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# Role-Playing Gamification-based Educator Career Promotion System

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**Abstract:** This article offers a solution to a longstanding problem in higher education institutions in Indonesia, where the number of Associate Professors and Professors is still small. The identified cause is the educators' lack of motivation to achieve these academic positions. HRD management implements a reward and punishment system to increase motivation. However, this motivation is often associated with material rewards, and causes educators to feel dehumanised. Reward and punishment actually represent a gamification mechanism that should present a fun gaming atmosphere, not a sense of insecurity for educators when completing their tasks. This article proposes a novel gamification approach to the Indonesian Educator Career Promotion System as a solution. The gaming mechanism was redefined and implemented to a gamification application for educators. As a result, a diverse spectrum of interests in achieving higher careers was found, as opposed to only those based on material rewards.

**Keywords:** educator career, gamification, higher education, role-playing game

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## 1 Introduction

The Indonesian government is progressively working to improve Indonesia's global innovation index, which, based on the World Intellectual Property Organization, was ranked 85th in 2019 and 2020 (Dutta et al., 2020) and also dropped

to 87th in 2021 (Dutta et al., 2021). Some aspects that concern the government in raising this index are the number of publications in reputable international journals and patents. Relevant efforts to compensate for this situation include clustering higher education institutions (HEIs) based on academic and research quality and improving the Educator

Career Promotion System (ECPS) for HEIs in Indonesia. This has been outlined by policy of the Ministry of Education & Culture, Research and Technology (shorted as the Ministry) (Ristekdikti, 2019). Seamless promotion of educator careers can regularly increase the number of Associate Professors (AP) and Professors (PR), the two highest positions in ECPS, whose experience and ability in quality research are expected to increase the number of international publications and patents. In addition, the existence of these two academic positions in an HEI is also a significant point in the accreditation process for the HEI.

However, both positions currently cover only 13% of all educators in more than 3000 HEIs, according to Indonesia's Higher Education statistical report (Ristekdikti, 2018). This highlights that the level of educators' participation in ECPS is still low, especially in HEIs in the middle or lower clusters. That causes many educators to be stuck in low-middle career positions i.e., Lecturer (LR) and Senior Lecturer (SL) for quite a long time, where there is no special demand to conduct research and publications of national and international quality.

Observations found that Human Resources Department (HRD) management arbitrarily implements a reward and punishment system for educators to achieve institutional targets; however, this practice often presumes that the educators can only be managed if their interest in material rewards is met. In fact, this method not only fails to channel the interest of educators to complete their tasks for higher career achievements, but also makes them feel dehumanised and becomes indifferent to ECPS. Rewarding and punishing are actually parts of the gamification mechanics, which essentially aims to bring joy, versus an insecure atmosphere to educators when undergoing ECPS.

Some gamification approaches, such as those based on role-playing games (RPGs), can increase the motivation and role of educators not only to improve individual achievements and careers, but also develop HEIs where they work. Studies show that RPG-based gamification (abbreviated as RPGF) successfully leads to students becoming more proficient in some tasks in the computer programming process (Li and Edwards, 2020), or produces increased student participation in formative exams (Ntokos, 2019), or other in-class activities (Topîrceanu, 2017). Some references also discuss the application of RPGs to educate system users on the importance of information and password security (Thompson and Irvine, 2014; Scholefield and Shepherd, 2019), as well as the dangers of phishing (Yang et al., 2012). RPG is also applied in the company in the innovation ideation process in the early stages (Patrício et al., 2020, 2018). However, while these proposed frameworks are mostly focused on student activities, frameworks intended to increase educator motivation and enhance their professional careers still are rarely discussed.

This article proposes a solution to this problem through the development of an RPGF-based ECPS, shorted as RPGF-ECPS, which has the following features: a) game mechanics capable of channelling the educator's interests to complete the missions; b) roles for educators, based on the career

transitions that educators can make in order to support significant career leaps made by educators; c) a framework consisting of four gamification functions (interest, role, mechanic, dynamic) that runs in a life cycle that can lead educators' interests to be lifted and or shifted to institutionally-oriented interests. Four roles for educator were introduced, namely the Novice, Apprentice, Talented and Campus Hero, where for each role, the original and gamified tasks were defined. The RPG genre was chosen as the raw model because of its ability to hone players' skills both individually and socially (Li and Edwards, 2020).

Before being applied to the actual system, to see educators' interest in missions gamified in RPGF-ECPS, socialisation regarding gamified ECPS was conducted to 30 educators of two private HEIs consisting of five APs, nineteen LRs and six SLs for one semester. The goal is to capture the spectrum of their interest in completing gamified tasks, to achieve the highest career positions i.e., PR. Using the developed gamification application prototype, they simulated several career states' sequences with various types of career transitions (regular or jump). They are educated on ideas about the roles, mechanisms and dynamics of gamification that they will receive after making certain transitions. A survey at the end of the semester showed that 76% of educators stated that they wanted to jump positions or grades (sub-positions) rather than regular career advancements. The spectrum of interest shown by educators varies, from material and social interests, recognition and competition to spiritual interests, contrary to the assumption of a traditional reward and punishment system.

## 2 Related Works

### 2.1. Gamification Development

Gartner explained gamification as a tool for designing behaviour, building skills and enabling innovation. Gartner predicted that by 2020, gamification, together with trending technologies could produce significant changes in different areas of business and society, including globalisation of education, development of performance and personnel skills and attractive platforms for business customers (Burke, 2012).

According to some literatures (Cardador et al., 2017; Krath et al., 2021; Akhriza and Mumpuni, 2019) gamification transforms the actual system or task, into a gamified system or task by applying computer game mechanics such as points, badges and leaderboards, which in principle is to channel the system actors' interests when completing tasks. References (Saba, 2020; Krath et al., 2021) describe gamification as being close to two concepts, namely the concept of serious games and game-based learning. Game-based learning refers to the use of computer game applications that support the teaching and learning process and aims to educate, in a broad context not only in the school but also in other environment like industry or daily life. Nonetheless, the goal of gamification is different from games. Games are purely for entertainment, while gamification is for increasing the

participation of actors in a system with serious purposes (Krath et al., 2021; Deterding et al., 2011).

Researchers and practitioners apply gamification in various types of systems, so we can also find various understandings of gamification in the literature. Mapping studies of the gamification literature have been carried out by several researchers recently (Kasurinen and Knutas, 2018)(Dalmina et al., 2019), in which the literatures are obtained from several relevant and popular sources, such as ACM, IEEE Xplore, Science Direct, etc. It is not too surprising to find that the application of gamification is dominated in the field of education, from basic education to higher education. However, while gamification in the education field is mostly focused on the learning process for students, gamification research on academic staff and educators is still very rarely discussed. To support the development of gamification for educator career promotion systems in our study, we then refer to the term 'work gamification' as well.

(Cardador et al., 2017) explained that the application of gamification in the work environment, traditionally is to improve worker performance. However, what's new is that gamification also provides real-time access to performance information. Gamification should attract workers' intrinsic interest in getting the job done. Gamification is also applied to crowdsourcing-based work in (Morschheuser et al., 2016; Morschheuser and Hamari, 2019). If the participants in the crowdsource system are usually rewarded with extrinsic incentives, namely financial compensation, then through gamification, their intrinsic interest in completing their work is more highlighted. This intrinsic interest, for example, is autonomy, sociability and the nature of helping or wanting to be useful for a group.

(Suh et al., 2017) examines the responses of users of gamified information systems to their interest in continuing to use the system. The conclusion of this research is that aesthetic experience is more prominent than flow experience to explain continuance intention. Further study shows that the gamified information system was able to meet the satisfaction of the psychological needs of users, namely autonomy, competence and relatedness, so that they want to use this system in a sustainable manner (Suh et al., 2018).

(Mitchell et al., 2020) uses self-determination theory to determine contextual factors that contribute to the effectiveness of gamification in the workplace. They found that extrinsic interests would reduce the employees' satisfaction of the autonomy and competence needs. However, if internalised, for example through perceived personal value, extrinsic interests can fulfil internal drives and influence behavioural intentions in carrying out their duties. Through the application of proper mechanics, gamification can be used by workers as a tool for self-monitoring for themselves in completing actual activities (Gerdenitsch et al., 2020).

## 2.2. Mainstream Frameworks

The success of gamification approach is inseparable from the effectiveness of applying the game functions to the people

in the system, who are the actors of gamified system. Several gamification frameworks have become mainstream and are widely applied by many gamification researchers and practitioners. MDA, which stands for Mechanics-Dynamics-Aesthetics (Hunicke et al., 2004), is a game framework that is often considered the starting point for developing gamification frameworks. The mechanics function is placed as the beginning of a game's plot that creates the dynamics of the game, which then creates a game aesthetic that is felt by the players to create a feeling of attachment to the game. Although placed at the end, such aesthetics is the business goal of making a game that is determined before the game itself is made. The goal of the selection of game mechanics applied is aesthetics to be achieved such as points, levels, rewards, likes, guilds, etc.

Several gamification frameworks have adopted MDA, such as MDE, which stands for Mechanics-Dynamics-Emotions, where the aesthetic function is replaced by emotion (Robson et al., 2015), and Design-Dynamics-Experience (DDE) (Walk et al., 2017). Nonetheless, in general, most mainstream frameworks agree that basically, the mechanical component chosen by the gamification designer should be the medium to channel the extrinsic and intrinsic drives within the actor to voluntarily complete more challenging tasks. Studies have mapped the relationship between the types of drives in humans that make them want to do work voluntarily, and the game mechanics that correspond to those drives.

The Octalysis framework (Fig. 1) divides human drives into eight types, each suitable for some specific mechanic. For example, those who do many things because of a drive for epic calls will fit mechanics such as narrative or humanity hero. Octalysis also divides drives into two groups: White-hat and Black-hat drives. The first group contains 'good' drives, namely Epic meaning, Empowerment and Accomplishment. 'Bad' drives include Scarcity, Unpredictability and Avoidance. Two drives in a horizontal line imply drives with a balance or neutrality between good and bad motivations. However, interestingly, the drives are also divided into left-brain driven drives that tend to use intellectual intelligence, moved by extrinsic factors, namely Accomplishment, Ownership and Scarcity; and right-brain driven drives that tend to use spiritual / emotional intelligence to be more driven by intrinsic factors, such as Empowerment, Social influence and Unpredictability. The two drives in a vertical line also show the balance between left and right brain usage. This means, Octalysis places Epic meaning & calling as the noblest drive. while Avoidance is placed as the lowest drive that humans have when completing their missions.

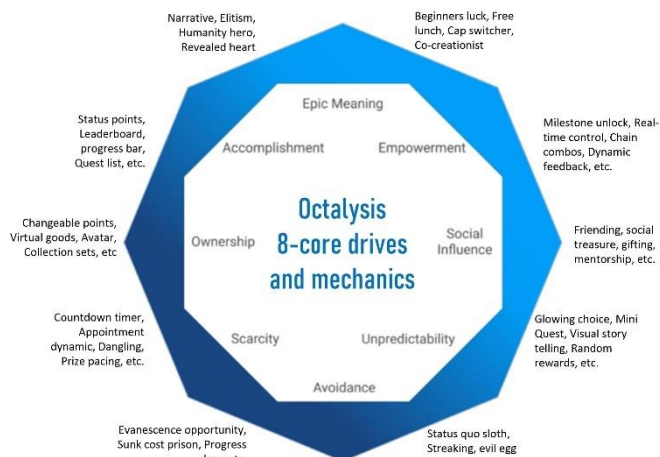


Figure 1. Octalysis' 8-core drives and mechanics (adapted from (Chou, 2021))

Andrej Marczewski divided the gamification users into six types: Philanthropist, Achiever, Free Spirit and Socialiser who belong to the intrinsic motivation group, and Player and Disruptor who belong to the extrinsic motivation group (Marczewski, 2016). The author further explained that in a gamified system, there are still people who want to “play” and don't want to “play”. Disruptors are those who do not want to play in a negative context, because they are motivated by the desire to change the game. In a positive context, the five types of gamification players are the following types. Those who are willing “to play” are called the Player, driven by the reward; the other four types that don't want “to play” are: Socialiser, driven by social or connectedness; Free spirit, driven by autonomy; Achiever driven by mastery; and Philanthropist, driven by purpose.

Richard Bartle's proposed player model, which defines four players, or more precisely, the gamer i.e., Achievers, Explorers, Socialisers and Killers (Bartle, 1996). These types seem to match the player types in Hexad, except for the Killers who live for the competitive elements of the game. They love the opportunity to compete with (and beat) other gamers (Kocadere and Çağlar, 2018; Andrias and Sunar, 2019; Dixon, 2011). Several player type models are derived from the Bartle model, such as BrainHex (Nacke et al., 2014) and Geographic Game Design version 1 and 2 (Nacke et al., 2014).

The frameworks discussed above are built based on groups of components or functions in gamification. Another type of framework is based on gamification development procedures in a company. For example, GAME (Gather, Act, Measure, Enrich) proposed in (Marczewski, 2014); the sustainable gamification design (SGD) framework, which includes activities of Discovery, Reframe, Envision, Create and Values Ethics (Raftopoulos, 2014).

### 2.3. RPG Approach to a Gamified System

Several studies (Ntokos, 2019, 2020; Topîrceanu, 2017; Li and Edwards, 2020) have developed a gamification approach by adopting a game genre, called RPG or role-playing game. In this genre, players take on a role, which is

mandated with a set of responsibilities, facilities and abilities (Li and Edwards, 2020). The role of a player is part of achieving the organisation's larger mission. Each role has some missions to complete, and players with one role usually should be working with players with other roles to achieve a common goal i.e., organisational goals. By adopting this genre model, the gamified system can increase player participation both to meet individual and organisational interests. However, it is interesting when the literature study finds that many applications of RPG in the learning process target students, while the RPG approach to gamification applied to academic staff is still very limited.

(Li and Edwards, 2020) shows that the application of RPG on the gamified classroom can increase student competency in computer programming activities. The author uses components in the RPG, namely experience points (XP) and levels to reward the progress of each role. RPG-style characters are developed to reflect expected programming behaviour patterns that the author wants students to follow. These characters include: Time manager, Incremental developer, Bug stamper, Persistence, Syntax mastery and Self-regulator. (Topîrceanu, 2017) developed RPG-based gamification for in-class activities. Each student is assigned a role as a Hero, that is, for each in-class activity that he participates in, and gets XP. The mechanism for gaining experience is divided into chapters (one teaching unit). Heroes can earn XP by performing the following four achievements each chapter: presence (physically attending lectures/labs/seminars), homework, activities and quiz. This article explains well the spectrum map of the motivation that is expected to be achieved by the participants (students), with a range from starting without motivation, to extrinsic motivation and ending up at intrinsic motivation (Figure 2). In this figure, gamification is expected to change the students' drive, from being reluctant to learning independently and striving to learn to reach a higher level of knowledge with pleasure. Although the above approaches are applied at the student level, the shifting of the motivational spectrum here can be a good practice for the development of gamification for the career promotion system of higher education educators.

The RPG approach has also been applied in other fields, such as information security. The objectives vary, for example to educate system users about the characteristics and dangers of phishing attacks (Yang et al., 2012; Sheng et al., 2007; Wen et al., 2019), and the importance of password security (Scholefield and Shepherd, 2019). The RPG approach is also discussed in the literature (Patrício et al., 2020, 2018), particularly in its use for early-stage innovation development in enterprises. These innovations include developing ideas and knowledge with customers, optimising the ideation process between teams or testing new features in software. These references can also be good practice for the development of ECPS gamification, especially to inspire educators in the innovation ideation process that supports their career development as professional educators.

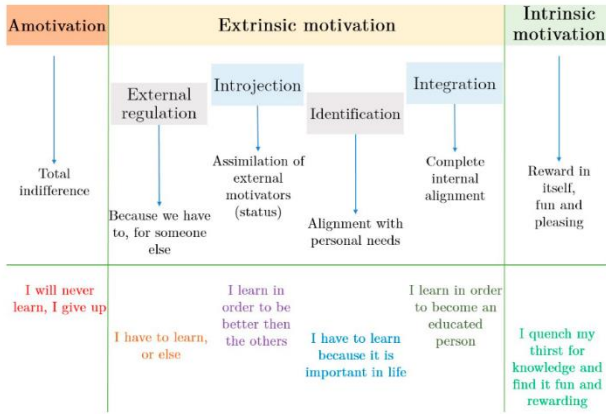


Figure 2. Spectrum map of Student's Motivation

### 3 Proposed Methods

The development of the RPGF-based ECPS framework follows the following research methodology. First, define career transitions that may occur in the ECPS applicable at HEIs in Indonesia. Career transitions made by educators determine the roles assigned to them; second, define the proposed framework, in which the real and gamified missions are further elaborated; third, develop prototypes of gamification applications to be tested for educators to find out their interest in gamified missions. Fourth, conduct some experiments to test the prototype to several educators for one semester, and then, distribute questionnaires and analyse the results to determine the spectrum of interest resulting from the application of the prototype.

#### 3.1. Career Transitions in ECPS

The activities of educators in a HEI where they work include their responsibility to carry out the Three Dimensions<sup>1</sup> of HEI or 3D-HEI activities and meet the work targets that apply at HEI internally. 3D-HEI covers three main dimensions i.e., education and teaching, research including scientific publications and community service; plus, the fourth dimension i.e., activities outside those mentioned above. The Ministry's new regulation about 3D-HEI has included a total of 130 activities, all having points accumulated to a Kum point (Ristekdikti, 2020). Based on such regulation, in this study, academic career states in ECPS applied in Indonesia HEIs are expressed as (P=position, G=grade) pairs or state  $q_i = (P, G)$ , see Table 1. Here  $q_i$  and  $(P, G)$  respectively represent the short and long expression of a career state. The positions are LR, SL, AP and PR, while grades are from III-B, III-C, III-D and then IV-A to IV-E, from the lowest to highest, written in such combined Roman-Latin numerals. Grade of a position can be seen as the sub-position of respective position.

In general, the lowest career state of an educator is  $q_1 = (LR_{150}, III-B)$ , but career can start from SL if the initial Kum is sufficient. If the educators came from another institution, they could just continue their career in the new institution. In

short, a career can start from any state. Conversely, careers at current HEI can also stop at any state because of retirement, death or moving to another HEI. The requirements to move up to the next-state  $q_B$  include, among others, the working period in the current-state  $q_A$  and the minimum Kum points. In Table 1, a subscript of the state name indicates the Kum needed to reach  $q_B$ .

The problem with traditional ECPS is that there is no maximum time limit for educators to remain in  $q_A$ . Time limitation  $\Delta$  is applied in the proposed ECPS gamification model to detect a looping transition (LT) at  $q_A$  carried out by educators. Overall, we define five career transition types that might occur from  $q_A$  to  $q_B$  such as given in Table 1, where  $q_1 = (LR_{150}, III-B)$ ,  $q_2 = (SL_{200}, III-C)$ ,  $q_3 = (SL_{300}, III-D)$ ,  $q_4 = (AP_{400}, IV-A)$ ,  $q_5 = (AP_{500}, IV-B)$ ,  $q_6 = (PR_{750}, IV-C)$ ,  $q_7 = (PR_{850}, IV-D)$ , and  $q_8 = (PR_{1050}, IV-E)$ .

Table 1. Career State Transition Table<sup>2</sup>

$q_A$	Reachable $q_B$ and transition types							
	$q_1$	$q_2$	$q_3$	$q_4$	$q_5$	$q_6$	$q_7$	$q_8$
$q_1$	L/S	R	G	P	P	P		
$q_2$		L/S	R	G	G	G	P	P
$q_3$			L/S	R	G	G	P	P
$q_4$				L/S	R	G	G	G
$q_5$					L/S	R	G	G
$q_6$						L/S	R	G
$q_7$							L/S	R
$q_8$								S

A regular transition (RT) occurs when the career increases by one grade, like from  $q_1$  to  $q_2$ . A grade jumping (GJ) transition occurs when there is an increase in two or more grades, such as from  $q_1$  to  $q_3$  or  $q_3$  to  $q_4$ . A position jumping (PJ) transition occurs when there is an increase or leap to two higher positions i.e., from  $q_1$  to  $q_4$  and from  $q_2$  or  $q_3$  to  $q_6$ . The stationary transition (ST) is a situation where the educator is still in  $q_A$  completing the planned activities. In this situation, Kum has not met any  $q_B$ 's requirements while  $\Delta$  has also not been exceeded. The last one is an LT that occurs when there is no increase in even one grade from  $q_A$  after  $\Delta$  is exceeded. The Ministry defines the PJ as an outstanding and most wanted event, and in contrast, the LT is the transition that is least expected by both the Ministry and HEI's management.

#### 3.2. The ECPS Gamification Framework

The idea of adopting the role-playing model into our framework is, for educators to focus on completing gamified missions according to their roles, while they are completing actual missions. They will enter an entertaining game

<sup>1</sup> Three Dimensions of HEI is known as Tridarma Perguruan Tinggi in Indonesian

<sup>2</sup> In ECPS for Indonesian HEIs, LR = "Asisten ahli", SL = "Lektor", AP = "Lektor Kepala", PR = "Guru Besar"

atmosphere, when in fact, this atmosphere presents because the mechanics provided are able to channel the interest of educators. Our framework applies four roles to educators, from the most basic to the most advanced: the Novice, the Apprentice, the Talented and the Campus Hero. Different roles, different responsibilities, hence the facilities and abilities provided to educators are also different.

The role of Novice is principally given to those who start their career in an HEI in the position of LR ( $q_1$ ) or SL ( $q_2, q_3$ ). The role of Apprentice is given to Novices who can only go up one grade successively until they reach  $q_4$ , the first grade of AP. However, for those who start their career directly as AP in any grade, the roles given are the Talented. Those who immediately occupy PR positions are given a role as Campus hero. The role applied is the highest role the educator has ever achieved. This means that an educator with the 'Talented' role will not turn into a Novice because of the "Novice activities" that have been carried out, such as doing RT. However, if the educators do an LT, the management will warn educators, regardless of the role they hold. Some of real and gamified tasks for each role are described in Table 2.

Figure 3 is a visual description of the RPGF-ECPS, which shows that the framework is composed of four squares, each being a quadruple of four gamification functions (interest, role, mechanic, dynamic). The term 'interest' is used here to express the feeling of wanting to give one's attention to something or of wanting to be involved with and to discover more about something. Interests are generally divided into extrinsic and intrinsic interests. The former includes individual, material and competition interests, while the latter includes emotional, social and recognition interests. Above all, there is a spiritual interest that is created from the balance between extrinsic and intrinsic interests possessed by an educator.

The outermost square represents the role of the Novice, or those in state  $q_1, q_2$  or  $q_3$ . The transition that type Novice creates is set as an RT. Two most basic interests that usually dominate the Novices are individual and emotional interests. The difference is, individual interest is based on selfish thoughts, while emotional interest is often influenced by self-esteem. The dominance of these interests makes the Novices behave as they please, and even just ignore the future of their academic career. In our study, these interests are mapped to Octalysis' scarcity & impatience and avoidance drives where educators will value rarity more. The corresponding mechanics are the  $\Delta$  threshold and Escalator. Here, the  $\Delta$ , represented with an hourglass, is a tool that forces educators to always value the time and career advancement opportunities provided by the institution. The Escalator is a special mechanic introduced in our study that offers some ways out of the impasse that educators may face today. Educators who take this escalator will encounter several solutions provided by HRD management. However, the Escalator does not operate all the time, so educators must be

ready at any time to press the Escalator button to use it. The Escalators run the concept of evanescence opportunity applied in Octalysis. The dynamics presented make up the atmosphere that encourages a Novice to carry out more significant 3D-HEI activities. This dynamic is presented through the UI of the application.

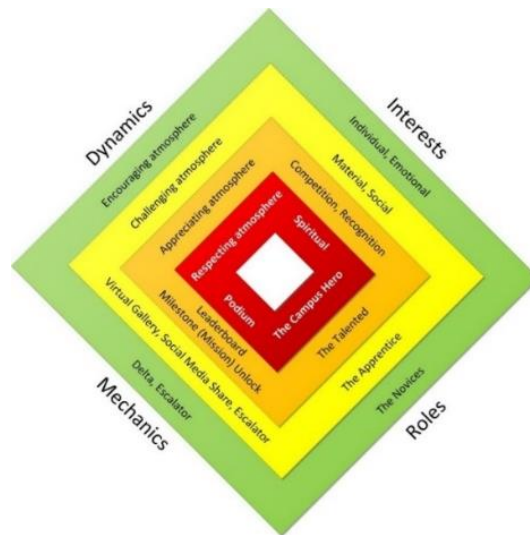


Figure 3. Framework of Role-based ECPS Gamification

Above the Novice position is the role of the Apprentice, where the square of this role lies deeper than the Novice's square to show their increasing experience in 3D-HEI activities. However, the interest of an Apprentice has begun to increase to become material-oriented. Educators began to like to collect souvenirs or evidence of participation in activities. The mechanic used is a virtual gallery to store a collection of badges, as a souvenir from participating in various activities. Educators will greatly consider the value of Kum point from these activities. If it is profitable, it will be done; if not, it will be abandoned, though this activity is significant for institutional development.

Parallel to material interest, is an intrinsic social interest where material is not their main target, but their influence on society. The matching mechanics is the button to share their achievement to social media networks. The Escalator can still be used, because educators with this role still only dare to do RT. The dynamics designed for Apprentice is a gamified atmosphere which is more challenging for them to do collaborative activities, and to make career leaps.

The next role is called the Talented which is given to those who are able to do GJ i.e., by jumping over one or more grades, but not the position; such as from  $q_1 = (LR_{150,III-B})$  to  $q_3 = (SL_{300,III-D})$  or from  $q_3 = (SL_{300,III-D})$  to  $q_5 = (AP_{550,IV-B})$ . However, those who start their careers at a university from LR or SL and can reach  $q_5$ , will also get a role as The Talented.

**Table 2.** Role and Examples of the actual and gamified tasks assigned

No	Role	Actual tasks	Gamified Tasks
1	The Novice	<ul style="list-style-type: none"> <li>Develop hard skills and soft skills, through participation in workshops, training and the like.</li> <li>Understand your role in achieving institutional vision, mission and goals</li> </ul>	<ul style="list-style-type: none"> <li>Get more activity badges to earn points and rewards</li> <li>Want to know about your role and other roles. Take this escalator (explained in Section 3.3.) for a Tour into the future.</li> </ul>
2	The Apprentice	<ul style="list-style-type: none"> <li>Improve relationships with peers as team members, through collaborative activities such as joint research, making learning modules and the like.</li> <li>Improve self-competence through professional certification activities</li> </ul>	<ul style="list-style-type: none"> <li>Decorate Virtual gallery with more activity badges</li> <li>Earn the Silver Steve Jobs badge by becoming a member of the research team.</li> </ul>
3	The Talented	<ul style="list-style-type: none"> <li>Improve relationships with internal peers as team leaders in collaborative activities, such as joint research, authoring reference books and the like.</li> <li>Become a speaker in scientific and/or professional forums</li> </ul>	<ul style="list-style-type: none"> <li>Be the top-5 educators on the leaderboard in teaching, research, or community services</li> <li>Complete these tasks to unlock the next milestone</li> </ul>
4	Campus Heroes	<ul style="list-style-type: none"> <li>Expanding collaboration networks with external campus parties both nationally and internationally</li> <li>Become a member or chairman of a professional organisation</li> <li>Convey your wisdom using text or voice recording</li> </ul>	<ul style="list-style-type: none"> <li>Get the Rectors' inventors award for your international or national achievements</li> <li>Are you a member of national/ international professional association? Upload the proof and get an inspiring badge.</li> <li>Use Podium mechanic to voice your ideas and wisdom to the outside world (explained in Table 3)</li> </ul>

In practice, the GJ process requires educators to do more 3D-HEI activities, both in quantity and quality. For example, if educators commonly are only interested in publishing national indexed journals ranked number three or four, the Talented educators can publish in journals ranked number one or two. This achievement is indeed balanced with the ability of intelligence and diligence of the educators who are usually above average.

It is observed that there are two types of interests that enable educators to achieve this, namely extrinsic competition interests and intrinsic recognition interests. They are quite happy and satisfied if they can jump one or more grade(s) ahead of their peers, but are not ready to jump further. Those who have an interest in competing will be happy if their achievements are compared and published, for example through the leaderboard. On the other hand, there are those who prefer to prove themselves capable of completing missions. However, even though they don't like to be compared, they still need feedback from observers, especially those who are experts. Milestone unlocks are better suited than leaderboard for that type of educator. Here, leaderboard and milestones are two mechanics that act as XP that serves to show the progress of experience that has been achieved so far. Although their achievements are still oriented towards the need to be acknowledged by others, institutions benefit from their outstanding achievements. The dynamic designed for the talented is an atmosphere that appreciates their genius and perseverance.

The deepest and highest square represents the role of the Campus Heroes that is moved by spiritual interest or purpose call. They are considered heroes because they are willing and able to make PJ transition, not for the benefit of individuals,

but institutional. In practice, a PJ from LR to AP e.g., from  $q_1$  to  $q_4$  requires a minimum of two articles and from SL to PR e.g., from  $q_2$  to  $q_7$  requires a minimum of eight articles published in reputable international journals as the first author. Such an achievement requires high patience, both while waiting for publication and staying in a low career state, and possessing good scientific writing skills too. Spiritual interest is achieved through a balance between extrinsic and intrinsic interest and is above competition and recognition interests. This means that educators whose activities are dominated by spiritual interests are usually also intelligent and diligent people, so they are willing and able to carry out missions that are considered difficult by the average educator. However, for those who reach a high spiritual level, the extrinsic factor referred to here is not what is provided by humans, but God or something that is considered the Almighty by him/her. To channel the experiences and wisdom of these Campus Heroes, a narrative mechanic is provided for them called the Podium (see Table 3). The dynamic for these Campus Heroes is an atmosphere that respects their spirituality.

### 3.3. The Gamification Application Prototype

The prototype of the ECPS gamification application was developed to be piloted for educators, before ECPS gamification is implemented in the actual system. The career state transition made by educator, is simulated using the Mealy machine, which is a finite state machine that has output function, in addition to the transition function. The educator can move from the current state  $q_A$ , to the next state  $q_B$ , when the input as a condition for moving to the state  $q_B$  is met. After arriving at  $q_B$ , the educator will receive the

output. Educators can test the application by entering an input string, indicating the order of career states transition they want. The validation of this state sequence is checked with reference to the list of career state transitions in Table 1. Supposed, an educator is currently in a  $q_A$ , then the general format of the input string is given as follows

$$[-\text{switch}](A, \text{Kum}, \Delta, q_T)$$

Switches -st and -lt are used to simulate ST and LT respectively, against a given input, where input is a quadruple  $(A, \text{Kum}, \Delta, q_T)$ . Set A contains several activities that have been completed by the educator with activity points given in the Kum variable.  $q_T$  is the next state targeted, and  $\Delta$  is the time limit required to reach  $q_T$ . Both variables were determined by the educators themselves as self-assessment metrics. Supposed the educator reaches state  $q_B$ ; if  $q_B \geq q_T$  and  $\Delta$  is not exceeded, then there will be a special reward for educators, but if  $q_B = q_A$  and  $\Delta$  is exceeded, then LT has occurred, and educators will get a warning.

The number of activities can be written in units of A, for example A, 2A, etc. Kum is a number and the Kum required to be accepted in the next-state is given in the Table 1. State

$q_3 = (SL_{300}, \text{III-D})$ , for example, requires 300 Kum points to reach that state. The  $\Delta$  can have units of w, m or y for weeks, months or years respectively; For example, 52w (roughly one year), and  $q_T$  which should be at least equal to  $q_A$ .

For example, if the input string is “-st(A, 20, 2w, q2)(5A, 100, 52w, q2)(20A, 100, 52w, q3)”, then using a transition graph of a Mealy machine, the career transition that occurs is as shown in Figure 4, where  $In_1 = (A, 20, 2w, q2)$  simulating an ST,  $In_2 = (5A, 20, 52w, q2)$  and  $In_3 = (20A, 100, 52w, q3)$ . After the next state  $q_B$  is reached, the application will send output to the educator, which is represented in a triple-output  $(R, M, D)$  consisting of role R of educator, a set of mechanics M and its settings, and the resulting dynamic D, which all correspond to the type of transition made by the educator. All the mechanics and interests that are channelled are described in Table 3, where some mechanics apply to certain roles, but others apply to all roles.



Figure 4. Example of a career transition graph

**Table 3.** Mechanics, Interest channelled and Functionality

No	Mechanics	Interest channelled	Functionality
1	Podium	Spiritual	Podium is introduced in this study here as a mechanic provided for the Campus heroes to channel their experiences and wisdom in a narrative manner. Narrative can be in the form of storytelling, a technique in gamification that plays a role in the care and healing process for educators when they face challenges and problems in achieving their goals (Malkawi <i>et al.</i> , 2019). Such words of wisdom can be sent in written or voice recording form.
2	Milestone unlock	Recognition	Milestone channels educators' interest in recognition and at the same time, acts as XP of the RPG genre (Scholtz <i>et al.</i> , 2016; Beza, 2011). Milestones are applied to all roles.
3	Leaderboard	Competition	Leaderboards are well known as legitimate tools to reflect interest in healthy and open competition. The leaderboard implemented in this application is a Dart-leaderboard with more features described in (Akhriza and Mumpuni, 2019).
4	Social sharing	Social	It is a mechanism to channel the interests of showing off and or informing an achievement to social media networks. This tool is specifically for Apprentice roles that have social influence interests, but when it is used by other roles, it is an indication of a social interest in educators.
5	Virtual gallery	Material	Through the virtual gallery (Beza, 2011; Sardi <i>et al.</i> , 2017), educators can proudly display evidence (badges) of their participation in various 3D-HEI activities. This mechanic is actively used when educators perform the Apprentice or Novice role, but is optional for other roles.
6	Escalator	Emotional	The escalator is introduced in this study, with the functions described previously.
7	Hourglass	Individual	Hourglass is an implementation of the $\Delta$ threshold, with functions as described previously. It can be combined with other mechanics such as the Escalator to remind educators that time at $q_0$ doesn't stop, but keeps on decreasing.
8	Points and rewards	All extrinsic interests	While these two mechanics are extrinsic motivators, points and rewards are almost inseparable in the game, and also in the gamification (Tobon <i>et al.</i> , 2020; Li and Edwards, 2020; Chang and Wei, 2016). The points accumulated will lead to rewards. However, there are two kinds of rewards in this framework. Performance rewards set by HRD management, and social rewards provided by



No	Mechanics	Interest channelled	Functionality
			educators for peers for their participation as partners in collaborative activities.
9	Badges	All interests	A badge is able to create self-confidence in educators in achieving mission after mission (Sailer <i>et al.</i> , 2017). The badge types in our framework have been described previously.
10	User interface (UI)	All interests	The UI of the application also affects the aesthetics and emotions of educators, and can be set according to a role (Klock <i>et al.</i> , 2020).

Figure 5(a) describes the application prototype UI which is a gamification dashboard for individual educators. The top part displays the educator's career transition, which is depicted using a directed graph. This transition also represents the mechanics of milestone unlock, where the state, be it achieved or unachieved can be known by educators. The orange circle indicates the educator's current career position. Underneath, there is a label "GJ", which indicates that the educator has made a grade jump from SL to AP. Previously, there were two RTs, followed by the LT transition, symbolised by the arrow circling the SL with III-D. In the middle, there is an area for entering an input string with the format described above. The lower part shows the red area, which is the UI change when the LT occurs. There are points whose calculations are pending and rewards that are not given (none). This is an implementation of the warning given to educators who do LT. Underneath, there is a blue area, which is the result of GJ's transition, plus points and hotel vouchers given by HRD management to the educators concerned. Badges with letters A and T represent the Apprentice and the Talented role, respectively. Similarly, badges with the letters N and H represent the roles of Novice and Campus Heroes. Next to it, there are sentences of encouragement, the implementation of Podium mechanics.

Figure 5(b) is the Dart-leaderboard developed in a previous study. This leaderboard is circular in shape, so it is able to provide a helicopter view of all the transitional states of an educator's career without having to scroll the page up/down (Akrhiza and Mumpuni, 2019). Each circle in this dartboard represents a career state from  $q_1 = (LR_{150}, III-B)$  in the outermost, to  $q_8 = (PR_{1050}, IV-E)$  in the innermost circle (big white), which is also the highest position and top destination of all transitions. The outermost circle is labelled "ER" or  $q_0$ , representing the state where the educator does not yet have a professional career. So, all transitions start from  $q_0$ .

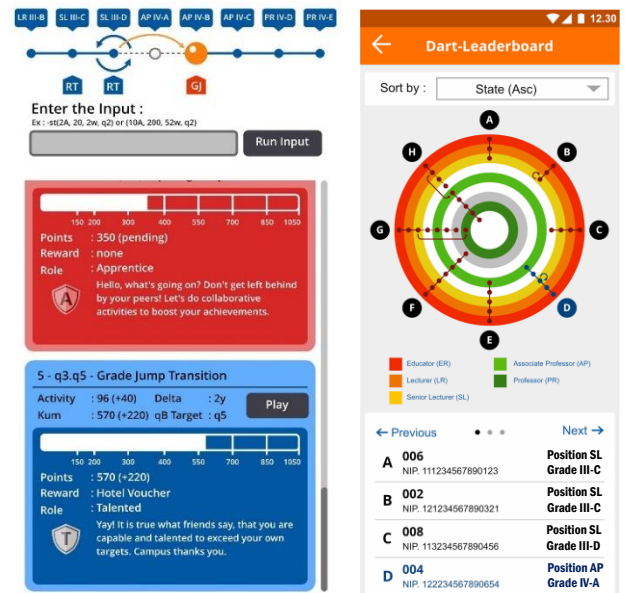


Figure 5. the Prototype interface (a) and the Dart-leaderboard (b)



Figure 6. The virtual gallery with social media sharing button (a) and delta reminder hourglass (b)

Figure 6 displays a virtual gallery as a space to display the badge of activities completed by educator. In the upper right corner of the gallery box, a button is provided to share the completed activity to social media networks. These two mechanics are placed in one box to provide opportunities for educators who have material and social interests to be enthusiastic in completing activities that have a more significant impact on institutional development, in addition to self-development. The Escalator icon also appears in the gallery, provoking educator reactions to find out what

collaboration opportunities are open. Below is a description of the use of the hourglass with a description of  $\Delta$  and a reminder of the time available (10w or ten weeks) for the educator to be in the current state. This hourglass can become the screen saver of this application.

## 4 Experimental Works

### 4.1. Settings

The socialisation of ECPS gamification was held at an IT related study program of a private university in Indonesia to introduce this system before wide-scale implementation. The purpose of this socialisation is to capture the spectrum of educators' interest in gamified 3D-HEI missions. A total of 25 educators with nineteen LR and six SR positions were invited to this activity. They were asked to run the prototype by entering various input strings to find out how gamification works, including the resulting output. The input string should simulate the transition from their current state  $q_A$  to  $q_7$ , no need to get to  $q_8$  because  $q_7$  and  $q_8$  are both Professors. After this application is piloted for one semester, research on the educators' interest to the gamified missions was also conducted through a questionnaire. Some of the questions (Q) and answers (A) presented are as follows, where the question reflects the spectrum of educators' interest in the question asked. We will investigate the roles that educators choose before they reach  $q_5 = (AP, IV-B)$ . This is because if  $q_5$  can be achieved with any transition, then the educator is given the role of the Talented.

- 1 Q1: is the Apprentice role your target?
  - a. A1: yes, it's my way,
  - b. A2: yes, badges and rewards are so interesting
  - c. A3: no, I will try to do better with my own ability
  - d. A4: no, but to get better, I will collaborate with those who are more experienced.
- 2 Q2: Why do you only do RT throughout your career (for educators who only do RT), with the answers provided being:
  - a. A1: I don't need a career leap,
  - b. A2: the reward is pretty good
  - c. A3: I understand my abilities. Slowly but surely, I can achieve a better career
  - d. A4: I hope to get help to do more than this
- 3 Q3: Is the Talented role your target? The possible answers are:
  - a. A1: yes, because I don't want to be just the Apprentice,
  - b. A2: yes, the rewards and badges are attractive.
  - c. A3: yes, it helps me increase my social influence,
  - d. A4: yes, it helps me to increase my portfolio
  - e. A5: no, but the PJ transition takes a tremendous amount of effort, and I haven't been able to choose that path yet

- 4 Q4: What is your motivation for doing GJ? (for educators who have done at least one GJ), with the answers provided:
  - a. A1: the badges and rewards
  - b. A2: top position on leaderboard
  - c. A3: feel challenged to open mission after mission
  - d. A4: feel called to advance the institution
- 5 Q5: Is the Campus Hero role your target? The possible answers are:
  - a. A1: yes, I like the challenges
  - b. A2: yes, I feel more honored
  - c. A3: no, but my activities brought me to this role
  - d. A4: no, it is an institutional call
- 6 Q6: What is your motivation for doing PJ? (for educators who choose to do PJ), with the answers provided:
  - a. A1: the badges and rewards
  - b. A2: top position on leaderboard
  - c. A3: challenged to open mission after mission
  - d. A4: social influence
  - e. A5: feel called to advance the institution.

### 4.2. Results and Discussions

Figure 7 is a Dart-leaderboard, visualising the career transitions sequence finally selected by educators in this gamification. Transitions are represented by graphs that also perform the milestone unlock mechanism. Each circle of states reached shows the XP of educators. ST and LT do not exist because they are not programmed here. The Dart-leaderboard displays the efforts of all educators in achieving a higher career. Because this can be seen by peer educators, it should also be able to provoke educators to spur their performance in 3D-HEI activities. The educator represented by A is the one who does the PJ, which is indicated by a jump from the second outer circle  $q_1$  to the green circle  $q_4$  inside. In contrast, the four educators represented by V, W, X and Y chose to only do RT to achieve  $q_4$ .

The reasons behind the variation in these transitions are explained through a tree-map in Fig. 8, which is the result of a recapitulation of the questions' answer asked of the educator. First, four educators who choose to become Apprentices are discussed. Regarding Q1: is the Apprentice role your target? One educator (25%) answered yes, because this is the right path for him (A1), another 25% said no, and will try to do better in his/her own strength (A3), while 50% said that Apprentice is not their path and they will try to achieve better through collaboration with other educators (A4). The two last answers indicate an interest in proving self-ability and a desire to socialise.

The next question also relates to these four educators, Q2: why do you only do RT throughout your career? This time, each educator answered a different answer. One educator said they didn't need a career leap (A1) just take the flat road to get to the top of their career, an indication of emotional or

individual interest. There is one educator who is motivated because the reward is sufficient for him (A2), and this means he has a material interest. Another educator said that at this time, it was enough for him to just do RT, because this was within his current ability (A3). Another educator wants more than just RT, but he needs help from his colleagues (A4). The answer to this question also has a variety of interests. Some are fixated on individual, emotional and material interests. However, some others also have an interest in improving their abilities, to achieve a better career than an RT, either independently or in collaboration. This is an indication of a willingness to socialise.

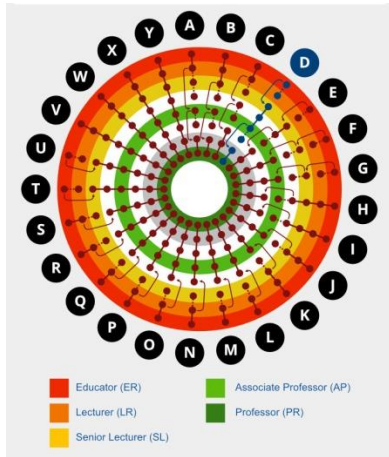


Figure 7. Dart-leaderboard shows all educators' career state transitions

Question 3 was answered by 20 educators who chose the path to become the Talented, with a recapitulation that can also be seen on the chart in Figure 8. Three educators stated that they did not want to be given the role of an Apprentice (A1). The other three people were interested in the rewards of this role (A2). What's interesting is that eight (40%) educators are pursuing social influence (A3), while five (25%) educators are motivated to increase their portfolio. Surprisingly, an educator wants to do PJ, but feels unable to do so, at least for now. These twenty people provide a spectrum of different interests, not only individual or emotional interests, but also material and social interests.

Question 4: 'Why choose to do GJ?' also has varied answers. Three educators were expressly interested in the reward (A1), but eight (40%) educators wanted their position to be seen on the leaderboard. This is interesting because many of these educators were found to be driven by competing interests. In contrast, seven (35%) educators answered that they were driven to complete mission after mission only and did not think much about their position on the leaderboard, an indication of an interest in other people's recognition of their abilities. However, two (10%) educators stated that they were motivated by the interests of their institutions (A4), so they wanted to do GJ. The latter shows the existence of educators who have a spiritual drive that is worth considering. They can do more for the campus, so their activities need special guidance from management.

Finally, there is an educator who is willing to do PJ, and therefore, he is given the role of a Campus Hero (because there is only one person, so the chart is not shown). Question 5: 'Is Campus Hero your target?' had a response from an educator that this was not his target, but his activities brought him to this role. For, question 6 related to the motivation to do PJ; he answered that he felt called to improve the quality of his institution. This educator clearly shows his heroic spirit for the advancement of his institution. Additionally, this educator admits that currently, he already has several international publications that he will use to make a career jump, namely from  $q_1$  to  $q_4$ .

In actual cases, there are often educators who do cost-benefit calculations before carrying out an activity. For example, participation in a professional association outside campus can be motivated by a variety of factors. There are those who want to introduce their campus to professional networks, while some want to expand the network for themselves; however, there are also those who consider the Kum they will get if registered as a regular member or as a member of the association's board. On the other hand, there are also educators who are motivated to do things that are more than the set standards, but all of these are done for their personal success, for example, publishing in several national journals to pass their career promotion applications. This difference in interest was successfully channelled through the gamified ECPS, as well as breaking the traditional reward and punishment system assumption that educators can be regulated through material rewards only. This difference in the spectrum of interest is visualised through Figure 9.

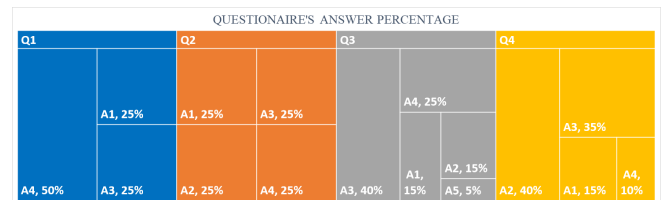


Figure 8. Question's answer percentage

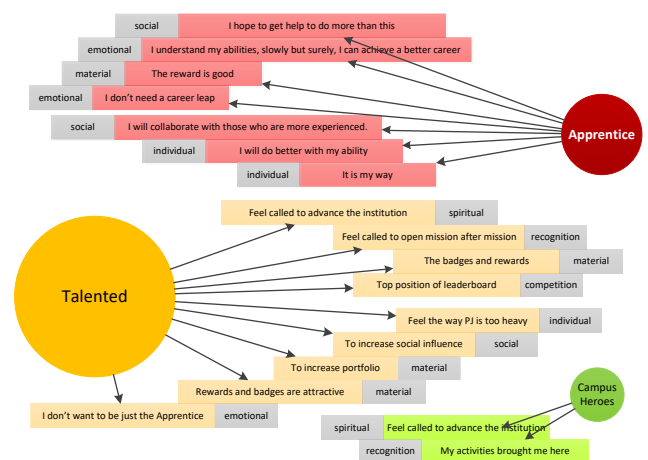


Figure 9. Visualization of the Educator's Spectrum of Interest

Other profiles of the educators investigated, in terms of their duration in  $q_A$  (whether LR or SL), are discussed below. The duration is associated with the maximum transition that can be made by the educator, presented in Figure 10. The yellow bar represents transition of GJ, which, as already explained, dominates the choice of educators to undergo gamification. However, in fact, they have been in  $q_A$  for 3-6 years, and even 10 years. According to regulations, after two years of being in  $q_A$ , an educator may apply for an increase in position or grade. Therefore, the duration of three years is enough to complete activities with Kum, which is also enough to get to a next career state, at least one grade. However, many educators generally have been in LR or SL for longer than two years. Investigations directly to these educators reveal that most of them are between the ages 30 and 39 years, while the rest are between the ages 40 and 59 years. Most of them also work concurrently as administrative staff or even leaders of a particular study program or work unit. As a result, they feel they do not have much time to produce research or publications that are significant contributions to the institution.

The next focus is about four educators who chose to only do RT throughout their careers (red bars). This situation needs to be brought to the attention of management, because the duration of their work as an LR has reached 8, 10, 18 and even 21 years. In this gamification context, their best career transition option is only RT. Their age range is 40–49 and 50–59 years old; therefore, there needs to be a more in-depth investigation, whether the age factor triggers them to feel indifferent to their professional career advancement, or indeed because of an attitude that does not dare to take risks. In actual gamification practice, they need to be accompanied by their more experienced peer educators.

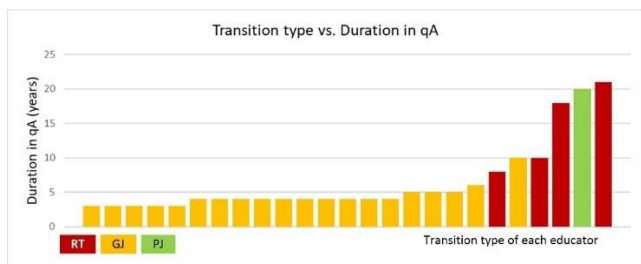


Figure 10. Transition type versus duration of educator in  $q_A$

Another finding is about an educator who chose the PJ transition (green bar), and it turns out that the duration of work in LR has reached 20 years. Several factors contributed to this situation. For example, not only because the educator is undergoing a doctoral program, but also because it takes quite a long time to collect the number of good publications needed to make the career jump to AP. In addition, promotion through PJ is a special case in the assessment of the ministry's assessment team. The assessment process can take one to two years, especially in the process of issuing approval documents for promotions. Obviously, it was exhausting for one to wait so long. Therefore, there are those who think that it is better to do GJ to get to the AP because the approval

process is shorter, than to reach the AP through PJ. However, still there are educators who are willing to wait a long time, in order to show their abilities that can make the institution proud of their career leaps. Since it requires quite a lot of patience, those who are willing and able to do PJ deserve to be called the Campus Heroes.

### 4.3. Extended Experiment

The experiment was also extended to educators with academic positions higher than LR and SL, namely  $q_4 = (AP, IV-A)$ . The purpose of this experiment is to find out their strategy for achieving current  $q_4$ , and for achieving PR position in the future through the gamified system. Five APs were included in the experiment. They were recruited from another campus, because the campus in the first experiment did not have AP or PR. However, educators with the position of Professor were not involved in this experiment, because they reached the highest position in the actual and gamified system.

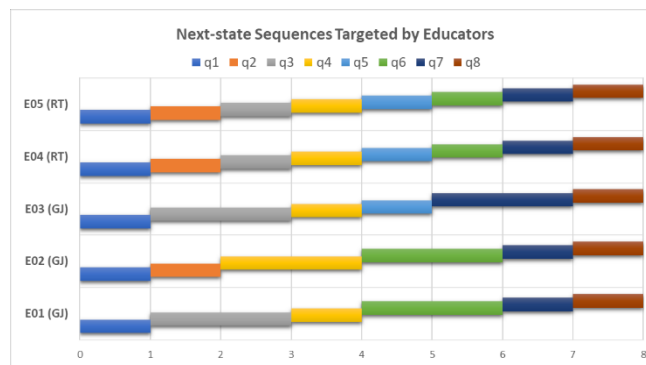


Figure 11. Next career state sequences reached and targeted by educators

Figure 11 describes the results of the experiment, where each bar represents the sequence of career transitions of an educator, and each coloured piece represents the position achieved. Long pieces indicate a career leap (GJ or PJ); as in E01, which has a GJ transition from  $q_1$  to  $q_3$ . As shown in such chart, of the five educators none has ever made the PJ transition. The reason is the difficulty of being able to meet the requirements of international publications, while the passage of time and the pressure of material requirements forced them to rise to a higher grade. Nonetheless, it was observed that three educators chose to perform successive RTs from LR to achieve  $q_4$ . In the context of gamified ECPS, they choose the role of an Apprentice. The reasons given were because they were comfortable with this step and felt no need to contribute more than that; because what is more important is that they comply with the obligation to move up one grade higher periodically. It is a fact that there are educators who pursue their careers in terms of individual interests only. Interestingly, to achieve a career as a PR, one of these three educators chose to do GJ, while the rest planned to continue doing RT until they achieved PR. Educators who want to do GJ reasoned that their current achievement has produced a sufficient Kum to do GJ, which is from  $q_4$  to  $q_6$ .

On the other side, two out of five educators stated that they had done GJ once in their career to achieve  $q_4$ . Their interest in carrying out GJ is the need for recognition of their ability to complete their missions so far. This recognition needs to get positive feedback from the university's leaders, so that their motivation to complete challenging missions in the future is balanced between individual and institutional interests.

#### 4.4. Comparing ECPS Gamification with Octalysis' 8-Core Drives

The ECPS Gamification framework adopts the Octalysis framework from the aspect of extrinsic and intrinsic interests and the game mechanics that channel them. The magnitude of this interest channelling is measured using the Octalysis tool (<https://yukaichou.com/octalysis-tool/>) and the results are shown in Figure 12. The box outside each core drive explains the equivalence between the quadruple components of ECPS gamification (i.e., interest, role, mechanics and dynamics) and the respective drive. The score for each quadruple is also given in each box, on a scale (0-10). Outside each side is a blue area that varies in size depending on the score assigned to each drive and this is what is interpreted as the magnitude of the ECPS gamification component in our study.

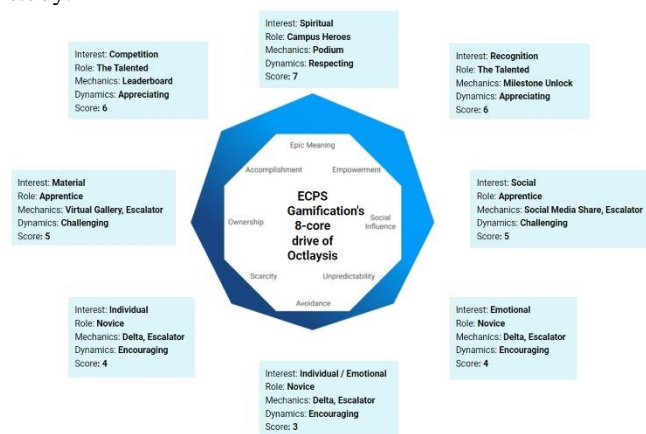


Figure 12. Magnitude of ECPS Gamification Framework, in comparison with Octalysis' 8-core drives

As seen, the proposed framework has a large magnitude for channelling spiritual, competitive and recognition interests, in which each corresponds to the Epic meaning, Accomplishment and Empowerment drives. Therefore, each interest is given a score of seven and two sixes respectively. Through the application of roles as Campus Heroes and the Talented, educators are expected to be willing to change the direction of their interests, from individual to institutional. Spiritual interest is particularly given the highest score in our framework. The reason is, Indonesia is a country with a religious society where they are taught to do activities with the intention of worshiping God Almighty. Those who have this spiritual interest will work with pleasure, and expect the main reward from God, not from humans. Campus heroes are those whose strengths are balanced not only in their intellectual abilities, but also emotionally and spiritually. It is

the element of local wisdom that is applied in ECPS gamification, which makes it unique and novel. Local wisdom in a gamified system has also been proposed in the literature (Marisa et al., 2021).

Under these three interests is the channelling of material and social interests, which is also quite strong in our framework, through the role of the Apprentice. These interests correspond to the Ownership and Social influence drives in Octalysis; both were given a score of five. Through the application of the role and mechanics of Virtual Gallery, Social media share and Escalator, educators are expected to be willing to carry out more significant activities for their institutions, while completing the gamified missions.

While the channelling of these five interests is seen as rewards for educators who have a significant contribution to the institution, the proposed ECPS gamification does not actually implement punishment for educators who do not have a significant contribution, namely those whose careers tend to stagnate in low-medium positions (LR and SL). Rather, it is replaced with the Delta mechanism as a reminder of the time they are in their current state, and the Escalator mechanism as their way out of their stagnant career promotion progress. The magnitude of channelling emotional and individual interests was only given a score of four and three. Overall, the total score obtained is 199 for the proposed framework, which according to Octalysis tools, is quite balanced between white and black hat drives, and between right and left-brain drives.

## 5 Conclusion

An RPGF-based ECPS gamification framework was proposed to be the foundation for ECPS gamification development at HEIs, especially in Indonesia. It redefines the mechanics of gamification so that it can channel the interests of educators that drive them to be able to complete missions. Educators can focus on completing their actual missions through gamified mission completions. From a total of 30 educators who participated in gamification socialisation, 76% of educators will make a grade jump transition in completing gamified missions with diverse interests, which at the same time, breaks the assumption of the traditional reward and punishment system that educators only consider material aspects and individual interests.

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Figures

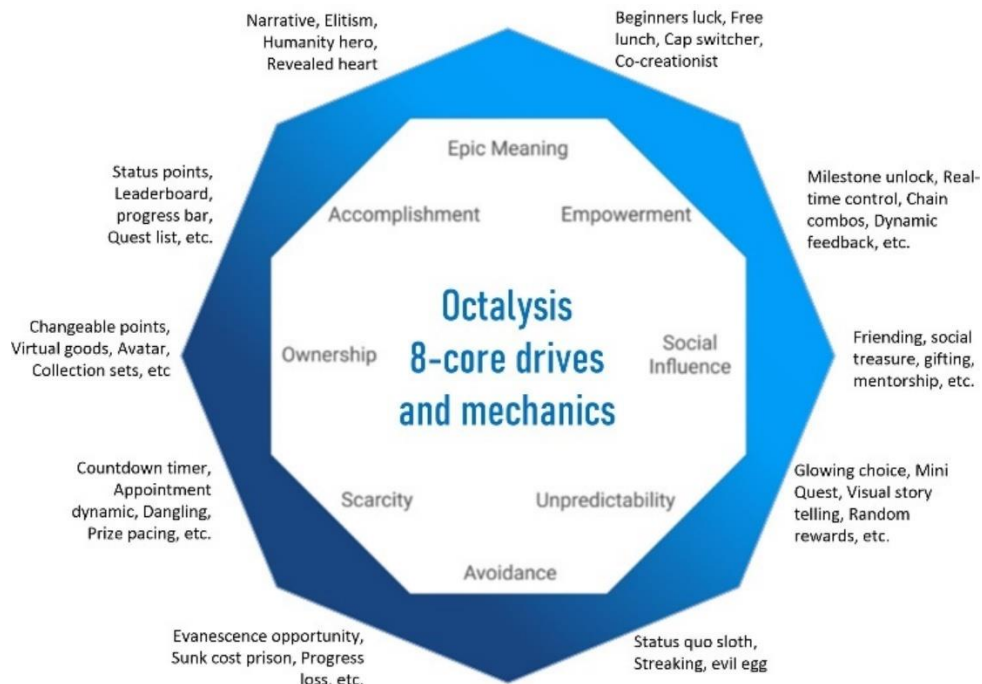


Figure 1. Octalysis’ 8-core drives and mechanics (adapted from (Chou, 2021))

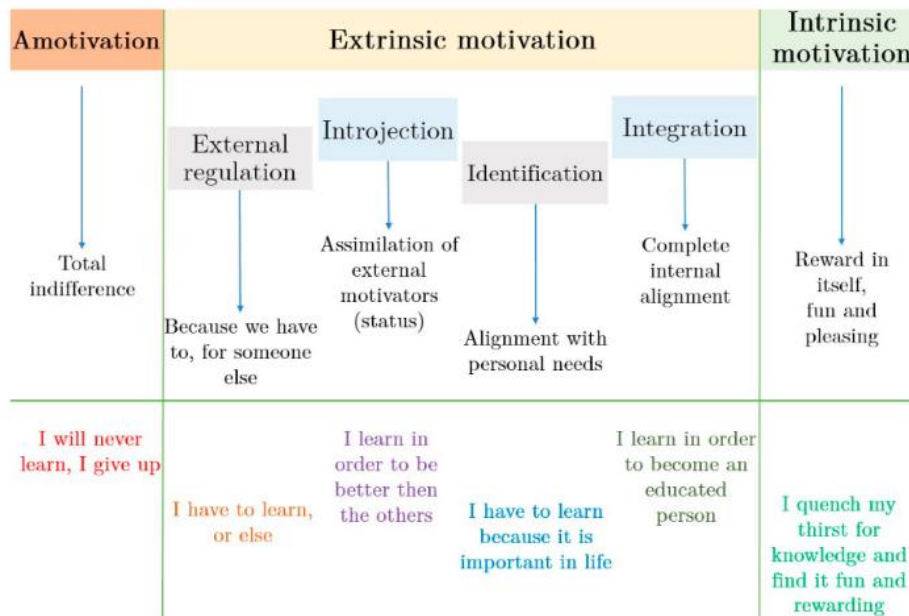


Figure 2. Spectrum map of Student’s Motivation



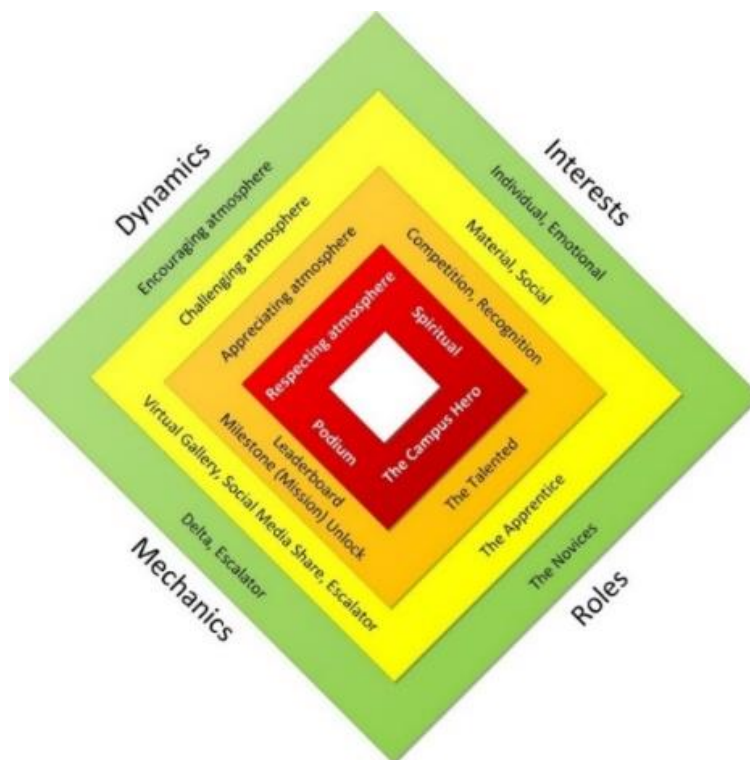


Figure 3. Framework of Role-based ECPS Gamification

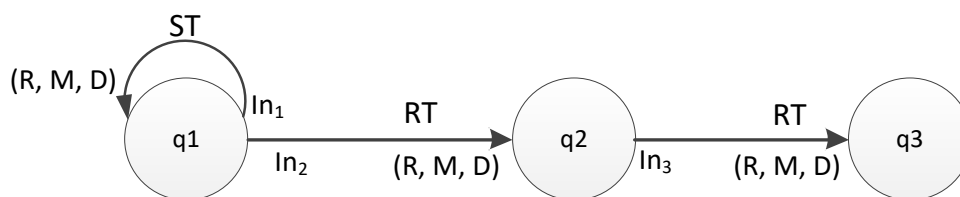


Figure 4. Example of a career transition graph

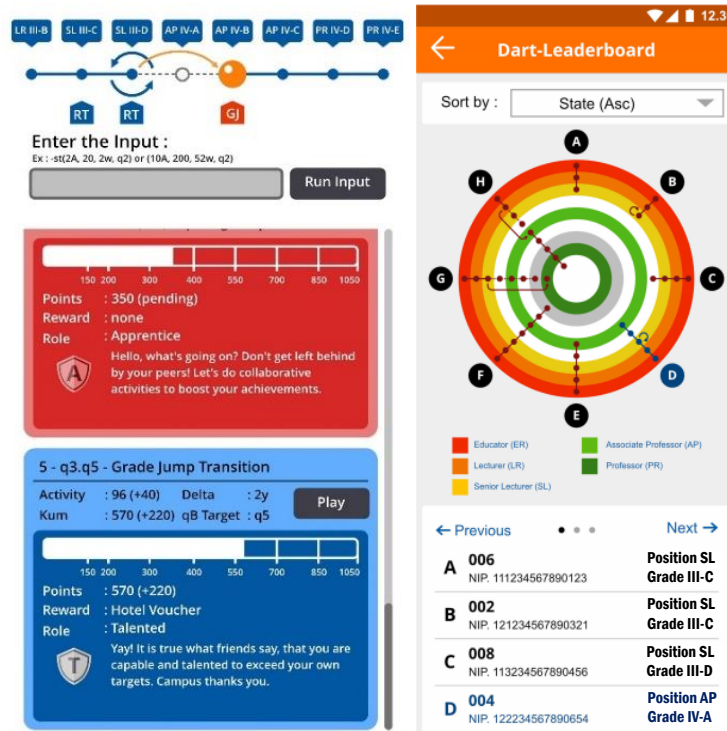


Figure 5. the Prototype interface (a) and the Dart-leaderboard (b)



Figure 6. The virtual gallery with social media sharing button (a) and delta reminder hourglass (b)

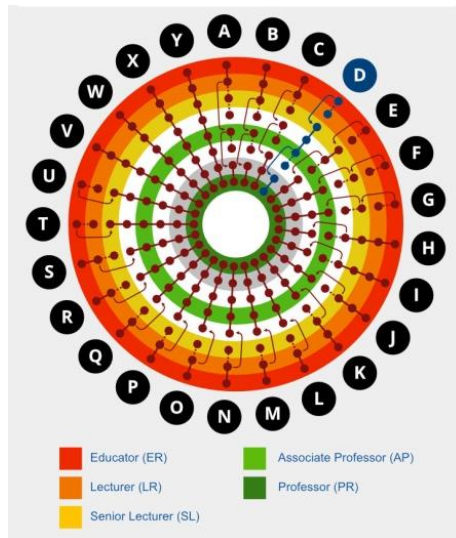


Figure 7. Dart-leaderboard shows all educators' career state transitions

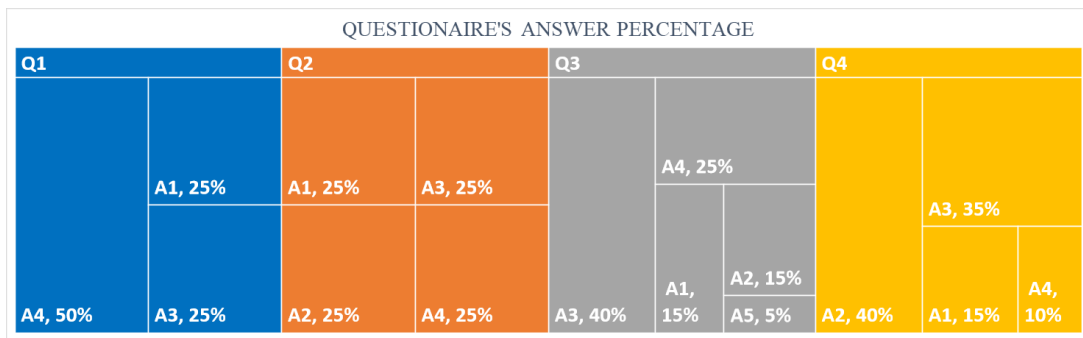


Figure 8. Question's answer percentage

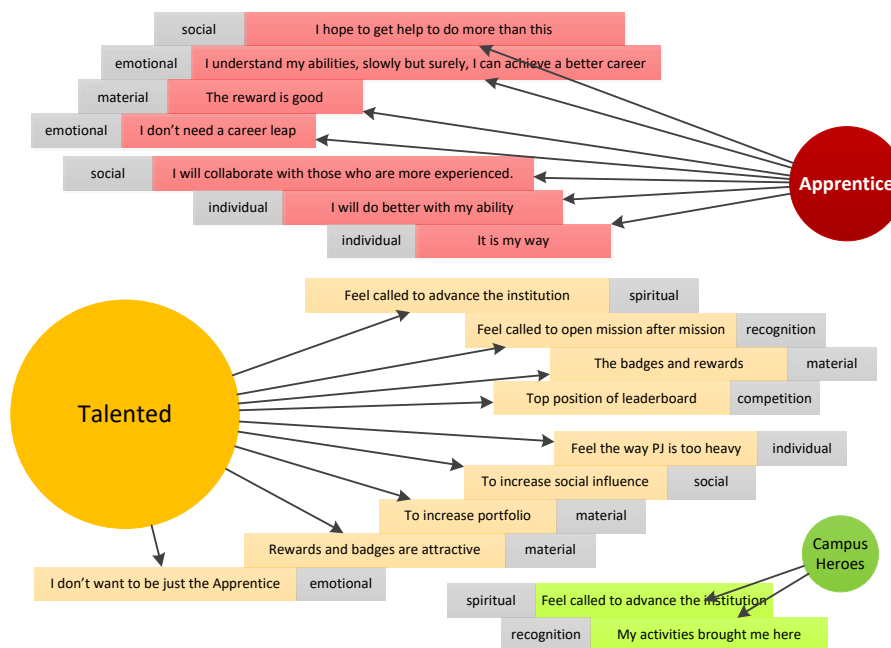


Figure 9. Visualization of the Educator's Spectrum of Interest

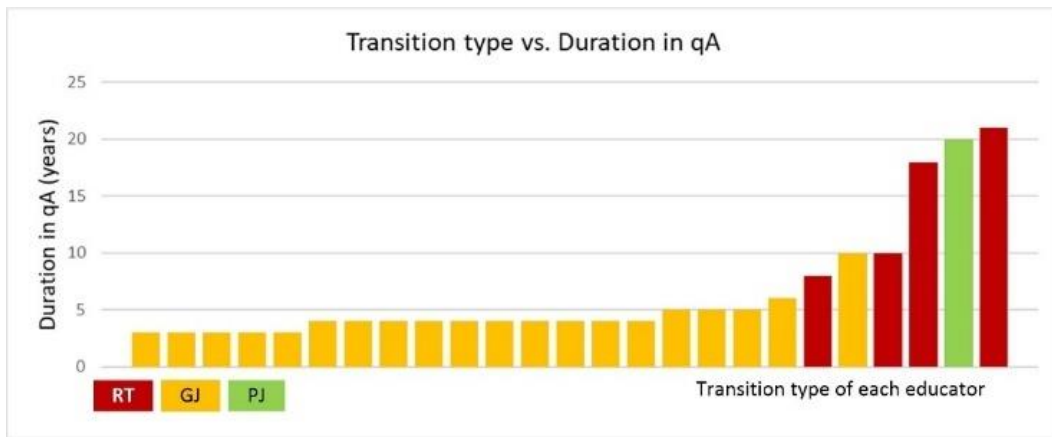


Figure 10. Transition type versus duration of educator in  $q_A$

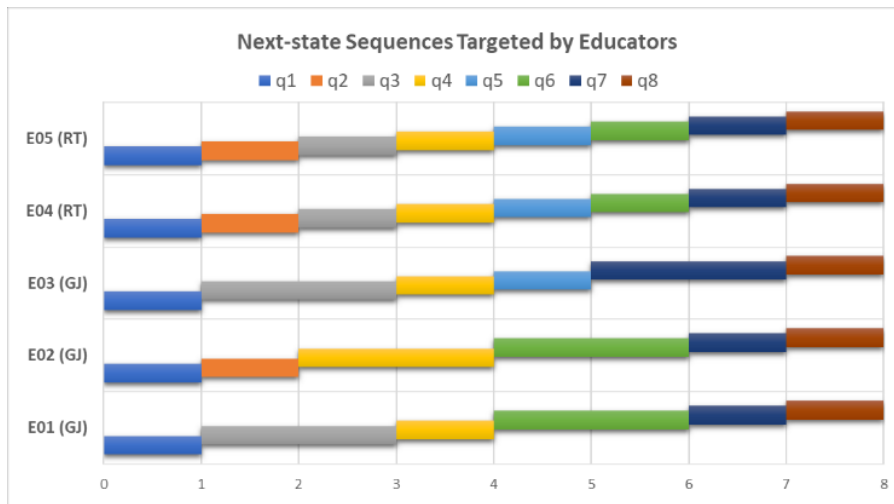


Figure 11. Next career state sequences reached and targeted by educators

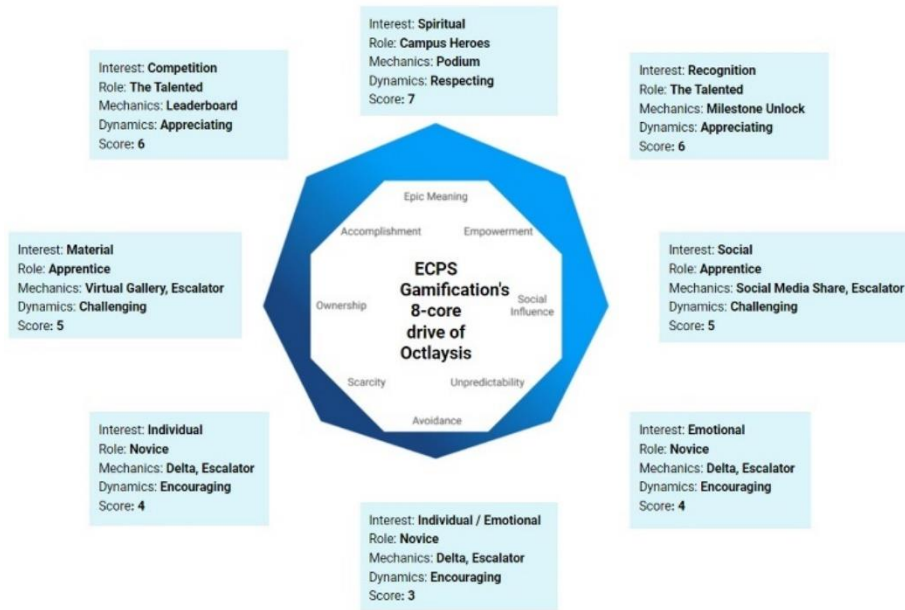


Figure 12. Magnitude of ECPS Gamification Framework, in comparison with Octalysis' 8-core drives

Tables

Table 1. Career State Transition Table<sup>3</sup>

$q_A$	Reachable $q_B$ and transition types							
	$q_1$	$q_2$	$q_3$	$q_4$	$q_5$	$q_6$	$q_7$	$q_8$
$q_1$	L/S	R	G	P	P	P		
$q_2$		L/S	R	G	G	G	P	P
$q_3$			L/S	R	G	G	P	P
$q_4$				L/S	R	G	G	G
$q_5$					L/S	R	G	G
$q_6$						L/S	R	G
$q_7$							L/S	R
$q_8$								S

Table 2. Role and Examples of the actual and gamified tasks assigned

No	Role	Actual tasks	Gamified Tasks
1	The Novice	<ul style="list-style-type: none"> <li>Develop hard skills and soft skills, through participation in workshops, training and the like.</li> <li>Understand your role in achieving institutional vision, mission and goals</li> </ul>	<ul style="list-style-type: none"> <li>Get more activity badges to earn points and rewards</li> <li>Want to know about your role and other roles. Take this escalator (explained in Section 3.3.) for a Tour into the future.</li> </ul>
2	The Apprentice	<ul style="list-style-type: none"> <li>Improve relationships with peers as team members, through collaborative activities such as joint research, making learning modules and the like.</li> <li>Improve self-competence through professional certification activities</li> </ul>	<ul style="list-style-type: none"> <li>Decorate Virtual gallery with more activity badges</li> <li>Earn the Silver Steve Jobs badge by becoming a member of the research team.</li> </ul>
3	The Talented	<ul style="list-style-type: none"> <li>Improve relationships with internal peers as team leaders in collaborative activities, such as joint research, authoring reference books and the like.</li> <li>Become a speaker in scientific and/or professional forums</li> </ul>	<ul style="list-style-type: none"> <li>Be the top-5 educators on the leaderboard in teaching, research, or community services</li> <li>Complete these tasks to unlock the next milestone</li> </ul>
4	Campus Heroes	<ul style="list-style-type: none"> <li>Expanding collaboration networks with external campus parties both nationally and internationally</li> <li>Become a member or chairman of a professional organisation</li> <li>Convey your wisdom using text or voice recording</li> </ul>	<ul style="list-style-type: none"> <li>Get the Rectors' inventors award for your international or national achievements</li> <li>Are you a member of national/ international professional association? Upload the proof and get an inspiring badge.</li> <li>Use Podium mechanic to voice your ideas and wisdom to the outside world (explained in Table 3)</li> </ul>

<sup>3</sup> In ECPS for Indonesian HEIs, LR = "Asisten ahli", SL = "Lektor", AP = "Lektor Kepala", PR = "Guru Besar"

**Table 3.** Mechanics, Interest channelled and Functionality

No	Mechanics	Interest channelled	Functionality
1	Podium	Spiritual	Podium is introduced in this study here as a mechanic provided for the Campus heroes to channel their experiences and wisdom in a narrative manner. Narrative can be in the form of storytelling, a technique in gamification that plays a role in the care and healing process for educators when they face challenges and problems in achieving their goals (Malkawi <i>et al.</i> , 2019). Such words of wisdom can be sent in written or voice recording form.
2	Milestone unlock	Recognition	Milestone channels educators' interest in recognition and at the same time, acts as XP of the RPG genre (Scholtz <i>et al.</i> , 2016; Beza, 2011). Milestones are applied to all roles.
3	Leaderboard	Competition	Leaderboards are well known as legitimate tools to reflect interest in healthy and open competition. The leaderboard implemented in this application is a Dart-leaderboard with more features described in (Akhriza and Mumpuni, 2019).
4	Social sharing	Social	It is a mechanism to channel the interests of showing off and or informing an achievement to social media networks. This tool is specifically for Apprentice roles that have social influence interests, but when it is used by other roles, it is an indication of a social interest in educators.
5	Virtual gallery	Material	Through the virtual gallery (Beza, 2011; Sardi <i>et al.</i> , 2017), educators can proudly display evidence (badges) of their participation in various 3D-HEI activities. This mechanic is actively used when educators perform the Apprentice or Novice role, but is optional for other roles.
6	Escalator	Emotional	The escalator is introduced in this study, with the functions described previously.
7	Hourglass	Individual	Hourglass is an implementation of the $\Delta$ threshold, with functions as described previously. It can be combined with other mechanics such as the Escalator to remind educators that time at $q_0$ doesn't stop, but keeps on decreasing.
8	Points and rewards	All extrinsic interests	While these two mechanics are extrinsic motivators, points and rewards are almost inseparable in the game, and also in the gamification (Tobon <i>et al.</i> , 2020; Li and Edwards, 2020; Chang and Wei, 2016). The points accumulated will lead to rewards. However, there are two kinds of rewards in this framework. Performance rewards set by HRD management, and social rewards provided by educators for peers for their participation as partners in collaborative activities.
9	Badges	All interests	A badge is able to create self-confidence in educators in achieving mission after mission (Sailer <i>et al.</i> , 2017). The badge types in our framework have been described previously.
10	User interface (UI)	All interests	The UI of the application also affects the aesthetics and emotions of educators, and can be set according to a role (Klock <i>et al.</i> , 2020).