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# INTERNATIONAL JOURNAL OF CREATIVE MULTIMEDIA

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## Aim and Scope

The International Journal of Creative Multimedia (IJCM) is a peer-reviewed open-access journal devoted to publish research papers in all fields of creative multimedia, including Digital Learning, Film & Animation, Media, Arts & Technology and Visual Design & Communication. It aims to provide an international forum for the exchange of ideas and findings from researchers across different cultures, and encourages research on the impact of social, cultural and technological factors on creative multimedia theory and practice. It also seeks to promote the transfer of knowledge between professionals in academia and industry by emphasising research where results are of interest or applicable to creative multimedia practices. We welcome all kinds of papers that connect academic researches with practical and industrial context in the field of creative multimedia. The scope of the IJCM is in the broad areas of Creative Multimedia following the five major thematic streams, includes but not limited to:

- Digital Learning
- Media, Arts & Technology
- Games and Virtual Reality
- Cinema and Film Studies
- Animation and Visual Effects
- Visual Design and Communication

## Foreword from Digital Learning Editorial Team

Greetings from the Editors and welcome to the Special Issue on Digital Learning in the 21st century. In this Issue, we present papers from international and local researchers focusing on research papers in areas of education technology, learning analytics, e-learning, engineering, IT, business and management, creative multimedia and many other domains that seek to improve the learning process of the learner with technologies. These papers were presented in the ELITE 2019 International Conference held in Multimedia University, Cyberjaya, Malaysia on October 2, 2019, in conjunction with the 2019 IDE4TE International Exhibition on Oct 1, 2019. Themed, “Empowering Learning, Innovating Teaching Environments”, this event showcased best practices of Malaysian Universities, particularly from the network of Industry Driven Education Alliance (GLU iDE4) comprising of Universiti Teknologi Petronas (UTP), Universiti Multimedia (MMU), Universiti Tenaga Nasional (UNITEN) and Universiti Kuala Lumpur (UniKL), as well as from international presenters from China, India, Bangladesh and Maldives.

The papers presented in this Special Issue centred around 5 sub-themes; 1) Innovative Pedagogies & Instructional Design, 2) New Roles of Teachers, 3) Redesigning Curriculum for Education 4.0, 4) Emerging Technologies In The Classroom, and 5) Designing Learning Spaces for 21st Century Education, and are very timely articles for readers interested in adapting technology in today’s classrooms. We hope that these papers will provide further insight and contributions to the knowledge base in these fields and we hope you enjoy reading them.

**Prof. Ts. Dr. Neo Mai**, Multimedia University, Malaysia

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## Designing Lesson Plans for Adaptive Learning Using Moodle LMS Platform

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### Abstract

This paper presents a research study in developing lesson plans for differentiated learning or adaptive learning using 'Lesson' on Moodle LMS platform. The lessons are to provide learning paths based on inquiring category from Laurillard Conversational Framework. The design of various learning paths provide teaching methods used in class such as videos, quizzes and reading tasks. This lesson when planned using flowcharts would guide the instructors to link the topics and assessment in any order that would promote students' self-paced and self-learning experience.

**Keywords** Adaptive learning; Differentiated learning; Lesson plan; Moodle

### Introduction

Differentiated or adaptive learning is described as "the delivery of custom learning experiences that address the unique needs of an individual through just-in-time feedback, pathways, and resources (rather than providing a one-size-fits-all learning experience). The mechanism of how technology can be used to adapt to students' learning phases can either use designed, or algorithmic adaptivity (SmartSparrow, 2019). As the definition may vary, the framework can be categorized into three main fields: (1) adaptive content, (2) adaptive sequence, and (3) adaptive assessment (EdSurge, 2019).

Generally, an adaptive learning platform is associated with predictive analytics and algorithms. Adaptive learning is an educational technology that can respond to a student's interactions in real-time by automatically providing the student with individual support. Nevertheless, using educational technology

to design differentiated lessons for students is demanding. It requires instructors to possess a conceptual framework for differentiation. In addition, Bower (2012) identified that “the curriculum material must be broken apart into its component levels or skills”. Besides this, instructors must be able to design formative questioning to enable diagnosis of student understanding to facilitate adaptivity.

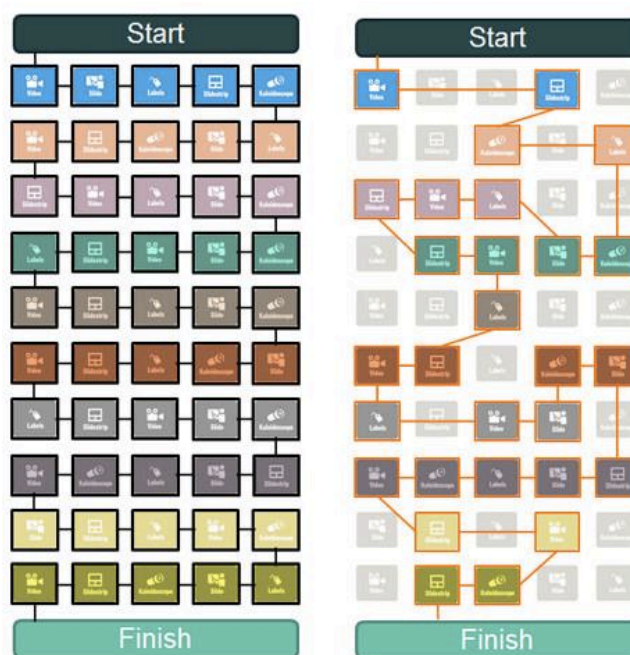


Figure 1 Learning Route: Conventional versus Adaptive Learning (Posner, 2017)

Consecutively, Posner (2017) presented an example of adaptive learning as illustrated in Figure 1 that shows individual learners following through the content in a conventional and linear setting on the left. Every learner must come across every piece of content. However, the one on the right shows that with adaptive learning, a learner only goes through necessary content. Moreover, Milosevic (2006) stated that lacking of personalization of learning is one of the main problems in designing suitable and targeted lesson plans. In this research, designing suitable and targeted lesson plan is carried out in Moodle, a learning management system (LMS). Therefore, a structured design for adaptive learning helps students to learn more meaningfully and systematically. The next section elaborates the research methodology on adopting a framework and the LMS involved in the study.



### Research Background

This research is carried out to first identify differentiated/adaptive learning framework and the best practices. The learning framework is aligned to the six learning types of how students learn based on Laurillard Conversational Framework (Laurillard, 2016).

#### *Laurillard Conversational Framework*

The Laurillard Conversational Framework was introduced to assist students' learning. The framework details a model of how students learn effectively via the six learning types derived from the framework. Teaching and learning process is a highly complex activity that demands effort in lessons targeted for various students' background. The learning types are then mapped to the lesson plan according to the student's level of understanding. Figure 2 depicts the learning types that are categorized into:

- Acquisition (acquiring),
- Collaboration (collaborating),
- Discussion (discussing),
- Investigation (inquiring),
- Practice (practicing), and
- Production (producing).

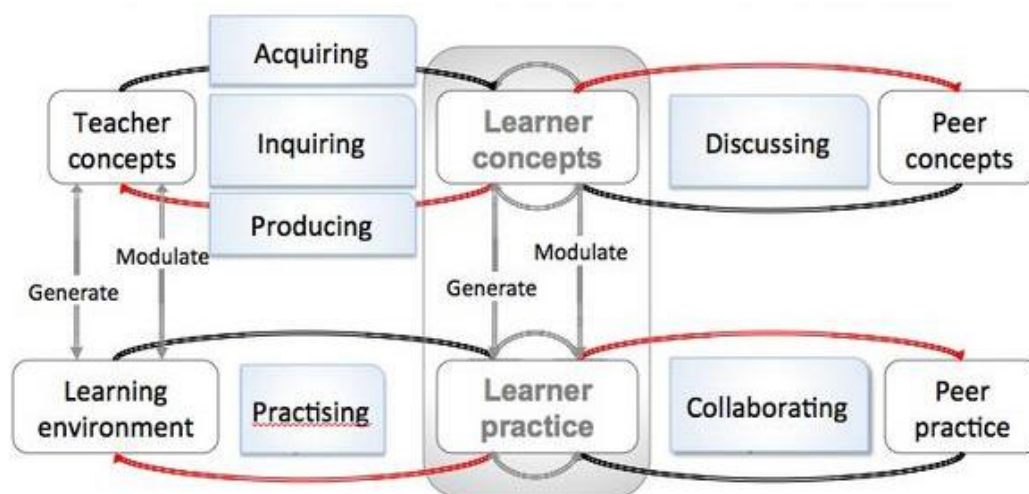


Figure 2 Laurillard Conversational Framework (Laurillard, 2016)

Thus, the adaptive learning aligns to Laurillard's "inquiring" category. The students would first inquire themselves on the concept, and later apply it in the given questions after acquiring the solving skills. Through the "inquiring" process, students would adapt to own path of learning.

### *Moodle Learning Management System (LMS)*

Modular object-oriented dynamic learning environment, or Moodle, allows for covering and fitting learning environments using community-sourced plugins. The Learning Management System (LMS) provides robust, safe and unified system to create personalized learning environments. It can be downloaded into a web server to cater for holistic course repository. In a Moodle course, activities are features suitable to design assignments and assessments (Activities, n.d.). Typically, an activity promotes student to student, or student to instructor interactions.

One of the activities that recommend differentiated or personalized learning is 'Lesson'. The adaptive learning takes place with lessons designed with flowchart of intended topics, and the advancement to preferred topics would be created using page 'jumps'. The pages need to be linked systematically to ensure students can experience meaningful and adaptive lessons. According to Couëdelo (2018), the lessons once validated would reasonably create the differentiated or personalized learning as students have options to pick his or her learning path independent of others. Based on early findings, the learning sessions can be tracked by the LMS built-in analytics.

### *Lesson Plan Design*

A lesson plan is described as "the instructor's road map of what students need to learn, and how it will be done effectively during the class time" ("Lesson Planning", 2019). Only when the learning activities are designed appropriately, it would develop strategies to obtain feedback on student learning. In addition, a successful lesson plan contains three objectives: learning objectives, learning activities, and assessment to check for student understanding.

The adaptive learning structure is used within the Moodle activity selection. The "Lesson" activity subscribes to a structured lesson plan arranged by topics. The next section details the design of the lesson plan in an engineering course in Moodle.



## Methodology

The first adaptive learning module for EECB423 Data Communication and Network course is designed for IP addressing. One of the course outcomes of this module is to master the IPv4 addressing technique. The students are to apply calculation skills in network design. The topics include introduction to IP address, applying conversion from binary to decimal (vice versa), determining network class, network address, host address and subnets. The lesson plan flowchart is outlined in Figure 3.

Next, the lesson plan is then translated into Moodle Lesson activity with required content page jumps to associate the learning adaptivity and mastery levels. The flowchart requires a decision to link to the next content after fulfilling some requirements based on the course outcomes. Table 1 details the page numbers, contents, activities, and page jumps. Generally, the Lesson consists of pages with contents prior to assessments to allow students to proceed to the next level. Some of the activities that can be included in the Lesson page are reading materials, watching videos, and listening to Podcast.

The various activities should cater to various students' learning type. Subsequently, the next page hosts questions on the materials covered earlier. The assessment may include multiple choice questions, and short answers. Based on right attempts, the students would progress to the next page. On the other hand, students with incorrect answers are directed to the previous page for another try. This number of tries however can be limited to a few attempts to avoid being at the same page.

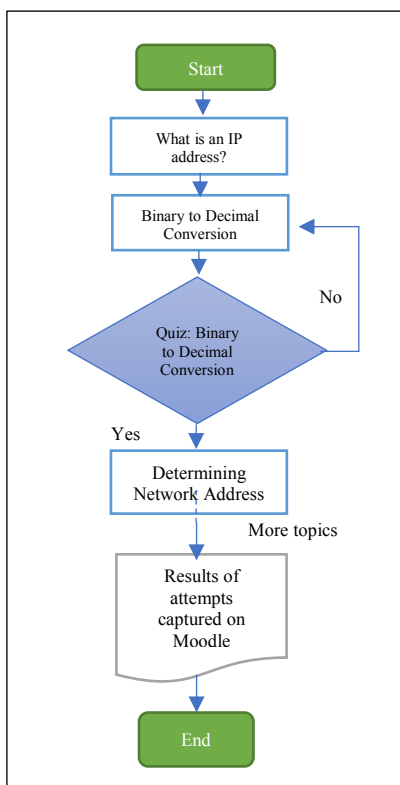


Figure 3 Flowchart for Lesson Planning

Table 1 Page outline to create Lesson in Moodle

(BL – Inquiry) IP Addressing

Page	Content	Activities	Jump to (OK)	Jump to (NOT OK)
1	What is an IP Address?	Read, Watch video	Page 2	NA
2	Binary to Decimal Conversion	Read	Page 5	Page 2
3	Determining Network Address and Host Address	Read, Watch video	Page 6	Page 3
4	Determining Subnet and Host Numbers	Short Answer	Page 7	Page 4
5	Quiz – Binary to Decimal Conversion	Multiple Choice Quiz	Page 3	Page 2
6	Quiz – Network Address and Host Address	Short Answer	Page 4	Page 3

7	Quiz – Subnet and Host Numbers	Multiple Choice Quiz	Page 5	Page 4
8	Conclusion	Read	Complete	Score

### Results and Discussions

The lessons discussed in the previous section is elaborated here. The steps to create the lesson are shown in the following order. The “Lesson” is selected to create the pages containing topics to be learned. Next, Figure 4 shows the lesson in the activities tab.

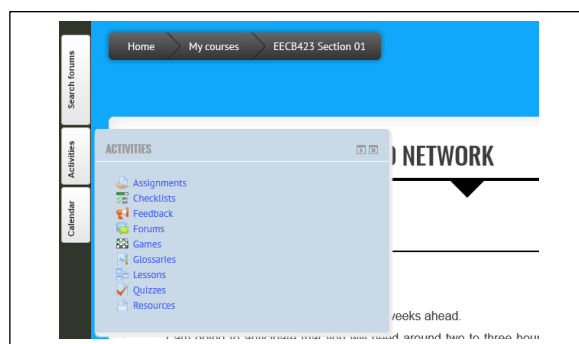


Figure 4 Lesson Activity in Moodle

Figure 5 depicts the page for lesson plan containing tabs for preview, edit, reports, grade essays, collapsed and expanded. Below the general tabs, there are options to import questions from other page, add a content page and question page. From the figure, the first topic has been entered as a content page as introduction to IP addressing.



Figure 5 Creating Content Page for the First Topic

Subsequently, the content page provides the page jumps for the students to attempt. Based on the table discussed in the earlier section, a few content pages were created and the page jumps were linked to the 'Next Page'. In Figure 6, the contents were assembled in order and labelled as 'Content 1: Binary to Decimal Conversion' and 'Content 2: Classes of IP Addresses'. The pages jumps labels are 'Jump 1: Next page' and 'Jump 2: Next page' respectively. The jumps must be sequenced correctly to provide the learning experience required for adaptive learning.

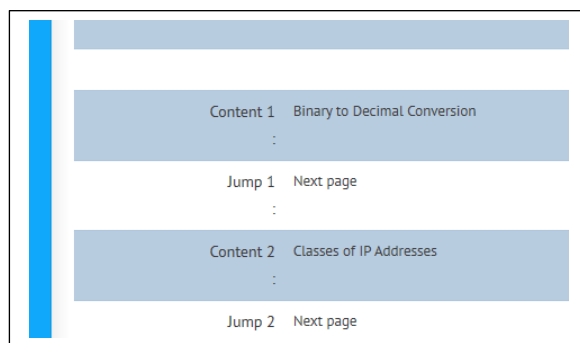


Figure 6 Creating Content Page for the First Topic

Following the list for content and jump pages, the summary of the changes and links can be seen from Figure 7 depicting the pages and jumps created. The 'Action' section contains the list of actions required to amend to adjust the order of the pages.

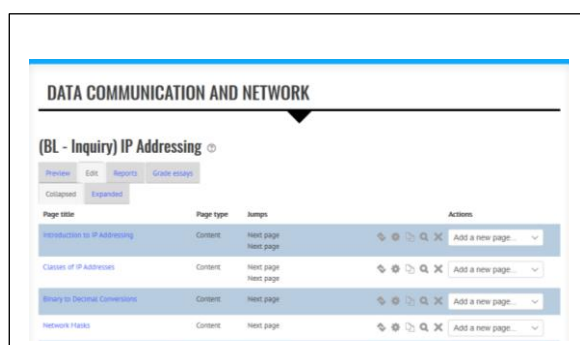


Figure 7 Summary of Lesson Pages

Next, the Lesson statistics reports on students' performance and progress for the particular tasks. The instructor receives feedback instantly to gauge students' understanding of the given topics.

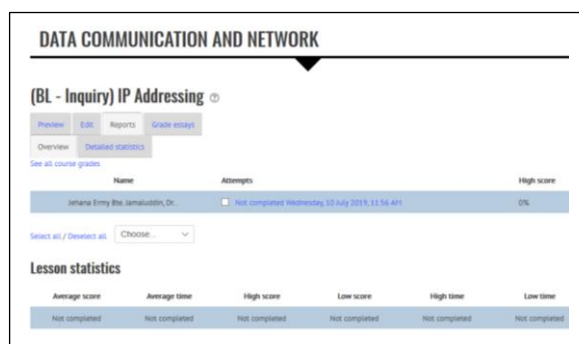


Figure 8 Lesson Statistics Report

The preparation to design the Lesson in Moodle can be time consuming but using a standard lesson plan approach may address the issue. In addition, a clear outline of the topics ensures that the students follow the contents and have the assessment done accordingly. Subsequently, the instructor has to run the lessons a few times to ensure its reliability, as there is likelihood of the pages not being linked in order.

## Conclusion

Adaptive learning can be designed to accommodate various learners according to their learning types. The lesson plans for adaptive learning are designed appropriately to meet the course's learning outcome using Moodle's Lesson. Though the preparation process takes longer time, a successful learning experience is captured through a systematic lesson plan aided by the Moodle content and assessment pages. As students can adapt to the Lesson, a comprehensive approach to the lessons allows differentiated learning or adaptive learning to take place.

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