Report Part Three: Identify related reading articles

COMP-4110 Software Verification and Testing

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Related Articles/Technical Reports

1. Gamification

   Link to Article : https://journals-scholarsportal-info.ledproxy2.uwindsor.ca/details/07407459/v34i0005/76_g.xml

   Summary:

   Gamification is not tied to a singular profession. This strategy has been employed with MBA students to help introduce them to complex economic scenarios as well has been used in software teams to promote collaborative experiences, learning, and knowledge sharing. Gamification is a popular business framework that is particularly beneficial solely for the reason of turning nongame scenarios into a more motivating and engaging system. Companies using this framework must understand that this doesn't have a one size fits all approach due to the different factors that need to be considered based on the company employing it and the task that is being gamified. Gamification is more than just gaining points based on completed tasks, a slew of different levels or change in difficulty is a factor that needs to be considered. If the level of difficulty remains the same, as the user gains more experience and knowledge the lower leveled task would become trivial. Another factor that must be considered is trust, this refers to obtaining badges or trophies based on completed tasks that can be displayed then viewed by others in the gamified system. This adds a sense of competition and motivates the participants to obtain as many badges/trophies as possible. There are three different aspects of gamification, mechanics, dynamics, and aesthetics. Mechanics refers to the game components concerning data representation and algorithms, dynamics refers to the runtime of the mechanics based on the input and output of the players over time. Lastly, aesthetics refers to the emotional response evoked in the player when working with the gamified system. This resource is helpful to our technical report for the purpose of explaining the foundation of gamification and allowing us to become more aware of the components involved in gamification.

2. More Than Just a Game Ethical Issues

Link to Article: https://link.springer.com/content/pdf/10.1007/s10676-016-9401-5.pdf

Summary

Gamification has more to it than just increasing motivation and efficiency among participant/s, there is also a level of gamification that may be seen as unethical or contain unethical components. Due to gamification being one of the fastest dispersing behavioral tools in business, a fair number of unethical components can fly under the radar. Gamification links the real world of work with the virtual game world, this is something that allows companies to manipulate the participant/s. although user feedback is a major factor in gamification, companies must tread lightly on this, the reason is if a public leaderboard is displayed based on scores pertaining to a job some participants can see this as insulting or offensive. Another ethical issue that is involved with gamification programs is the idea that these games can serve the interest of the organization by simulating the interest and motivation of the participant/s. Lastly, this resource talks about the exploitation of gamification, this is referring to the idea of replacing real incentives like a money bonus or promotion with fictional incentives like achievements. As time progresses and gamification makes its way too many organizations, the uncovering of ethical issues that are accompanied by this framework will come to light. This resource provided much-needed information on the topic of ethics pertaining to gamification, this is very important because our report will be explaining gamification and providing a small gamified system. Now having a resource that dives deep into the ethical issues involved in gamification can allow us to change our approach to make our gamified system as ethical as possible.

3. Investigating Information System Testing Gamification with Time Restrictions on Testers' Performance

Link to Article:
https://www.proquest.com/docview/2545735307?parentSessionId=HYfMnldjqPvxNsne9TuYIYgROxp2SakKnOOJeCSjl8s%3D&pq-origsite=primo&accountid=14789

Summary

The purpose of this resource is to explain the effects of gamification as a method to improve the performance of software testers. A definition of gamification was provided which is as follows, the use of game design elements, mechanics, aesthetics, and game thinking in a non-game context. The purpose of gamification is to increase the engagement and motivation of the participant/s. When looking to design a gamified system, one must keep certain factors in mind to obtain a successfully gamified system. The factors mentioned include effectiveness, efficiency, satisfaction, gaming, and gamification, without these factors in mind it is nearly impossible to create a successfully gamified system. There are also human motivation factors that must be considered as well, these include collecting, connecting, achievements, feedback, self-expression, reciprocity, and blissful productivity. The reason human motivation factors are important is due to human psychology, obtaining a badge/trophy gives instant feedback to the

participant that what they have done is correct/expected behavior. This resource also goes into depth on why gamification is not about changing the way of learning but rather how it is enhancing learning, engagement, and positive behavior through a game-like design. The resource explains different applications which use the gamification framework in a production scenario. This resource is very beneficial to our technical report due to the fact of having a plethora of applications that used gamification and having mass information on the groundwork on gamification.

4. Gamification in software engineering – A systematic mapping

Link to Article:
https://www.sciencedirect.com/science/article/abs/pii/S0950584914001980

Summary

Gamification makes for improvement of user engagement, motivation, and performance when carrying out a certain task, by means of incorporating game mechanics and elements, thus making that task more attractive. Much research work has studied the application of gamification in software engineering for increasing the engagement and results of developers. The objective of this research is to carry out a systematic mapping of the field of gamification in software engineering in an attempt to characterize the state of the art of this field identifying gaps and opportunities for further research. Researchers carried out a systematic mapping with a view to find the primary studies in the existing literature, which were later classified and analyzed according to four criteria: the software process area addressed, the gamification elements used, the type of research method followed, and the type of forum in which they were published. A subjective evaluation of the studies was also carried out to evaluate them in terms of methodology, empirical evidence, integration with the organization, and replicability. As a result of the systematic mapping, they found 29 primary studies, published between January 2011 and June 2014. Most of them focus on software development, and to a lesser extent, requirements, project management, and other support areas. In the main, they consider very simple gamification mechanics such as points and badges, and few provide empirical evidence of the impact of gamification. Prior research in the field was quite preliminary, and more research effort analyzing the impact of gamification in Software engineering would be needed. Future research work should look at other game mechanics in addition to the basic ones and should tackle software process areas that have not been fully studied, such as requirements, project management, maintenance, or testing. Most studies share a lack of methodological support that would make their proposals replicable in other settings. The integration of gamification with an organization's existing tools is also an important challenge that needs to be taken up in this field.

5. Gamification of software testing

Link to Article: https://dl.acm.org/doi/10.1109/AST.2017.20

Summary

Writing good software tests is difficult, not every software developer's favorite occupation, and not a prominent aspect in programming education. However, human involvement in testing is unavoidable: What makes a test good is often down to intuition; what makes a test useful depends on an understanding of the program context; what makes a test find bugs depends on understanding the intended program behaviour. Because the consequences of insufficient testing can be dire, this paper explores a new angle to address the testing problem: Gamification is the approach of converting potentially tedious or boring tasks to components of entertaining gameplay, where the competitive nature of humans motivates them to compete and excel. By applying gamification concepts to software testing, there is potential to fundamentally change software testing in several ways: First, gamification can help to overcome deficiencies in education, where testing is a highly neglected topic. Second, gamification engages practitioners in testing tasks they would otherwise neglect and gets them to use advanced testing tools and techniques they would otherwise not consider. Finally, gamification makes it possible to crowdsource complex testing tasks through games with a purpose. Collectively, these applications of gamification have the potential to substantially improve software testing practice, and thus software quality.

6. Gamification of Software Testing – An MLR

Link to Article: https://link.springer.com/chapter/10.1007/978-3-319-49094-6_46

Summary:

This article is a multi-vocal literature review (MLR) that gives an overview of common occurrences in papers on the topic of gamification in software testing. It covers several basic concepts that make up the basic requirements to understand what gamification is and how it can be used with software testing. The first section covers types of testing, systems under testing (SUT), and roles of individuals. Gamification of software testing can be used under most circumstances by almost any role. However, developers and software testers are the most likely to use this process. The next section covers elements that are used such as points (as the most common) and other ways to motivate "players". It is stated that rules are required to ensure that there is still quality work being created and suggests that there is a way to turn points into something further. Finally, examples of how software testing gamification is used, any challenges and real tools are discussed. In general, there is great success with promising numbers to show that gamification is making a positive impact on quality and quantity of work, motivation, and discovering more code defects. This does not come without its challenges, such as differences in goal definitions, how to distribute points for different difficulties of tasks and finding a balance to still allow for freedom and creativity. This paper gives our group a good understanding of how gamification is used in software testing and some of the basic tools to build upon using other resources.

7. A Framework for gamification in software Engineering

   Link to Article: https://www.sciencedirect.com/science/article/pii/S0164121217301218

   Summary:

   This article presents a framework to be used in the software engineering environment to support implementation of gamification into the workplace. This includes how it can be used and effects software testing along with other typical tasks done by software engineers. The framework is called Gamification focused On Application Lifecycle Management (GOAL). Games and software engineering have many similarities as they both require the "player" to learn new skills, use and combine those skills to complete a challenge that can result in rewards or punishments based on the level of success. The GOAL framework has an emphasis on continuous feedback to motivate and keep the "players" on track. The main sections of this paper include an analysis of gamification in the software engineering environment, the 3 main elements of the framework (ontology, methodology and tools), the application of the framework and the future of the framework. This paper is very useful for our team project as it has an in-depth analysis of what is required to successfully implement gamification in the workplace. With the objective to present a full framework to a company to implement and includes a real case study you can see how gamification is applied to testing along with the entire software engineering process. Testing is just one of the tasks needed to produce a successful project, so it is important to understand how this method of software testing works with the overall process.

8. Educational Innovations and Gamification for Fostering Training and Testing in Software Implementation Projects

   Link to Article:
   https://uwindsor.primo.exlibrisgroup.com/discovery/fulldisplay?docid=cdi_springer_books_10_1007_978_3_030_33742_1_23&context=PC&vid=01UTON_UW:UWINDSOR&lang=en&search_scope=OCUL_Discovery_Network&adaptor=Primo%20Central&tab=new_Windsor_Omni&query=any,contains,Gamification%20of%20software%20testing&offset=0

   Summary:

   Gamification has recently gained much interest from both practitioners and academics. In addition, gamification is used as a tool for a better understanding of materials and illustrates a specific scenario or a case in which demonstration is required. It has been used for greater commitment to a cause (representing the topic as a game, not an obligation or responsibility). Educational innovations are defined by Taylor et al as "any novel teaching technique, strategy, tool, or learning resource that could be used by an instructor to lead to effective (or promising) instructional techniques that benefit

student learning and engagement." Educational innovation must have these three components:

- use of a newly revised material or technology
- use of a new teaching strategy or activity
- alteration of beliefs (pedagogical assumptions).

Educational and training innovations are mostly focused on creative methods for teaching and understanding, involving technology, networking, or collaboration for open innovation or updating the education in general as a primary cause for analyzing and research.

Two groups of 8 individuals were randomly chosen and thought the same material, the first group used the old teaching methodology where the second group used education using gamification. The average results of the evaluation after the week of training for the second group were 72,53%. and the average results of the evaluation after the week of training for the first group were 69.14%. Higher performance has been achieved by the second group of trainees who were trained with teaching and learning innovations.

9. Clean Game: Gamifying the Identification of Code Smells

Link to Article
https://www.researchgate.net/publication/335959479_CleanGame_Gamifying_the_Identification_of_Code_Smells

Summary:

Based on the assumption that gamification is well suited to engage learners with "code smell" identification concepts, especially when used to provide learners with activity follow-up, we set out to explore whether gamification can have a positive effect on post-training reinforcement in comparison with a more traditional approach, which consists in setting up post-training reinforcement content manually. Generally, classic post-training to assess skill-building in activities such as code smell identification entails hands-on homework that involves perusing source code for code smells. Usually, in traditional post-training, these tasks are supported only by a coding editor or IDE, which allows for faster code navigation and a more convincing environment. The lack of guidelines and features to keep users engaged makes traditional post-training for code smell identification unmanageable. The gamified approach can be used to mitigate these concerns. To probe into the advantages provided by a gamified environment over an IDE-driven post-training, a mechanism is designed that supports post-training exercises centered on "code smell" identification. In the context of our mechanism, these post-training exercises follow a gameful design process, which is they leverage gamification components such as leaderboard and rewarding badges. The nature of gamification is

complex and under development. There are many variables in designing games which makes designing an efficient game to have to highest learning outcome is difficult.

10. dark side of gamification at work: Impacts on engagement and well-being

Link to Article:
https://www.sciencedirect.com/science/article/abs/pii/S0148296320305415

Summary:

There have been many studies around the well-being research field, perhaps, one way to improve the quality of workspace and education is by gamification the process, the proposed process of enhancing work satisfaction starts by inviting participants (employees who wish to try gamified workspace) and evaluate their job satisfaction and job engagement. Gamification introduced contests to the workplace and the result has shown employees' job engagement is significantly more in weeks before the contest. This result shows that gamification can be an important factor in motivating employees and improving their job quality. Engaged employees' performance has also been more dynamic and enthusiastic. As found in the mentioned result, gamification might be used to “[add] life and fun to the work context” and “improve the interaction between the employees”, however, gamification should be adopted carefully as it can have many unwanted side effects such has extra pressure on employees in final days of the contest, excessive comparison, and ranking among employees and long term frustration. The recent service literature has emphasized the high rate of turnover among service FLEs due to the high stress and anxiety that characterize their job. In addition, continuous competition in the workplace and education can negatively affect individuals' mental health.