Design and Development of INSPIRED Using MOODLE Learning Management System (LMS)

Faaizah Binti Shahbodin[1], Raidah Binti Yazid[2], Nur Syazwani Binti Sukormo[3], Siti Nurul Mahfuzah Binti Mohamad[4], Gunarhadi[5], Joko Yuwono[6], Munawir Yusuf[7], Mahardika Supratiwi[8]

[134]Faculty of Information and Communication Technology, Universiti Teknikal Malaysia Melaka (UTeM) 76100 Durian Tunggal Melaka Malaysia
[2]School of Creative Multimedia, University Malaysia of Computer Science and Engineering (UNIMY) Block 12 Star Central Lingkaran Cyber Point Timur 63000 Cyberjaya Selangor Malaysia
[5678]Special Education Program Faculty Of Teaching Training And Education, Universitas Sebelas Maret

faaizah@utem.edu.my, raidah.yazid@unimy.edu.my, syazwanisukormo@gmail.com, mahfuzah@utem.edu.my, gunarhadi@staff.uns.ac.id, jokoyuwono@staff.uns.ac.id, munawiryusuf@staff.uns.ac.id, mahardika.s@staff.uns.ac.id

Abstract. A Moodle is the commonly used LMS globally, with almost 87.3 thousand installations representing over 73 million users as well as their track record is proven sustained and successful use by large-sized universities. Moodle LMS is the most comprehensive and widely used e-learning system with a multilingual interface because this is a learning platform designed to provide educators, administrators, and students with a straightforward, and integrated system for creating personalized learning environments. Besides, the system's ability to create a learning environment, group information flow simulation, and communicate in the mode of joint involvement of the learning group is an essential characteristic for implementing a successful and comprehensive educational cycle. This research aims to implement INSPIRED learning system using Moodle learning management system. The Moodle LMS has been chosen not because it is cost-free and open source but also because of its extensibility, modularity, and maturity as well as it also continues to be adopted in higher education institutions. Henceforth, the use of Moodle LMS can also improve classroom preparation and classroom learning. The INSPIRED learning system is developed and designed to support personal learning environments (PLEs) among MRSM students and integrate the LMS with 21st Century educational tools. The aim of this paper is to share how we use ADDIE Model in designing and developing INSPIRED Learning System integrated with Personalized Learning Environment (PLE) for subjects Mathematics, Additional Mathematics, and Physics. We will share in our next paper the finding of a questionnaire distributed to the respondents who are asked to give feedback about the design, content, ways the content deliver,

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usability, and opinions towards their experiences using the INSPIRED learning system.

Keywords: e-Learning, Learning Management System (LMS), Moodle, Personal Learning Environments (PLE), Web 2.0

1 Introduction

Nowadays, the internet allowing a two-way exchange information and becomes more user centred. As a result, instead of being passive readers or consumers, people become creators of knowledge and resources. The evolution of the internet and its impact on education has revolutionized how educators work, providing them with a new set of information and communication technology (ICT) tools to connect with students, as well as the ability to use these tools to develop critical thinking and problem-solving skills [18]. Moreover, since 1960s and 1970s, computer have been used for educational purpose and with the help of the internet, they were employed more passionately among e-Learning volunteers, students, and instructors in 2000 [2]. Many colleges and universities today use a learning management system (LMS) to support students' learning activities by providing a comprehensive and integrated set of services and resources [30].

Furthermore, the computer is in the second row in the field of efficient e-Learning process in terms of providing technical improvement, either with the assistance of the latest hardware or software. Technology has the potential to revolutionize education. It can assist educators and students develop and grow their relationships, reinventing our approach to learning and collaboration, reducing equity gaps, and ensuring long-term accessibility, and customizing learning experiences to match the needs of all students [7]. Web 2.0 refers to the growth of web technology and its applications, and e-Learning 2.0 refers to integrating Web 2.0 technology and applications into educational and institutional practice in education. Besides, the higher education institutions such as universities and schools devote a significant amount of effort, money, and resources to implementing learning management systems (LMS). If the LMS is created without the compatibility of e-Learning 2.0, educators and students may find it challenging to profit from these technologies directly through the LMS [8].

The primary purpose of e-Learning environments is to facilitate the learning process by utilizing a computer and an internet connection. They allow for equal access to education regardless of time or location. e-Learning materials can be easily updated and have a high level of relevance. Meanwhile, e-Learning has the potential to improve and streamline teaching and learning activities. At the same time, before accessing and storing educational materials in repositories, teachers must adequately prepare them. e-Learning, often known as virtual classrooms, is an alternative learning applied for long-distance learning at various higher education institutions and schools. However, it is recognized that direct learning's emotional level will be lowered [19]. Incidentally, e-learning technology is rapidly evolving, which is one of the reasons why this concept must be widely used and improved. The nature of online learning is cooperative, and to be successful, it necessitates a high level of engagement and collaboration.

There are numerous advantages to online learning for improving thinking and innovation skills, including the ability for students to acquire the values of knowledge sharing and knowledge co-creation in open communities without regard to time or location by exchanging ideas, sharing thoughts, and exploring information together. Current students in higher education are mainly satisfied with this style of learning, according to researchers, because they can play vital roles as content creators who share their work through the online learning environment [5].

Since the dawn of the computer era, learning management systems (LMS) have been widely used. Learning Management Systems are web-based systems where learners can interact with the material, learning tools and resources, assessments, and other learners and instructors. Besides, LMS provided an opportunity for students to learn with various lifestyles in a safe and secure environment, free of time and space constraints. They can also aid in the organization and management of course content, the submission of assignments, the provision of feedback to students, the formation of groups, the organization of grades, and the assessment of students. Furthermore, LMS gives students space to discuss information, which can assist students in getting a deeper understanding of subjects. The capabilities of collaboration in LMS can improve students' social connectivity by connecting them to other students they don't know and helping them identify people with similar interests in a safe environment [30].

Nevertheless, online learning systems are necessary to develop and design to enhance learning skills. Researchers have begun to pay greater attention to this process, and now more high-quality publications are encouraging online teaching strategies in the classroom [5]. Henceforth, e-Learning needs to be developed to organize learning content using LMS. The LMS is designed to address the requirement of e-Learning and be packaged more easily for instructional materials, lecture assignments, interactive multimedia, online discussions, learning videos, and even interactive video conferences [19].

According to [5,11,27], the majority of higher education institutions have provided online learning, and over six million students have enrolled in at least one online course in the United States. Besides, students and teachers use internet-based learning technology to communicate and interact with course information during the online learning process. By providing accessibility and flexibility, online learning offers significant advantages over traditional classroom learning. Subsequently, students may search for information more quickly from learning resources, giving them greater flexibility to study at any time and anywhere.

In education, learning systems via mobile devices have the potential to enable global learning by providing new ways to acquire knowledge and think both independently and in network communities, where students contribute to encouraging the development of new understanding and discussion for new solutions [6,23]. There are various options for developing an online learning system. According to [23], there are four approaches to creating an online learning system: developing myself, purchasing an existing system, using open-source LMS, and customization.

A learning management system (LMS) is a software application or web-based technology that is used to design, implement, and evaluate a learning process [4]. Undoubtedly, several LMS exist currently in the market, and Moodle LMS is an ideal learning

management system that consists of multiple functions that also can achieve through simple architecture [1,9]. The word Moodle is an abbreviation for "Modular Object-Oriented Dynamic Learning Environment," which is most beneficial to programmers and educational theorists. Besides, Moodle is a software package for creating internet-based courses and websites, and it is a global development project meant to support a social constructionist framework of education [16,26].

Meanwhile, Moodle is the commonly used LMS globally, with almost 87.3 thousand installations representing over 73 million users as well as their track record is proven sustained and successful use by large-sized universities [1]. Furthermore, Moodle LMS is an ideal technological solution for organizing a system of international exchange of knowledge and practical experience [13], as confirmed by numerous scientific studies at the world's leading universities. Moodle LMS is the most comprehensive and widely used e-learning system with a multilingual interface because this is a learning platform designed to provide educators, administrators, and students with a straightforward, dependable, secure, and integrated system for creating personalized learning environments [10,12]. Besides, the system's ability to create a learning environment, group information flows simulation, and communicate in the mode of joint involvement of the learning group is an essential characteristic for implementing a successful and comprehensive educational cycle [23,29].

Therefore, in these cases, the INSPIRED learning system is developed using Moodle learning management system. The Moodle LMS has been chosen not because it is cost-free and open source but also because of its extensibility, modularity, and maturity as well as it also continues to be adopted in higher education institutions. Henceforth, the use of Moodle LMS can also improve classroom preparation and classroom learning. Self-learning features that are intrinsically accessible and available attract students to use e-learning portals for further education. Besides, students' learning motivation will increase without going anywhere to accomplish their job [25]. Nonetheless, to succeed in a learning technique like this, technical assistance from the educators is essential, likewise students' contribution. In addition, excellent exam results can be achieved by showing weekly quiz scores and reporting learning activities via Moodle [20]. Students can keep updating their learning outcomes while also assisting the teachers in performing similar activities for each student, and students can discuss with friends who have similar assignments by using a forum for students in Moodle [3,9,23].

The emergence of Web 2.0 technology has not only changed the available Web technologies, but also the way students and teachers communicate and relate to one another. This technology is continuously impacting learning communities, especially student behavior. The growing ubiquity of Web access, and the variety of devices that allow us to interact with it, have made it possible for learners and teachers to choose the right tools and services that better adapt to their needs. Besides, today's students have spent their entire lives surrounded by information in a variety of mediums. Studies have shown a positive impact on learning when students are required to engage in inquiry, analyze content, construct knowledge, and effectively communicate their learning. To build 21st century classroom: take a multimedia approach to learn core content, promote essential learning and innovation skills, build information, media, and technology skills in context, and, advance life and career skills.

Moreover, this study has applied the Personal Learning Environments (PLE) based on Web 2.0 services, in the context of higher education, as both a means of transforming learning and teaching processes, and as preparation for the learner's future professional lives in a dynamic environment with a heavy digital and technological influence [15,24]. Figure 1 shows the Personal Learning Environment (PLE) based on Web 2.0 [14].

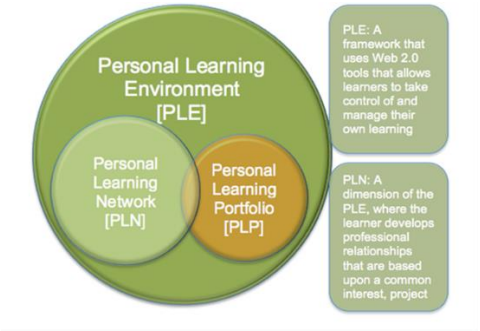

Fig. 1. Personal Learning Environment (PLE) Based on Web 2.0 Services [28]

This research aims to develop an INSPIRED learning system using Moodle LMS based on the proposed model, and the prototype will be evaluated. The INSPIRED learning system is developed and designed to support personal learning environment (PLEs) among MRSM students and integrate the LMS with 21st Century educational tools to measure the impact of PLEs on student performance. Besides, this research is conducted on Personalized Learning Environment (PLE) for subjects Mathematics, Additional Mathematics, and Physics using the Learning Management System (LMS) platform. PLE is focused on individual learning rather than the instructor, facilities, resources, and tools. At the end of this research, the questionnaire is distributed to the respondents who are asked to give feedback about the design, content, ways the content deliver, usability, and opinions towards their experiences using the INSPIRED learning system. All of these findings will be shared in our next paper.

1.1 ADDIE MODEL

The ADDIE model has been chosen to develop the INSPIRED learning system because it is the framework used by the instructional designers, and it is simple, complete, and tested. The ADDIE model consists of five stages as the Figure 2, including Analysis, Design, Development, Implementation, and Evaluation [17].

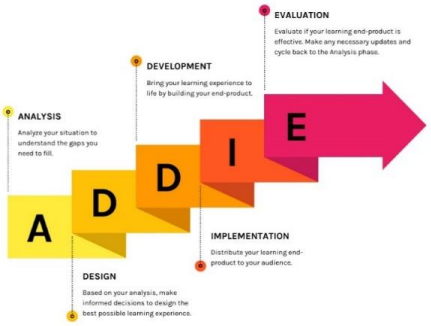

Fig. 2. ADDIE Model

1.2 Analysis

The first phase is called analysis, and at this phase, the research is conducted to identify the problem students and educators face. Thus, three issues come out from this research: memory, educational technology, and preparation and integration. The first issue is memory, where students often have difficulty recognizing, remembering, organizing, and interpreting IGSCE learning resources. As a result, they are easily confused in the classroom. Teachers should always be prepared to change the teaching and learning environment. Innovation should be taken to make effective teaching and learning in a classroom. Next is educational technology, where the tools that teachers can and should be used to integrate technology in the classroom are changing. There are several web-based technology tools that teachers can use to increase their use of technology. These tools can be used independently, in collaboration with students, or collaboration with other educators. Teachers need to be updated with technology. The third is preparation and integration, where teachers need the knowledge, expertise, and various tools to design and create interactive teaching materials in online learning. All teachers should equip themselves with more ICT skills than students. They also must use all existing platforms and mediums not only as a channel of communication with the students but also to assist in the process of teaching and learning. Therefore, this research aims to identify the suitable learning tools needed to support PLEs among MRSM students, design a learning management system embedded with PLEs, integrate learning management systems with 21st-century educational tools, and measure the impact of PLEs in student learning performance.

1.3 Design and Development

The second phase is design where the INSPIRED learning system are designed based on the analysis requirements. At this phase, the personal learning environment (PLEs) are divided into three types of learning style which is auditory, visual, and kinesthetic [22].

Visual – Visual learner tends to have good dress sense as well, and sometimes just looking at a color-coordinate colleague can give you a few clues into their learning style. Visual learners are often especially creative and get involved in design, photography, architecture, or professions that demand a good sense of orientation and planning.

Auditory – Auditory learners best understand new content through listening and speaking in situations such as lectures and group discussions. Sometimes referred to as "aural" learners, where use repetition as a study technique and benefit from the use of mnemonic devices.

Kinesthetic – Students who are kinesthetic learners best understand information through tactile representations of information. These students are hands-on learners and learn best through figuring things out by hand for example understanding how a clock

works by putting one together. Figure 3, Figure 4, and Figure 5 below shown the icon and logo are designed to be used in INSPIRED learning system.

Fig. 3. INSPIRED Logo

Fig. 4. Subject and Tools Icon

Fig. 5. INSPIRED Headers

Next, at development phase, the content that should be in INSPIRED learning system are given and requested by subject matter experts (SME) where teachers or educators will short list the difficult topic for subject mathematics, physic, and additional mathematic. Therefore, based on the topic listed, developers will design content that appropriately follows the learning style, either visual, auditory, or kinesthetic.

1.4 Implementation and Evaluation

Subsequently, for implementation phases, all the design are placed in INSPIRED learning system using Moodle and the features on Moodle are applied in INSPIRED learning system such as H5P plugin. H5P is a plugin tool that help educator to produce and run interactive content and interactive video within the LMS or any kinds of e-Learning browser [21,28].. The Figure 6, and Figure 7 are showing what the INSPIRED learning system looks like.

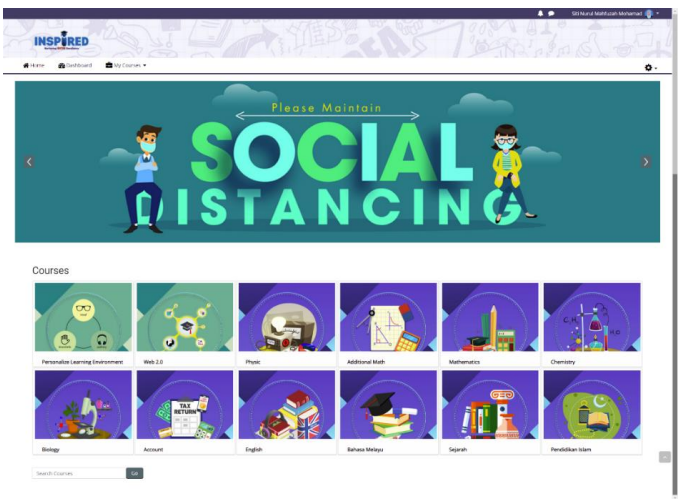

Fig. 6. Home Page of INSPIRED After Login

Fig. 7. Interface of Physic Subject

2 Conclusion

In conclusion, the process of developing INSPIRED learning system has been completed through five phases, namely: analysis, design, development, implementation, and evaluation. The process has run smoothly, quickly, and more organized because it is based on the planning that has been made beforehand and the readiness of the materials needed based on the results of the analysis that has been done. Furthermore, the internet's evolution and its impact on education have revolutionized how educators work, giving them a new set of information and communication (ICT) tools to connect with students together with the ability to use these tools for the development of critical thinking and problem-solving. Many higher education institutions now capitalize on some learning management system that supports students' learning activities by providing an extensive and integrated range of services and tools for learners. In addition, people can become creators of knowledge and materials instead of passive readers or consumers. This advancement in web technologies and its applications are known as web 2.0. In education, web 2.0 technologies and tools in educational and institutional practice are called eLearning 2.0. Researchers stress the importance of implementing eLearning 2.0 in the learning process. Universities and schools invest substantial amounts of time and money in implementing learning management systems (LMS). If not designed with eLearning 2.0 support in mind, the LMS can pose difficulty for instructors and students to benefit from these technologies through LMS directly.

Therefore, as conclusion, it is important for any content developer to design and develop online learning systems that fulfill their user requirements and enhance their skills. This process has gained more attention from researchers, and there are now many high-quality publications to encourage online teaching techniques in the classroom. So,

E-learning will be developed in software applications, namely LMS, to organize learning materials. LMS is designed according to the need to facilitate the packaging of interactive multimedia, teaching materials, lecture assignments, online discussions, learning videos, and even interactive video conferences. It is recommended for any content developers to consider the student learning style, and their multiple intelligence to be wisely integrated with information and multimedia technologies so that LMS produced will be usable.

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