Gamification Framework Design of Management Education and Development in Industrial Revolution 4.0

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Abstract. The Industrial Revolution (IR4.0) has dramatically affected economic growth, technology advancement, business development and innovation are major contributors to economic growth. Today, the field of technology has transformed the landscape of educational technology. The revolution in technology is rapidly changing, producing new models and methods of education for the future, enhancing the universities capabilities to prepare graduates for future life, life in the real world. The IR 4.0 will advance to establish smart robots and replace humans in certain job sectors and industries. However, specific skills, knowledge and emotional intelligence can never be replaced by robots. Because of the technological advancement, the education sector is forced to begin its technological revolution, focusing on educational innovation, agility, ultimately changing the traditional methods of learning. Many works of literature have discussed educational innovation, by increasing the student's motivation and changing the student environment of the class. An analysis of the literature conducted on gamification determined that gamification support student achievement and motivation at a college level. The analysis revealed significant signs individual points, badges, achievements leaderboards and levels are the most commonly implemented form of gamification.

1. Introduction

Industrial revolution 4.0 is generally known as a change in the way of work that focuses on data management, industrial work systems through technological advances, communication and work efficiency improvements related to human interaction. Data is the primary need of organisations in corporate decision-making processes supported by unlimited computing power and data storage systems. Quantity is no longer the primary indicator for a university in achieving success, but the quality of its graduates. The success of a country in facing the 4.0 industrial revolution is closely related to innovations created by quality resources so that universities must be able to answer challenges to face technological advances and competition in the world of work in the era of globalisation[1]. Indonesia is building its human resources, including highly educated human
Based on the Law of the Republic of Indonesia number 20 of 2003 states that in the framework of national quality control of education conducted evaluation as a form of accountability of education providers to interested parties [2].

In developed countries, the existence and development of MOOCs increasingly rapidly perceived a threat to the existence of various universities [3]. Not only that, the development of gamification elements is also increasingly felt in many scopes, especially education management. Learning adopt elements of games designed to balance the subject matter with game elements aimed at creating excitement, maintaining and applying the subject matter to the real world [4].

![Gamification Framework](https://en.wikipedia.org/wiki/Gamification_surroundings)
Gamification learning method means applying the working principle of a game into the learning process in hopes to cultivate learning motivation and change student behavior [5]. Gamification provides positive benefits in the field of education that is increasing motivation and involvement (active role) of students in learning activities [6]. Positive benefits are the main attraction to make gamification become an option in running the learning process [7]. In fact, in the current digital era needs to be observed what was delivered by Steve Jobs when introducing a new edition iPad. "In Apple's DNA itself it is explained that technology alone is not enough. Technology mated with liberal art, technology mated to the humanities that leads us to obtain results that make our hearts satisfied "[8].

It is utilized by educational institutions to support the learning system in the classroom with a computerized system. Similarly, Raharja University apply the learning method of iLearning [9] online which can be accessed through http://idu.raharja.info/ so as to facilitate the students to access the lecture material and the collection of independent tasks become easier and efficient. iDu is designed so flexibly that it produces a quality learning process [10], but it does not run maximally because the lecturer only gives material and independent tasks which are then done by the students within the specified time limit. Should online learning system can be more Gamification of online learning system is interactive that is by way of lecturer can know the development of student in informative.

2. Research methods
Learning is a human way to grow and develop. The learning component to be considered in modern times is learning media. The growing development of information technology supported by the internet presence has various impacts. Many factors why the learning outcomes as well as the interest in performing the independent tasks of the students are reduced, including the miscommunication factor between the lecturers and students in the class, meaning that the students do not understand the material given by the lecturer and ultimately do not perform the task given. And the lack of enthusiasm and the enthusiasm of the students in the work because the task is too much and the time given the short course lecturer. Another factor is bored with the online lecture system is monotonous, and the lack of motivation to complete the task.

In the end of the cause, the lectures run with no maximum. iDu has enormous benefits as a social network between teacher and student that can be monitored by parents. Moreover, supported by various advanced features that make teaching and learning process more effective, efficient and organized. Like when students login iDu will have features classes, groups, dashboards, news, users. After entering the classes there will be lesson features, news, assignments, calendars, teachers, students, and portfolios.

However, the problem is that there is no differentiation between students who complete the task independently earlier than the deadline specified by students who are late to finish it. This causes the students to be less motivated to do independent tasks and choose to finish at the end times.
Above is a flowchart diagram of assignment problems on iDu where there is no gamification element. In the flowchart that runs can be concluded that there should be a renewal of the concept for students addicted in running the learning process and complete the task independently online. As data support the gamification framework in creating educational management along with the 4.0 industry revolution, there are 10 (ten) previous research with the same variables:

1. This research was conducted by Acun Kardianawati, Hanny Aryanto, Umi Rosyidah from Dian Siswanto University in 2016 entitled "Application of Appreciate Gamification Concept in UMKM E-Marketplace" This research aims to improve the competitiveness of E-Marketplace UMKM by using gamification method which is useful for enhance experience, loyalty, brand awareness, and buyer motivation in conducting transactions [11]. In this technology using inquiry that appreciates is a system that can be used by consumers, relevant products from certain products, and can also be used by consumers. It can be learned and applied to the system http://idu.raharja.info/, where students can learn things related to specific subjects and immediately publish lecture materials that are relevant to the interest of the student.

2. The research was conducted by Enrica Pesare, Teresa Roselli, Nicola Corriero and Veronica Rossano in 2015 from the Department of Computer Science, University of Bari with the title "Game-based learning and Gamification To promote engagement and motivation in medical learning contexts" the intelligent can be defined as a system aimed at proposing innovative uses of emerging pedagogical approaches and technologies to effectively support the learning experience [12].

3. Research conducted by Rubin Hukita Irwin in 2017 from Raharja University with the title
"DEVELOPMENT OF IDU SYSTEM USING GAMIFICATION METHOD TO OPTIMIZE LEARNING ON HIGHER EDUCATION" This study aims to create a pleasant learning environment but still do not forget the material given by the lecturer [13].

4. Research conducted by Dimas Sambung, Sihkabuden, Saidah Ulfa in 2017 entitled "Development of gamification-Based Mobile Learning for Mastery of Japanese Vocabulary Class X SMAN 1 GARUM" This study aims to produce a valid mobile learning product as a source of learning and effective for learning Japanese vocabulary class X. This Multimedia Development uses Lee's learning media development model, WW, & Owens, DL [14].

5. Research conducted by Mohammad Farozi in the year 2016 entitled "DESIGN AND DEVELOPING WEBSITE GAMIFICATION AS A LEARNING STRATEGY AND EVALUATION OF STUDENT LEARNING RESULT (Case Study: AMIK Lembah Dempo Pagar Alam)" This research aims to help the lecturers AMIK Dempo Pagar Alam Valley in giving lecture material, tasks and evaluation of each task implementation in the form of challenge, level and awarding points [15].

6. Research conducted by Imam Kuswardayan, Darlis Herumurti, Ardha Putra Santika in 2016 entitled "Design of Edutainment Application for Elementary Children with Octamalytic Gamification Technique and Machinations Framework" This research is implemented on mobile platform into Edutainment application. Obtained from testing ten usability testers that the tested gamification has the effect of making the application more interesting, educative, not boring, and can increase the child's interest in learning [16].

7. A study by Pranatha Widya Pradana in 2016 entitled "The design of liva applications to reduce nomophobia by gamification approach" This study develops the Liva application, which aims to reduce dependence on smartphone as one of the solutions [17].

8. Research conducted by Arif Prambayun, M. Suyanto, Andi Sunyoto in 2016 entitled "Model gamification For Learning Management System" This research uses gamification model for learning management system, seeks to get interest and attention from participants of E-learning where management system learning is an application that can be used as an E-learning platform [18].

9. Research conducted by Benedictus Arya Binarsatya, Nisful Asrul Sani in 2018 entitled "APPLICATION OF GAMIFICATION CONCEPT AT DESIGNING APPLICATION OF AL-QUR'AN LEARNING" This research aimed to apply gamification which combined with robot / agent will later be proposed to overcome one e-learning problems, namely mentoring. This application was designed with the application of gamification using Huang and Soman methodology, the final form of the study results in the form of content learning application of Qur'an [20].

From the previous 10 (ten) studies, the main challenges that must be prepared by the students are complex problem solving and cognitive flexibility skills. To produce students with a variety of skills qualifications above, one of the first steps is to improve learning motivation by inserting gamification elements.

3. Result And Discussion
The purpose of education is to develop knowledge in order to prepare college graduates to participate in the development of appropriate education [21]. One technique to overcome the problem of lack of motivation to meet the needs of students is by applying design elements that exist in the game on the design http://idu.raharja.info/, or better known as gamification. Higher Education is a place to run
education consisting of students as learners and lecturers as teaching staff to be able to achieve the national development goals [22].

The gamification element in http://idu.raharja.info/ aims to give pleasure to the students so that students do not feel saturation following the lecture including the self-employment task. A highly informative leaderboard serves to show the number of points the students have gathered during the lesson. This is in line with the government's target of dealing with the disruption era and synergizing the gamification elements in education management.

The research stages used are problem identification, data collection, data analysis, system design and implementation, evaluation of results. Stages of research can be seen in Figure 2 below.

3.1. Problems Identification
   The issues to be solved are as follows:
   1. Collection of student assignment.
   2. The value of student activity.
   3. There is no difference in the value of the tasks between students who are working on the task at the beginning and students who do the task at the end of time task.

3.2. Data collection
   In data collection the author observes by:
   1. Timing of each student assignment.
   2. The difference between the start and end time of the online students or follow the online learning activities.

3.3. Data analysis
   Analyzing the system is under study.

3.4. Evaluate results
   This is the stages of conclusions or outcomes of research methods.

To realize the system, it makes an online-based system that is gamification on iDu iLearning (iLearning Education).
1. *iDu Landing Page*

![iDu Landing Page](image)

*Figure 5. iDu Landing page*

The picture above is the landing page view on iDu, the view that first appeared when accessing the website: iDu.raharja.info/. Dynamic home view with multiple banners showing project developed by Raharja's personal.

2. *Login page of iDu*

The login menu is used so that the user can log into the iDu system. Previously must be done by the user is to sign up that can only be done once and once the user successfully sign up, then certainly the user can log in as shown above. Users can login using username and password or can also use SSO (Single Sign On) by utilizing google apps button integrated with Rinfo email.

![Login page](image)

*Figure 6. Login page of iDu*
3. News page on iDu

![Image of news page on iDu](image1)

**Figure 7.** News page on iDu

The above picture is the news view on iDu which serves as information about lectures for students.

4. Game menu on iDu

![Image of game menu on iDu](image2)

**Figure 8.** Game menu on iDu

Figure 8 is a feature of gamification feature, which is a rule and how to use gamification feature.
5. **Listing program level**

![Listing program level](image)

**Figure 9. Listing program level**

6. **Points and leveling on iDu**

![Points and leveling on iDu](image)

**Figure 10. Point and leveling on iDu**

The picture above shows the level on iDu. The add button works to add a level when the lecturer wants to add a level, and can set the number of points per level.
7. Award point on iDu

The display of award points on iDu is a page for lecturers to enter the number of points that will be obtained by students who have already done the assignments given by the lecturer.

8. Listing Program Leaderboard

Figure 11. Award point on iDu

Figure 12. Listing Program Leaderboard
9. Leaderboard feature in class

![Leaderboard](image)

**Figure 13.** Leaderboard feature in class

It is a display that shows the level of all students. The level difference depends on the length of time the task is done. Students who submit first, get a higher level.

10. Assignment on iDu from Teacher account

![Assignment](image)

**Figure 14.** Assignment feature view from teacher account.
The picture above is a view for the lecturer to give assignments to students. When the task has been submitted, the task notification will automatically appear on the iDu student page.

4. Conclusion
With the implementation of feature gamification on iDu (Ilearning Education) system can be taken 3 (three) conclusion as follows:
1. The presence of gamification features enhances the spirit of students to collect tasks on time
2. The existence of gamification feature makes the classroom learning more effective and interactive, that students can know directly the point obtained depends on the length of time collection task
3. Learning method becomes more fun but still do not forget the material given by the lecturer. So there is a balance in learning in the classroom, creating a comfortable learning environment and not boring.
4. The application of the concept of gamification on iDu (Ilearning education) for learning is still very possible to continue to be developed in a better direction, such as by collaborating with professionals in the field of gamification so as to make the material delivered more weighty.

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