INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 14, Issue 1, (2024) E-ISSN: 2222-6990

Design Process in Gamifying E-Library Services in Higher Institutions

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To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v14-i1/20517 DOI:10.6007/IJARBSS/v14-i1/20517

Published Date: 08 January 2024

Abstract

Many gamification initiatives fail primarily because they do not adopt a clear and suitable framework that would save the purpose of the task. Gamification is applied in many contexts, of which the library is not an exception, thus applying game elements to users' engagement in a non-game setting. This study aims to design a framework that will guide system librarians in gamifying e-library services (ELS) for users' engagement in higher institutions in order to increase library patronage. In this research, four major tools that guide designers in gamifying a system were discussed. The study adopted frameworks including the D6 design framework, the lean model canvas, and the EMPAMOS canvas framework. In designing a framework as a tool to guide librarians and information technologists in gamifying ELS, the EMPAMOS design framework served as a foundation, combined with some items in the lean gamification model and D6 design process framework. The study gamification framework for ELS was presented in the form of a canvas for visual representation of the tool and contains two phases with seven blocks. It was explained in detail for proper application in an e-library context. Furthermore, the study suggested that future research pays close attention to the framework and develop a prototype that would be evaluated by experts in a library setting.

Keywords: Gamification, Design, e-library, Framework, Canvas

Introduction

Due to the information and communication technology (ICT) sector's rapid expansion, electronic libraries (e-libraries) are now widely used and popular. E-library is ubiquitous, accessed anywhere in the world, and synonymous with digital libraries, virtual libraries, or libraries without walls (Bizi, 2021; Kudu et al., 2020) It is described as the library that uses ICT, employing digital technologies that enable online retrieval, preservation, dissemination, and archiving of those documents and services in the delivery of services and a set of documents through electronic means (Mageto, 2021; Onwuchekwa & Jegede, 2011).

Gamification has really gained popularity in the educational system, owing to its positive impact on application. It includes game design elements in a non-game context (Deterding et al., 2011).Gamification elements (also known as game design elements) are a broad term that refers to all of the components and factors that go into creating and understanding a gamification concept (Schöbel et al., 2020). Game elements, sometimes used with features, are numerous and thus serve different purposes in any discipline that requires their incorporation, such as business, industry, or education-related (Mee Mee et al., 2021). In its application, examples of game elements are leaderboards, badges, rewards, Points, achievement, competition, curiosity, challenge, etc.

Design thinking is a component of the design process, which may be seen as a human-centered strategy, toolkit, mindset, and approach (Höllen & Voit, 2022).The process of creating creative, human-centered goods and services is known as "design thinking." If ideas for games are innovations based on human connection and activity, then service design is an even more specialized field in the context of digital innovation and design thinking (Höllen & Voit, 2022). Therefore, the aim of this study is to describe the process of designing a framework as an artifact for e-library service gamification. The idea of incorporating well-designed artifacts stands as an enhanced strategy for gamifying an e-library for users' engagement. This study is organized into five sections. The article's section two (2) covered a literature study on concept of gamification, inclusion of gamification in ELS and various gamification frameworks as tools to help designers incorporate gamification into the system. The method taken in developing a suggested framework (tool) as an artifact in the form of a canvas for gamifying ELS will be covered in Section 3. The artifact will be demonstrated in the context of the ELS in section 4. Conclusions and recommendations are closed in Section 5.

Literature Review

Concept of Gamification

Gamification applies across various fields, and its existence has contributed significantly to achieving the intention of its integration. It applies game thinking and game mechanics to support long-term user engagement and behavioral change in problem-solving (Deterding et al., 2011; Piki et al., 2020). According to the American Library Association (ALA) (2018), gamification applies game elements and digital game techniques to non-game settings and game-based learning that has defined learning outcomes, seeing greater adoption and recognition in educational or professional settings. These elements are goals, feedback, reward, progress, points, badges, leaderboards, levels, and challenges, as well as concepts such as rules, conflict, competition and cooperation, time, reward structures, storytelling, the curve of interest and aesthetics, amongst others (Adams et al., 2018; Walz & Deterding, 2018). Gamification has gained its root from the business industry, and it has been relevant in many fields of human endeavor, such as health, education, commerce, industry, government, etc. It is highly applicable in the library, which houses all the information resources used in all fields of human endeavor. The techniques adopted are crucial in this digital era since the world is evolving and becoming a global village. This pedagogy has the potential to improve e-library services among the users of the library, especially students in higher institutions.

Inclusion of Gamification in ELS

In order to improve the effectiveness of activities, gamification has been utilized in education, business and marketing, as discussed above. Kozak (2019) conducted research at the

Lichtenberger Engineering Library of the University of IOWA using an augmented reality (AR) Scavenger hunt to gamify library services. Since the students are no longer interested in the former way of searching for resources in the library, AR Scavenger hunt was developed using HP Reveal Springhare's lib-Chat and Go Animate applications for students' orientation sessions. This orientation was exciting and more engaging for students, according to (Kozak, 2019) It was also argued that some students made a complaint that the program was very hard to complete, which might be the reason why 142 students disregarded the survey form. Kim (2015) also adopted mobile scavenger hunts to gamify library services in a study conducted to promote library activities at North Carolina State University. Mobile Scavenger hunt allows the students to explore library spaces, interact with the staff, and perceive the library's resources comfortably. Prior to the scavenger hunt game, the librarian divided the students into four different teams, and each group was given 15 questions to answer and an iPod. The result of the survey indicated that 91% of the students found the activity fun and engaging, and 93% of participants reported learning something new about the library. Similarly, Long (2017) adopted the use of twine software to gamify e-library services at the Gardner Harvey Library (GHL) to create a research tutorial. The game's development follows the storyline, whereby the librarians created seven steps that beginners could follow in the research process. The steps are choosing a topic, finding background information, finding books, finding articles, finding digital media, evaluating web resources, and citing sources. The survey indicated that 80% of students found the game helpful for their future research.

Gamification Models/ Framework

Studies have shown that various models or frameworks have been proposed to guide game designers or developers in gamifying any system (Höllen & Voit, 2022; Jiménez & Escribano, 2013; Werbach & Hunter, 2012; Yousefi & Mirkhezri, 2020). Meanwhile, some of these models or frameworks come in the form of canvas for proper visualization. Canvases are related to the design science methodology that aided in the visual creation of artifacts as opposed to purely verbal documentation. This makes it easier to naturally and rapidly understand complex concepts. Canvases are already extensively utilized in gamification initiatives (Morschheuser et al., 2017). Examples of these gamification frameworks that guide the design process are the D6 design framework (Werbach & Hunter, 2012), the lean gamification model Canvas (Yousefi & Mirkhezri, 2020) and the EMPAMOS design process (Höllen & Voit, 2022).

Giving insight into various gamification frameworks, the D6 gamification design process was proposed by (Werbach & Hunter, 2012). The design approach was broken down into six parts, as suggested by the name, including defining the business objectives, delineating target behavior, describing the players, devising activity loops, not forgetting the fun, and deploying the relevant appropriate tools. Define the objective, which is the first step in the D6 approach. It is emphasized that before a system is gamified, the purpose must be well specified in order not to have a disorganized system (Rajanen & Rajanen, 2017). Next is to delineate an objective, which is the second step. This stressed that the designer of a system should specify what the users seem to gain in the process of gamifying a system. Also, the designer should be able to describe how the player will benefit from a gamified system. Here, the ages, personalities, and educational level of such a player must be properly defined. In addition, an activity loop, which is the basis for gaming elements, should be generated. According to (Rajanen & Rajanen, 2017), the concept of an activity loop is when an action provokes another action, which aggravates another action. Do not forget that fun is the output of a gamified

system; hence, for a gamified system to be achieved, users must derive fun and engage in the whole process. Generally, in using game elements for users to enjoy fun in a gamified system, the designer must be able to consider the right game elements that would motivate and engage the players in the system.

Lean gamification Canvas (LGC) is another form of framework proposed by (Yousefi & Mirkhezri, 2020). This is the combination of the lean model canvas proposed by Maurya (2012) mechanics, dynamics and emotional framework proposed by Robson et al (2015) and gamification 3.0 developed by Gadiyar (2014), which was structured using thirteen blocks (encompasses of platform and channels, action feedback loop, mechanics, general and unique value propositions, psychological factors determining users' behaviour, dynamic and emotional features of users and the associated personality, problem, activity tracking, solution, unfair advantage and user-motivated/engage, stakeholders and target audience, result and criteria measurement, resources: cost and impediments).

The EMPAMOS design process was proposed by Höllen & Voit (2022) and it was presented in the form of meta canvasses with four phases, each comprised of four blocks. It is a very powerful tool that aims to reduce the complexity of gameful design in non-game contexts and increase the fit of a concept with target and context. These phases are briefing, exploration, creation, and fit. According to the framework, the briefing phase is known as the analysis phase and would determine the successful outcome of the gamified system. Morschheuser et al (2017) relate the briefing to the project preparation and the analysis. The briefing phase demands a definition of the target group(s) and their description by facts (age, demography) and emotional, cognitive, and personal needs. Also, the target context and other necessary information that would help in preparation for gamified systems are considered.

Additionally, the briefing phase identifies the resources in the context and the target audiences and prepares the groundwork for the project on game-like design. It comes before the ideation stage, which is considered to be somewhat hazy in modern gamification practice (Höllen & Voit, 2022). The process's ideation phase, known as the create phase, starts with the artifacts (misfits and existent elements) as a foundation for a comprehensive framework. There are two (2) stages in a continuum between intuition/randomness and rationalization/calculation during the creation phase. This is to confirm if the game design network aligns with the target groups' objectives, the context, and the behaviour described in the briefing phase as fit, which is the last phase that immerses into the real world of the game. Table 1 indicates the requisite items for gamifying a system in different frameworks.

Table 1
Various Models/Frameworks as Tools for Gamifying a System

No.	D6 approach (Werbach & Hunter)	Lean gamification Model Canvass	EMPAMOS Design process
1.	Define business objectives	Problems	Target Group
2.	Delineate target behaviours	Stakeholders	Behaviour
3.	Describe players	Solution	Context
4.	Devise activity loop	General Unique and value proposition	Broken game
5.	Do not forget the fun	Psychological factors determining users' behaviour	Motivation

6.	Deploy the appropriate game elements	Dynamic and emotional features of users' and associated personality	Misfits
7.		Unfair advantages & user motivate/ engagement	Game elements
8		Resources, costs, and impedimenta	Hypothesis about chance or problem
11.		Mechanics	New and existing elements

Research Methodology

In developing a design process framework for gamifying ELS, this paper followed the design science research (DSRM) methodology popularly used in information systems and design research. Design science is the scientific study and creation of artifacts as they are developed to solve practical problems when used by people (Johannesson & Perjons, 2014) thus, the study plans to develop a design process framework as an artifact for gamifying ELS for users' engagement. There are six stages for this research design, as suggested by (Peffers et al., 2007). These are: problem identification and motivation, definition of the objectives for a solution, design and development, demonstration, evaluation, and communication. Thus, the six stages are illustrated in Figure 1. Out of these stages suggested by (Peffers et al., 2007), this study would focus on the first four stages, as expounded below.

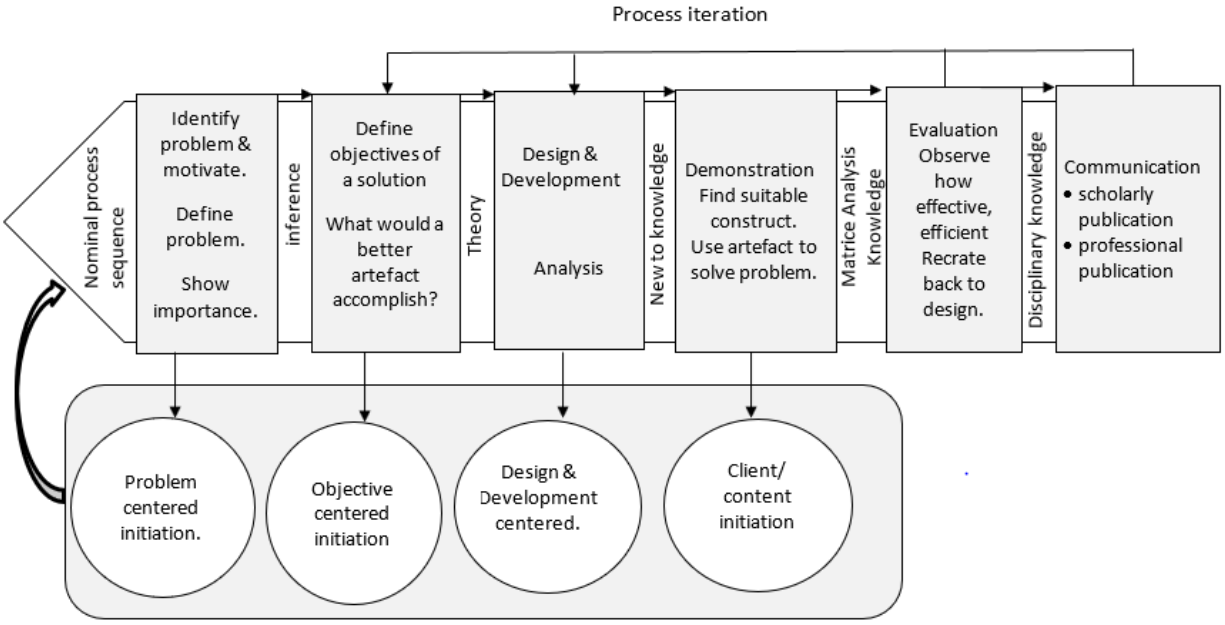

Figure 1: Research design adopted in this study (Peffers et al., 2007).

The first stage is problem identification and motivation. This stage focuses on exploring motivation and problems from knowledge and the real world. This involves defining and understanding the research problem that users are not patronizing the library as expected based on ELS challenges (Anyim, 2019). This serves as a motivation to develop a design process framework for users' engagement since there is no clear framework for gamifying ELS. Accordingly, as in the second stage, which focused on the objective of the study, we developed a framework that would guide the systems librarian in gamifying ELS for users' engagement.

The third stage, which is the design and development stage, is the crucial stage in which the artifact is created. According to (Mora et al., 2017) many gamification initiatives fail primarily because they do not adopt a clear and formal framework (Hevner, 2007) opined that research rigor in design science is predicated on the researcher's skilled selection and application of the appropriate theories and methods for constructing and evaluating the artifact. In the process of designing the artifact for gamifying ELS, four steps were involved. The first step is the selection of three design process frameworks (EMPAMOS, Lean gamification model and D6 design framework). Second, the most important concepts were collected and mapped to suit the design process. Third, the suitable terms in ELS were used for the selected concept. Concepts like target group were replaced with users, behaviour was replaced with users' activities and items under contexts were academic libraries, e-library services, human resources, and the cost of implementation. In addition, items under problem identification were listed, and the tools involved in gamifying ELS were also itemized, such as game elements and web applications. Fourth, the steps were developed into a canvas, and the canvas was divided into two phases: the briefing phase and the creation phase, as illustrated in the proposed gamification framework in Figure 2. The fourth stage is the demonstration stage which is the use of the artifact to solve one or more instances of the problem. The artefact was demonstrated in the result and discussion section to test its workability in the ELS.

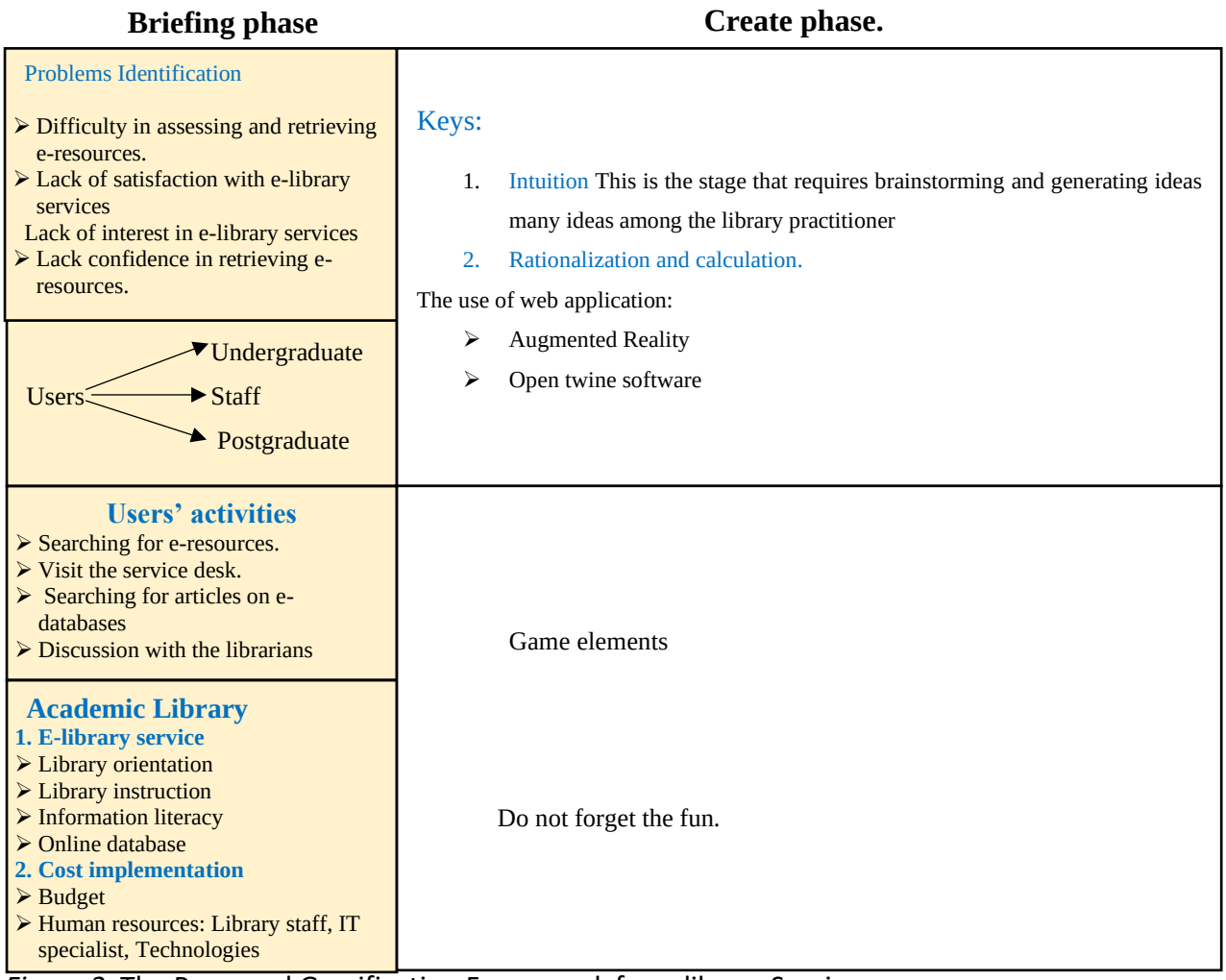

Figure 2. The Proposed Gamification Framework for e-library Services

Results and Discussions

Demonstration of the Artefact for Gamifying ELS in Higher Institution

In proposing an artifact for gamifying ELS, two phases of canvas (Figure 2) were developed to guide designers. The demonstration of the artifact was comprehensively discussed. Figure 3 illustrated the design process of the artifact in the briefing phase.

Briefing Phase

The briefing phase provides the designer with information that would help in successful gamification. To propose gamifying ELS, in the briefing phase, the requisite information is made up of problem identification, users, users' activities, and context for the suggested gamifying ELS service architecture in the form of a canvas. Problem identification in the briefing phase, such as the fact that students are not using the e-library because of the issues encountered. According to Oyewole & Oladepo, (2017) students are not using the e-libraries because of a lack of confidence in retrieving information resources. This might be due to poor information retrieval skills leading to low library patronage. Having identified the problem, it is always good to identify the categories of users in such an environment so that they are properly taken into consideration. Failure to identify and define the categories of users in a library might undermine the purpose of gamifying a library. In every higher institution, an academic library is situated to support teaching, learning and research. Thus, the categories of users in an academic library comprise undergraduates, graduates, and members of staff. Previous studies showed that the majority of the users who are not using the ELS are undergraduate students (Anyim, 2018; Reed & Miller, 2020). The observation on this might be because of non-conversant with the environment.

However, in the process of gamifying ELS for users' engagement, the users would engage in one of the activities, such as visiting the service desk or searching for research topics, among others. Also, in the users' activities, it is pivotal to identify what is expected of the users after the ELS has been gamified. At this point the expectations from introduction of gamification like fun and to get the users engaged will be achieved. However, the developer or the systems librarian should take into cognisant of what to do at the creation phase that would generate both intrinsic and extrinsic motivation, which would engage the users with ELS. Hence, at the end, the users would be able to perform the activities, and the positive resultant effect would be for both the library users and the library.

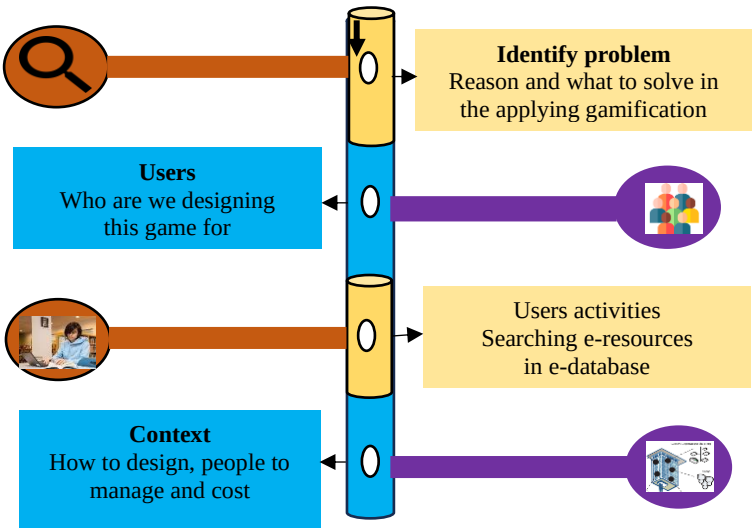

Figure 3. Briefing Phase for Gamifying ELS in Higher Institution

Furthermore, context is another component that must be properly harnessed during the briefing phase of gamifying a library. In this context, e-library has been identified as being gamified in an academic library. The essence of gamifying the e-library is to increase the library patronage of prospective users. In identifying an e-library, the services to be gamified must be identified as well. For instance, if the designer identifies ELS to gamify, the main services that need to be gamified for users' engagement must also be known in order to actualize the expected motive for the designing process. Previous studies showed that library orientation, library instruction, information literacy and e-databases were gamified for users' engagement (O'Brien & Pitera, 2019; Pothier et al., 2020; Reed & Miller, 2020; Shannon, 2019; Tang, 2021; Veach, 2019). The outcome of the gamification of the system for user engagement was highly recommended; however, it emphasized the need to consider the cost of gamifying ELS before embarking on the project. Costa et al. (2017) pronounced that cost is known as the main investment in project development since identification and classification serve as a base for budgeting. Also, human resources that would help in gamification are identified by the designer before the creation stage, since gamifying an ELS needs expertise such as Media technologists, technology experts, librarians, system librarians, information technology (IT) specialists, and others.

Creation Phase

Creation Phase is the second and technical phase in the design process of gamifying ELS. This phase requires design thinking that would make the designer to get the right elements for users' engagement with ELS. At the creation phase ideas are generated to ascertain which elements would be appropriate for gamifying ELS. According to Höllen and Voit (2022) the creation phase is divided into intuition/randomness and rationalization/calculation. At the intuition stage, the designers brainstorm on the appropriate game elements that would create fun and get users engaged with ELS. As different game elements are being put into consideration, the game designers or systems librarian would also think of the order in which the elements would be selected. Höllen and Voit (2022) and Morschheuser et al. (2017) discovered that most of intuitive and random approach is to just draw cards from the pile of game design element cards and to intuitively decide, whether the game design element fits for the concept and connects with the other elements or not.

Rationalization and calculation are the inclusion of the web application, in a gamifying system technology is vital and even makes the activities more engaging. A study revealed that the most rational and calculated approach is the use of the web application, where an algorithm suggests new elements based on artificial intelligence (Höllen & Voit, 2022). Also, for successful gamification of ELS the right technology such as Augmented reality, virtual reality and others forms of web- application must be wisely selected. Figure 4 illustrates the components in creation phase.

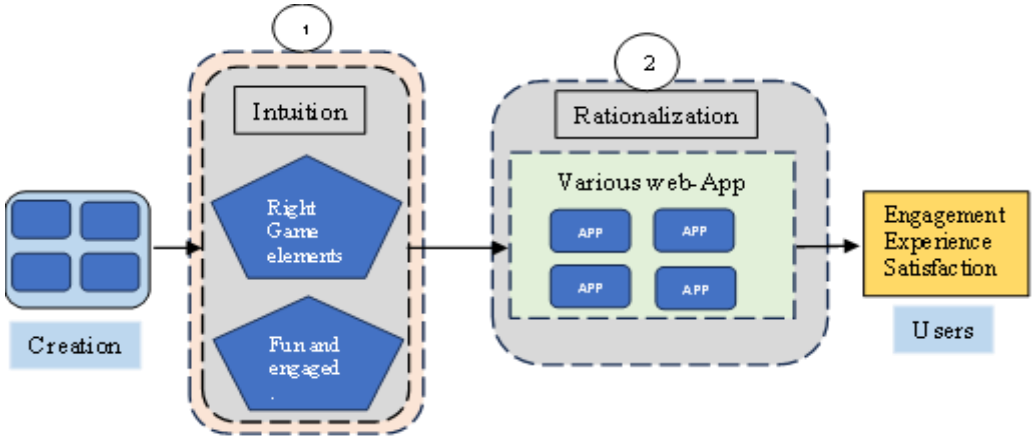

Figure 4. Components in Creation Phase

Conclusion and Suggestion for Further Studies

Gamification is not only limited to the use of game design elements, although these elements are essential items for a gamified system. To have a complete gamifying ELS, there is a need to apply algorithm technics design process. In this research, various design processes were examined in detail to provide a framework in gamifying ELS. The study presented a comprehensive and systematic framework as a tool for librarians and IT specialist for gamifying ELS for users' engagement. However, the study suggests that future research could concentrate on the framework to develop a prototype for ELS that would be evaluated by the experts.

Acknowledgments

The authors wish to thank the Tertiary Education trust fund (TetFund) for financing this project.

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