



## GAME-BASED LEARNING SYSTEM: AN EXCEPTIONAL LEARNERS MOTIVATION FOR BETTER PERFORMANCE

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### Abstract

*Special education is a specialized area of education which uses unique instructional methods, materials, learning aids, and equipment to meet the educational needs of students with learning disabilities. Exceptional learner is an inclusive term that refers to students with learning and behavior problems, students with physical disabilities or sensory impairments, and students who are intellectually gifted or have a special talent. Computer games are increasingly part of the daily activities of students of all ages, and have been shown to support student motivation and learning however can be challenging to implement in the classroom. Gamification involves incorporating elements of computer games such as points, leaderboards, and badges into non-game contexts in order to take advantage of the motivation provided by a game environment. Based from literature analysis points, badges and achievements, leaderboards and levels are the most commonly implemented form of gamification. The study aims to determine to what extent gamification supports student achievement and motivation among exceptional learners. Incorporating gamification elements into exceptional learners' environments can motivate students and support their achievement. Increased class attendance and participation, which is positively correlated with improved student performance, was seen as a result of gamification. The user acceptability test was used to determine the proficiency of the system to help the teachers in teaching exceptional learners in the approach of their learning. To test the acceptability of the developed system, the researchers floated an acceptability questionnaire to stakeholders where the target user enjoys exploring the content of the system. Based on their rating, the researchers motivated to enhance the functionality of the system. The target user strongly agrees with a*

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*ratio of 4.5 which mean that the system has the functionality needed in their school process.*

**Keywords:** *exceptional learners; gamification; learning system; education; motivation; performance*

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## **INTRODUCTION**

Special education is a distinctive education provision, for students with disabilities and disorders. It encourages academic progress and personal and social development. It aims to enhance the behavior of the students through giving reinforcements and many different teaching methods and strategies.

Special education is a specialized area of education which uses unique instructional methods, materials, learning aids, and equipment to meet the educational needs of students with learning disabilities. In fact, every student in the same classroom may have a different way of understanding and should have an individual learning plan with specific goals and objectives.

Many people think of special education as separate classes or separate schools, but special education is actually a continuum of specially designed instruction. This instruction includes a combination of supports and services, which is intended to meet the unique needs of a student with disability. Special education is used to describe a wide range of supports, programs and placements for students who need different teaching methods or special equipment to help exceptional learners with their school work. Exceptional learners include students who experience difficulties in learning as well as those whose performance is so superior that

modifications in curriculum and instruction are necessary to help them fulfill their potential.

Teaching exceptional learners requires a lot of efforts and resources. Teachers should always repeat the same lessons several times due to lack of memorization and recognition of objects and concepts. In giving directions to the class, teacher should leave a pause between each step so student can carry out the process in their mind. Teachers can also provide visuals via the board or overhead, and also use flash cards.

For the past decades, SPED teachers' in Dagupan City common strategies in teaching exceptional learners are making their students cooperative in learning through having games, storytelling, hands-on activities, brainstorming and discussion. Students with intellectual disabilities are very challenging to teach, and can learn best with the use of different methodologies that engage their senses such as using images, sounds and clips.

From early examinations, the researchers have expanded the multimedia applications reflecting to a constructivist approach of learning. It is common for the students to become fascinated with colorful materials and effects given by multimedia. The more the animation is, the more the chance to

get the students' attention. Hence, with the use of multimedia, students with disabilities and disorders will give their full attention to the teacher and the discussion because of its playful but informative presentation. Therefore, these promote the learning habit of the students by the use of the playful environment of the application.

Most students with mild learning disabilities spend at least some portion of the school day in the regular classroom. They spend time in the regular classroom because some parents want their children to act like a normal student in a regular class. Because of this, many of these students find it difficult to keep up with their nondisabled peers. Their teachers often find it difficult to spend significant amounts of time providing them with individual attention. Technology has proven to be an effective method of giving such students opportunities to engage in basic drills and practices, simulations, explorations, and communication activities that are matched to their individual needs and abilities. A research examining the potential benefits of computer-based instruction is grounded in basic learning theory and is the same for all students, including both those with or without mild disabilities.

Technology is a natural part of living that plays an important role in different aspects of life. Nowadays, technology gives a huge impact in changing the educational system and provides new teaching strategies to catch students' attention which includes the exceptional learners. Special education is designed to arrange the teaching procedures of

teachers and address the needs of every student with learning difficulty. Thus technology also helps to expand the students' ability to obtain more knowledge about the world.

There were studies that indicate the use of technology to enhance students' acquisition of skills and content knowledge through the use of computer to deliver well-designed and wellmanaged instruction. One of which was a multimedia courseware for slow learner children with reading difficulties. The courseware helped slow learner children using an approach and a suitable technique/method with appropriate teaching materials essential for the learning process. The courseware integrates Literacy and Numeracy Syllabus officially prepared by the Ministry of Education for primary school children aged between 7 to 9 years old with the learning multimedia theme. It is primarily consisting of 2 sections for the modules and exercises. The modules consist of 3 sub-modules. Each module is designed to teach in certain domain starting from Module 1 till Module 3. The module 1 teaches the users on how to recognize and pronounce a letter. The module 2 teaches users on how to combine letters to form a word. While module 3 guides users on how to combine words and syllable to form complete sentences. A user acceptance test was conducted in two primary schools in Perak. The results help to support suitability and acceptability and the effectiveness of the courseware for further improvement. The findings of the evaluation indicate positive feedback

about the courseware (Ahmad, Noordin, & Shariffudin, 2013).

A system for students under the age of 6 to 12 years old in all countries in Malaysia was also developed. The program is developed to ensure that all children in that age category are able to recite Al-Quran properly, and also can learn and practice basic things that are necessary (fardhu) for a muslim. In order to form a strong foundation of Islamic Studies and knowledge of Islam among these children, KAFA subjects are taught in primary schools in this country. Alternatively, the program was also conducted in other places such as mosques, kindergartens, and other places deemed appropriate for its delivery. The developed system was used by students and teachers in the process of teaching and learning of KAFA subjects. The students used the system based on their learning pace, according to their preferred learning styles. Innovative elements such as storyboarding, scripting, pedagogy of teaching, Islamic content presentation, user interface design that improve visualization and presentation, simulation, drill and practice, tutorial, multistage quizzes, test, game, and links to web-based learning are integrated in this courseware (Isa et al., 2010).

Incorporating commercially available computer games into the classroom through the use of gamification is a big challenge to educators. "Gamification desires to combine intrinsic motivation with an extrinsic one in order to raise motivation and engagement" (Muntean, 2011). Typically, these game elements include items such as points, leaderboards, and badges (Barata, Gama,

Jorge, & Gonçalves, 2013), however, game elements also can include avatars, three-dimensional environments, feedback, ranks, levels, competition, communication systems, and time pressures (Deterding, Dixon, Khaled, & Nacke, 2011). Gamification's impact on student motivation and performance is an important topic, as there has been increased interest in gamification at the college level (Hanus, & Fox, 2015). Lambton College in Sarnia, Ontario, has recently announced intentions to incorporate gamification into its curriculum to better reach mobile-savvy students and increase student engagement. The college is now able to design curricula that include avatars and scoreboards (Kloet, 2014). Fanshawe College in London, Ontario, is using gamification elements (e.g., goals, rules, and feedback systems) to engage children and adults in improving their literacy skills (Beach, n.d.). Ensuring students are engaged in their learning in post-secondary environments is critical as student engagement "is positively related to academic outcomes as represented by first year student grades and by persistence between the first and second year of college" (Kuh, Cruce, Shoup, & Kinzie, 2008).

This study provides answer to the needs of the students with disabilities. This serves as an educational tool to be used by the students with special needs and teachers for it offers innovative system equipped with different activities to help and support the students' special needs. It shall also be useful to the teachers for it provides them materials to support their teaching methodologies for

students with disabilities and special needs.

**Conceptual Framework**

This study uses the Input-Process-Output (IPO) diagram. An IPO diagram is widely used approach in system analysis and software engineering because it is a graphical representation of all of the factors that make up a process. An input-process-output diagram includes all of the materials and information required for the process, details of the process itself, descriptions of all of the products and by-products resulting from the process.

The input is composed of the existing processes in teaching exceptional learners in different SPED schools in Dagupan City, the hardware and software requirements needed in the development of the system and the features to be included in the system.

The process includes ADDIE Model, which is divided into five phases such as analysis, design, development, implementation, and evaluation. This model serves as guide for developers during the course of system’s development along with the traditional way of teaching.

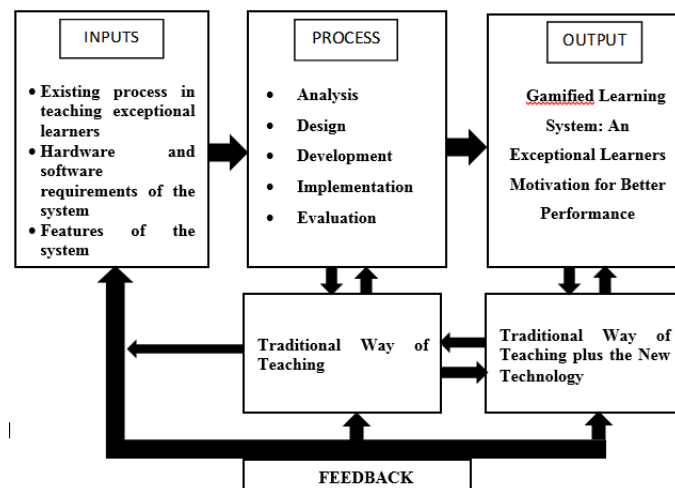


Figure 1. Paradigm of the Study

The output is the Game-Based Learning System: An Exceptional Learners Motivation for Better Performance which is a new technology that can be use in the traditional way of teaching. Fig. 1 shows the paradigm of the study which uses the Input-Process-Output Model.

The study aimed to design and develop a gamified learning System for SPED schools in Dagupan City. It attempts to answer the following

questions: (1) What are the existing processes in teaching exceptional learners in different SPED schools in DagupanCity?; (2) What are the hardware and software requirements needed in the development of the system?; (3) What are the features of the system?; and (4) What is the level of acceptability of the system? The purpose of the study is to enhance learning abilities of the exceptional learners by developing and designing a gamified learning system. The study

specifically sought to: (1) Identify the existing processes in teaching exceptional learners in different SPED schools in Dagupan City; (2) Determine the hardware and software requirements needed in the development of the system; (3) Determine the features of the system; and (4) Test the acceptability of the system. This study is deemed significant for the following:

- To the Exceptional learners. Through this learning system it could help exceptional learners in their lessons and it will provide a well—organized and structured learning materials. Moreover, interactive learning with video, audio, graphics and question and answer activities keep learners interested and it reinforces their skills. Because it is exciting, challenging and fun to use, it encourages learners to maximize the use of the program. Therefore, learning is absorbed and integrated into daily performance through drill and practice. This learning system is flexible because learners can access in computer laboratories and in their own machine.
- To the SPED Teachers. Through the use of the learning system, teachers could give more opportunity to understand both visual and verbal comprehension of their learners. The highly presence and motivation of the teachers also bring positive aspects to learners so that they can improve their skills.
- To the SPED Schools. The system shall enhance the institution using this modern technology, as well as, in

exploring new techniques of educating students through the use of computers. Thus, offering a high standard to improve the quality of education, which is beneficial on the part of the institution to help the learners.

- To the Developers. This study shall help developers in improving the skills that are to be gained on schooling. It increases the work performance of the developers while conducting the study. It also allows the developers to apply and develop the knowledge, abilities, investigative thinking and all the things that come from the instructors, trainers and adviser which are essential in designing and developing the application to be utilized by the institution.
- To the Future Developers. The study shall serve as a guide for other developers who will attempt to conduct a similar study. The theories on the current study will serve as a stepping stone for the future developers to formulate their own idea and help them pursue similar project or develop similar application.

The study focused on the learning enhancement through gamified learning system. This study was limited to four (4) types of exceptional learners like autism, hearing impairment, intellectual disability and speech and language impairment. The respondents were both female and male, ages six (6) to eighteen (18) years old. The system is consists of different types of learning activities with animation, sounds and videos. The

system also caters games to encourage the exceptional learners to participate.

However, the study will only provide basic learning activities; this reading and other difficult lesson that does not suit to their intellectual ability are not included. These factors may alter or give inaccurate result to the study therefore exclusion was made. This ensures that the data collected would give a precise and accurate result on the study.

## **MATERIALS AND METHODS**

This study utilizes the descriptive-development method of research. It is said to be a descriptive method because it is a fact-finding study that involves describing, explaining, and interpreting the conditions of present. Through descriptive method, it is also concerned with conditions, practices differences or relationship exists and interaction between the participants. On the other hand, it is developmental because the developers will develop and design a system based on the specification of the clients. Developmental method is a systematic study of developing, designing and evaluating instructional programs, process that must meet the criteria for the acceptability of the system.

In developing technology based educational activities, ADDIE Model was used to build an effective e-learning courseware approach. It enables both the client and the students to provide an early feedback in the project development. This approach to rapid courseware prototyping can reduce the time required of programmers, instructional designers, authors, and subject matter experts, while making that time spent more focused and

useful for the courseware design and development process.

The ADDIE instructional design model is the generic process traditionally used by instructional designers and training developers. The ADDIE model is at the very core of instructional design and is the basis of instructional systems design (ISD). There are various adaptations of the ADDIE model, but it generally consists of five cyclical phases— Analysis, Design, Development, Implementation, and Evaluation. These processes represent a dynamic, flexible guideline for building effective training and performance support tools. This model attempts to save time and money by catching problems while they are still easy to fix. With the help of this methodology, the user could easily understand the project through the approach of the developers in every change that is being developed in the project study.

In order to gather needed information, the researchers used different instrumentation to support the requirements gathered from the client. The instruments include document analysis, observation, and interview.

## **RESULTS AND DISCUSSIONS**

The researchers found out that SPED schools in Dagupan City are using a traditional way of education. The researchers decided to develop a system that will enhance the learning instruction for the exceptional learner's through gamified learning system.

## **Existing Processes in Teaching Exceptional Learners**

Exceptional learners are often the most challenging to teach. The teacher has the more difficult task of individualizing the instructions to the student. The exceptional learners may seem to have strengths that are similar to other children, but the rate of their learning ability is unexpectedly slower. A learning disability can cause a person to have trouble in learning and in using certain skills. The academic performance indicates that exceptional learners need to learn better and faster.

1) **Worksheet.** These worksheets can help the facilitator or the teacher to evaluate whether the exceptional learner is improving in his or her learning capability. The developers provided worksheets for the exceptional learners. The provided worksheets are printable for them to learn better and improve faster.

2) **Curriculum based assessment.** The Curriculum based assessment is design in recording student's performance that will serve as a basis in planning the instructional purposes for the students. The teachers typically follow the sequence of the outline-curriculum based assessment and focus on content coverage. It will help the teacher to assess what would be the instructions to be delivered to the exceptional learners.

3) **Oral Instruction.** Present test and reading materials in an oral format so the assessment is not unduly influenced by lack of reading ability. Provide learning disabled students with frequent progress checks. Let them know how well they are progressing toward an individual or class

goal. The developers developed the system in order to make a change in exceptional learner's education environment. The system provides a feature that would help exceptional learners to understand every topic clearly and better. It provides a mechanism that facilitates the exceptional learners on how to pronounce the letters and read the words correctly. This mechanism will be able to help the students to understand what he or she reads and is able to answer the specific question that is being asked.

## **Hardware and Software Requirements**

Hardware and software specification tells about the details of the specification hardware and software resources, so that the system specification remains independent of the target system. On behalf of the users, the developers provide appropriate and minimum hardware and software specification of any device accessing the system.

Hardware has the entire component that makes your particular device work and must be capable of supplying the needs of the multimedia system and that's why the developers should specify the quality of the needed devices for the deployment of the learning system. Multimedia capabilities are needed to support the preparation and presentation of the multimedia. The basic elements that makes up the multimedia computer is a processor capable of supporting audio and video, interactions tools such as keyboard and mouse, screen for displaying text, graphics and images, speakers and microphones, playback devices such as the CD-ROM to access recorded materials.



Software is the interfacing medium between the courseware developer and the hardware. In multimedia presentation the software is required to capture text, images, sounds and animations in a single digital environment. Software requirements also should be specified for the better feature of the system, the hardware and the software should be compatible not to cause any complication during the deployment of the learning system for the exceptional learners.

### **Features of the System**

With the observations and interviews, the researchers found out what will be the best tool on how to develop the gamified system effectively for the exceptional learners through the use of multimedia. The researchers developed the system in order to enhance the exceptional learner's educational environment and approach. The system provides features that help exceptional learners understand the subject matter clearly and better. It provides a mechanism that facilitates the learners to pronounce the letters and read the words correctly. This mechanism also helps the learners to understand what they read and answer specific questions that are asked.

Student module caters mechanism for the student to be familiar with the lessons and activities in the class. The multimedia serves as the navigational tool that allows users to pass through the information. Integration of multimedia into instruction can help reduce curriculum barriers and improve learning for all students. It increases student efficiency and motivation. It also facilitates active learning and experiential

learning. It is consistent with student-centered learning and leads to better learning.

Incorporating games in the system solves problem on exceptional learners not coping up with lectures using the traditional way of teaching. Teachers can use activity area with games as a motivational tool for students. Students are naturally motivated to study more and pay attention during class if they know that later they will be tested on the material in front of their peers. Students enjoy reviewing the concepts they have recently studied. Activity area allows students to build on prior knowledge and reinforce concepts which may have been unclear to them.

The developed system included some games activities that can help, whether the exceptional learners learned from the played videos or demonstrations including the worksheets that can be printable. Teacher module is intended for teachers. This is where teachers can manage their account, can manage their class, view class resources for all types of exceptional learners, enlist students, set student type, and print reports.

Class resources of all types of exceptional learners are important feature of the system under teacher module. Through this feature, teachers can view all teaching resources that they can use for the different types of exceptional learners where teachers can access lectures for every type of exceptional learners. It also includes worksheet which teacher can print. Teacher can also manage assessment questions through the system. The developed system included some activities that can help, whether the

exceptional learners learned from the played videos or demonstrations including the worksheets that can be printable. The system also provides report for teachers on their student performances. They can view the reports on how many times a student takes a quiz and the student score in each try. Teachers can also set up student quiz. They can set new questions for different types of exceptional learners and they can also view existing questionnaires. Teacher can add quiz or export questionnaires.

### Acceptability of The System

Upon the completion of the system, the developers conducted a test to determine the satisfactory of the system. The developers presented the developed system to the stakeholders, particularly to the student of different school in Dagupan City. An acceptability test was conducted that may prove that the developed system will be esteemed and accepted by the educational system.

Table 1 shows the overall system acceptability as to Usability, Design, User Friendliness and Navigation.

Table 1. Overall Acceptability of The System

Summary	Overall Acceptability of the System	
	Response	Description
System as to Usability	4.6	SA
System as to Design	4.7	SA
System as to User Friendliness	4.5	SA
System as to Navigation	4.4	A
<b>Pooled Mean</b>	<b>4.5</b>	<b>SA</b>

Legend: SA-Strongly Agree; A-Agree; N-Neutral; DA-Disagree; SD-Strongly Disagree

The target user is satisfied with regards to the content of the system. Based on the rating, the developers are motivated to enhance the functionality of the system. The target user strongly agrees with the ratio of 4.5 which mean that the system has the functionality needed in their business process.

### CONCLUSION

The technology incorporates multimedia and the curriculum based assessment were the basis of the developers on determining the content of the project developed; the project provides a more interactive way of

teaching and new learning environment for the exceptional learners. Thus, it could support the traditional method of learning since it allows user to study the lessons that are based from the curriculum-based assessment.

The features of the project provide an easy to use interface and the project can bring a new dimension of learning since it provides a new method on the Special Education Program.

The inclusion of gamified elements such as points, badges, achievements, leaderboards, and levels resulted in positive effects on learner motivation among exceptional learners.

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