediums overall, but rather the level of usability and conventional familiarity. Because of this, it's important to design any

digital learning tool as being able to integrate students that are less accustomed to digital systems (Bower, 2017).

Tablets and smartphones for instance, has enabled education to be accessible from any part in the world. (Miltiadis, D. et al, 2014) Being able to access the intended information for a course or program by themselves enables students to explore the information more freely (Laurillard, 2007).

Summary

- Digital LMS are with varying degrees of understanding being implemented across institutions
- Students feel digital mediums are more effective for learning, regardless of the level of technical experience in using digital tools
- Digital learning supplements large parts of the current way of imparting knowledge

3.7 Summary of theory

The following table is the summary of the theoretical findings that have been presented. This summary is meant to concretize the foundations, research and contexts that the artefact was built upon, so it is able to answer the research question posed.

Motivations & approaches	Challenges	Actions
Film science	Lack of interest and unity in the field	Displaying theory and literature concretely
Gamification	Game elements in non-game contexts	Implement points, levels and feedback
Design Science	Solving problems using design practices	Creating artefact with purpose to answer thesis
Usability	Users should intuitively be able to use application	Use theory and user testing to assess the artefact
Digitally enhanced learning	LMS is more being used in academic faculties	Use theory from existing academic bodies
Prototyping	Many forms of prototyping are suitable for varying needs	Utilizing rapid, paper prototyping for the artefact

4   Designing the Artefact

The previously displayed table summarizing the theoretical findings showcases what foundations the designing, deploying and user testing the artefact was based upon. The process of the work on the artefact was also based on the previously mentioned Peffers framework for design science and its methodology "design thinking".
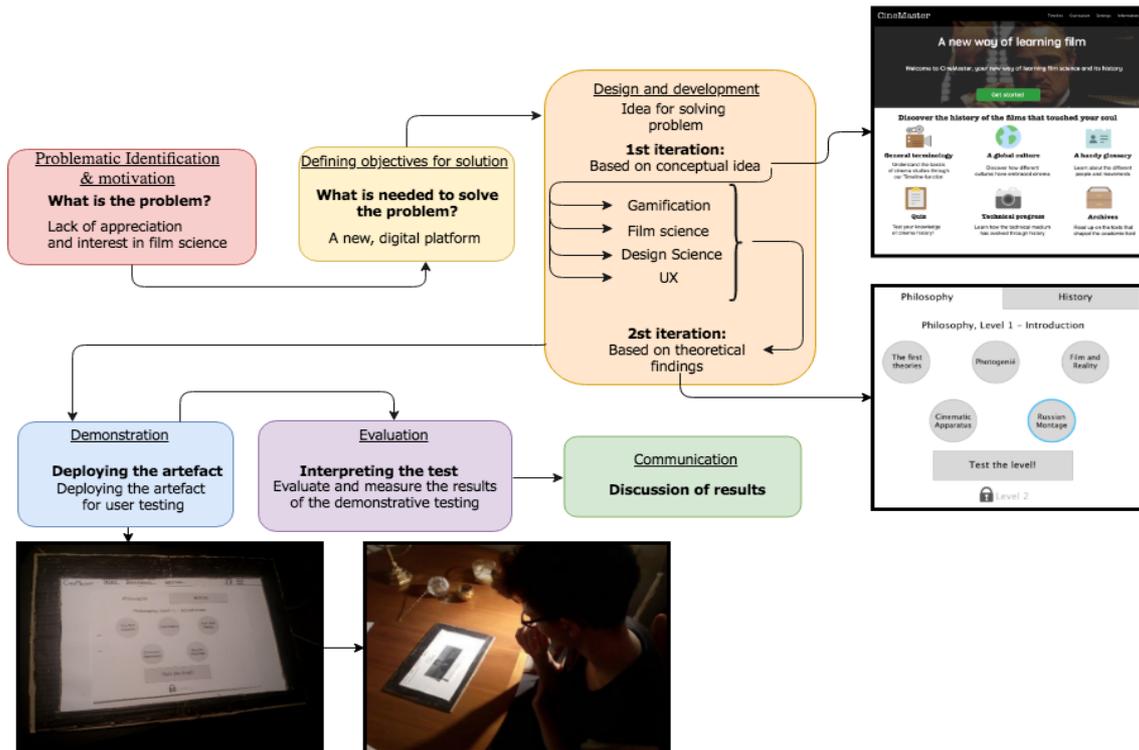

Figure 1: Flowchart of the framework in action with images from the development and deployment

The initial and continuous purpose of the artefact was to impartially and squarely present the conceptual solution to the participants for them to understand and interact with.

The first iteration was a mock-up of the intended digital prototype. It was designed for displaying the intended functions and to demonstrate the concept. In this initial phase, a plethora of different categories and sections that could be included in the final service was displayed. Focus was from the beginning put on making the mock-up visually pleasing.

After reviewing data both already gathered and needed for the project, the decision was made to utilize a paper prototype for its second iteration. This, for usage when testing with participants. The second iteration was based on the theoretical findings that concluded paper prototyping was

the best suited option for answering the research question. This was due to the emphasis on conceptually conveying ideas to the group of participating users it entailed. The method, which belongs in the category of lo-fi prototyping, is dependent on there being a facilitator who conducts the topical user testing. It functions as such that the facilitator guides the user through certain scenarios that showcases the conceptual functionalities of the topical ideas.

Instead of displaying all different categories a full-scale version would have, the second iteration put emphasis on making sure the intended functionalities of the application were understood by the users. This meant only the lessons and quizzes were used during the testing, with the addition of a participants score based on his or her answers. The choice to display the artefact in black and white is to make the user focus on the quality of the prototypes concept, structure and functionality rather than judge it based on design. Overall, the second iteration meant the prototype was "stripped down" to only showcasing the essential parts of the concept. This, to ensure that the focus laid on its functionality as to gain as constructive answers as possible regarding the concept from the participants.

For this testing, I would function as the facilitator who guides the participants through the prototypes different scenarios. There was a total of ten example lessons produced that could be chosen from the artefacts menu. The scenarios included going through three of these example lessons the prototype contained, and answering their corresponding quizzes as an assessment. Depending on what buttons the participant clicked during these scenarios, I as the facilitator would then interchange the different elements represented with paper cut-outs on the interface.

Both iterations were a fusion of two main processes of prototyping, "rapid" and "iterative". It is considered rapid since it was created with a single purpose; for the intended user test group to conceptually understand and be introduced to. It's also considered iterative since it evolved from its original form based on review and evaluation. (Beudoin-Lafon and Mackay, 2002)
The two iterations of the prototype were to some extent based on the structure of Duolingo, the gamified service for teaching linguistics. This, since reviews had praised its usage of gamified constructs in non-gaming contexts but did little in the field of improving the enhanced learning of linguistics (Cunningham, 2015), an area which did not concern the prototype used for this work.

The theoretical text used in the prototype was based on an information search done at various universities and higher educational institutions in Sweden. As mentioned earlier in this work,

the field and consensus of film sciences is very fragmented (Richards and Johnson, 2017). Because of this, the literature and materials used at these institutions were inspected so to find the most homogeneous and academically accepted literature.

It was determined that the work of American film professor David Bordwell was most regularly used during the research. The lessons and quizzes used in the paper prototype was thus based on work he either wrote, co-wrote or were part of an anthology in which he participated in to a great extent.

5   Evaluation

For the user evaluation, eight students who had previously studied film science and four students with other academic backgrounds were recruited. I chose this structuring of the group as to see what differences could be discovered regarding to varying familiarity, interest and knowledge of the field. Moreover, two of the students with differing academics background had studied fields related to film, namely film music. This similarity in their academic background but still not in the same area of the field was taken into account when they were interviewed and exposed to the concept and prototype.

The table below details information about the participating students. The eight students from film studies are prefaced with the letter 'F', and the other four with 'P' for participants.

Participant code	Age	Gender
F-A	22	Male
F-B	22	Male
F-C	22	Male
F-D	24	Male
F-E	25	Male
F-F	70	Male
F-G	36	Male
F-H	24	Male
P-A	24	Male
P-B	25	Male
P-C	23	Male
P-D	26	Female

Before the user testing, a qualitative interview with the active respondent was performed based on the foreseen information required to discuss and answer the research question. Afterwards the process of performing the fixed-path prototype with the respondent began, where he or she were guided through a scenario of wanting to read up on, and then quiz themselves, on certain subjects and areas.
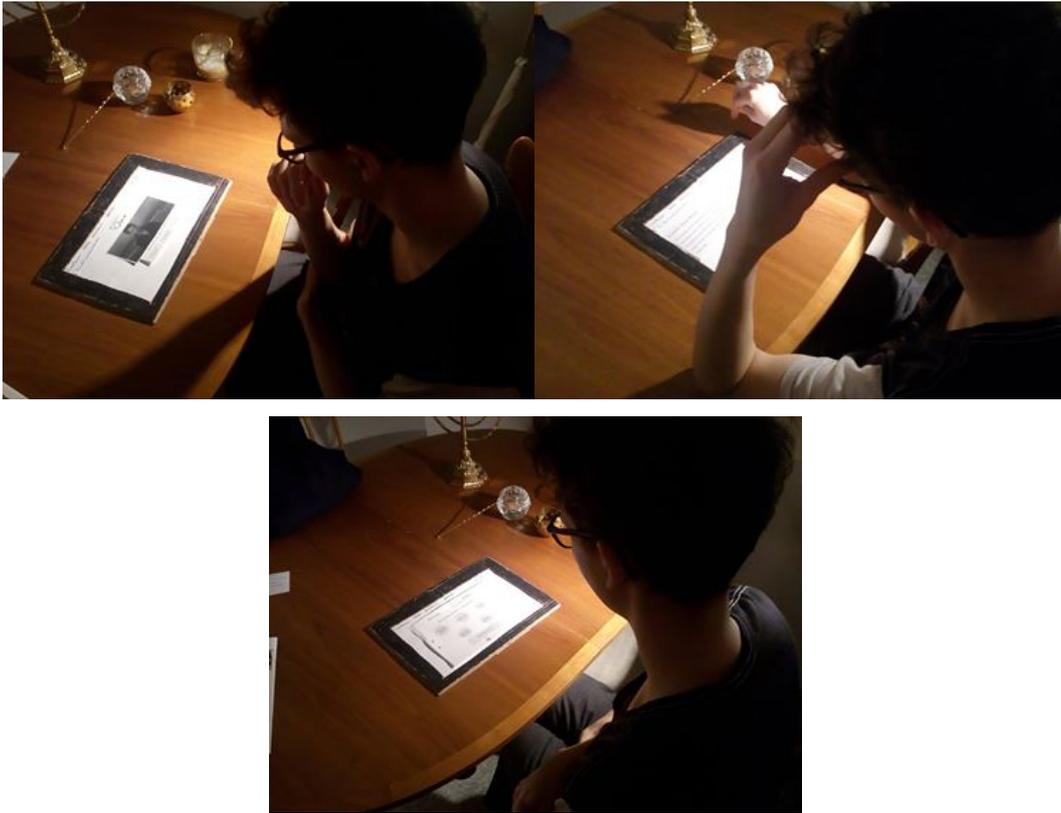
Figure 2: Participant during user testing

After the user had been navigated through the conceptual interface and the different scenarios of lessons, they received a questionnaire where they rated the success, effectivity and how opportune the concept is or can be for the future of film science. Since the perspective and interpretations of usability and functionality is subjective, the questionnaire provided a scale of what level of positivity or negativity the user felt the concept imparted.

The questionnaire
1. I feel the application is a better approach than the traditional method of learning film science for me
2. The application makes me want to continue or resume my film studies
3. If available earlier, it would have made me want to study film science more and/or earlier
4. The addition of score and levels would encourage me to continue using the full-scale application
5. The application is better suited as a tool for practicing than for usage in actual film classes
6. The implementation of an application like this one in film science is necessary for the fields future
7. I would recommend the application to my peers and teachers
8. The assessed quizzes help and encourages me to learn effectively

6   Results

The interview conducted showed an array of different attitudes, experiences and recommendations from the user group. One outcome the interviews found was that the majority of the film students did not start their academic study mainly for such academic purpose. Rather, they began the courses in question due to the passion they had for film without the goal of becoming film theorists and/or scholars. The major outcome from the students who had not studied film science prior was that the artefact did not entice them to divulge themselves in film science on any level, even if the concepts usability was appreciated.

Another common outcome amongst the film students were that film studies ultimately were not the specific path within either academics or areas of film they finished. The two major divisions of outcome regarding their further careers were either in the production-aspect of film, other creative arts or choosing a different academic field all together.

The results showed appreciation for changing the way film sciences is taught. All of the participants attitude towards the conceptual artefact was also appreciated, but modestly so.

The most shared sentiment amongst the film students regarding the curriculum were that it and the accompanying learning strategy of film science is in need of change. In this criticism, some students felt film science focused more on aspects of film not even related to film science. "…it felt like the focus on film disappeared, and more the subject film was applied on. I had a problem with that [at times] it felt like a history lesson rather than discussing the film... The film became the second priority" (Participant F-B). Another participant shared this criticism as he explained that he felt "film science had too much influence from other disciplines of study" (Participant F-D).

Another prevalent criticism was regarding to the lectures conducted. Specifically, some felt that the lecturers had too much influence as to what aspect or part of the topic the lecture was being highlighted. One participant recounted that "they were given too much space, that what they felt was interesting. And it was pretty hard to… justify, to tie in with the red thread the class had" (Participant F-F). None of the participants explicitly expressed negative sentiments regarding the forms of assessment or exams they had undertaken.

None of the students had never been given or recommended any LMS for usage in class. Each one had almost exclusively had the literature assigned to the topical film as a resource. Those who reported other resources had received compendiums of relevant articles to read and understand before specific seminars.

When asked about what they believe is needed to improve the strategy behind teaching and learning film science, none said that a digital alternative or aid could be implemented. The answers there ranged from more classes, less focus on theoretical literature and more practical exercises in learning.

A polarizing opinion among the participants were their appreciation of the literature. One participant for example felt a solution could be to minimize the required reading and instead use summaries of theories when assessing a film (Participant F-G) while others felt it fitting to read the required literature (Participant F-D, Participant F-F).

When conducting the test session, the majority of the users seemed very neutral to its concept. The greater warmth shown to any part of the artefact were the quizzes that were assessed after each lesson. The time it took for the different users to read and go through the lessons varied greatly, as it depended on their quickness in reading and understanding the material. Since the different lessons also varied in length they also influenced the time it took for participants to finish them. Some of the previous students of film science skipped through sections of the lessons very quickly, stemming from the security in knowledge they had of the material.

The quizzes were timed for one minute, in which the users had to answer three multiple-choice questions regarding the lesson they just performed. On average, the users finished a quiz within 30 seconds, with no one taking more than 40 seconds to answer these.

There were very different reactions and attitudes displayed while conducting the tests. One user (Participant F-F) expressed interest in performing another quiz after the session, but not in being presented with another example lesson. This sentiment was less excitable, but still apparent, in the other users as they displayed more eagerness and positive attitudes when performing a quiz rather than reading the lesson attached to it. No major misconception or frustration were apparent in the different sessions, as the artefact seemed to display and convey the concept in a clear way. The positive attitude towards the quizzes were also apparent when conducting the test with the participants who had not studied film science before.

Below the result of each film participants responses in the questionnaire is presented, coupled with the overall median value of each field.

	F-A	F-B	F-C	F-D	F-E	F-F	F-G	F-H	Sum
Q1	3	1	5	7	6	7	8	7	**46**
Q2	5	2	4	7	8	7	1	5	**39**
Q3	8	1	6	7	7	8	8	6	**51**
Q4	10	7	8	8	8	7	10	7	**66**
Q5	5	8	10	7	5	1	2	8	**46**
Q6	9	5	7	7	4	9	10	4	**55**
Q7	10	3	9	9	8	9	10	9	**67**
Q8	8	6	10	9	8	9	10	9	**69**

(Highest rate of scale in given statement is 100)

Of the eight statements, the lowest value registered were the statement regarding whether an application like the artefact presented encouraged the user to resume their film studies. This in addition to the fact that they believed it to be stronger as a tool for practicing, as evident for their openness to that function and also that the element of using quizzes was more welcome. The highest value registered were in regard to how effective the quizzes felt like.

6.1   Reliability and validity

Aside from the aspects discussed in this works methodological chapter, certain steps were taken during the gathering and assembling of the results in order to assure its quality. In qualitative research, it is important that the data gathered be reliable and (Thomas & Magilvy, 2011). For the data to be considered having good validity, the researcher in question must be able to represent the interpretational sphere he or she is receiving data from (Kuzmanic, 2009). This was undertaken by this work in representing the personal experiences and thoughts of the interviewees as just that. The reliability of qualitative research occurs when external peers can guide themselves through the process of decision the researcher in question has done. This, so that the external peer could perform the same approach and data gathering to see if differing or similar results were yielded when conducting the approach with subjects (Thomas & Magilvy, 2011).

7 Discussion

One general similarity one can see between the information given by this study's participants and the sentiment of Carroll (2009) is that film science is very fragmented and misconstrued. This, due to the number of participants who felt the curriculum they studied was too much influenced by other academic fields and the sentiment that film science was too much influenced by the film journals in the twentieth century.

One usual misconception film students find when studying is that studying film science would be more entertaining and amusing, without relying on academic principles and discourse (Crafton, 2003). This misconception can be seen as evident in the results from the interview as few of the film students explicitly found (Participant F-A, Participant F-G) the nature of the field not constructive or engaging enough.

The majority of the students found problems regarding the way film science was taught during their time as active students. This can be seen as showcasing an apparent fault, since a positive attitude towards the strategy of teaching is necessary for that strategy to be successful (Alabassi, 2017) The students had differing approaches as to what an appropriate solution would be.

One of the greater criteria required to be fulfilled for an LMS to be regarded as successful is for it to be intuitive enough for usage with varying levels of technological familiarity in students. (Bower, 2017) During testing, it can be argued for that the major factor influencing the ease users had with interface were their own motivation and preferences. This, since the grand majority of the users showed more intuitiveness when it came to pressing buttons and objects during the quizzes than the lessons. No major drawback for each individual user was apparent during testing.

Moreover, this was a behaviour noticed in all ages of the participants which arguably shows the structuring of the quiz in the artefact at least is understandable to a larger demographic than young adults.

The sentiment that the quizzes helped learning and could be used for playful practice was more appreciated. This can be due to the context-dependency Laurillard (2007) highlights, as the successful passing of knowledge is dependent on the form and nature of the knowledge in question.

The aim of implementing gamification in a certain context is to increase the engagement, interest and learnability of it (Morschheuser et al, 2018). Here it could be argued that the artefact incited engagement in the students, but not the interest or learnability of the field. This, since the actual lessons required to be undertaken in order to be able to do the quizzes were not as appreciated as the quizzes in themselves. This can also be seen as evident due to the low value recorded in the questionnaire regarding how much the concept of the artefact sparked interest in resuming their studies.

Surveys done in academic institutions have found that gamified systems are more appreciated by their students (Alabassi, 2017). The results from the testing also found that the system was appreciated, but not in all of the major aspects it entails. The students found the assessment of knowledge through the usage of the quizzes positive, but not the actual imparting of that knowledge. This can point to the what some scholars find negative about gamified learning, namely that it reduces the process of learning knowledge through gamification to a simplistic stimulus-response experience (Fuchs et al., 2014).

The engagement the user generates when interacting with and answering the quiz can be seen as becoming the prime motivator for continuing usage, disregarding the actual knowledge needed to be indelibly remembered. It can thus be evidence of the gamified constructs, the form of feedback and the challenges the quizzes were designed for and with shows the psychological state of motivation being triggered by a gamified interface.

Since the information used in the artefact mirrored the literature found in contemporary academic institutions, the content cannot be considered to be a prime source for the apparent demotivation. When implementing an LMS, the context which it is being implemented in must be considered for the highest probability of success (Bower, 2017).

The content of the artefact has been formed around the content from the academic courses which uses the traditional methods of imparting knowledge. Because of the apathetic results regarding the comparison and the general liking between the artefacts concept and the traditional format, one could argue that the gamified method of imparting knowledge either is not effective in itself or that the content of film science ultimately does not sit well with either approach.

The context of the information being passed is key in a gamified interface, as contexts which gamification is being implemented in have their own sets of rules which can or cannot be gamified properly (Kapp, Blair and Mesch, 2014). This problem of differing contexts can thus be evidence for that the context of imparting knowledge of film is harder to gamify than the context of testing that knowledge.

When comparing the conceptual success of the artefact s usability to Neilsens criteria, one can interpret notes of both success and failure. The three pillars Nielsen advocates as necessary criteria are efficiency, effectiveness and satisfaction (Nielsen, 1993). These criteria can be seen as fulfilled regarding the aspect of the quizzes connected to the lessons, but not the lessons themselves. This is evident from the apparent excitement shown by the participants during active testing of the quizzes

A major consensus shared by the participants shown in the questionnaire was that the concept of the artefact did not spark or rejuvenate the idea of resuming their film classes. This can be seen as enforcing the trend noticed by scholars that the academic form of film science is steadily dropping in overall interest (Brooks, 2010). It can also show that the context of film science is not suitable for gamification being implemented into its format. This, because the contextual format of gamification has to share the interface with the context of the applied area (Morschheuser et al, 2018).

8   Conclusion

The state of film science is in need of more research conducted into just how effective the current strategies employed over the world are, in relation to what kind of methods are available to the academic institutions in question. The disillusion and misunderstanding of the field likely contributes to the fact students halt or quit their studies.

One aspect this paper has found is evidence of the power gamification can bring to students. The assessed quizzes were the most appreciated form of the gamified concept, showing the validity of the use of feedback in such applications.

However, there still exists doubt regarding the effectiveness of these quizzes. This, as the critical notion that the sole appeal of gamification can be reduced to simple stimulus-response context has not been able to be disproven.

The results of this paper have unfortunately not found any clear sign that a gamified service does well in easing the actual imparting of knowledge to the students. There is no denying that the context of film science is different from the context of gamified content, the two of which has not been brought closer from this research.

Any understanding into what alternatively could be used to entice students to foster and gain interest into film science has not been extensive. Here, the artefact and its concept was majorly appreciated but not credited to enticing any notion of beginning or resuming studying film science.

In conclusion, a gamified service can aid in enticing and enhancing learning of film science, but cannot be the only entity in such a solution. Assessing the effectivity of the knowledge being imparted in a different full-scale solution using gamified quizzes with the addition of points and levels is recommended. This, as the gamified quizzes created some level of engagement in film students for a field they had abandoned.

Recommendations for further research into more accurately being able to assess the success a gamified service for learning film is to conduct a study over a longer period of time with a digital prototype. This way, the participants could experience the actual effects the service can have which does not base itself solely in how they subjectively experienced it during the testing. Furthermore, the usage of digital prototype would be welcome here for the participating

students to use without a facilitator present. This way, the problematic areas of the user being influenced by the facilitators presence could be dismissed when gathering the topical data.

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