The Backward Design Mix Metaverse: BDMM Platform to Promote Decision-Making Skills in Higher Education

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Abstract

The backward design mix metaverse platform, or BDMM platform to promote decision-making skills is based on the concepts of backward design integrated with metaverse technology, and it is intended to be used as a tool to promote decision-making skills in higher education. The BDMM platform uses virtual reality technology to design a virtual learning environment in such a way that it can help learners achieve deep learning. The research participants in this study were 10 referees who judged football matches of the students in the Sports Coaching Program at Thammasat University. The research results show that the overall suitability of the development of the BDMM platform is at a high level, and the suitability of the elements of the BDMM platform is at a high level.

Keywords: backward design mix metaverse, BDMM platform, decision-making skills, football competitions

1. Introduction

Technology has been developing in such a dynamic manner that virtual reality can be leveraged in conjunction with football competition, which is widely accepted as the most popular sport in the world (Burdea & Coiffet, 2003). The simulated environment can be either a virtual environment or an imaginary one. To replicate the realistic experiences and to interact with virtual environments, a variety of tools are needed to create visibility patterns that make users see images as if they were in real events (Laowreandee, Kitroongrueng & Sirisamphan, 2017). This is considered a guideline to develop 21st-century skills that focus mainly on learners' ability to learn on their own.

The backward design of Wiggins & McTighe (2005) begins with the completed process of thinking. Thereafter, the real process starts with the desired results (goals or learning standards), which are derived from the courses and regarded as evidence of learning (Performances). After that, teachers or instructors design the instruction plans to equip students with the necessary knowledge to enable them to use the said knowledge to create evidence of learning (Wiggin & McTighe, 2005; Chunpungsuk, Chatwattana & Piriyasurawong, 2021).
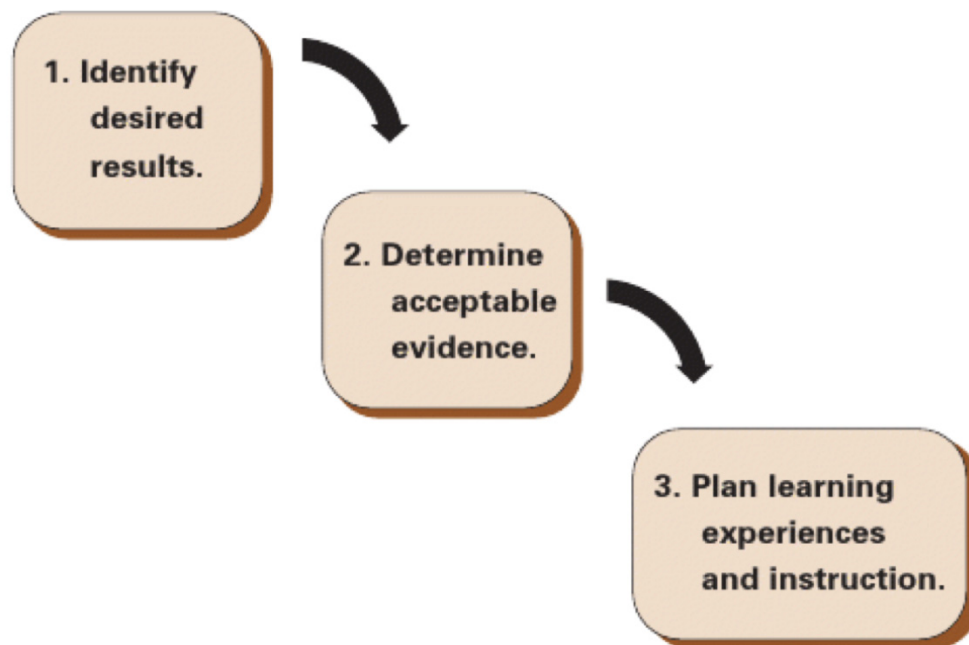
Figure 1. Backward design steps (Wiggins & McTighe, 2005)

Figure 1 illustrates the backward design (Wiggin & McTighe, 2005; Chunpungsuk, Chatwattana & Piriyasurawong, 2021), which can be summarized into three steps as follows:

(1) Identify the desired results: It is advisable to take into account the knowledge, understanding, and abilities of learners when identifying the expected learning outcomes. The sustainable knowledge and abilities, which need to be developed step by step, are the core essence of determining the expected learning outcomes.

(2) Identify acceptable evidence: The backward design provides teachers with guidance to create evidence for assessment in order to examine the learning process. Wiggins & McTighe (2005) defined five behaviors that demonstrate knowledge, abilities, and feelings, that is, (1) explain various things effectively, (2) clearly interpret the specific contexts, (3) apply knowledge or methods in different situations, (4) connect important issues or solve problems based on reasons, and (5) have knowledge and understanding.

(3) Plan learning experiences and instruction: This is related to the consideration of what students need to learn effectively and what must be taught and guided.

Wiggins & McTighe (2005) developed a backward learning management model, starting from defining learning management steps and setting goals for students, then followed by the backward analysis of learning objectives. The design of measurement and assessment consists of three steps, i.e., (1) define the knowledge, (2) define the behavior, and (3) design the activities, respectively.

Metaverse is a virtual reality in which many different people can interact with one another through the 3D images. In other words, these people interact with others in real-time within the same virtual space. The avatars in the metaverse can be personalized to represent a person's expression, which results in more engagement and more interest among students (Mystakidis, 2022). For this reason, the metaverse is considered a new dimension of borderless education management which can be implemented by utilizing virtual reality technology in order to enhance the ability to access shared resources (Sapliyan, Chatwattana & Nilsook, 2023) by exchanging information through a 3D virtual world (Damar, 2021). In addition, with the aid of metaverse technology, learning activities can be organized in an immersive learning environment, which is believed to help learners achieve deep learning through their experiences (Wannapiroon, 2022).

Football rules refer to the international football rules and regulations provided by the International Football Association Board (IFAB), whose members include the Football Association, Football Association of Wales. Scottish Football Association, Irish Football Association, and Federation Internationale de Football Association (FIFA). Referees are responsible for observing the rules and administering the game while making decisions on such matters as fouls, free kicks, throw-ins, penalty shootouts, and extending the play time. Referees may consult

assistant referees at any time, although the main duty of assistant referees is to judge when the ball has left the field of play including the throw-ins by both teams (Dunning, Maguire & Pearton, 1993; FIFA, 2002).

According to the principles and theories above, the researchers birthed an idea to apply the concepts of backward design in combination with metaverse technology in order to design the BDMM platform to promote football decision-making skills through virtual reality technology. At present, virtual reality technology is so popular that it is often used to promote and provide opportunities related to knowledge creation, knowledge exchange, and collaboration. This results in elevated quality of social services via network systems, especially in the education field in Thailand, which is said to lead to unlimited access to information.

1.1 Research Objectives and Hypotheses

(1) To synthesize the conceptual framework of the BDMM platform to promote decision-making skills in higher education

(2) To develop the BDMM platform to promote decision-making skills in higher education

(3) To study the results of the BDMM platform to promote decision-making skills in higher education

The hypotheses are the development of the BDMM platform is the overall suitability is at a high level.

2. Research Methodology

This research is related to the development of the BDMM platform, and the research methodology is as follows:

2.1 Participants

The research participants were 10 referees who judged football matches of the students in the Sports Coaching Program at Thammasat University.

2.2 Research Instruments

The tools employed in this research consisted of (1) the BDMM platform, and (2) the evaluation form on the suitability of the BDMM platform.

2.3 Research Methodology

The research methodology designated to design this model is based on the system approach (Khemmani, 2010; Utranan, 1982), which can be divided into three stages as shown in Figure 2.
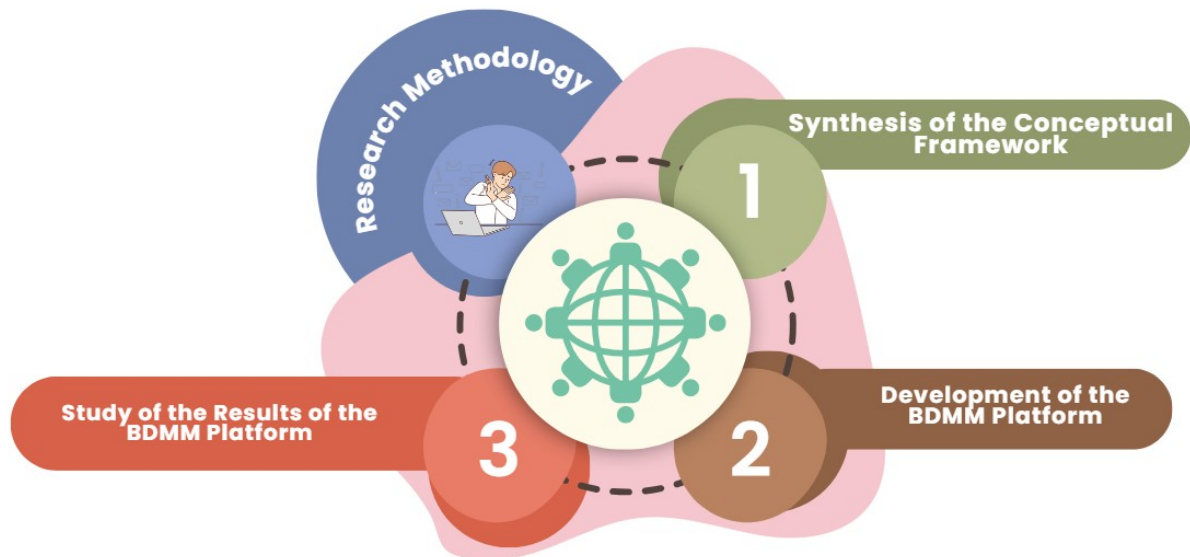

Figure 2. Research methodology

Stage 1: Synthesis of the conceptual framework and learning process of the BDMM platform. The researchers studied and analyzed the documents and the researches, which concerned backward design, metaverse, football rules, and decision-making skills.

Stage 2: Development of the BDMM platform. In this stage, the researchers based the design and development of this platform on the principles of backward design, metaverse technology, and system approach.

Stage 3: Study the results of the BDMM platform. The researchers employed the research tools to find out the results after having the experts use the said platform. The 10 referees in this research who were derived using means of purposive sampling, which met the criteria for evaluation and the levels of suitability (Kanasutra, 1995).

3. Results

The BDMM platform to promote decision-making skills in higher education can be summarized as follows:

3.1 The Synthesis of the Conceptual Framework and Learning Process of the BDMM Platform to Promote Decision-Making Skills in Higher Education

From the synthesis of the conceptual framework and learning process of the BDMM platform. To establish the conceptual framework of this research, the researchers had studied and analyzed the documents and research, regarding backward design, metaverse, football rules, and football decision-making skills, the conceptual framework of this research is shown in Figure 3.
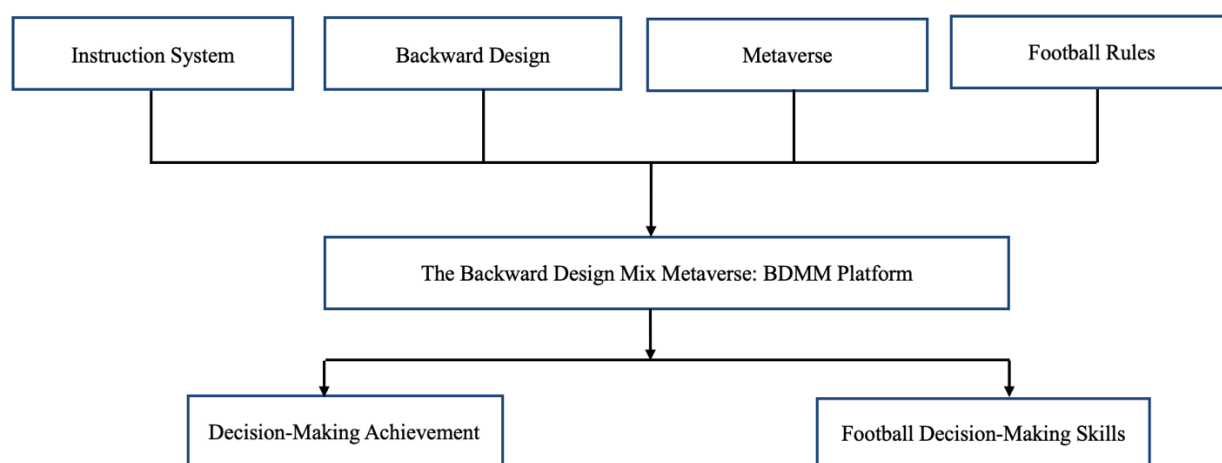

Figure 3. Conceptual framework of the BDMM platform

3.2 Results of the Development of the BDMM Platform to Promote Decision-Making Skills in Higher Education

The development of the BDMM platform is based on the concepts and the steps of backward design integrated with metaverse technology. Besides, the judgment tools of referees were also used in this development as guidelines for judging the game and creating understanding. It is expected that the BDMM platform can appropriately satisfy the needs of both learners and referees as they can take action and work together through a virtual environment. The details of the BDMM platform to promote decision-making skills in higher education are shown in Figure 4.
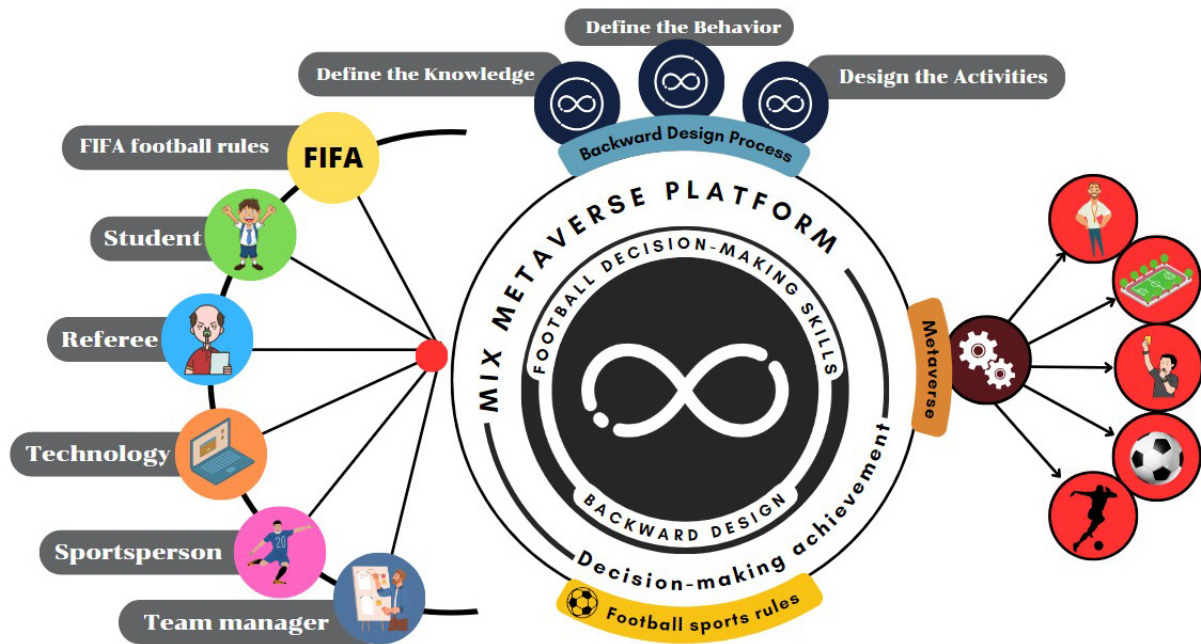
Figure 4. The BDMM platform to promote decision-making skills in higher education

Figure 4 illustrates the BDMM platform, which consists of four main elements as follows:

(1) Input factor: This element refers to the overall environment in the design of the BDMM platform, that is, FIFA football rules, student, referee, technology, sportsperson, and team manager (coach).

(2) Backward design mix metaverse process (BDMM process): This element is related to the design that begins with the completed process of thinking. The real process then starts with the desired results (goals or learning standards), followed by the design of instruction plans aimed to equip students with the necessary knowledge that can be used to create their works. The backward design mix metaverse process is divided into two sections as below:

1) BDMM process, which consists of three steps, that is to identify the desired results, identify acceptable evidence, and plan learning experiences and instruction, respectively. The design of measurement and assessment consists of three steps: (1) define the knowledge, (2) define the behavior, and (3) design the activities, respectively.

2) Metaverse, a virtual reality in which many different people can interact with one another through the 3D images. In other words, these people interact with others in real-time within the same virtual space, using avatars to represent their expression, thereby resulting in more engagement and more interest in learning. Metaverse in this research is composed of five elements, which are all in the form of virtual reality; team manager, referee, football field, ball, and sportsperson.

(3) Output: This element refers to decision-making achievement and football decision-making skills.

(4) Feedback: This includes the results of decision-making achievement and the scores of football decision-making skills.

3.3 The Study of the Development of the BDMM Platform to Promote Decision-Making Skills in Higher Education

The study of the BDMM platform to promote decision-making skills is shown in Table 1 and Table 2.

Table 1. Results of evaluating of the BDMM platform (overall elements)

Items for evaluation	Assessment results		Interpretation of results
	Mean	SD	
1. What is the level of suitability of the principles and the concepts used to develop the BDMM platform?	4.43	0.53	High
2. What is the level of suitability in the elements of the BDMM platform			
2.1 Input factor	4.29	0.76	High
2.2 BDMM process	4.57	0.53	Highest
2.3 Output	4.57	0.53	Highest
2.4 Feedback	4.43	0.53	High
Overall average	4.46	0.36	High

According to Table 1, it is found that the overall suitability of the BDMM platform is at a high level (Mean = 4.46, SD = 0.36). It can be summarized that the BDMM platform to promote decision-making skills contains the principles and concepts that can be used as guidelines to develop the tools for making decisions in football competitions that are organized with the aid of metaverse technology.

Table 2. Results of evaluating on the suitability of the BDMM platform

Items for evaluation	Assessment Results		Interpretation of results
	Mean	SD	
1. Input factor			
1.1 Student	4.43	0.79	High
1.2 Referee	4.29	0.76	High
1.3 FIFA football rules	4.00	1.00	High
1.4 Technology	4.57	0.53	Highest
1.5 Sportsperson	4.29	0.76	High
1.6 Team manager	4.43	0.53	High
2. BDMM process			
2.1 Backward design steps			
2.1.1 Identify the desired results	4.43	0.53	High
2.1.2 Identify acceptable evidence	4.43	0.79	High
2.1.3 Plan learning experiences and instruction	4.57	0.79	Highest
2.2 Metavese			
2.2.1 Team manager	4.43	0.53	High
2.2.2 Referee	4.71	0.49	Highest
2.2.3 Football field	4.14	0.69	High
2.2.4 Ball	4.14	1.07	High
2.2.5 Sportsperson	4.57	0.53	Highest
3. Output			
3.1 Decision-making achievement	4.39	0.40	High
3.2 Football decision-making skills	4.36	0.69	High
4. Feedback			
4.1 Decision-making achievement	4.43	0.53	High
4.2 Football decision-making skills	4.57	0.53	Highest
Overall	4.41	0.46	High

Referring to Table 2, it is found that the suitability of the elements of the BDMM platform is at a high level (Mean = 4.41, SD = 0.46). Therefore, it can be concluded that the BDMM platform consists of elements that can be employed as guidelines to judge the sports games based on a backward design process. It is expected that the BDMM platform encourages referees to acquire football decision-making skills which are essential for them because the platform shall urge them to think systematically before taking any actions. As a result, referees will do their duty more efficiently in the game thanks to the decision-making skills derived from this platform.

4. Discussion & Conclusion

The BDMM platform was designed based on virtual reality technology concepts integrated with the steps of backward design. The backward design begins with the completed process of thinking, and then the real process starts with the desired results followed by the design of instruction plans. The BDMM platform is intended to promote decision-making skills among football referees so that they can learn about the rules and make accurate and efficient decisions in the game.

The BDMM platform is composed of four main elements; 1. input factor, which includes of FIFA football rules, student, referee, technology, sportsperson, and team manager (coach); 2. the BDMM process to promote decision-making in football competitions, which consists of three steps, i.e., identify the desired results, identify acceptable evidence, and plan learning experiences and instruction, respectively. The design of measurement and assessment consists of three steps, i.e., (1) define the knowledge, (2) define the behavior, and (3) design the activities, respectively; 3. output, which consists of decision-making achievement and football decision-making skills; and 4. feedback, which includes decision-making achievement and the scores of football decision-making skills.

The results of this research show that the overall suitability of the development of the BDMM platform is at a high level, and the suitability of the elements of the BDMM platform is at a high level as well. The results herein are in line with the research of Chunpungsuk, Chatwattana & Piriyasurawong (2021), who concluded that the backward design of instruction-supporting tools, in the form of applications, which simulate virtual learning environments and enable learners to interact with the said learning environments, can encourage students to learn by themselves in a continuous and unlimited manner. This can be regarded as a guideline for developing the 21st-century. Also, the results are consistent with the research of Johansson-Skolberg, Woodilla & Çetinkaya (2013), who found that the proper integration of design thinking can promote and create the design works very well. Similarly, the findings corroborate with the research of Lloyd (2013), who found out that the instruction process using design thinking via distance assists learners in acquiring 21st-century learning skills.

Using the findings of this research, a BDMM platform can be developed to promote decision-making skills in higher education incorporating virtual reality technology concepts with backward design steps. Nevertheless, there is still a limitation in this research; that is, the number of research participants is too small. As a result, the findings derived herein are considered merely the findings from a pilot study, which can be used as a guideline for future development. Therefore, future studies should be conducted with a larger sample group or different research methods.

Reference

Burdea, C.G., & Coiffet, P. (2003). *Virtual Reality Technology*. Boston: MIT Press. https://doi.org/10.1162/105474603322955950

Chunpungsuk, C., Chatwattana, P., & Piriyasurawong, P. (2021). Effect of Backward Design with Virtual Learning Ecosystem to Enhance Design Thinking and Innovation Skills. *Research in World Economy, 12*(4), 70-81. https://doi.org/10.5430/rwe.v12n4p70

Damar, M. (2021). Metaverse shape of your life for future: a bibliometric snapshot. *Journal of Metaverse, 1*(1), 1-8.

Dunning, E., Maguire, J. A., & Pearton, R. E. (1993). *The Sports Process: A Comparative and Developmental Approach*. Champaign: Human Kinetics Publishers.

FIFA. (2002). *FIFA World Cup TV Coverage*. Retrieved from https://www.fifa.com

Johansson-Skolberg, U., Woodilla, J., & Çetinkaya, M. (2013). Design Thinking: Past, Present and Possible Futures. *Creativity and Innovation Management, 22*(2), 121-146. https://doi.org/10.1111/caim.12023

Kanasutra, P. (1995). *Statistics for Research in the Behavioral Sciences*. Bangkok: Chulalongkorn University Press.

Khemmani, T. (2010). *Science of Teaching: Knowledge of Efficient Learning Process Management*. Bangkok: Chulalongkorn University Press.

Laowreandee, W., Kitroongrueng, P., & Sirisamphan, O. (2017). *Active learning instructional strategies for thinking development and educational improvement of the 21st century*. Nakhon Pathom: Phetkasem Printing Group.

Lloyd, P. (2013). Embedded Creativity: Teaching Design Thinking Via Distance Education. *International Journal of Technology and Design Education, 23*(3), 749-765. https://doi.org/10.1007/s10798-012-9214-8

Mystakidis, S. (2022). Metaverse. *Encyclopedia, 2*, 486-497. https://doi.org/10.3390/encyclopedia2010031

Sapliyan, S., Chatwattana, P., & Nilsook, P. (2023). A constructionist, imagineering learning system with the metaverse: a study of learning outcomes at secondary schools in Thailand. *Global Journal of Engineering Education, 25*(2), 90-98.

Utranan, S. (1982). *Systematic Instructional Management*. Bangkok: Chulalongkorn University.

Wannapiroon, P. (2022). *Innovation and Intelligent Technology for Next Normal Education*. Bangkok: MAC Education.

Wiggins, G., & McTighe, J. (2005). *Understanding by Design 2nd Edition*. New Jersey: Prentice Hall.

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