MOODLE QUIZ: A METHOD FOR MEASURING STUDENTS' ENGAGEMENT

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ABSTRACT

Students' engagement is an important factor in students' success. It refers to the degree of which students are attentive, curious and passionate about their studied subject. Therefore, academics have a responsibility for creating platforms that ensure and measure students' participation and engagement during the delivery of different modules. Moodle is a great platform where tools such as Quiz can be easily deployed for improving and measuring students' engagement. This paper discusses the design and implementation of Moodle Quizzes and provides a reflection on their advantages in aiding students' participation in the classroom. In this study, the process of designing and creating quizzes that are used effectively to engage students before, during and after the classroom have been covered. Our study shows that Moodle Quiz could be used for measuring student engagement level which can be placed on Student's Moodle front page to create a sense of completion and belonging. The study has been primarily carried out on the degree apprentices (Applied Engineering Program: AEP) at Warwick Manufacturing Group (WMG), Warwick University.

KEYWORDS

Moodle, Quiz, Engagement, Engineering, Active Learning, Digital Learning, Blended Learning, Standard: 8.

INTRODUCTION

Some teaching theories widely accept that teaching is one-way of knowledge transfer, where the teacher is the transmitter and the student is the receiver. The focus of these theories is on either who the student is or what teachers do (Biggs & Tang, 2011). Carl Rogers (Rogers, 1957) argues that teachers cannot teach directly but they can only facilitate learning. Therefore, students activities before, during and after the classroom is what matter to measure learning compared to what teachers do.

The responsibility of conveying the subject knowledge according to these theories rely on the student's ability to learn and the teaching skills the teacher has. The depth of understanding during the classroom is not practically measured. While it is vitally important that the intended learning outcomes, learning activities and assessment are constructively aligned (Biggs and Tang, 2011), it is even more important to ensure that effectiveness of these learning activities is measured.

Bearing in mind that students have different learning styles, background, motivations and subject-knowledge experience, our proposed approach at WMG follow a student-centred

approach where the purpose of teaching is to aid learning (Biggs & Tang, 2011). Student-centred teaching strategy does not necessarily reduce teacher preparation load rather it is a more complex business. In our approach, considerable attention has been paid on what students do and how well the intended learning outcomes are achieved. This is carried out using a variety of Moodle tools amongst which is the Quiz.

Moodle is an open source virtual learning management system used by a large number of education providers (Nash & Moore, 2014). It has rich learning tools that allow for engaging and user-friendly experience. As a secure and robust system, educators can create personalised or cohort-level learning plans (Moodle, 2019).

Moodle Quiz activity is a great tool that allows academics to design varieties of online questions, including multiple choice, matching, short answer and numerical as shown in Figure 1. Moodle Quiz provides design flexibility and creativity by incorporating text, images and videos (Coy & Edstrom, 2013). Based on its purpose, the Quiz can be configured to run for a set time limit and for multiple or unlimited numbers of attempts. It can be also ordered systematically or randomly. The use of quiz in our teaching methodology prior, during and after the classrooms is a practice that helps reflective teaching and deep learning (Knutson Wedel, 2011). This enhances students' experience and optimises the achievement of the intended learning outcomes and development of students which in turn uplift the performance and reputation of the institution (Trowler, 2010). Therefore, we accept that students' engagement is a responsibility of both students and their academic institution.
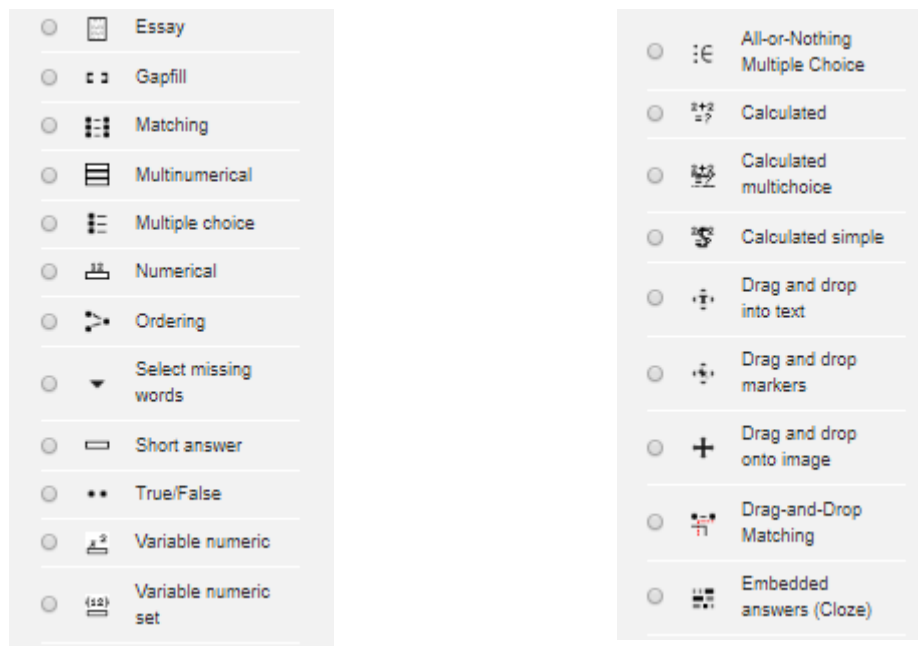

Figure 1. Example of Quiz types offered by Moodle platform.

A portfolio can be regarded as the purposeful collection of a learner's work that can be structured to exhibit the learner's efforts and achievements over time (Kim, Ng & Lim, 2010). Portfolios are increasingly seen to be a valuable tool for the assessment of competencies and are used in many professions (McColgan & Blackwood, 2009). In accreditation environments, digital portfolios can provide a space where learners' evidence of their competencies and achievements can be stored and systematically evaluated (Fiedler, Mullen & Finnegan, 2009).

The paper contributes to the CDIO initiative educational framework by investigating the idea of building up a learning portfolio via Moodle Quizzes. Each awarded mark acknowledges a successful completion of an individual activity, assessment or even a whole module. The awarded mark also increases personal satisfaction and functions as an indicator to demonstrate to their teachers and peers what they have learned, rather than what was taught.

PROPOSED METHODOLOGY

We have designed and used Moodle Quiz for pre-class, in-class and post-class activities. These activities have been tested for different modules in the AEP program. The AEP offers a flexible teaching pace tailored around the industry need. The programme welcomes students from different industry backgrounds and ages. Currently, for year 1 and 2 students, modules are split into 6 blocks with one week long each and 5 weeks between each two consecutive blocks. Students are expected to be working full time outside these blocks with some given time at work to revise.

In line with the university education strategy and in recognition of its commitment to communicate teaching excellence, life-shaped learning is ensured through the design of teaching sessions and seminars. These sessions ensure that students are well engaged with the subject knowledge during 5 weeks of full-time work. The students may study an average of 6 subjects a week which makes session engagement an essential part of its design. Each of the facet used for increasing student engagement in AEP program is explained as follows:

Pre-class: Flipped Learning

Quiz tool comes in handy to be especially useful in its support of flipped learning. In order to cover easy-learnt subjects, students are encouraged to watch a short subject-related clip of recorded lecture or YouTube video and answer several relevant questions before the class.

To reward achievement and ensure learning, students may not have access to particular resources unless they pass a quiz. Nevertheless, students are allowed to attempt the quiz an an unlimited number of times until they pass. An example of this set up is shown in Figure 2.
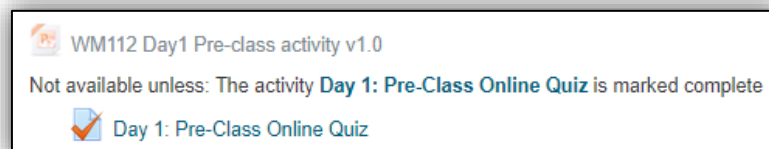

WM112 Day1 Pre-class activity v1.0

Not available unless: The activity **Day 1: Pre-Class Online Quiz** is marked complete

Day 1: Pre-Class Online Quiz

Figure 2. Example of restricted resources to ensure and reward achievement.

In-class: Class interaction and existential involvement

Active learners learn by doing, reflective learners learn by thinking back. This is often missed by traditional teaching as students are unable to do or reflect during the lecture or briefing itself. To encourage both, the student should actively take part throughout the virtual learning environment then also be given something to take away and think about (Kvam, 2000). Group-based activities during the lecture make students active learners and measure the understanding of the content introduced during the class. Educators can also observe which questions spark students' attention, which leads to a deeper discussion.

The classroom that we currently use for delivering AEP lectures has a theatre set-up with a capacity of 60 students, which is not the best structure to support group activities and does not easily allow the lecturer to interact with the students. Until we have a classroom with a flat structure, in class activities, have to be delivered differently. Quiz helps lecturers create in-class quiz that should not take more than 5 to 10 minutes to complete. This quiz breaks the lecturer rhythm and recharge students' attention. Students can discuss the quiz questions with peers sitting on both sides. This type of quiz can be considered as an informal formative assessment that helps both educators and students to measure understanding and identify gaps in the design of the subject knowledge taught during the classroom. Students or in fact anyone like to get his effort rewarded and hence the score that students received at the end can fulfil this desire. This learning activity is likely to motivate and help students achieve the learning outcomes intended.

Post-Class: Learner commitment, consolidation & assessment

A quiz related to paperless seminars or home revision activities is a great method to measure students understanding and interaction with the module contents. It quantifies the amount of time and efforts students invest in their revision and other extracurricular activities.
A quiz is also helpful in running online assessments, a method that majority of the professional bodies use to assess and hence award professional qualifications.
To involve students in our self-reflexive process (Lea, 2015) and to ensure students engagement with the course design, students-faculty partnership (Cook-Sather, Bovill & Felten, 2014) was formed via a survey to solicit feedback on this type of assessment. This ensures that the quality system is well equipped with the right method that fosters active students' participation (QAA, 2012).

RESULTS & DISCUSSION

We have conducted our proposed study on different degree apprenticeship modules offered in WMG. For example, the pre-class activities have been assessed for the Y1 Electrical and Electronic Principles (EEP) module offered to the BSc in Engineering apprenticeship, in-class activities have been evaluated in the Y3/Y4 AEP module: Sustainable Energy Systems (SES) module while Quiz has been used as an assessment tool and post-class activity for the AEP Y1 module: EEP.

Pre-class activities

Successful delivery of intended learning outcomes is bounded by the relevant learning activities that support it. These activities not only have to be used but also they should come with a measurable outcome to ensure their effectiveness. In order to assess students' involvement in learning, educators can simply identify whether students have viewed the lecture notes and completed the designated activity via the quiz result section. In order to create a sense of competition and belonging, the top 10 results may be configured to be visible to all students on the main page. This is done via utilising the "Activity Results" block feature as seen in Figure 3.

Additionally, to have a holistic view of all students activities including what resources students are ignoring, a "**Progress Bar**" feature can be employed as seen in Figure 4. Educators will be able to track students' engagement via the "progress Bar tool and hence identify students who are disengaged or struggling.

Figure 3. List of the top ten students

Figure 4. Students interaction with a set of activities on Moodle

In-class activities

We introduced in-class Quiz for the SES module, which is an elective module selected by about 30 of Y3/Y4 students. The Quiz, as illustrated in Figure 5, covers the content of the lecture titled "Wind Energy". Figure 6 provides proof of measuring the level of students' attention during the classroom and hence a method of measuring students' learning.

After completing the activity during the lecture, the lecturer observed that the students' engagement level was increased. Giving the students a set of questions to answer before proceeding the lecture stimulates their thinking process and encourages a wider engagement.
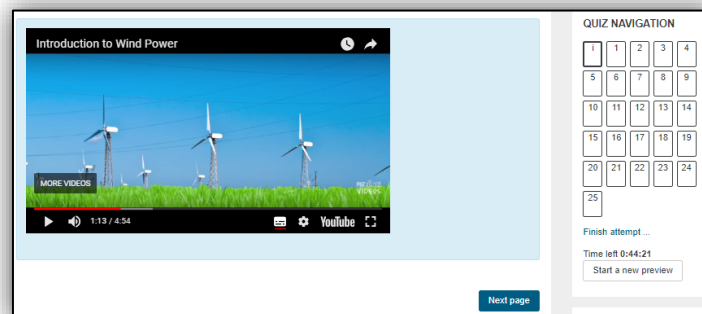

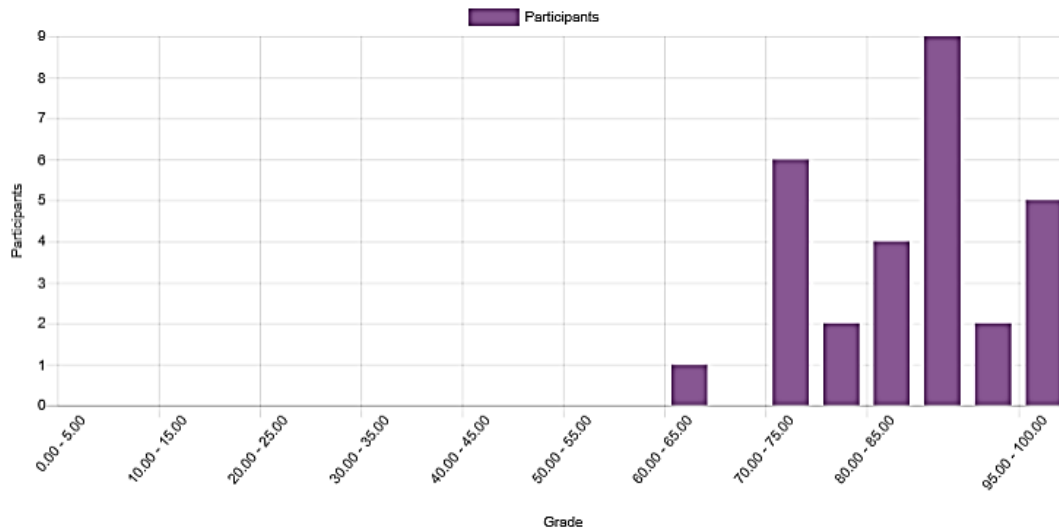Figure 5. SES Moodle quiz showing 24 in-class questions

Figure 6. Students scores of the in-class questions

Post class activities

Modules like EEP, which are content-intensive, require face-to-face teaching, seminars, simulation and lab experiments.

Based on the EEP Module Information Descriptor or MA1 form, students have to submit two Lab reports forming 30% of the overall mark. A suggestion of replacing one of the reports with a new assessment in the form of an online quiz was welcomed and approved by the Teaching and Learning Committee.

Students were supplied with a mock test that emulates the test question behaviour and complexity level and it can be retaken as often as they wish. Self-evaluation is an important process in teaching reflection, however, it should be undertaken in active consultation with students (McNiff, 2001). Therefore, the students were asked to express their views on the online test, a sample of which is shown in Figure 7.

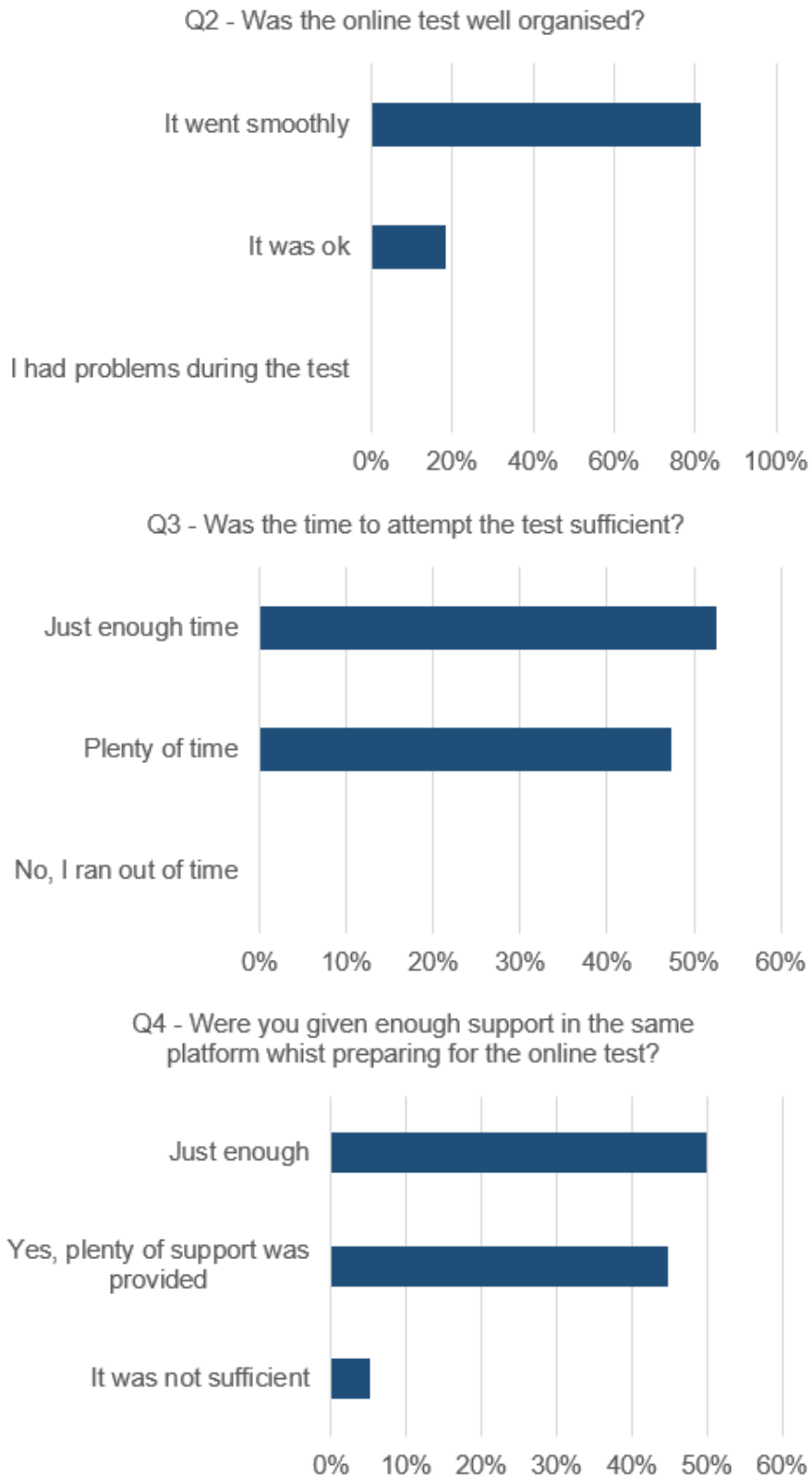Q1 - Would you like to have more online tests used in the future as an assessment method?
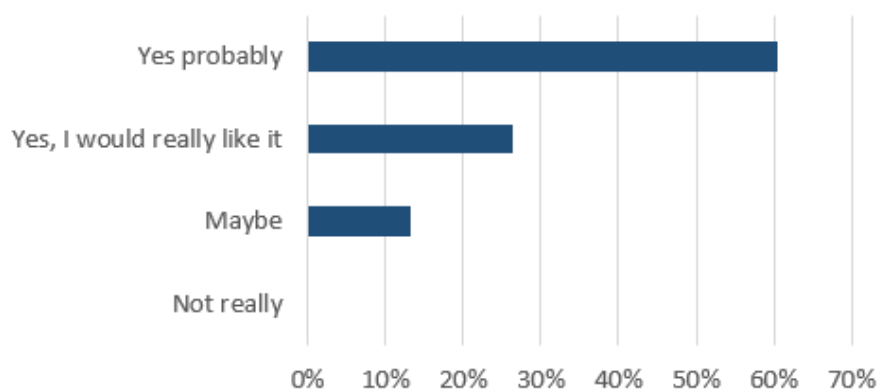
Figure 7. Students' feedback on the proposed new online-based assessment

Feedback of the newly implemented assessment method was collated and proved positive. Example of the qualitative feedback is presented in the Box below wherewith students expressed their acceptance of the online Quiz style and provided some feedback. The feedback was collected anonymously after the Quiz marks were published to students. Therefore, the students had the freedom to express their opinion which eliminated the tutors' influence on the feedback result.

I think the test went well. It allowed just enough time and the mock exam was adequate preparation before it. There was an issue with members of the class doing the exam on IE instead of Chrome which resulted in issues.
Great mix up from 3 hour examinations
I thoroughly enjoyed this test and the practice tests really helped me learn and understand concepts much better and learn from my mistakes.
Really liked the idea. I had the ability to concentrate more as a person who dislikes exams. As a suggestion, I think holding the exam on a Monday would be better.
More variety in mock quick s would be helpful to get a greater feel for the test, as with the mock test once completed you would remember some of the answers making it difficult to then try to test your self to see if you have improved in terms of revision for the actual online test. On a while I was very pleased with this type of test, one recommendation for modules that cover a lot of content such as materials and manufacturing processes, this type of test would help to spread out testing of the content rather than say having to revise continent for 3 blocks worth of content having a test on two blocks worth of continent and a quiz test in this format for one blocks worth of content (similar to what was done with this electrics module test that was done.
A couple more variations on the online test format would be good, i.e. Mock Test A, Mock Test B etc.
Having an online mock test on the same platform really helped as it left no room for nasty surprises when sitting the actual test. Not having to write out long wordy answers was also a welcome change.
Check the quiz is compatible with the internet software prior to the test, and that all images needed are shown.
If this was to become a platform used for assessments in the future I'd like to see more practice resources. I feel like one practice online test is not enough to use before the real exam.
More mock tests
Advise not to use google chrome as image of circuits etc appears to small on screen and can not be enlarged. Works ok in internet explorer.
Would have benefited from having solved solutions to the mock test. Also feedback on which questions were correct and incorrect on the test would be helpful.
Would be good to have multiple mocks to aid revision/different results. Steps taken to get correct answer could be given in mock for incorrect solutions
No marks for working on tricky questions. Had no access to the lab the day before test but were told to check accounts worked in lab :/.

The feedback shows a positive reaction towards the new assessment/online test. The test was able to give the students the chance to demonstrate their understanding of multiple learning outcomes without going through 3-hours exam time and without necessarily writing long answers. However, challenges always exist with technology; one of which is checking the compatibility of the web browsers with quizzes different elements (text and image). A common request from students was to be provided with more mock exams/extra practice questions. Creating questions in Moodle Quiz might take longer time than typing it for a traditional exam, however, once the question is created then it can be saved in a question bank and reused again when necessary. Generating a test from question bank is a simple and straightforward procedure in Moodle. You can choose which questions will go to the test and save it.

CONCLUSIONS

Measuring whether learning has taken place during a lecture helps educators to define the areas of focus where students struggle or need extra support. Regardless of the number or type of the teaching techniques used in the class, if the learning does not take place then the contribution of used techniques is null. Technology enhanced teaching empowers educators to develop various opportunities for students' engagement and interaction and evaluate their understanding.

Moodle provides practical solutions for overcoming common barriers to students' engagement before, during and after the classroom. Amongst several tools, Quiz feature has been proven to be a powerful tool to engage students with subject content on different pace and scenarios. They allow educators to experiment with different approaches to encourage class participation and evaluate the level of engagement. The quiz tool has been well received by the students, colleagues and learning development advisors. The quiz results provide educators with gaps demonstrated by students and hence help in setting up a more suitable teaching strategy. Furthermore, students' interaction with activities and resources can be traced using "**Activity Results**" and "**Progress Bar**" features. Therefore, educators can create a competitive environment for strong students and identifies those who are struggling.

FUTURE WORK

Research articles related to engineering education illustrate that industry demands play a very large role in determining how engineering curricula should be structured and delivered (Arlett et al., 2010). Given the highly technical aspects of the degree, which also requires the active application of knowledge within the field, it is no surprise that graduates are expected to not only effectively apply the theories they are taught but to do so almost instantly as and when required in real-world settings. Given that we are teaching apprentices at WMG, who are working full time in Industry, it becomes hard for apprentices to commute to the University for accessing resources, (such as software), performing experiments and getting guidance from tutors. In this situation, our main goal at WMG is to provide a majority of the educational support online. We are aiming in future to use virtual learning environments (such as Moodle, Blackboard) to create an effective portal for students that is not only engaging but also useful for developing practical knowledge. We are exploring the features such as remote labs to find the possibilities of delivering authentic learning using online platforms.

REFERENCES

Arlett, C., Lamb, F., Dales, R., Willis, L., and Hurdle, E. (2010). Meeting the Needs of Industry: the Drivers for Change in Engineering Education. *Engineering Education.* 5(2), 18-25.

Biggs, J. B., & Tang, C.S., (2011). *Teaching for Quality Learning At University*. 4th ed. UK: McGraw-Hill Education, ProQuest.

Cook-Sather, A., Bovill, C., & Felten, P., (2014). *Engaging students as partners in learning and teaching: a guide for faculty*. John Wiley & Sons .

Coy, J., & Edstrom, J., (2013). *Instant Moodle Quiz Module How-to*. UK: Packt Publishing Ltd.

Fiedler, R. L., Mullen, L., & Finnegan, M., (2009). Portfolios in Context: A Comparative Study in Two Preservice Teacher Education Programs. *Journal of Research on Technology in Education*. 42(2), 99-122.

Kim, P., Ng, C., & Lim, G., (2010). When cloud computing meets with Semantic Web: A new design for e-portfolio systems in the social media era. *British Journal of Educational Technology*. 41(6), 1018-1028.

Knutson Wedel, M., (2011). Activating deep approach to learning in large classes through quizzes. In *Proceedings of the 7th International CDIO Conference, Technical University of Denmark, 2011*.

Kvam, P. H., (2000). The Effect of Active Learning Methods on Student Retention in Engineering Statistics. *The American Statistician.* 54(2), 136-140*.

Lea, J., (2015). *Enhancing Learning and Teaching in Higher Education : Engaging with the Dimensions of Practice*. Maidenhead, Berkshire, England: McGraw-Hill Education.

McColgan, K., & Blackwood, B., (2009). A systematic review protocol on the use of teaching portfolios for educators in further and higher education. *Journal of Advanced Nursing*. 65(12), 2500-2507.

McNiff, J., (2001). *Action Research: Principles and Practice*. 2nd edition. London: Routledge.

Moodle. (2019). [Viewed 9 April 2019]. Available from: https://moodle.org/

Nash, S, & Moore, M., (2014). *Moodle Course Design Best Practices*, Packt Publishing Ltd.

Quality Assurance Agency for Higher Education, (2012). UK Quality Code for Higher Education, Part B: Assuring and Enhancing Academic Quality – Chapter B5: Student engagement. *QAA*.

Rogers, C., (1957). Personal thoughts on teaching and learning, in *H. Kischenbaum and V.L. Henderson (eds) (1989) The Carl Rogers Reader*. New York: Houghton Mifflin.

Trowler, V., (2010). Student Engagement Literature Review. *Higher Education Academy*. 11(1), 1-15.

BIOGRAPHICAL INFORMATION

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