

iJET

International Journal of
Emerging Technologies in Learning

HOME ABOUT LOGIN REGISTER SEARCH CURRENT ARCHIVES ANNOUNCEMENTS

Home > Vol 15, No 08 (2020)

International Journal of Emerging Technologies in Learning (iJET)

This interdisciplinary journal aims to focus on the exchange of relevant trends and research results as well as the presentation of practical experiences gained while developing and testing elements of technology enhanced learning. So it aims to bridge the gap between pure academic research journals and more practical publications. So it covers the full range from research, application development to experience reports and product descriptions.

iJET is an Open Access Journal. Readers don't have to pay any fee.



Papers

Cloud Computing Based E-learning in Mexican Universities

Applying Blended Problem-Based Learning to Accounting Studies in Higher Education: Optimizing the Utilization of Social Media for Learning

Research on Personalized Recommendations for Students Learning Paths Based on Big Data

Mobile Application Development for Technology Enhanced Learning: An Applied Study on the Students of the College of Mass Communication at Agham University

The Effect of Learning Motivation, Self-Efficacy, and Blended Learning on Students' Achievement in The Industrial Revolution 4.0

Can a Technology Touch Meditation? Enhancing the EEG Headband Interaction Mode as a Meditation Guide

Design, Construction and Evaluation of a Web Application for the Teaching-Learning Process on Financial Mathematics

Point Estimation with Markov for Effective Mobile Auditory Graphs

Project-Based Learning Approach for Teaching Mobile Applications Development Using Visualization Technology

Improving Accuracy in Initiating and Reading About via Speech Visualization Technology

Exploring MOOC User Behaviors Beyond Platforms

A Sports Teaching Model Based on Social Networking Services Teaching Resources

Exploring Student Academic Performance Using Data Mining Tools

A Personalized English Teaching Design Based on Multimedia Computer Technology

Correlation between Self-Efficacy and English Performance

Toward an Adaptive Educational Hypermedia System (ADHS-J) based on the Overlay Modeling and Fuzzy and Stearns Learning Styles Model for Job Seekers

Short Paper

Online Self-Regulated Learning Strategies in MOOCs: A Measurement Model

iThenticate
Professional Plagiarism Prevention



iJET is indexed in:



FONT SIZE



USER

Username

Password

☐ Remember me

Login

JOURNAL CONTENT

Search

Search Scope

All

Search

Browse

- [By Issue](#)
- [By Author](#)
- [By Title](#)
- [Other Journals](#)

INFORMATION

- [For Readers](#)
- [For Authors](#)
- [For Librarians](#)

Journal Contact

Mailing Address

International Association of Online Engineering
Kirchengasse 10/200
A-1070 VIENNA
Austria

Principal Contact

Michael E. Auer
Prof. Dr.-Ing. Dr.sc.
International Association of Online Engineering
Kirchengasse 10/200
A-1070 VIENNA
Austria
Phone: +43 664 7362 1196
Fax: +49 12120 294752
Email: auer@cti-online.net

Support Contact

Sebastian Schreiter
Email: support@online-engineering.org

International Journal of Emerging Technologies in Learning (IJET) – eISSN: 1863-0383

Indexing:



Editorial Team

Editor-in-Chief

[Dominik May](#), University of Georgia, United States

Executive Editor

[Michael E. Auer](#), CTI Frankfurt/Main - New York - Vienna - Bangalore

Associate Editors-in-Chief

[Martin Ebner](#), TU Graz

[Mohammad Khalil](#), University of Bergen, Norway

Associate Editors

[Neelakshi Chandrasena Premawardhena](#), Department of Modern Languages, University of Kelaniya, Sri Lanka

[Stamatis Papadakis](#), Department of Education, University of Crete, Greece

[Valerie Varney](#), RWTH Aachen University, Germany

Technical Editor

[Sebastian Schreiter](#), Lagorce, France

Editorial Board

[A. Y. Al-Zoubi](#), Princess Sumaya University for Technology Amman, Jordan

[Gerald Friedland](#), International Computer Science Institute, Berkeley (CA), USA

[Andreas Holzinger](#), Medical University Graz, Austria

[Dr. George S. Ioannidis](#), University of Patras, Greece (Professor) "The Science Laboratory" - (Head of), Greece

[Andreja Istenic Starcic](#), University of Ljubljana, Slovenia University of Primorska, Slovenia University of North Texas, US

[Dr. Barbara Kerr](#)

[Lars Knipping](#), TU Berlin, Germany, Germany

[Massimo Marchiori](#), World Wide Web Consortium (W3C) at MIT, USA and University of Venice, Italy

[Andreas Pester](#), Carinthia University of Applied Sciences, Austria

[Rob Reilly](#), University of Memphis and MIT Media Lab, USA

[Cornel Samoilă](#), Transilvania University Brasov, Romania

[Gabriel Yue](#), IETI, Hong Kong

[Mario Zagar](#), University of Zagreb, Croatia

International Journal of Emerging Technologies in Learning (iJET) – eISSN: 1863-0383

Indexing:



Scopus®



IET

Inspec

DOAJ

DIRECTORY OF
OPEN ACCESS
JOURNALS



computer science bibliography



The Learning and Technology Library



GLOBAL SERIALS DIRECTORY



Academic
Search

Editorial Policies

- [Focus and Scope](#)
- [Section Policies](#)
- [Peer Review Process](#)
- [Publication Frequency](#)
- [Open Access Policy](#)
- [Publication Ethics and Malpractice Statement](#)
- [Archiving](#)
- [Screening for Plagiarism](#)

Focus and Scope

This interdisciplinary journal focuses on the exchange of relevant trends and research results and presents practical experiences gained while developing and testing elements of technology enhanced learning especially in the post secondary field. It bridges the gap between pure academic research journals and more practical publications. So it covers the full range from research, application development to experience reports and product descriptions.

Fields of interest include, but are not limited to:

- Software / Distributed Systems
 - Knowledge Management
 - Semantic Web
 - MashUp Technologies
 - Platforms and Content Authoring
 - New Learning Models and Applications
 - Pedagogical and Psychological Issues
 - Trust / Security
 - Internet Applications
 - Networked Tools
 - Mobile / wireless
 - Electronics
 - Visualisation
 - Bio- / Neuroinformatics
 - Language /Speech
 - Collaboration Tools / Collaborative Networks
-

Journal Sponsorship

Publisher

IAOE
Kirchengasse 10/200
A-1070 WIEN
Austria

[International Association of Online Engineering \(IAOE\)](#)

Sponsors

- [International Association of Online Engineering \(IAOE\)](#)

International Journal of Emerging Technologies in Learning (IJET) – eISSN: 1863-0383

Indexing:



Vol 14, No 11 (2019)

Table of Contents

Papers

- [School Readiness From Kindergarten to Primary School](#) PDF
Georgia Kokkalia, Athanasios S. Drigas, Alexandra Economou, Petros Roussos pp. 4-18
- [A Study of Applying Automated Assessment in Teaching College English Writing Based on Juku Correction Network](#) PDF
Yusheng Wang pp. 19-31
- [Innovation Technologies in Student's Independent Activity and Creativity Development: The Case of Medical Education](#) PDF
Nurila Maltabarova, Alexey Kokoshko, Aigul Abduldayeva, Nasrulla Shanazarov, Galiya Smailova pp. 32-40
- [Students' Metacognitive Weaknesses in Academic Writing: A Preliminary Research](#) PDF
Dina Ramadhanti, A Syukur Ghazali, Muakibatul Hasanah, Titik Harsiati pp. 41-57
- [Exploring the Effectiveness of Glog in Language Learning](#) PDF
V Anitha Devi pp. 58-69
- [Evaluation of an Academic Program: The Case of Computing Accreditation Commission Framework in Higher Education](#) PDF
Khalid Mohiudddin, Asharul Islam, Shiblee Mohd, Mansoor Shariff pp. 70-91
- [Skill-Centered Assessment in an Academic Course: A Formative Approach to Evaluate Student Performance and Make Continuous Quality Improvements in Pedagogy](#) PDF
Khalid Mohiudddin, Ashiquee Mohammad Rasool, Mansoor Shariff Mohd, Rashid Hussain Mohammad pp. 92-106
- [Using Data Expedition as a Formative Assessment Tool in Data Science Education: Reasoning, Justification, and Evaluation](#) PDF
Olga Maksimenkova, Alexey Neznanov, Irina Radchenko pp. 107-122
- [Understanding Language MQOC Learners: The Issue of Capability Development](#) PDF
Nikoletta Agonács, João Filipe Matos pp. 123-137
- [A Cognitive Assistant that Uses Small Talk in Tutoring Conversation](#) PDF
Luciano Frontino de Medeiros, Armando Kolbe Junior, Alvin Moser pp. 138-159
- [A Novel Expert Evaluation Methodology Based on Fuzzy Logic](#) PDF
Khalid Salmi, Hamid Magrez, Abdelhak Ziyyat pp. 160-173
- [A Semantic Web Solution for Enhancing The Interoperability of E-learning Systems by Using Next Generation of SCORM Specifications](#) PDF
Abdellah Bakhoui, Rachid Dehbi, Mouad Banane, Mohamed Talea pp. 174-185

Short Papers

- [Organization of Student Project Based Activities through Individual Learning Routes](#) PDF
Ekaterina Politsinskaya, Vladislav G. Lizunkov, Olga Ergunova pp. 186-193
- [Proposed Model of Multiplayer Matching Game Plugins Using Websocket in Moodle](#) PDF
I Nyoman Darma Kotama, Komang Oka Saputra, Linawati Linawati pp. 194-201
- [Flipped Classroom Method for the Teacher Training for Secondary Education: A Case Study in the University of Granada, Spain](#) PDF
Francisco-Javier Hinojo-Lucena, Inmaculada Aznar-Díaz, María-Pilar Cáceres-Reche, José-María Romero-Rodríguez pp. 202-208

Proposed Model of Multiplayer Matching Game Plugins Using Websocket in Moodle

<https://doi.org/10.3991/ijet.v14i11.10190>

I Nyoman Darma Kotama ^(✉), Komang Oka Saputra, Linawati
Udayana University, Bali, Indonesia
kotama@student.unud.ac.id

Abstract—Nowadays Learning Management System has widely been used to assist learning process. On the other side, the advancement of technology in multimedia made many researchers have positive result in game based learning as factor that increase motivation and interest to deliver educational information. We try to propose a concept to implement a multiplayer matching quiz in Moodle LMS to enrich game based learning using Moodle future research about game-based learning implementation in Moodle. The proposed model implements websocket as its multiplayer backend and game questions using Moodle Quiz plugin as a question bank.

Keywords—Moodle, Game-Based Learning, Multiplayer Game, Websocket

1 Introduction

Learning Management System (LMS) in universities is widely used to assist learning activities such as forums, quizzes and remote lessons. Some LMS are open-sources, which mean we can use it, modify it, and distribute it freely. One of Open Source LMS Sample that popular in Europe is Moodle LMS [1]. Until 30 November 2018, there are estimated 144,523,216 peoples that registered to Moodle LMS [2]. The advantages of its open-source nature, provide room for hobbyist, researchers and communities to implement new idea and expanding Moodle capabilities via its plugin system[3]. This plugin development were categorized by its function, like activities, reports, repositories, themes, and many others [4].

Video game has interesting ways to interact and motivate its user when they play [5]. The technology revolution in computer and multimedia, is the main reason for usage of digital game as a learning platform [6]. Game based learning is a concept where video game can facilitate education needs including problem solving, feedback and the most important is making learning more fun and interesting [7]. Many researchers also have similiar result about game usage for increasing motivation and interactivity on delivering course [8][9][10].

Moodle itself has a game activity called game plugin it consist of 8 games [4]. To implement it, course manager should make a course first and add activity with this game plugin. However, current plugin still does not implement multiplayer activity. Therefore in this research we propose a concept how a websocket technology can be

applied to Moodle so multiplayer game can be implemented. This concept also provides an alternative way to deliver more interesting experience in learning process.

2 Related Topics

2.1 Moodle plugin

E-Learning System in this case Moodle LMS has many benefit to its institutional user or regular user, it provide cut for technology cost, data consistency, easy to access the educational data, easy to implement on current system and data can be accessed for a long time (timely consent) [11][12][13]. Moodle LMS also has various successes in helping another educational technology implementation, from efficiently helps foreign languages for Russian Federation's higher education students [14], create a personalized course with parameter from student competencies using fuzzy c-means clustering[15] and integrating podcast to help teaching aerobic to gymnastics [16]. But the main point is Moodle open-source license, which gives its communities a way to implement any ideas and new technology via its plugin system [17].

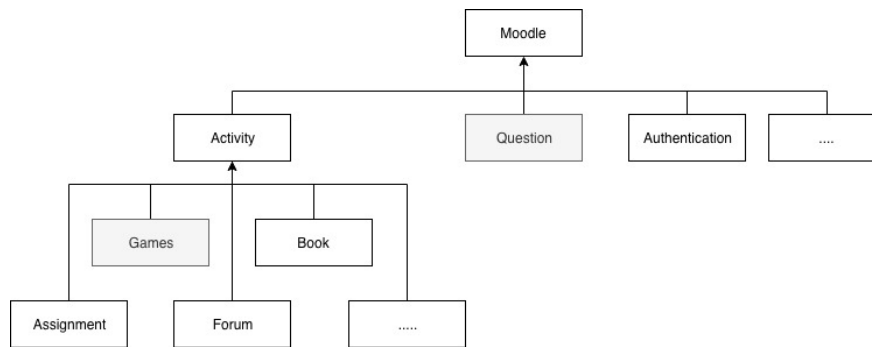


Fig. 1. Moodle plugins structure

To understand how modular is Moodle plugin, Fig. 1 explains structure of Moodle LMS plugins system and Games plugin is located in activity section.

2.2 Real-time web communication with websocket technology

Before websocket introduced, web developers tend to use Polling, long polling and HTTP streaming to accomplish real-time communication[18]. Therefore websocket is built to support real time communication web application development, by breaking limitation of request/response protocol of HTTP [19]. To use this technology developer need to set endpoint and connect it via valid URL using ws:// scheme for common connection and wss:// scheme for secure connection. Then the connection of websocket is established when HTTP Protocol is updated to Websocket protocol during the initial handshake between client and server. This real-time communication is a

fundamental aspect in multiplayer games which will be the bridge between player experience when playing the games.

3 The Proposed Plugins

3.1 System architecture

To implement this concept we need to modify and add two plugins into Moodle backend, which are matching quiz question generator and multiplayer quiz view. Fig. 2 explains how each module in Moodle will interact with proposed plugin modules. Question modules by Moodle will return a question type to make a question bank. This question bank will be applied to each games later via generator modules.

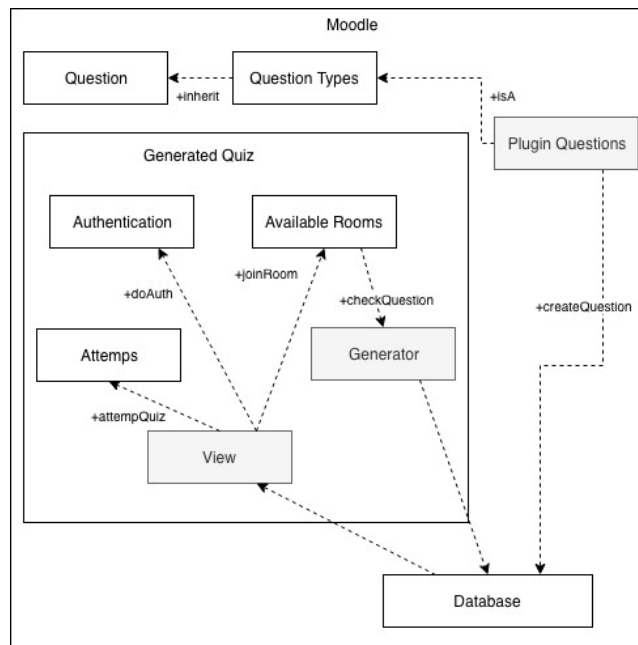


Fig. 2. Proposed System Architecture

To make multiplayer games, course manager must add this game activity first via view interface that provided by Moodle. After assigning rooms and who will compete, student can login into game via view modules and it will check how many attempts does the student has. Plugin system also check whether student has a correct access right to join the multiplayer room or not. Greyed part modules mean that that part were added to Moodle or directly from native module.

3.2 Multiplayer room system

Multiplayer Room concept can be seen in Fig. 3. Proposed multiplayer plugins basically is a turn-based game, where each player takes turn to do some action on a declared time that can be set by course manager.

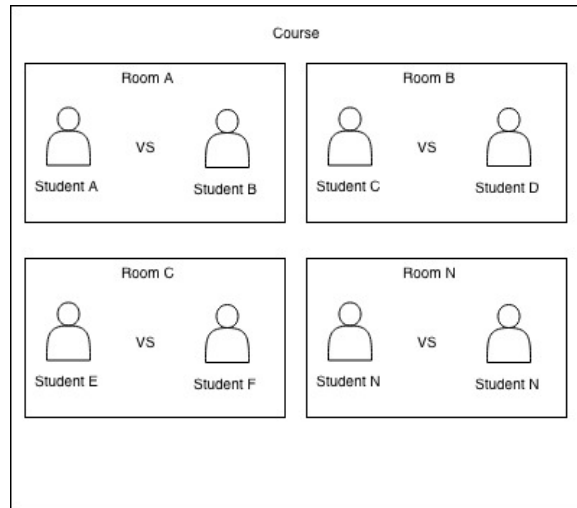


Fig. 3. Multiplayer room system

In this case player will take action to search each boxes to find matching object. Mul rooms will be their center to pass the turn to each other. Who was eligible to go inside each room can be set via plugin manually. Currently in proposed concept, there should be no limitation to how many rooms that can be made.

3.3 Websocket and moodle

Moodle is hosted with PHP technologies that rendered on the server. To use multiplayer capabilities over websocket we need to add websocket host into the server.

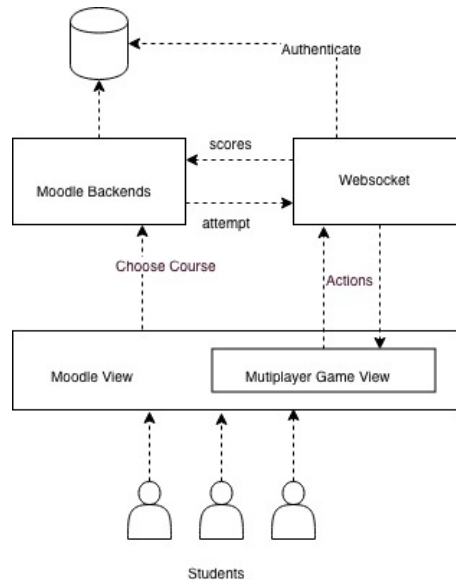


Fig. 4. Moodle and Websocket Illustration

Fig. 4 explains how the websocket will communicate with Moodle and student. Websocket end-point will authenticate first with crawling data of assigned student and then show the user interface on the Moodle view. Moodle Backends will assign student, how much rooms, game rules, question, and other thing to be consumed later by the websocket end-point.

3.4 Plugin capabilities

This plugin will have several capabilities to manage Moodle Game Quiz Activity:

- *Creating Question* : This plugin will use native Moodle modules to create question banks and convert it to its own question structure
- *Categorize Question*: Plugin can categorize question based on user input, example : geography, physics, etc
- *Randomize Question*: Plugin can automatically randomize assigned question banks to the room, each room will have different result randomization.
- *Creating Multiplayer Quiz*: This plugin can add a new Multiplayer Game Quiz Activity
- *Authenticate Student* : Student that were not eligible, or does not assigned to room yet will be automatically kicked from system
- *Pairing*: With room system teacher can pair student to compete to each other
- *Set game rules*: This means teacher can freely adjust every room that they made

3.5 Game sample screen

Fig. 5 explains the User Interface concept that each player will see on their screen. After login and choosing room, two players will see this kind of screen. If boxes already open by one of the player, on the other player screen also will be open. This is the core game screen, each box will represent question that must be matched. Amount of boxes is according to assigned question by teacher.

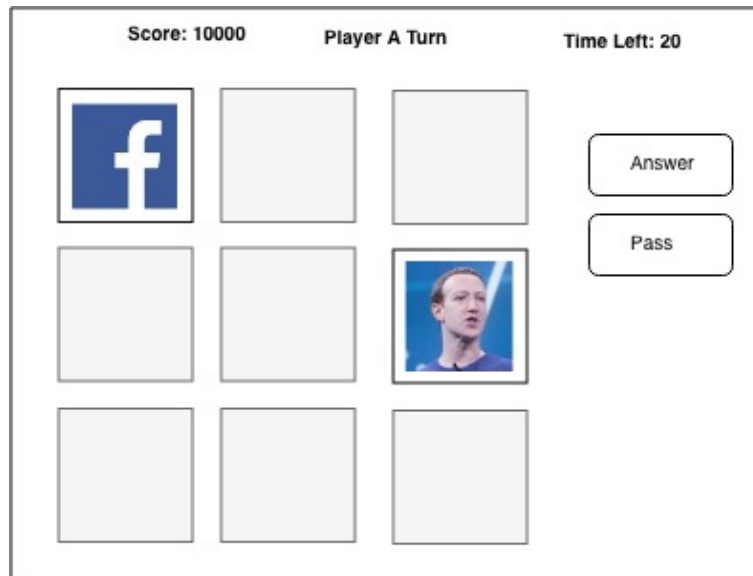


Fig. 5. Game Sample Screen

After choosing two boxes, player can push “Answer” button to answer the question, or if player doubt with their answer she can push “Pass” to pass the turn to the enemy. Wrong answer will lead to minus point to make the game more exciting, and passing by pressing “Pass” button will make revealed box closed again. Each player that answer the most question will win the match, amount of correct score for each answer can be set from the course admin page for increment or decrement.

4 Conclusion

As we research further about Moodle LMS Capabilities there still many things that can be optimized and extended. This concept made to enrich Game-Based Learning implementation in LMS. Future research about current result is to implement this concept into real life application, or even extending it for example single room with more than 2 players support.

5 References

- [1] “New Release of European LMS Market Report,” e-Literate, 01-Dec-2016. [Online]. Available: <https://mfeldstein.com/new-release-european-lms-market-report/>. [Accessed: 03-Dec-2018].
- [2] “Moodle.org: Moodle Statistics.” [Online]. Available: <https://moodle.net/stats/>. [Accessed: 03-Dec-2018].
- [3] P. Kumar, “Moodle plugin for game based learning,” PhD Thesis, Citeseer, 2013.
- [4] “Moodle plugins directory.” [Online]. Available: <https://moodle.org/plugins/index.php?q>. [Accessed: 03-Dec-2018].
- [5] J. P. Gee, “What video games have to teach us about learning and literacy,” *Computers in Entertainment (CIE)*, vol. 1, no. 1, pp. 20–20, 2003. <https://doi.org/10.1145/950566.950595>
- [6] G.-J. Hwang and P.-H. Wu, “Advancements and trends in digital game-based learning research: a review of publications in selected journals from 2001 to 2010,” vol. 43, no. 1, 2012. <https://doi.org/10.1111/j.1467-8535.2011.01242.x>
- [7] M. Prensky, “Digital Game-based Learning,” *Comput. Entertain.*, vol. 1, no. 1, pp. 21–21, Oct. 2003. <https://doi.org/10.1145/950566.950596>
- [8] H. Tüzün, M. Yılmaz-Soylu, T. Karakuş, Y. \Inal, and G. Kızılkaya, “The Effects of Computer Games on Primary School Students’ Achievement and Motivation in Geography Learning,” *Comput. Educ.*, vol. 52, no. 1, pp. 68–77, Jan. 2009. <https://doi.org/10.1016/j.compedu.2008.06.008>
- [9] N. E. Cagiltay, “Teaching software engineering by means of computer-game development: Challenges and opportunities,” *British Journal of Educational Technology*, vol. 38, no. 3, 2007. <https://doi.org/10.1111/j.1467-8535.2007.00705.x>
- [10] M. Papastergiou, “Digital Game-Based Learning in High School Computer Science Education: Impact on Educational Effectiveness and Student Motivation,” *Comput. Educ.*, vol. 52, no. 1, pp. 1–12, Jan. 2009. <https://doi.org/10.1016/j.compedu.2008.06.004>
- [11] M.-L. Hung, C. Chou, C.-H. Chen, and Z.-Y. Own, “Learner Readiness for Online Learning: Scale Development and Student Perceptions,” *Computers & Education*, vol. 55, no. 3, pp. 1080–1090, Nov. 2010. <https://doi.org/10.1016/j.compedu.2010.05.004>
- [12] V. Cantoni, M. Cellario, and M. Porta, “Perspectives and challenges in e-learning: towards natural interaction paradigms,” *Journal of Visual Languages & Computing*, vol. 15, no. 5, pp. 333–345, Oct. 2004. <https://doi.org/10.1016/j.jvlc.2003.10.002>
- [13] D. M. Poole, “Student Participation in a Discussion-Oriented Online Course,” *Journal of Research on Computing in Education*, vol. 33, no. 2, pp. 162–177, Dec. 2000. <https://doi.org/10.1080/08886504.2000.10782307>
- [14] T. Y. Aikina, O. V. Sumtsova, and D. I. Pavlov, “Implementing Electronic Courses Based on Moodle for Foreign Language Teaching at Russian Technical Universities,” *International Journal of Emerging Technologies in Learning (iJET)*, vol. 10, no. 3, pp. 58–61, Jun. 2015. <https://doi.org/10.3991/ijet.v10i3.4501>
- [15] K. Jebari, F. Boussedra, and A. Ettouhami, “Teaching “Information Systems Management” with Moodle,” *International Journal of Emerging Technologies in Learning (iJET)*, vol. 12, no. 04, pp. 4–16, Apr. 2017. <https://doi.org/10.3991/ijet.v12i04.6183>
- [16] Y. Zhou, “Design of Moodle-based Podcast Teaching Platform for the Course of Aerobic Gymnastics,” *International Journal of Emerging Technologies in Learning (iJET)*, vol. 12, no. 09, pp. 95–104, Sep. 2017. <https://doi.org/10.3991/ijet.v12i09.7490>

- [17] “Forum participation plugin for Moodle: Development and Discussion - ScienceDirect.” [Online]. Available <https://www.sciencedirect.com/science/article/pii/S1877050917323293> [Accessed: 03-Dec-2018].
- [18] Q. Liu and X. Sun, “Research of Web Real-Time Communication Based on Web Socket,” vol. 2012, Dec. 2012.
- [19] N. Wang, X. Chen, G. Song, and H. Parsaei, “Using Node-HTTP-Proxy for Remote Experiment Data Transmission Traversing Firewall,” *International Journal of Online and Bio-medical Engineering (iJOE)*, vol. 11, no. 2, pp. 60–67, Mar. 2015.
<https://doi.org/10.3991/ijoe.v11i2.4443>

6 Authors

I Nyoman Darma Kotama is Postgraduate Student from Electrical Engineering Department, Udayana University, Bali, Indonesia. He received B.Eng in Electrical Engineering department on computer and information technology specialization from Udayana University in 2017. Currently his research interest is about Game Based Learning, Serious Games and E-Learning.

Komang Oka Saputra received his Ph.D. degree in Computer Science and Information Engineering from National Taiwan University of Science and Technology, Taipei, Taiwan. Since 2008 he has been a Faculty Member with the Department of Electrical and Computer Engineering, Udayana University, Bali, Indonesia. His current research interests include computer network, software engineering, e-learning, and e-exam.

Linawati is Head of Electrical Engineering Postgraduate Department at Udayana University, Bali, Indonesia. She is also Head of Udayana Centre for Learning Innovation and member of Learning Development and Quality Assurance Institution. She involves in IEEE Indonesia Section for Human in Technology Rural Empowering (HTRE) Activities.

Article submitted 2019-01-21. Resubmitted 2019-03-15. Final acceptance 2019-03-22. Final version published as submitted by the authors.