

The Preliminary Study Of Gamification Framework To Increase Research Productivity

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Abstract: This preliminary study begins with a review of several related articles that discuss how to increase research productivity. The review focused on the source of data, the analysis method, and the results obtained by each author. After reviewing and obtaining meaningful input from each article, we try to provide a different alternative by using designs or elements derived from games. The term use of game design as a solution for non-games context, better known as gamification. We design these games as constructs in the proposed framework model as a mechanism for research productivity enhancement. At the time of this article's publication, the proposed mechanism was still in the form of an initial framework, not yet through a comprehensive testing and analysis phase. In future work, we will discuss the analysis and evaluation related to this framework.

Index Terms: gamification, framework, research productivity, enhancement.

1 INTRODUCTION

The ideas in this paper emerged from our experience in conducting research activities in a higher education institution environment. Before going further on the use of the gamification framework for research productivity enhancement, first will present some of the research relates to the topic to be discussed. The research productivity we will discuss is dominant in the number of research results published by researchers. One of the many cited papers discussing the topic to be discussed was delivered by Silver [1], in this paper author's opinion was based on personal experience in carrying research. The research was conducted in the form of collaboration with several colleagues and involved many students. Silver believes that there should be a reward given to high-quality research to motivate and recognize the individual researcher in the context of increasing research productivity. Another researcher, Olson, and Connelly [2] suggested that research productivity enhancement can be obtained by providing mentoring through pre-doctoral fellowships to some students who will conduct research activities. Although some students have been research-assistants and have received the usual course in conducting research activities, experience during pre-doctoral fellowship mentoring will be more intense. Nafukho, et al. [3], said individual characteristics such as gender and personal experience are significantly associated with faculty research productivity. Institutional characteristics (students enrolled and funding) have a role in research productivity enhancement. The faculty's experience was not a significant factor in their research productivity. As for the opinion expressed by Uncles [4], academic discipline is very instrumental in this regard.

The author also states that there are at least three factors that hamper productivity, including inadequate training, lack of concentration in research activity, and competing commitments.

2 LITERATURE STUDY

In the next section, we perform comparison between several publications related to research productivity enhancement. This comparison is shown in Table 1.

TABLE 1
RELATED PUBLICATIONS

Author(s)	Type of Articles	Result Obtained
Silver [1]	Research article	The author conveys ideas that can be used as a reference for research productivity enhancement. The main idea from the author is to focus on generating ideas related to research and immediately create a kind of record that can store these ideas.
Olson and Connelly [2]	Research Article	The mentoring of predoctoral fellowships shows a positive effect on research productivity enhancement. All participants were excited about the study, and students showed increased trust in the research process is applied.
Nafukho, Wekullo, and Muya [3]	Research Article	The study suggests a combined formula for the research output of the faculty that combines research funding and Faculty awards. In fact, the authors agree that h-index should not be the sole measure of the productivity of university faculty.
Uncles [4]	Research Article	A good research community and culture are needed, which can support the development of junior staff in conducting research activities.
Zain, et al. [5]	Review Article	Experience and consistency are needed in producing high-quality research. In the research productivity enhancement discourse, the authors not only look at quantity but also in terms of the quality of research results. High-quality research goes hand in

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Li, et al. [6]	Review Article	hand with high-impact on society. To improve research publication, the authors suggest that every researcher must be able to see appropriate opportunities for publications. To be able to improve writing skills, researchers can obtain guidance from experienced mentors that are relevant to their research. The mentoring process should be done iteratively, to reach maximum results.	productivity of faculty in selected leading public universities in Kenya [3]	consisted of academics from the two leading public universities in Kenya. For the following reasons the two universities have been deliberately chosen. (A) These are large universities with well-established systems, and (B) have more than 1000 professors/faculty. The first university, known as A, had a faculty of 2022 and the second university, known as B, had a faculty of 1138, a total of 3160, around 32 per cent of the total faculty in Kenya's public universities.	Analysis of Variance
Kokulu, Mutlu, and Sert [7]	Research Article	Emergency physicians (EP) has contribution to scientific publication productivity during the 10-year period (2008-2017), both qualitatively and quantitatively. The results showed that the proposed framework model had a positive impact on research productivity enhancement. This is indicated by the results of testing the constructor of the framework, including knowledge sharing (KS) behavior as the main construct has a substantial impact on research productivity.			
Fauzi et al. [8]	Research Article	The proposed triple-helix model is implemented in a strategic plan supported by the Council of Ministers (council of ministers), which means that a triple-helix collaboration between government, universities and official industries is formed.	Increasing Faculty Research Productivity via a Triple-Helix Modeled University Outreach Project: Empirical Evidence from Thailand [9]	The researcher and eight faculty staff took part in a 12-month project, beginning in June 2010 until the end of May 2011. When working on this project, the author also studied her colleagues about the ideas, actions and research productivity, as well as the views of the MBS Dean, University Chair, two senior FTI managers and five members of the NESAC.	Grounded theory approach
Chanthes [9]	Research Article				

Some of the ideas or results obtained that have been outlined in Table 1 show that topics that discuss research productivity enhancement are still very relevant. Research productivity enhancement both qualitatively and quantitatively by involving academicians in universities, even in the triple-helix model has the support of the government and industry. Next, we compare the source of data and analysis method from several research articles (not all) that have been presented in Table 1.

TABLE 2

THE COMPARISON OF THE SOURCE OF DATA AND ANALYSIS METHOD

Title	Source of Data	Analysis Method
Mentoring Through Predoctoral Fellowships to Enhance Research Productivity [2]	The research was a qualitative descriptive analysis using semistructured interviews and a written questionnaire as the primary methods of collecting data. During the last month of the 11-month fellowship every predoctoral fellow and faculty mentor was approached and asked to participate in the report. Sample data used were lecturers/professors in Malaysia, data taken from a total of 56,992 academicians (private universities: 24,476 and public universities: 32,516). The total number of correspondents is 542, with valid data at 525.	Qualitative analysis data
Knowledge sharing: Role of academics towards research productivity in higher learning education [8]		Variance-based PLS- SEM (Structure Equation Modeling) analysis
Examining research	The research sample	Multi-factor

Olson and Connelly [2] explain about mentoring relationships formed during pre-doctoral fellowships awarded to five nursing students working with faculty mentors at Kansas University, School of Nursing. Each of the eight study participants (four of the five pairs) collected data through interviews and a written questionnaire. The Fellowships have proven to be an effective way of engaging students directly in ongoing research activities. The four pairs worked together on different sizes and complexity of funded grant projects. There were numerous smaller assignments, experiments, and projects within the projects which provided the protégé's research experience. Other researchers, Fauzi, et al. propose a framework model that is built on the basis of knowledge sharing (KS), based on testing the framework model by involving lecturers/professors in Malaysia, proving that almost all hypotheses can be accepted, and a positive effect on research productivity enhancement. Nafukho, et al. [3] in his article tested the productivity research of two leading Kenyan universities. The analysis revealed that the faculty's research productivity is differed by institution, class, level, discipline, terminal degree, and years of work experience. Individual characteristics (rank, gender, experience, and terminal degree) and institutional characteristics (number of Doctorate students enrolled, number of undergraduate students, and funding grants allocated for research) are substantially related to research productivity. The expertise of the faculty was not a determinant factor for their research productivity. Furthermore, Chanthes [9] in his article explained that the synergy between higher education institutions, government, and industry had a positive impact on research productivity enhancement. Faculty members can be part of industry-funded projects.

3 PROPOSED FRAMEWORK

The contribution we want to make is to propose a framework

model based on gamification. This framework is part of the research we have done before [10]. Gamification is the use of design games or elements of games in non-games context for various purposes. The importance here is usually to improve non-games contexts such as learning motivation, work motivation, and others. There are many game designs that can be used in non-games contexts as shown in Table 3.

TABLE 3
GAMES DESIGNS CAN BE USED IN NON-GAMES CONTEXTS

No	Games Design	References
1	Teamwork, Competition, Network	[11][12][13]
2	Virality, Mission, Countdowns, Goals	[11][14][15]
3	Skill, Ability, Status	[11][16]
4	Level, Points, Badges, Progress Bar, New Item	[17][18][19]

Teamwork can be interpreted as cooperation between members in a team that is complementary to achieve mutually agreed goals. Competition is a competition between two or more individuals/groups. Virality associated with something that spreads in a very fast time with a very large area. The mission is to work done to get goals in the future. The countdown is the time to count down an event that will occur, while the goal is the goal to be achieved in the future. Ability is the ability to do something, while a skill is a skill or ability to do something well. Status is the position of individuals/groups in a community. The level is a tool to measure achievements with agreed height heights. Point is a size that is usually in nominal form. A progress bar means a condition that shows achievements that have been completed from the overall stage. Based on the elements or games design in Table 3 we formulated a number of hypotheses that would construct the initial framework:

H1: The teamwork has a positive effect on academics' behavior towards the enhancement of research productivity.

H2: The network has a positive effect on academics' behavior towards the enhancement of research productivity.

H3: The competition has a positive effect on academics' behavior towards the enhancement of research productivity.

H4: The points have a positive effect on academics' motivation towards the enhancement of research productivity.

H5: The goals has a positive effect on academics' motivation towards the enhancement of research productivity.

H6: The leveling up has a positive effect on academics' motivation towards the enhancement of research productivity.

H7: The good behavior among academics' will have a positive effect on the enhancement of research productivity.

H8: The high motivation for academics' will have a positive effect on the enhancement of research productivity.

Based on the hypotheses that have been explained, then the initial framework we propose is as follows:

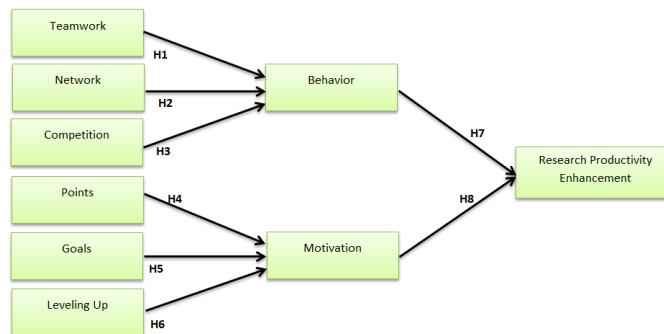


Fig. 1. The Initial Framework

This framework model consists of 6 independent variables and 3 dependent variables. The independent variables are networks, teamwork, competition, points, and leveling up. The dependent variable used is academics' behavior and motivation, and research productivity enhancement. In future work, we will conduct a pilot test of the initial framework model. For testing and analysis of the proposed framework, we will use PLS-SEM (Partial Least Square - Structure Equation Modeling). The reason for choosing the SEM method is because it supports complex modeling constructs with minor correspondents. SEM is powerful in modeling latent variables, measuring error correction, and estimating simultaneous parameters for the whole theories [20]. PLS-SEM is an alternative structure equation modeling method used to explain relationships between constructs, emphasizing the theory of the value of these relationships with a small sample data size.

4 CONCLUSION

Various mechanisms that have been discussed in the literature study are very meaningful input for us in designing and making a productivity research enhancement framework. It is still too early to say that the framework that we propose is better than other mechanisms because this framework has not yet gone through a comprehensive testing and analysis phase. But we are optimistic that this gamification based framework can be the main alternative for research managers in higher education institutions to enhance their research productivity.

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