

### Concept Paper

# University Licensure Examination Reviewer for Teacher: A Framework for Developing Gamified Examination

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## Abstract

*Purpose* – The study aims to develop a framework that can be used in gamifying the LET reviewer and determine the necessary gamification elements to be used and identify the area of improvement of the students based on their assessment in the system.

*Method* – The researchers will use the descriptive research in order to accomplish the study and as for the development of the system, the researchers will apply the Iterative and Incremental Model Methodology.

*Results* – Based on the literature, gamification is an effective technique in which necessary game elements should be implemented, namely: points, levels, leaderboards, points, and feedback with the game design. Through gamification, the framework was developed to apply in the creation of a gamified examination for teachers.

*Conclusion* – As the results of different studies, gamification is a good approach to make a positive change in students' behavior and attitude towards learning that helps improves students' motivation and engagement.



*Recommendations* – Develop a gamified application that can cater to the needs of the students, must be used by the College of Teacher Education every Pre-LET examination in all campuses of the university to assess the student performance to determine possible intervention to assist the student’s need.

*Research Implications* – The integration of new educational technique helps to progress the learners, so it is upright to introduce the developed framework and system that might help to increase positive impact on the passing rate of the university.

*Keywords* – gamification, licensure examination, reviewer, descriptive analytics, predictive analytics, prescriptive analytics.

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## INTRODUCTION

Education is important to humans. As mentioned by Tiruneh and Griffin (2015), a well-educated community leads the country to a higher economy. This will open doors for more and better opportunities. The way to get there is by learning and knowing about something, and it is not only what they get from school or textbooks but also from what they are continuously experiencing (different events and scenarios) can teach something. (De Jesus et al., 2019). It is challenging for educators to provide quality education. An educator is a person who teaches students to be academically equipped. Future educators rely on their professors. With this, future educators must be prepared to provide quality education.

In the Philippines, one must complete a four-year course to earn a degree in Education. After that, the graduate shall pass the licensure examination for teachers in order to practice the profession in public schools. Universities and colleges use different strategies and techniques to prepare their students for the licensure examination. Some of them are conducting an in-house review. Attending sessions in a review center is also an option.

However, in-house reviews and sessions in a review center are using the traditional method of teaching wherein the attendees need to listen to their reviewers. Afterward, they will be answering the assessment to know if they are ready enough to take the licensure examination for teachers. It is also their guide in order for them to know what area they need to focus on. Licensure Examination for Teachers (LET) is a nationwide qualifying examination for all aspiring teachers. It is being administered every September and March of the year. In preparation for this, LET takers are making measures by having a review on their own or they will go to a review center.

According to Tan (2016), the College of Teacher Education in Laguna State Polytechnic University (LSPU) Los Baños Campus is having an intervention program that they are

conducting a review for those first takers that will get the examination. As a result, there was an increasing passing rate. It can be concluded that the review sessions are important. The intervention program of the college is setting up sessions. However, they are conducting it the traditional way of teaching. There is a table of specifications for the topics to be discussed in a certain period. For example, there are two topics to be discussed for a certain week. The college will invite respective resource speakers for each of the topics. Different resource persons are expected to share their knowledge in the duration of the intervention program. After the discussion, there will be an assessment regarding the review.

However, in the past three years (March 2017 – September 2019), the passing rate of LSPU in elementary is lower than 30% and in secondary is lower than 40%. This also indicates that repeaters are the factors for the decline of almost 20%. It can be said that there is a need to improve the intervention program. Educational gamification can be considered in improving the performance of the students.

Educational gamification improves learning experiences, engaging the students in a social, emotional, and cognitive level (Maraffi, Sacerdoti & Paris, 2017). According to Kiryakova, Angelova, and Yordanova (2013), gamification is an effective approach to make a positive change in students' behavior and attitude towards learning, to improve their motivation and engagement. The use of gamification could provide a partial solution to the decline in learners' motivation and engagement the schooling system is facing today (Alsawaier, 2018). Yildirim (2017) stated that gamification-based teaching practices have a positive impact on student achievement and students' attitudes toward lessons.

The study aims to develop a framework that can be used in gamifying the LET reviewer. In order for this to be successful, the researchers will identify the necessary gamification elements to be used and identify the area of improvement of the students based on their assessment in the system. The researchers will use the descriptive and developmental research in order to accomplish the study.

## **REVIEW OF RELATED LITERATURE**

With an ever rapidly changing world everyone must cope with it. Education is a process where a person will be educated using informal education (change, experiences) and formal education (Peters, 2015; Gross, 2012). It is a long-term development of humans and used it to earn more to cope with the change. (Baum et al., 2013; Oprean & Stan, 2015). In the Philippines, influenced by different regimes, an educational system composed of basic education (6 years), secondary education (6 years), and tertiary education (4 years) where the people of the Philippines have the free access to public school education (Valenzuela, 2010; Durban & Catalan, 2012; Republic Act No. 10533; Republic Act No. 6655; Republic Act No. 10931; Manno, 2012).

The Commission on Higher Education (CHED) governs implementing rules in higher education and responsible for releasing the policies, standards, and guidelines. It includes education courses such as Bachelor of Elementary Education, Bachelor of Technology and Livelihood Education, and Bachelor of Secondary Education. In line with this, the Professional Regulation Commission (PRC) managed the examination for future teachers so that they can teach in public schools. The Licensure Examination for Teachers covers three examinations: general education, professional education, and field of specialization. (Republic Act No. 7722; Republic Act No. 7836; PRC Board, 2020).

Laguna State Polytechnic University is a state university that offers Bachelor of Secondary Education (BSEd) and Bachelor of Elementary Education (BEEd) programs. In the past three years (March 2017 to September 2019) the university performance in the board exam in the BSEd program was 31.47% passing and the BEEd program was 29.10% passing. The results were based on the official released by PRC. It is notably seen that repeaters have a great effect on the decrease in the university's performance. Laguna State Polytechnic University comprises of four campuses: Sta. Cruz (Main), Siniloan (Host), San Pablo, and Los Baños. Among the four campuses, Siniloan Campus performed the lowest for the first-timers for the BSEd program and third to the lowest for the BEEd program. In terms of repeaters, Siniloan campus performed the lowest for the repeaters for the BEEd program and second to the lowest for the BSEd program, which made Siniloan campus ranked second in the BSEd Program and BEEd program ranked second to the lowest.

The intervention program is needed to improve in the area that the students had a struggle with (Lee, n.d.). The intervention program of the College of Teacher Education has a lecturer for a specific topic. There is a lecture that has different review materials that are in conjunction with the Table of Specifications as stipulated in the respective areas of disciplines and clusters. And as a result, there was an increasing passing rate. (Tan, 2016).

The review was conducted traditionally. Gamification is a process integrating game elements and game thinking to other activities that are not classified as games. Additionally, elements of game design, game mechanics and strategic theory if used, will motivate the user of the gamified application. By gamification, it can increase the ability of the user to learn new skills by 40% and enhances the user experience and engagement (Giang, 2013; Kryakova et al., 2013; Al-Azawi, Al-Faliti & Al-Bushi, 2016; Deterding et al., 2011).

Gamification in education is a rapidly growing phenomenon since it has a positive impact on the achievement and attitudes of the students towards the subject (Caponett, Earp & Ott, 2014; Yildirim, 2017). In the study of Faghihi et al. (2014), it was notably seen that the students who use the gamified application have higher scores than those who did not. And to accomplish a gamified application few game elements are considered. Game elements in education include points, levels, leaderboards, points, and feedback

with the game design: game mechanics, visually aesthetic design, narrative design, incentive system, musical score, and content and skills (Nah et al., 2014; Lee & Hammer, 2011; Plass, Homer & Kinzer, 2015). Most important is the content of the gamified application, in this case, is the LET Reviewer. Applying the necessary techniques will be necessary.

Descriptive analytics provide trending information on past or current events using business intelligence and data mining and summarizes it to give understandable reports that can be used in decision support (Bayrak, 2015; Strickland, 2015; Ertemel, 2015; Daniel, 2015; Milliken, 2014). Predictive analytics transforms big data into usable and meaningful information and predicts the future outcomes that can be used by the decision-makers. (Abbott, 2014; Gandomi & Haider, 2015; Siegel, 2013). It was agreed by Strickland (2015) and added that a predictive model is a relationship between a unit in a sample and one or more features or attributes of the unit. As per the idea of Daniel (2015), decision-makers can have better decisions and actionable insights based on the prediction. Combining the descriptive and predictive model, prescriptive analytics gives the best action to take of the forecasted event using different techniques. (Basu, 2013; Ertemel, 2015; Strickland 2015; Daniel, 2015).

Table 1. Related Application in LET Review

Criteria	Content and Skills	Game Mechanics	Visual Aesthetic Design	Narrative Design	Musical Score	Points	Leaderboards	Levels	Feedback
Let Reviewer: Professional Education	✓	✓	✓	✗	✗	✗	✗	✗	✗
LET Reviewer   ProfEd GenEd Reviewer	✓	✗	✓	✗	✗	✓	✗	✗	✗
LET Reviewer 2020	✓	✓	✓	✗	✗	✗	✗	✗	✗
LET Reviewer – Licensure Exam for Teachers	✓	✓	✓	✗	✓	✗	✓	✗	✗
LET Reviewer 2019	✓	✓	✓	✗	✗	✗	✗	✗	✗
LET Reviewer: General & Professional Licensure Exam LET	✓	✓	✓	✗	✗	✗	✗	✗	✗
LET Intensive Reviewer	✓	✓	✓	✗	✗	✗	✓	✗	✓
LET Reviewer	✓	✓	✓	✗	✗	✓	✓	✓	✗

The proposed system will be a gamified application for the LET Reviewer. It will aim to increase the passing rate of LSPU. The following game elements that will be applied are based on the readings: points, leaderboards, levels, feedbacks with game mechanics, visually aesthetic design, narrative design, and content and skills. Using necessary techniques like descriptive analytics, predictive analytics, and prescriptive analytics, the gamified application will provide the area or skills the user needs to improve.

Table 1 shows the comparison between the different applications in Google PlayStore and the proposed application. The table shows the different game elements that a gamified application has. The different game elements were based on the readings of the researchers that can be found on the previous pages. It can be seen that there is a lack of game elements on different applications. The common element in the application is the content and skills, they have the content of possible questions that the takers might encounter in the examination. The LET Intensive Reviewer application has the community of educators where they can share questions that they had encountered in the time that they have taken the examination. With this, the proposed system will cater to all the game elements and some of the key features of the application that will make it different from other applications.

## **CONCEPTUAL FRAMEWORK**

With the help of different pieces of literature, the researchers come up with the conceptual framework shown in Figure 1. Through the years the Philippines' educational system is evolving. Educators are challenged on how to cope with the trend. Laguna State Polytechnic University is creating future educators. However, the passing rate of the said university was less than forty percent (40%). In line with this, the university is conducting a review as an intervention program. The researchers come up with gamifying the review of the university. It can be said that through the literature, gamification is helpful for the learning of the students. The right gamification elements should be considered.

According to Mekler et al. (2013), the commonly employed game design elements are points, leaderboards, and levels. As accepted by Al-Azawi et al. in 2016, the most used elements in gamified applications are feedback, leaderboards, points, and levels. Plass et al. (2015) added game mechanics, visually aesthetic design, narrative design, incentive system, musical score, and content and skills. Considering the aforementioned elements, the researchers come up to apply: points, leaderboards, levels, feedbacks with the appropriate game mechanics, visually aesthetic design, narrative design, and content and skills.

As mentioned by IBM (2013), descriptive analytics uncover the events and the cause of failures. In which the researchers come up to use the descriptive analytics in knowing what area the student fails. Additionally, those patterns can be used in decision support.

(Milliken, 2014). Based on the study by Gandomi and Haider (2015), predictive analytics can be used to predict future outcomes. In which it can be used in predicting what will be the possible outcome of the student in taking the LET. And the prescriptive analytics will help the system in generating the best action that students should do (Basu, 2013).

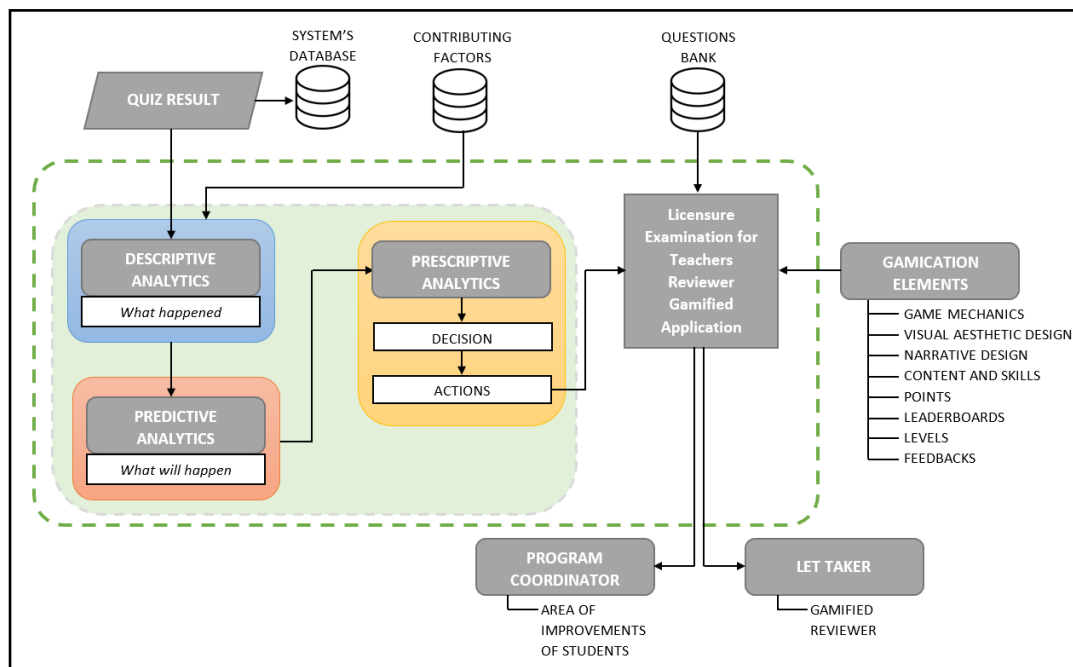


Figure 1. Conceptual Framework of Licensure Review Gamified Application.

Combining the above mentioned, the researchers come up with a system that will generate the best action that a student could do through a gamified application. The researchers will divide the system structure into four modules, namely administrator, program coordinator, student, and passer. Each of the modules is related to one another. The *Administrator* module will be responsible for the user account creation, including what type of user it is.

The *Program Coordinator* module has four sub-modules: *scheduling of review*, *area of improvement*, *task*, and *students' progress*. This part of the system will be used by the program coordinator of the college. They will be responsible for setting the schedule for the review. The *Area of Improvement* sub-module will be based on the results of analytics from the student module. Additionally, it will show what the reviewers need to focus on. The *Task* sub-module will be responsible for adding the questionnaires (categorized). The *Students' Progress* sub-module will show the list of the students and how they are progressing using the system.

The *Student* module is divided into five sub-modules namely *newsfeed*, *schedule*, *quest*, *task*, and *leaderboard*. The *Newsfeed* sub-module is part of the system where the student can share their thoughts and can view the question and sharing of thoughts of the LET

passer. From the schedule that is set through the program coordinator module, the student will be notified if there will be a schedule of review. The *Quest sub-module* will show what they need to accomplish. It is also related to the leveling system of the game. The maximum level that the user can get will be the Passer wherein they can access the Passer module. *Task sub-module* will be the assessment part where the analytics will work and provide results to the program coordinator. The *Leaderboard sub-module* will show the top students based on the quest sub-module.

Lastly, the *Passer module* can only be accessed by the user who completed the quest. The passer can share some thoughts and questions they have encountered using the examination. The passer can also be invited to the intervention program to share some insights or to be a reviewer.

Since there is an assessment after the review, that will be the input. The takers will have their assessment using the gamified application and the gamification elements stated above will be used in the gamification process of the proposed system. It will be applied in showing and answering of questions, where, they will earn points, account-level up, and will see who is running in the leaderboard.

The contributing factors are the classification of the question (e.g., area, skills) that will be used in the system. It will be identified after the thorough interview and study with the help of the faculty in the College of Teacher Education in LSPU. Using the result (in the gamified application) that will be saved on the system's database and the contributing factors, descriptive analytics will determine the result of the assessment of the taker. With the previous result, the predictive analysis will calculate the chances in the area that the taker will most probably fail. Using prescriptive analysis will give the prescribed action to the taker what he or she needs to focus on. Additionally, the application will provide to the program coordinator the area of improvements that they should consider for the next sessions.

## **PROPOSED METHODOLOGY**

This chapter contains the methods and procedures that will be performed in the gathering of data in the proposed framework. It presents the methods of research to be used, the instruments in the gathering of data, sampling technique in evaluating of system and software development model.

### ***Research Design***

The researchers will use two research design called descriptive research and developmental research. Descriptive research describes a phenomenon and its characteristics. It is also a tool for data collection method (Nassaji, 2015). It will be used in



the study to analyze the current phenomenon of the students in the College of Teacher Education. Developmental research used the analyzed data to design and develop a system to solve a particular problem. According to Blumberg and Fisch (2013), developmental research has the potential to contribute to effective educational game design.

### **Population of the Study**

The target respondents and users of the proposed system will be the graduating students of the College of Teacher Education at Laguna State Polytechnic University – Siniloan (Host) Campus as presented in Table 2. Currently, the total population of the students is thirty-two (32) in BSEd programs for the School Year 2019-2020. The students will test and evaluate the system. There are also two (2) undergraduate program coordinators.

Table 2. Population of the graduating students in CTE

<b>Criteria</b>	<b>Frequency</b>	<b>Percentage</b>
BSEd – Math	10	29.41%
BSEd – Filipino	6	17.65%
BSEd – English	10	29.41%
BSEd – MAPEH	6	17.65%
Program Coordinators	2	5.88%
<b>TOTAL</b>	<b>34</b>	<b>100%</b>

### **Sampling Design**

The researchers will be using Stratified Sampling. The population will be divided per major. The researchers will get a sample from Math, Filipino, English, and MAPEH. This will also be used in testing and evaluation procedures once the proposed system will be developed.

### **Data Collection Instrument**

The researchers will be using various techniques to gather important data for the study. Here are the lists of the data collection methods that will be using:

#### **Interview**

The researchers will visit the College of Teacher Education at Laguna State Polytechnic University – Siniloan (Host) Campus to gather necessary information regarding the status of pre-board review and the graduating students of the college. The researchers will also get sample questionnaires to the Dean, Program Coordinator and

other faculty included in the pre-board examination of the BSEd so that it will serve as the basis in the creation of the system.

### **Internet Research**

Internet research is one of the sources of information that the developer will use. The researchers will gather different useful facts that are available on the internet specifically the gamification elements, assessment techniques and practices in developing the system of examination reviewers for teachers. The researchers will use different sources such as google books, google scholar and different e-books in the study.

### **Library Research**

Library research will be a big help for the researchers to gather facts and information that could help with the creation of the system as well as the study. The researchers will collect any written materials such as books and theses to gain bases, proofs for the study, as well as available modifications that the researchers could apply to the system.

### **Statistical Treatment**

Table 3 shows the Likert scale that will be used in interpreting the result of the evaluation of the system.

Table 3. Likert Scale for Acceptability of the System

<b>Scale</b>	<b>Range</b>	<b>Descriptive Rating</b>
5	4.21-5.00	Acceptable
4	3.41-4.20	Slightly Acceptable
3	2.61-3.40	Undecided
2	1.81-2.60	Slightly Unacceptable
1	1.00-1.80	Unacceptable

### **Project Design**

In developing the system, the software development model called the iterative and incremental model will be applied as illustrated in Figure 2. The system will be divided into different modules. The different modules will be combined all together to form a complete system.

Once the system is done, it will be tested and evaluated. Different testing and evaluation procedures will be used. The following are the discussion of the procedures that will be done which includes the development, testing, and evaluation procedure:

## Software Development Model



Figure 2. Iterative and Incremental Model of Development.

### *Initial Planning*

The developer will research the topic. The researchers will also conduct a consultation with instructors that have a relative background in information technology and also in education. Also, the researchers will ask some experts that have a specialization in the field. With this, the researchers will have an initial idea of what to do on the proposed system.

### *Planning*

In this phase, the researchers will plan for the whole duration of the study. The researchers will also outline the topic. The timeline or Gantt chart will be made by the researchers in this phase.

### *Requirements*

In this phase of the methodology, the researchers will now organize the idea of the proposed system. With the use of the data that will be gathered by the researchers, the developer will come up with the right techniques that will be used and how to use it. In this phase, the researchers have the concrete idea of the proposed system.

### *Analysis and Design*

In this part, the researchers will analyze the organized data and how it will solve the problem presented in the earlier part. The researchers will start to conceptualize the design of the proposed system. Appropriate algorithm and techniques to be used in the

system will be studied. In this phase, the researchers will have the design of the system that will be used in the next phase.

### *Implementation*

In this phase, the developers will now start in creating the system. The concept made in the previous section will be applied. It includes gamification and analytics to be integrated as part of the system elements to assess the student's performance.

### *Testing and Evaluation*

The researchers will test the system. Students, program coordinators and IT experts will evaluate the system. The testing and evaluation phase of the system will be further discussed in the next section.

### *Deployment*

The system will be deployed and will be used in the review of the College of Teacher Education.

## **Testing and Evaluation Procedure**

### *Testing Procedure*

A series of testing will be conducted. The testing includes functionality, accuracy, and portability of the system. Using test cases, it will check the functional requirements of the system if working. The accuracy testing will be checking if the results of the application are accurate. And, the portability testing will be testing the application in different smartphones if it is working.

### *Evaluation Procedure*

Students, program coordinators, and IT experts will evaluate the system. Students and program coordinators will evaluate the usability and acceptability of the system. IT experts will evaluate the system using the Functional Suitability and Usability of the ISO 25010.

## **CONCLUSION AND FUTURE WORKS**

Educational gamification improves learning experiences, engaging the students in a social, emotional, and cognitive level. The use of gamification could provide a partial solution to the decline in learners' motivation and engagement the schooling system is facing today. The integration of new educational technique like gamification it can help to

progress the learners, so it is upright to introduce the developed framework that consists of the system which has gamified application for the LET Reviewer. It will aim to increase the passing rate of LSPU. The following game elements that will be applied are based on the readings: points, leaderboards, levels, feedbacks with game mechanics, visually aesthetic design, narrative design, and content and skills. The gamified application will provide the area or skills the user needs to improve.

As results of different studies, gamification is an effective approach to make a positive change in students' behavior and attitude towards learning, to improve their motivation and engagement. Developing a gamified application can cater to the needs of the students who will take licensure examination and must be used by the College of Teacher Education every Pre-LET examination in all campuses of the university to assess the student performance to determine possible intervention to assist the student's need.

For future studies, a gamified application for LET will be developed by the researchers. The developed framework and proposed methodology in this study will be used in future studies. Once the system is developed, it must be evaluated by IT experts using the Functional Suitability and Usability of the ISO 25010. The acceptability testing of the users shall be conducted. With this, it can assess that the system can be a good tool to improve learning experiences and students' attitudes toward lessons using gamification approach.

## REFERENCES

- Abbott, D. (2014). *Applied predictive analytics: Principles and techniques for the professional data analyst*. Indianapolis, Indiana: John Wiley & Sons.
- Al-Azawi, R., Al-Faliti, F., & Al-Bushi, M. (2016). Educational gamification vs. game-based learning: Comparative study. *International Journal of Innovation, Management and Technology*, 7(4), 132-136.
- Alsawaier, R. S. (2018). The effect of gamification on motivation and engagement. *The International Journal of Information and Learning Technology*, 35(1), 56-79. doi: 10.1108/IJILT-02-2017-0009
- Basu, A. (2013). Five pillars of prescriptive analytics success. *Analytics Magazine*. Retrieved from <http://analytics-magazine.org/executive-edge-five-pillars-of-prescriptive-analytics-success/>
- Baum, S., Ma, J., & Payea, K. (2013). *Education pays 2013: The benefit of higher education for individuals and society*. New York: The College Board.
- Bayrak, T. (2015). A review of business analytics: A business enabler or another passing fad. *Procedia-Social and Behavioral Sciences*, 195, 230-239.
- Blumberg, F. C., & Fisch, S. M. (2013). Introduction: Digital games as a context for cognitive development, learning, and developmental research. *New directions for child and adolescent development*, 2013(139), 1-9.

- Caponetto, I., Earp, J., & Ott, M. (2014). Gamification and education: A literature review. In *European Conference on Games Based Learning*, Vol. 1, p. 50. Academic Conferences International Limited.
- Daniel, B. (2015). Big Data and analytics in higher education: Opportunities and challenges. *British Journal of Educational Technology*, 46(5), 904-920.
- De Jesus, M. J. T., Lizo, L. D., Gomez, J. O., & Jain, A. M. (2019, March). Development of faculty profiling and capability enhancement advisor system using intelligent predictive string search algorithm. In 2019 IEEE 5th International Conference for Convergence in Technology (I2CT) (pp. 1-5). IEEE.
- Deterding, S., Sicart, M., Nacke, L., O'Hara, K., & Dixon, D. (2011). Gamification using game-design elements in non-gaming contents. In *CHI'11 Extended Abstracts on Human Factors in Computing Systems*, pp. 2425-2428.
- Durban, J., & Catalan, R. D. (2012). Issues and concerns of Philippine education through the years. *Asian Journal of Social Sciences & Humanities*, 1(2), 61-69.
- Ertemel, A. V. (2015). Consumer insight as competitive advantage using big data and analytics. *International Journal of Commerce and Finance*, 1(1), 45-51.
- Faghihi, U., Brautigam, A., Jorgenson, K., Martin, D., Brown, A., Measures, E., & Maldonado-Bouchar, S. (2014). How gamification applies for educational purpose specially with College Algebra. *BICA*, 182-187.
- Gandomi, A., & Haider, M. (2015). Beyond the hype: Big data concepts, methods, and analytics. *International journal of information management*, 35(2), 137-144.
- Giang, V. (2013). "Gamification" Techniques Increase Your Employees' Ability to Learn by 40%. Retrieved from Business Insider: <http://www.businessinsider.com/gamification-techniques-increase-your-employeesability-to-learn-by-40-2013-9>
- Gross, J. (2012). *Building your library career with Web 2.0*. Oxford, UK: Chandos Publishing.
- IBM. (2013). *Descriptive, predictive, prescriptive: Transforming asset and facilities management with analytics*. Retrieved January 10, 2015, from <http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?infotype=SA&subtype=WH&htmlfid=TIW14162USEN#loaded>
- Kiryakova, G., Angelova, N., & Yordanova, L. (2014). Gamification in education. *Proceedings of 9th International Balkan Education and Science Conference*.
- Lee, A. (n.d.). *Instructional intervention: What you need to know*. Retrieved from Understood: <https://www.understood.org/en/learning-thinking-differences/treatments-approaches/educational-strategies/instructional-intervention-what-you-need-to-know>
- Lee, J. J., & Hammer, J. (2011). Gamification in education: What, how, why bother? *Academic Exchange Quarterly*, 15(2), 146-151.
- Manno, M. (2012). *Reasons for becoming a teacher*. Retrieved from Teach: <https://teach.com/blog/reasons-for-becoming-a-teacher/>
- Maraffi, S., Sacerdoti, F. M., & Paris, E. (2017). Learning on gaming: A new digital game based learning approach to improve education outcomes. *US-China Education A Review*, 7(9), 421-432.
- Mekler, E. D., Brühlmann, F., Opwis, K., & Tuch, A. N. (2013). Do points, levels and leaderboards harm intrinsic motivation? An empirical analysis of common

- gamification elements. *Proceedings of the First International Conference on gameful design, research, and applications*, 66-73.
- Milliken, A. L. (2014). Transforming big data into supply chain analytics. *The Journal of Business Forecasting*, 33(4), 23.
- Nah, F., Zeng, Q., Telaprolu, V., Ayyappa, A., & Eschenbrenner, B. (2014). Gamification of education: A review of literature. *HCI in Business. HCIB 2014. Lecture Notes in Computer Science*, 8527.
- Nassaji, H. (2015). Qualitative and descriptive research: Data type versus data analysis. *Language Teaching Research*, 19(2), 129–132. doi: 10.1177/1362168815572747
- Oprean, C., & Stan, S. (2015). The importance of investing in education for sustainable human development: The case of Romania. *Вестник Киевского национального университета имени Тараса Шевченко. Экономика*, 32(174), 61-67.
- Peters, R. S. (2015). *Ethics and education (Routledge Revivals)*. New York, New York: Routledge.
- Republic Act No. 6655. *Establishing and providing for a free public secondary education and for other purposes*. Metro Manila, Philippines: Congress of the Philippines, Republic of the Philippines. Retrieved from: <https://www.officialgazette.gov.ph/1988/05/26/republic-act-no-6655/>
- Republic Act No. 7722. *Creating the commission on higher education, appropriating funds therefor and for other purposes*. Metro Manila, Philippines: Congress of the Philippines, Republic of the Philippines. Retrieved from: <https://www.officialgazette.gov.ph/downloads/1994/05may/19940518-RA-07722-FVR.pdf>
- Republic Act No. 7836. *Philippine Teachers Professionalization Act*. Metro Manila, Philippines: Congress of the Philippines, Republic of the Philippines. Retrieved from: <https://attorney.org.ph/legal-news/299-philippine-teachers-professionalization-act-of-1994>
- Republic Act No. 10533. *Enhancing the philippine basic education system by strengthening its curriculum and increasing the number of years for basic education, appropriating funds therefor and for other purposes*. Metro Manila, Philippines: Congress of the Philippines, Republic of the Philippines. Retrieved from: <https://www.officialgazette.gov.ph/2013/05/15/republic-act-no-10533/>
- Republic Act No. 10931. *promoting universal access to quality tertiary education by providing for free tuition and other school fees in state universities and colleges, local universities and colleges and state-run technical-vocational institutions, establishing the tertiary education subsidy and student loan program, strengthening the unified student financial assistance system for tertiary education, and appropriating funds therefor*. Metro Manila, Philippines: Congress of the Philippines, Republic of the Philippines. Retrieved from: <https://www.officialgazette.gov.ph/2017/08/03/republic-act-no-10931/>
- Plass, J., Homer, B., & Kinzer, C. (2015). Foundations of game-based learning. *Educational Psychologist*, 50(4), 258-283.

- PRC Board. (2020). *LET Coverage: Licensure Exam for Teachers March 2020*. Retrieved from PRCBoard.com: <https://www.prcboard.com/2016/07/Coverage-of-Exam-LET-Licensure-Exam-for-Teachers.html>
- Siegel, E. (2013). *Predictive analytics: The power to predict who will click, buy, lie, or die*. John Wiley & Sons.
- Strickland, J. (2015). *Predictive analytics using R*. Colorado Springs, CO: Simulation Educators.
- Tan, C. S. (2016). Impact of review on the performance of graduates in the licensure examination for teachers, 2012-2014. *e-Proceedings of the 4th Global Summit on Education*, pp. 64-73.
- Tiruneh, M. W., & Griffin, D. (2015). Can we be competitive without being educated? Empirical findings from European data. *World Development*, 29(9), 1501-1525.
- Valenzuela, E. A. (2010). The Philippines. In *International Encyclopedia of Education* (3rd ed.). doi: 10.1016/B978-0-08-044894-7.01579-7
- Yildirim, I. (2017). The effects of gamification-based teaching practices on student achievement and students' attitudes toward lessons. *The Internet and Higher Education*, 33, 86-92.