

**Article Info:**

Published Date: 01 August 2023

\*Corresponding Author: vanesri90@gmail.com

## THE DESIGN AND DEVELOPMENT OF THE ‘GRID AND GAME’ MODULE USING THE ADDIE MODEL FOR REMEDIAL PUPILS

Vanesri Kasi<sup>1</sup>, Rozniza Zaharudin<sup>2</sup>

<sup>1,2</sup>School of Educational Studies, Universiti Sains Malaysia (USM),  
Gelugor, Penang, Malaysia

**To cite this article (APA):** Kasi, V., & Zaharudin, R. (2023). The Design and Development of The ‘Grid and Game’ Module Using the Addie Model for Remedial Pupils. *KUPAS SENI*, 11(2), 23–31. <https://doi.org/10.37134/kupasseni.vol11.2.3.2023>

**To link to this article:** <https://doi.org/10.37134/kupasseni.vol11.2.3.2023>

### ABSTRACT

Mathematics is a compulsory subject in primary and secondary school curricula in Malaysia. Even though it is important and needed in daily life, there are many pupils who are afraid of this subject, especially during tests and examinations. This happened among the mathematics remedial pupils, as they have not mastered the basic arithmetic skills as required. Thus, this study explores the design and development process of the ‘Grid and Game’ module. This module plays a vital part in delivering the understanding and knowledge of multiplication skills for remedial pupils. Thus, the ‘Grid and Game’ module should be designed attentively and systematically. The aim of this paper is to provide specific information about the instructional design and development of the ‘Grid and Game’ module by applying the ADDIE model. One of the instructional design methods that many researchers widely use is the ADDIE model because it is relevant to the standard of learning and designing which provides good procedure input in designing the instructional module. The five phases in the ADDIE model are analysis, design, development, implementation, and evaluation. The result of the evaluation shows this module can enhance remedial pupils’ understanding of mastering multiplication skills.

**Keywords:** Mathematics, ADDIE model, Multiplication, Remedial, Module

### INTRODUCTION

#### Remedial Education

Remedial education is a vast field of study that involves many different methods, a stimulating learning environment, and the provision of engaging activities to give students an opportunity to gain experience that could expand their knowledge and improve fundamental abilities. Many children still face difficulties in literacy and numeracy (Mohd Asnorhisham & Abdul Rahim, 2017). According to the indicator of the percentage of students at each proficiency level in Mathematics in the Year 2018 by the Program for International Student Assessment (PISA) shows 69.8% of 15-year-old students are below level three out of six levels (*PISA 2018 Results (Volume I)*, 2019). This shows the importance of enhancement in Mathematics from the root of education which begins with early childhood education and primary school education. The fundamental goal of teaching is to help students learn as effectively as possible by making a conducive

atmosphere for teaching and learning. Throughout the teaching and learning process, teachers must plan the adoption of effective teaching tactics, especially when students' academic performance starts to decline (Mariappan, P., Khairani, M. Z., & Chanthiran, 2022). Thus, the researcher focused on the enhancement of Multiplication skills for remedial students.

### **Visual Approach in Mathematics**

Mathematics is one of the main subjects in all types of primary schools in Malaysia. Learning Mathematics will ensure children adapt to mathematical challenges which the future live will present them. The remedial students pay lack interest in Multiplication when compared to other numeracy skills. Addition, subtraction, multiplication, and division are basic and initial skills in numeracy. Thus, it is vital to master the multiplication operation skills before furthering other operations of Mathematic (Ahmad & May, 2018). Teachers can increase students' knowledge of mathematical ideas by using a visual approach. Some pupils, especially those who are visual learners, find it challenging to comprehend mathematical concepts when they are presented verbally. This method aids children with inadequate mathematics skills in developing independent problem-solving and reasoning since it stimulates interaction with real items and hands-on activities. Students are helped by the visual approach's tools, including as drawings and manipulatives, to make the connection between an abstract mathematical concept and the real world (Embong et al., 2019). For this purpose, the researcher will design and develop Grid and Game module with integrating ADDIE model as one of the strategies to strengthen multiplication skills among remedial students.

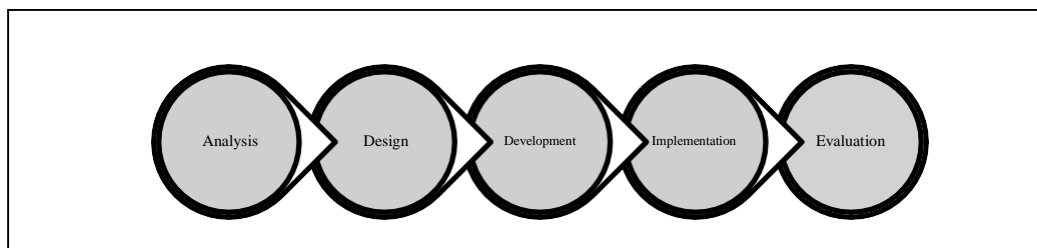
### **PURPOSE OF THE STUDY**

The purpose of this study is to explain the flow of the ADDIE model as an instructional design in the development of the 'Grid and Game' module to systematically design, implement and evaluate in order to achieve the objective of the module.

### **INSTRUCTIONAL DESIGN OF ADDIE MODEL**

There are many types of instructional design models used by researchers in designing and developing teaching and learning modules that use their strategy to achieve the respective objective. The instructional design is a systematic process that needs carefully select to produce educational teaching and learning modules to master the skill. Thus, the ADDIE model is one of the good models which have approaches that are able to guide in designing and developing teaching and learning module (Stapa & Mohammad, 2019). In order to design and develop teaching and learning modules we need a well-structured system to ensure the training designed is able to produce effective output for the students. The element in the ADDIE model is an effective approach for any content developer to produce modules efficiently and in any environment as online or face-to-face (Aldoobie, 2015).

As the ADDIE model is well known for its structure and flexibility, it is chosen in this study to design and develop the 'Grid and Game' module. This model also has many types of techniques to use as final evaluation either formative or summative (Abd Razak et al., 2020). As the ADDIE model is flexible in designing module, the creator can modified to make suit ADDIE model which comprises five main phases of analysis, design, development, implementation, and evaluation replicated the main domains of 'Grid and Game' Module elements. Figure 1 shows the stages of the ADDIE model.



**Figure 1** ADDIE Model

## **ANALYSIS**

According to ADDIE model, analysis is the first step in developing teaching and learning module. This phase is crucial for the development of a module since it identifies the actual problems that are plaguing the population under study (Gagne et al., 2005). The analysis phase is conducted to determine the problems and requirements of the target as well as to research in the demands of the criteria required for the creation of this module (Lee, Mohd Nor & Wong, 2022). During the development phase of the module activities, the needs of the target and the module are considered (Abd Razak et al., 2020). The researcher explores the issues faced by remedial teachers in this phase. Researcher collects the information about the low mastery remedial Mathematics skill among remedial pupils. Researcher also collect extra information on pupils desired knowledge, attitude in class and what needs to be taught to enhance pupils understanding.

According to Sahaat et al., (2020), the analysis process needs to be done with four aspects which are:

- a. analyze the existing knowledge of the pupils in the respective skill,
- b. analyze the standard content of the applied skills integrated in the curriculum standard,
- c. analyze the standard learning of the applied skills integrated in the curriculum standard,
- d. analyze the standard performance of the applied skills integrated in the curriculum standard.

The analysis step been carried out through focus group interview among Remedial Mathematics teachers. The interview questions been started with pupil's background of family and education. The first few questions are focus on pupils' interest in learning Mathematics. The following questions routed to discover main problem which is teachers' opinion and view about the less mastery topics in Mathematics to be give more enhancement. Before continuing to the next stage in the ADDIE model, educators must first determine learners' current knowledge and abilities, motivation to study the subject, and learning preferences.

## **DESIGN**

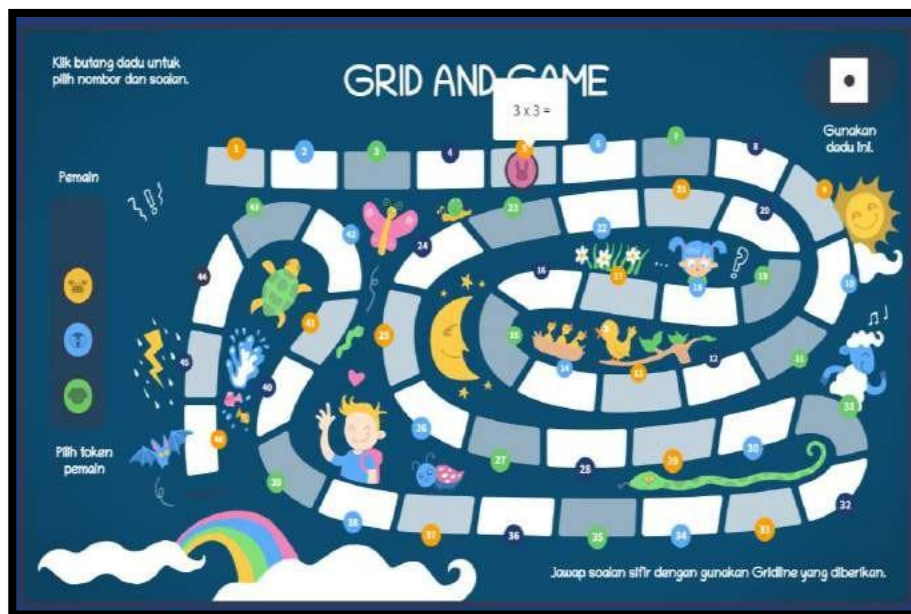
The second step in ADDIE model after analysis process is design phase. This second step's goal is to create a suitable teaching strategy that will enable the objectives to be met. Since the creation of the curriculum encompasses not only the curriculum's content, the topics covered in each subject, and the teaching resources, but also the teaching and learning methodologies, planning and choosing the best design of pedagogical approach is crucial (Curry et al., 2020). The emphasizing, inquiry, analysis, concept generation, problem-solving, and process evaluation are the major ways that researcher succeed in design the topics for the module (Sahaat et al., 2020). Using the information acquired during the need analysis, the learning materials were designed during this step. Researchers created the Grid and Game module based on the information acquired, integrating all the facts that had learned about the students' learning needs and

the challenges they had when learning Mathematics skills. As a result, the materials were designed to address the difficulties and expectations, and the module was also designed to correspond with their Mathematics national school curriculum.

Throughout the design phase, researchers built a broad foundation for how instruction will be delivered. This involves deciding on the best teaching strategies and creating realistic, practical learning goals to guide the learning process. In this phase the researcher designed the Grid and Game module based on information gathered in need analysis phase. The researcher found multiplication skill is the topic to be focused on enhancement activity through Mathematics PINCH data of remedial pupils. The researcher designed the grids as an intervention to mastery Multiplication skill and designed web-based game using Edpuzzle. The researcher acquired the design requirements during the design phase in order to create the first outline of the Grid and Game module prototype. The Grid and Game module designed

## DEVELOPMENT

The third phase of the ADDIE model is development. The analysis and design stages, which make up the first two phases, are dependent on this phase. This implies that if we completed these phases properly, development would be simpler (Aldoobie, 2015). The third stage is where the researcher incorporates all the information into the learning environment and procedures. This phase is carefully planned in term of selected topics in particular standard content, problems that need to be solved, pupils learning objective, situation and environment of task design, content of the module and proposed learning process to complete the objective (Sahaat et al., 2020). In this same vein, the researcher developed the Grid and Game module focused on pupils' comprehension of the activities and objectives to be achieved. The use of games in the classroom increases students' desire to learn and motivates them to delve deeper into each subject (Tagie, G., Merman, H., Taharuddin, N. S., & Ibrahim, 2022). The researchers created an interactive module that indicated the students' level of ability in Multiplication skill. In the development phase, multiplication games created using web based in Genially website and E-lesson plan created for teachers' guidance. Figure 2 shows the web-based game for multiplication.



**Figure 2.** Web-based Multiplication Game

The designed module then sent to experts in the field of Mathematics and Remedial Education to validate and to get comments and feedbacks. The feature of the module shows the indicator on how the good module to be developed. An illustration of a module assessment tool is shown in table below.

**Table 1** Module Assessment Instrument

Feature	Aspect	Indicator
Content	Curriculum	Material suitability with pupils' basic ability.
		Material suitability with learning objective
		Material is supported by appropriate media.
		Material is easy to understand.
		Material provides sources to learn something.
Learning design and media	Strategy	Attract pupil's interest
		Able to motivate pupils
		Material delivery is systematic
	Technical	Simplicity of the module
		Module able to help pupils understand lesson
	Display	Videos and pictures are catchy
		Suitable font size and space

**Adapted from:** (Jais et al., 2022)

## IMPLEMENTATION

The fourth phase in the ADDIE model is implementation. The use of learning and teaching modules for the multiplication skill in the classroom is referred as the implementation step. Evaluation of the Grid and Game module's effectiveness and viability is the goal of implementing or carrying out the module for pupils in classroom. The experimental design, which involves of control and treatment groups, is the research methodology suitable for the implementation of this module as proposed by this study (Yoong, 2022). The teaching and learning strategies used by the control group can be in traditional way while the Grid and Game modules used by the treatment group. The experimental research design is effective at clearly articulating a phenomenon linked to cause and effect by choosing two independent groups and hypothesizing that both groups share the same characteristics (Schoonenboom & Johnson, 2017). Subsequently, the Grid and Game module was then introduced in this phase to 60 Year Three students in one of the primary schools in Kuala Muda district in Kedah. During this phase, the module will be implemented among remedial pupils for eight weeks. Therefore, the researcher will assess the module effectiveness on remedial pupils throughout this phase. The following phase, which is evaluation, will begin after this module has been effectively implemented to the pupils with the aid of qualified remedial Mathematics teachers.

## **EVALUATION**

The final phase of the ADDIE model is evaluation. The evaluation stage is the last one to get input on how the teaching and learning module is being used. The evaluation process is crucial for determining the pupils' learning progress as well as their comprehension of the material, activities, and results from implementation of Grid and Game module. This phase of the learning process should involve formative evaluation, and summative assessments by analyzing the module's implementation results at its conclusion. The researcher suggested an informal formative evaluation through in depth interview with Remedial Mathematics teachers and analysis of the pupil's grid activities and game results makes it easier to give enough and detailed feedback on how well the students comprehend and use the Grid and Game module.

According to Sahaat et al., (2020), Some essential factors that must be taken into account while evaluating the teachers' traditional and experimental instruction are:

- a. Duration of teaching time
- b. Provision of teaching aids
- c. Preparation of lesson plan
- d. Cost involved

The evaluation phase is vital to discover whether the module's objective is achievable. This evaluation procedure plays an important role for determining whether the content of the module has attained the necessary level (Muslimin & Mansor, 2017). Interviews with the group of four teachers working on this Grid and Game module will be held after the assessment test. Strengths and limitations of the module might be determined during this evaluation step. All of this data is evaluated in order to improve the module. The final evaluation's effectiveness test revealed that this Grid and Game module might improve students' performance and achievement in multiplication skill. This module completed the experimental test with excellent results and can be utilized for remedial pupils. The results of the interviews further confirmed that the strategies and activities were appropriate for remedial pupils. Students and teachers who complete this module will also have a better understanding in mastering multiplication skill. As a result, the Grid and Game module's objective was successfully met.

Table 2 shows the summary of ADDIE model phases that implemented in Grid and Game Module:

**Table 2.** The ADDIE Model and the Process

Phases in ADDIE Model		Process from the ADDIE Model
1.	Analysis	<ul style="list-style-type: none"> <li>▪ Need analysis</li> <li>▪ Focus Group Interview with teachers</li> <li>▪ Background information of family, previous performance, PINCH data of Remedial Mathematics</li> </ul>
2.	Design	<ul style="list-style-type: none"> <li>▪ Create module's Objective</li> <li>▪ Select the samples</li> <li>▪ Integrating theories</li> <li>▪ Interactive and hands-on activity</li> <li>▪ Incorporating visual activities</li> <li>▪ 'Grid and Game' module prototype</li> </ul>
3.	Development	<ul style="list-style-type: none"> <li>▪ Pilot test of module</li> <li>▪ Content Validity</li> <li>▪ Language Validity</li> <li>▪ Reliability</li> </ul>
4.	Implementation	<ul style="list-style-type: none"> <li>▪ Implementation of 'Grid and Game' module</li> <li>▪ Formative evaluation of the module after each activity to reveal its flaws and strengths.</li> </ul>
5.	Evaluation	<ul style="list-style-type: none"> <li>▪ Formative evaluation</li> <li>▪ Evaluation of module effectiveness</li> <li>▪ In depth interview with teachers</li> </ul>

The ADDIE procedure utilized to create this Grid and Game module was the main topic of this paper. The results from each phase will be covered in more detail in upcoming publications. Each phase's findings start with data from the needs analysis and end with a test of the module's effectiveness and evaluation in the last step. The phases of this module's development are complementary to one another and backed by findings, evidence, quantitative analysis, and discussions with pupils and teachers. The ADDIE strategy is used in module development since it's a practical method for creating this module's final product. To create a high-quality product, this methodical procedure is completed in a way that complements one another, followed by testing and improvements to increase the module's effectiveness.

## CONCLUSION

The Grid and Game module was developed using the ADDIE approach, which has shown to be successful. Each stage has a wide range of processes for systematic improvement and is connected to each other's. It has a clear and pertinent procedure that must be followed, with the crucial data (input) from one phase serving as the output for the subsequent stages.

Future researchers are anticipated to benefit from an overview of the ADDIE model method in creating innovative education modules. The goal of creating this Grid and Game module was to create pupils who were competent in multiplication skill through the activities created in this module and the five ADDIE model phases. As it has been demonstrated to assist in producing evidence-based research in order to produce a high-quality output, the researcher is recommending that the ADDIE model be used more broadly in the field of education and as a reference in other fields.

## ACKNOWLEDGEMENT

The researcher acknowledges the Ministry of Education (KPM) for providing scholarships for the researcher's PhD studies. I want to express my gratitude to the supervisor for her guidance in the writing of this research paper. I also would like to thank Universiti Sains Malaysia (USM) for making this research successful.

## REFERENCES

- Abd Razak, A. Z., Surat, S., & Abd Majid, R. (2020). The Design of GIFTED Motivation Module Using the ADDIE Model Approaches Among the Gifted and Talented Students. *International Journal of Academic Research in Progressive Education and Development*, 9(2), 509–517. <https://doi.org/10.6007/ijarped/v9-i2/7494>
- Ahmad, N. A., & May, Y. S. (2018). Challenges in Preparing Teachers for Inclusive Education and Its Impact to Students with Learning Disabilities. *International Journal of Academic Research in Progressive Education and Development*, 7(3). <https://doi.org/10.6007/ijarped/v7-i3/4575>
- Aldoobie, N. (2015). ADDIE Model. *American International Journal of Contemporary Research*, 5(6), 69–73.
- Curry, J. H., Johnson, S., & Peacock, R. (2020). Robert Gagné and the systematic design of instruction. *Design for Learning: Principles, Processes, and Praxis*, 1–12. [https://edtechbooks.org/id/robert\\_gagn\\_and\\_systematic\\_design#chapterTitle](https://edtechbooks.org/id/robert_gagn_and_systematic_design#chapterTitle)
- Embong, Z., Syamimi, N., Adnan, M., Saidin, N., & Ibrahim, H. (2019). Effects of Visual Approach in Teaching Mathematics for Malaysian Secondary School: A Case Study. *Journal of Human Development and Communication*, 8(2013), 97–106.
- Lee, H. Y., Mohd Nor, N., & Wong, Y. S. (2022). Analisis Keperluan Pengajaran Dan Pembelajaran Pendidikan Seni Visual Berasaskan Kolaboratif-Konstruktivis Di Sekolah Rendah. *Kupas Seni*, 10, 90–103. <http://ojs.upsi.edu.my/index.php/JSPP/article/view/6591/3453>
- Mariappan, P., Khairani, M. Z., & Chanthiran, M. (2022). Design and Development Research (DDR) Approaches in the Development of Koin-Art Cooperative Learning Model for Student of Inclusive Education Program. *Kupas Seni*, 10, 66–77.
- Mohd Asnorhisham, A., & Abdul Rahim, H. (2017). Pendekatan pengajaran secara berkumpulan dalam program pemulihan khas Bahasa Melayu. *Malay Language Education Journal –MyLEJ*, 66(1), 2180–4842.
- Muslimin, M. S. M. N., & Mansor, A. Z. (2017). Using the ADDIE Model to Design and Develop a Mobile Learning Application for Microeconomics Module. *PROCEEDINGS OF THE INTERNATIONAL POSTGRADUATE CONFERENCE ON RESEARCH IN EDUCATION (IPCORE)*.
- Nur Farhana Mohd Jais, Ishak, S. A., & Melor Md Yunus To. (2022). Developing the Self- Learning Interactive Module using ADDIE Model for Year 5 Primary School Students. *International Journal of Academic Research in Progressive Education and Development*, 11(1), 615–630. <https://doi.org/10.6007/ijarped/v11-i1/11919>



- PISA 2018 Results (Volume I). (2019). OECD. <https://doi.org/10.1787/5f07c754-en> RM, G., WW, W., KC, G., JM, K., & JD, R. (2005). *Principles of instructional design*.
- Sahaat, Z., Nasri, N. M., & Abu Bakar, A. Y. (2020). *ADDIE Model In Teaching Module Design Process Using Modular Method: Applied Topics in Design And Technology Subjects*. 464(Psshers 2019). <https://doi.org/10.2991/assehr.k.200824.161>
- Schoonenboom, J., & Johnson, R. B. (2017). How to Construct a Mixed Methods Research Design. *Kolner Zeitschrift Fur Soziologie Und Sozialpsychologie*, 69, 107–131. <https://doi.org/10.1007/s11577-017-0454-1>
- Stapa, M. A., & Mohammad, N. (2019). The Use of Addie Model for Designing Blended Learning Application at Vocational Colleges in Malaysia. *Asia-Pacific Journal of Information Technology & Multimedia*, 08(01), 49–62. <https://doi.org/10.17576/apjitm-2019-0801-05>
- Tagie, G., Merman, H., Taharuddin, N. S., & Ibrahim, N. A. (2022). Gamification in Art and Design Appreciation. *Kupas Seni*, 10(2), 93–103.
- Yoong, S. (2022). Applying the ADDIE Model to Design and Develop an Instrument for Dyscalculia. *Seameo*, 1(January), 55–68. [https://www.researchgate.net/profile/Yoong-May/publication/366861346\\_Applying\\_the\\_ADDIE\\_Model\\_to\\_Design\\_and\\_Develop\\_an\\_Instrument\\_for\\_Dyscalculia/links/63b57caba03100368a51dcdf/Applying-the-ADDIE-Model-to-Design-and-Develop-an-Instrument-for-Dyscalculia.p](https://www.researchgate.net/profile/Yoong-May/publication/366861346_Applying_the_ADDIE_Model_to_Design_and_Develop_an_Instrument_for_Dyscalculia/links/63b57caba03100368a51dcdf/Applying-the-ADDIE-Model-to-Design-and-Develop-an-Instrument-for-Dyscalculia.p)