



ENHANCING SELF-ASSESSMENT USING SOCIAL LEARNING STRATEGIES AND LEARNER CHARACTERISTIC FACTORS IN MASSIVE OPEN ONLINE COURSES (MOOCs) FOR LANGUAGE LEARNING

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ABSTRACT

Massive Open Online Courses (MOOCs) provides an effective learning platform with various high-quality educational materials accessible to learners from all over the world. On the other hand, assessment plays an important role to improve student performance in MOOC learning. However, issues in assessment designs contribute to a lack of student engagement. Hence, a suitable assessment design should be developed in MOOC for language learning. A literature review was performed to identify the key principles of social learning theory and dimensions of learner characteristics. Five research questions have been constructed to assist the study. Results of the study are then used in formulating a conceptual model for a Self-Assessment based on social learning strategies, and dimensions of learner characteristic factors. Findings of this study are two folds: i) a conceptual Self-Assessment model based on social learning strategies and learner characteristic factors for improving student engagement in MOOC for language learning, and ii) a Self-Assessment model based on social learning and learner characteristic factors to improve language learning using MOOC. In the future, student performance will be investigated using that Self-Assessment MOOC model in language learning based on social learning and learner characteristic factors.

Keywords: MOOCs, self-assessment, social learning, language learning, learner characteristics, student performance.

1. INTRODUCTION

According to Admiraal *et al* [1], mostly categorization of MOOC pedagogy relates to the two main kinds of MOOCs, (i) cMOOC and (ii) xMOOC. The connectivist or cMOOC, driven by pedagogical principles of social learning, and the institutionally-focused xMOOC, reliant on video-lecture content and automated assessment. In MOOC assessment, the big challenge for a large number of students is to get detailed and timely feedback [2]. Tenório *et al* [3] stated the assessment can increase the performance of students at the same time it brings benefits to the teacher. Current MOOCs are (i) lacking personalized learning guidance, and (ii) intelligent assessment for individuals [4]. In MOOC assessment, the issue is, there was a reduction of interest and activity of students during the session of the course [5]. The important step toward designing efficacious courses and improving open online learning is understanding which factors account to students' learning outcomes including (i) students' characteristics, (ii) teaching context and (iii)

learning activities [6]. However, assessment is the third emerging issue in the literature on MOOCs [1].

This study aimed to evaluate visual and active an adaptive assessment approach for improving Massive Open Online Courses (MOOCs) performance in the language course and the research questions were constructed as follows:

- RQ1:** What are the social learning strategies that used in MOOC for language learning?
- RQ2:** What are the learner characteristic factors that used in MOOC for language learning?
- RQ3:** How to design Self-Assessment that incorporate elements for selected dimensions of social learning strategies?
- RQ4:** How to design Self-Assessment that incorporate elements for selected dimensions of learner characteristic factors?
- RQ5:** What are the student engagement in MOOC for language learning?

**Table-1.** Definition of social learning.

Definition	Author
A theme received the greatest interest, and a mixed method was the most preferred research approach.	[8]
A part of informal learning/ a part of informal learning is an evident reduction of the social learning scope.	[9]
As an interactive group process in which learners actively construct knowledge and then build upon that knowledge through the exchange of ideas with others.	[10]

The main contribution of this paper is to propose a Self-Assessment design that considers social learning and learner characteristic factors. Our solution is usable to Instructional Designer and applicable to any language learning design.

2. LITERATURE REVIEW

A. Learning

According to Pili and Admiraal [6], MOOC platforms can facilitate both online and offline communication. Authors stated that the platform is suitable for designing social learning experiences. The study connects the pedagogy of a MOOC and the interaction and communication of students. According to Cartner and Hallas [7], social constructivist learning theory blends two perspectives: (i) constructivism and (ii) social learning. Table 1 shows the definition of social learning.

Marzano and Ochoa-siguencia [9], social learning represents both an opportunity and a challenge for the training profession. Cartner and Hallas [7], a social learning approach assumes that students when they are (i) able to think through new concepts and (ii) problems in discussion with peers. In the social learning process in the (i) discussion forum analyzed, (ii) results will help to get useful feedback about the learners and (iii) improve the understanding from discussion forum [11]. The author concluded that can be used to inspect the relationship with participation retention and performance as well. Manathunga *et al* [12], mentioned that social learning may; (i) bring a sense of community, (ii) avoiding isolation in online learning and (iii) providing possibilities to learn from others.

The previous researcher listed two social learning requires assessment mechanisms, students can (i) voluntarily peers and share of learning contents and (ii) observe the assessment results of others [13]. Brinton *et al* [14] mentioned that social learning is a key element of scalable education on MOOC. Researchers stated that social learning is done via online discussion forums and

our main focus is on understanding forum activities. According to Crossley [15], discussion posts are of interest in research on student participation in MOOCs because they are one of the core methods that students use to participate in social learning. In discussion forums activities, students with a platform to exchange ideas, discuss lectures, ask questions about the course, and seek technical help, all of which lead to the production of language in a natural setting. However, other than the discussion forum, some initiatives offering collaborative and social learning opportunities are emerging within MOOCs, given the concern of implementing novel pedagogies and learning theories [12].

B. Learner Characteristics

Learner characteristics are important in all forms of online learning [16]. Most researchers focused predominantly on user perception of MOOC features, rather than individual learner characteristics such as exploring the factors which affect MOOC completion or learner retention [17]. However, Judy Lever-Duffy and Jean B.McDonald [18] listed three types of learner characteristics that are effective factors for student learning: (i) learning style, (ii) cognitive style and (iii) multiple intelligence. Table-2 shows the definition of learning styles used in this study.

Mohamad [19], mentioned that each student has his or her own learning style to be considered during the learning process [19]. Ali [20] listed three important elements for learning styles: (i) academic achievements, (ii) attitudes towards learning and (iii) multimedia technology. Sadhasivam and Babu [21] listed a few learning style models to build up their pedagogical hypothesis: (i) Kolb Experiential Learning Theory, (ii) VARK Model, (iii) Felder & Silverman Learning/Teaching Style Model and (iv) Dunn and Dunn Learning Style Model. Fasihuddin *et al* [22] highlighted that the Felder and Silverman Learning Style Model has been selected as the most appropriate model for open learning.

**Table-2.** Definition of learning styles.

Definition	Author
Are authentic as they are the appropriate techniques or methods in which learners learn, comprehend and get information.	[21]
Are the ways of receiving and responding to a learning stimulus with (i) unique psychological, (ii) affective and (iii) cognitive composition.	[20]
Refer to the variations in an individual's ability to accumulate as well as assimilate information, sensory preferences that have the impact on learning and related to personality.	[20, 23, 18]
The manner in which learners receive and perceive information.	[22]

Previous studies have found four different dimensions of learning styles: (i) processing (active/reflective), (ii) perception (sensory/intuitive), (iii) input (visual/verbal) and (iv) understand (sequential/global) [22], [24] and [25]. Rohaniyah [26] stated the major differences in learning styles are (i) the

way people perceive (sensation versus intuition), (ii) the way they made decisions (logical thinking versus imaginative feelings) and (iii) how active or reflective they were while interacting (extroversion versus introversion). Table-3 shows the definition of cognitive styles used in this study.

Table-3. Definition of cognitive styles.

Definition	Author
Cognitive styles are preferences or strategies used by individuals that influence functions such as (i) perceiving, (ii) remembering, (iii) thinking and (iv) problem solving.	[27]
Cognitive styles are (i) the way people think, (ii) the accuracy of their perception, (iii) how they process and remember information, (iv) how they use the information in problem solving or (v) how they organize and process information	[28, 29]

Jablokow *et al* [30] listed three parts of cognitive style: (i) individual's stability (ii) characteristic of mental approach; or (iii) cognitive preferences. The author has proposed three elements of the cognitive style dimension: (i) processing information; (ii) solving problems and (iii) making decisions. Cognitive style dimensions are: (i) energy (extroversion/introversion), (ii) information (sensing/intuitive), (iii) decisions (thinking/feeling), and (iv) lifestyle (judging/perceiving) [31]. The previous researcher found the differences between cognitive styles and learning styles, cognition based on (i) process or tendency to perceive stimuli, (ii) receiving & responding to a learning stimulus and (iii) use information, whereas learning style is (i) rooted in exterior behavior, (ii) response to learning situation and (iii) assimilate information [20, 23, 28].

C. Self-Assessment

MOOC in education must have three requirements; (i) assessment, (ii) instructor and (iii) model [32]. The limitation of experiential learning and many high-impact practices in higher education is the lack of assessment of embedded learning outcomes at the individual learner level [33]. According to Gikandi *et al* [34], the term assessment is purposefully used to refer to the measurement of learner's achievement and progress in a learning process. Two major forms of assessment exist (i) formative and (ii) summative assessments. Admiraal *et al.* [1], state that the quality of both assessments was moderate. In MOOC assessment, the issue is, there was a reduction of interest and activity of students during the session of the course [5]. Chan and King [35] mentioned,

one of the most challenging problems in MOOCs is that it is infeasible for the teaching staffs to grade all the assignments in such a large scale. The important step toward designing efficacious courses and improving open online learning is understanding which factors account to students' learning outcomes including (i) students' characteristics, (ii) teaching context and (iii) learning activities [6]. These authors suggest a reconceptualization of (i) curriculum activities and (ii) student achievement based on various indicators of performance. The design of engaging and challenging assessment tasks is one of the most important elements of planning a course [36]. However, current MOOCs are lacking (i) personalized learning guidance and (ii) intelligent assessment for individuals [4]. The previous researcher argued that Self-Assessment is a key to student's achievement and give significant information about students' achievements that is related only to the higher student achievement and improved behaviour [37].

3. RESULTS AND DISCUSSIONS

This study involves four phases: (i) literature review and analysis, (ii) design (iii) development and (iv) evaluation.

Literature Review. The study was initiated by conducting a literature review to find answers for RQ1 and RQ2 of the study.

Analysis. Analysis of RQ1 results tabled out the existing social learning strategies for assessment in MOOC platforms. Meanwhile, results of RQ2 analysis listed the elements for each dimension of learner characteristic factors.



Design and method. Based on findings from the analysis phase, RQ3 and RQ4 are then used to guide the researchers in proposing a conceptual model of Self-Assessment that is social learning strategies and learner characteristics factor to improve student engagement. By applying the conceptual model, the researchers built a draft learning design for a Mandarin MOOC. Data collection was conducted for one cohort. Self-Assessment activities were conducted throughout the one semester duration for cohort 6. The Self-Assessment activities were conducted via MOOC.

Evaluation. Evaluated the student engagement based on data collection from the MOOC platform in language learning.

Figure-1 shows the research design and development used in this study to develop a Self-Assessment model based on social learning and learner characteristic factors to improve student engagement in MOOC for language learning.

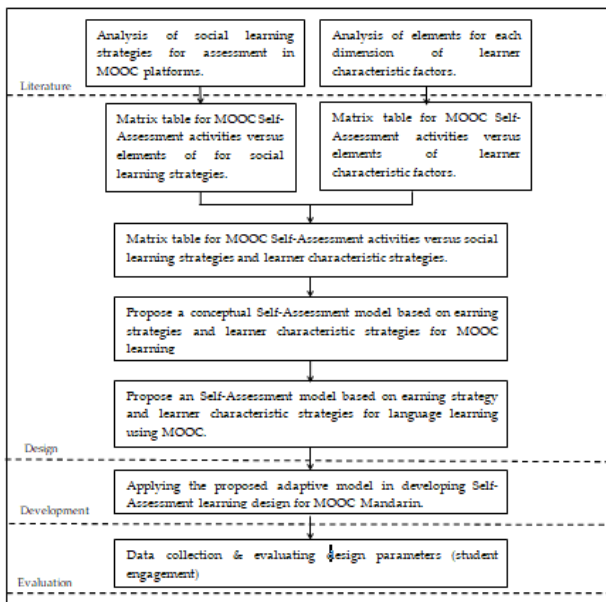


Figure-1. Research design and development.

Figure-2 illustrated the theoretical framework of this paper. Exclusively, the theoretical framework defined the assessment design as the independent variable and dependent variable is student engagement.

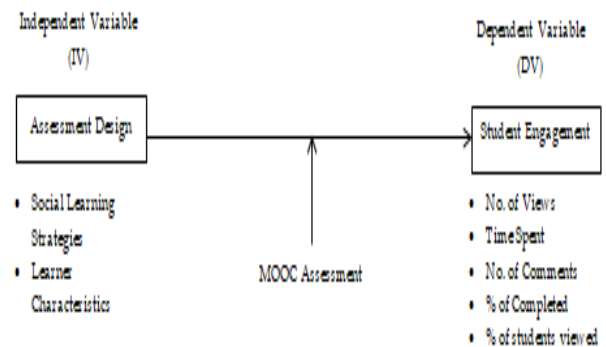


Figure-2. The theoretical framework.

4. RESULTS AND DISCUSSIONS

In this part, the results of data analysis are presented from both methods. The findings are presented, analyzed and discussed based on the research question.

A. Research Question 1: What are the social learning strategies that used in MOOC for language learning?

Social Learning Theory was introduced by Albert Bandura [38]. According to Bandura, people actually learn from each other. Learning happens when people generated information through observation, imitation, and modeling. Spencer [39] concluded that there are three main categories of conditions that contribute to effective modeling during the learning process: i) attention, (ii) memory and (iii) motivation Based on Bandura's Theory (1973) (1977) & (1986), Spencer recommended ways of using technology to implement social learning strategies in e-learning. This is summarised in Table-4.



Table-4. Comparative ways of applying social learning strategies in e-learning context.

Key principles of Social Learning Theory	Ways to apply social learning strategies in an e-learning context
To create this learning experience, we can provide video to demonstrate a behaviour or task, provide audio that describes a task verbally/use teleconference technology to allow real-time instructor's presentation & collaboration.	Observational learning - People learn through observation.
To recreate this learning experience in e-learning, we can build a forum, or set up a Facebook page for the course. If it is interesting and engaging, people will start talking and this may create retention of information. Other ways recommended include using effective storytelling, providing collaboration opportunities, and encouraging knowledge sharing & peer-to-peer support among students.	Retention and context - People internalize information in their memories and recall the information to respond to a similar case. An information is memorable if it is connected with context & emotion.
In e-learning, we can integrate gamification such as using leaderboard to encourage learner-to-learner communication.	Motivation and reward – People need the motivation to learn. Motivation can be in the form of reward or punishment.
In e-learning platform, to support intrinsic motivation we can provide students with challenging e-activities and their learning progress checklist. Intrinsic reinforcement can also be supported by providing the certificate of achievement which can be downloaded at the completion of the course.	State of mind – People also need intrinsic motivation or intrinsic reinforcement to learn.

B. Research Question 2: What are the learner characteristic factors that used in MOOC for language learning?

The findings of the first literature study are shown in Table-5. Altogether, there are 29 existing

elements in 8 dimensions of learning styles: Active, Reflective, Sensing, Intuitive, Visual, Verbal, Sequential and Global. While, there are 27 existing elements in 8 dimensions of cognitive styles: Extrovert, Introvert, sensing, Intuitive, Feeling, Judging and Perceiving.

**Table-5.** Dimension of learner characteristic factors that used in MOOC for language learning.

Dimension	Elements	Author													
		12	11	12	11	14	11	12	11	12	11	13	11	14	11
Learning Styles															
Active	Trying things														
	Impulsive, Risk-takers, Do not prefer lectures, Interpersonal		X												
	Group work	X	X	X	X	X									
	Task immediately			X	X										
Reflective	Think before action Like writing, Not inclined to too much note-taking,		X												
	Thinking	X	X					X							
	Intrapersonal & introspective		X												
	Analytical approach			X	X										
Sensing	Working alone	X		X	X	X									
	Concrete material	X	X					X							
	Prefer facts			X	X										
Intuitive	Follow tutors' approaches			X	X										
	Abstract material	X	X	X	X	X									
Visual	Innovative			X	X										
	See	X													
Verbal	Pictorial materials		X	X	X	X									
	Words	X	X					X							
Sequential	Written and listen			X	X										
	Step by step	X		X	X										
	Sequenced steps		X												
	Focus on details					X									
Global	Continual small steps							X							
	Large leaps, skipping, understand and look at detail	X		X	X										
	Holistically in large jumps		X					X							
Cognitive Styles															
Extrovert	Outer world									X				X	
	Collaborate with others										X				
	Try things out for himself													X	
Introvert	Inner world									X				X	
	Independent										X			X	
	Reflect on thoughts and ideas													X	
Sensing	Real objects and solid facts.									X				X	
	Physical qualities and affection by other information										X				
	Rely on past experiences													X	
Intuitive	Possibilities and personal meaning									X					
	Intuitive types										X				
	Speculations													X	
Thinking	Analysing fact									X				X	
	Structure and function										X				
	Logical and rational decisions													X	
Feeling	Subjective values and views									X				X	
	Initial energetic condition and interactions										X				
	Decisions based on the people and their actions													X	
Judging	Planned									X					
	Organized way									X	X	X			
	Prefers control									X					
	Seek closure											X			
	Think sequentially											X			
	Orderly													X	
Perceiving	Flexible									X	X	X			
	Spontaneous way of life									X			X		



	To keep things open ended							X	
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C. Research Question 3: How to design Self-Assessment that incorporate elements for selected dimensions of social learning strategies?

In order to answer RQ3, the researchers focused on designing Self-Assessment MOOC using online assessment method that is suitable for a particular social learning strategies. Types assessment consist of formative assessment and summative assessment. Formative

assessment includes three types of online assessment method (i) Quiz, (ii) Listening Assessment and (ii) Forum. While summative assessment includes two types of online assessment method (i) Mid-Term Test and (ii) Project. Table-6 shows the self-assessment method versus social learning strategies. Social learning strategy that can be adapted into potential Self-Assessment MOOC in order to improve student engagement in language learning using a MOOC platform.

Table-6. Online assessment method versus social learning strategies.

Assessment Types	Online Assessment Method	Social Learning Strategies
Formative Assessment	Quiz	Motivation
	Listening Assessment	Observational Learning Memory Retention
	Forum	Memory Retention
Summative Assessment	Mid-term Test Project	Memory Retention

D. Research Question 4: How to design Self-Assessment that incorporate elements for selected dimensions of learner characteristics factor?

To answer RQ3, the researchers focused on designing Self-Assessment MOOC activities for two selected dimensions of learning styles and two selected dimensions of cognitive styles. The chosen dimensions were made based on findings of our preliminary study H.Hashim et.al [42] on 50 students using Felder and

Silverman Learning Styles Model and Ancona et.al (1997) cognitive styles questionnaire. Once the dimensions have been determined, the MOOC topic learning outcomes were used as a guidance in selecting which types of Self-Assessment MOOC activities can be incorporated with which learner characteristic dimensions. Table-7 shows the dimensions of learner characteristic factors that can be adapted into potential Self-Assessment MOOC activities to improve student engagement in language learning using MOOC.

Table-7. Online assessment method versus dimension of learner characteristics.

Assessment Types	Online Assessment Method	Learner Characteristics Factors
Formative Assessment	Quiz	Visual Active Thinking
	Listening Assessment Forum	Visual Active Thinking Intuitive
Summative Assessment	Mid-term Test Project	Thinking Intuitive

Based on findings from RQ1, RQ2, RQ3 and RQ4, the researchers proposed a conceptual model for an adaptive Self-Assessment model based on social learning strategies and learner characteristics factors that can be applied by other MOOC developers and MOOC platform

developers. Figure-3 shows the proposed Self-Assessment model based on social learning strategies and learner characteristics factors to improve student engagement in language learning using MOOC.

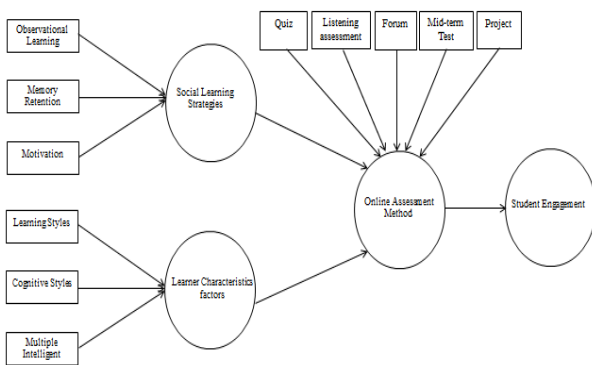


Figure-3. Adaptive Self-Assessment model for improving student engagement in Mandarin learning using MOOC.

Figure-4 shows the Self-Assessment Design Strategies in MOOC for language learning. Self-Assessment Design Strategies consists of Taxonomy Bloom (Affective, Cognitive and Psychomotor), (ii) Social Learning Strategies (Observational Learning, Memory Retention and Motivation), (iii) Learner Characteristics (Learning Styles and Cognitive Styles) and (iv) Online Assessment Method (Quiz, Listening Assessment, Forum, Mid-Term Test and Project).

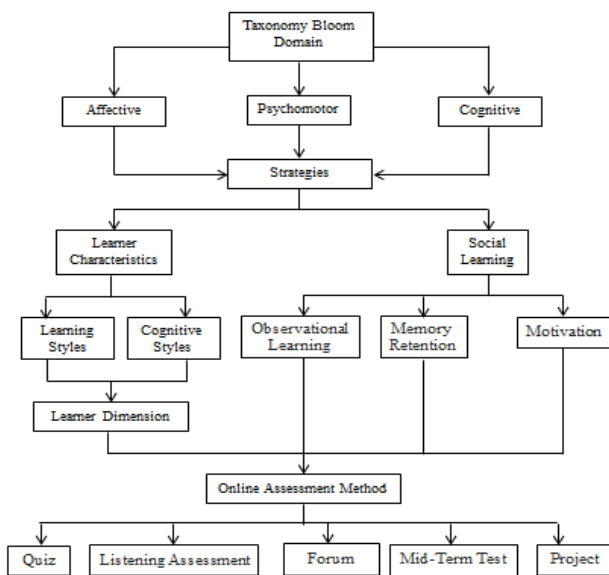


Figure-4. Self-Assessment Design Strategies.

Results of further analysis on each question/item in Self-Assessment activities for each element in social learning strategies and learner characteristics are presented in Figure-5. In this table, a shaded box means that the design of a question for this Self-Assessment activity (e.g. Quiz) will incorporate the element of its associated social learning strategies (e.g. Motivation).

Assessment	Social Learning Strategies			Learner Characteristics			
	Observational Learning	Memory Retention	Motivation	Learning Styles		Cognitive Styles	
				Visual	Active	Thinking	Intuitive
Formative							
• Quiz							
• Listening Assessment							
• Forum							
Summative							
• Mid-term Test							
• Project							

Figure-5. Self-assessment activities versus element of social learning strategies and learner characteristics in MOOC platform.

E. Research Question 5: What are the student engagement in MOOC for language learning?

Based on the data analyzed, we can conclude that the MOOC completion rates for each cohort have kept on increasing every time it is offered. Cohort 6 shows the highest completion rate with 90.14% for 90 to 100% completion. Result analyzed shows the overall status of students' completion rate for Cohort 6 which highlights that 256 students managed to complete the course with 100% completion. The most probable cause would be the learning design has been given continuous improvement by the MOOC developers, and new learning strategies designed.

According to Holmes [43], the analysis of data will allow instructors to monitor student engagement and evaluate the impact of learning. In this study, researcher analyzed the average result student engagement in language learning. Fig. 6 shows the student engagement results of applying the Self-Assessment model for Cohort 6. As we can see from the results, the highest percentage in average % of students viewed and average % of students completed in online assessment method is Quiz 1 (78.63% & 78.71%). Also, on average 1.76 of students' view with an average of 13.33 minutes being spent for each Quiz 1.

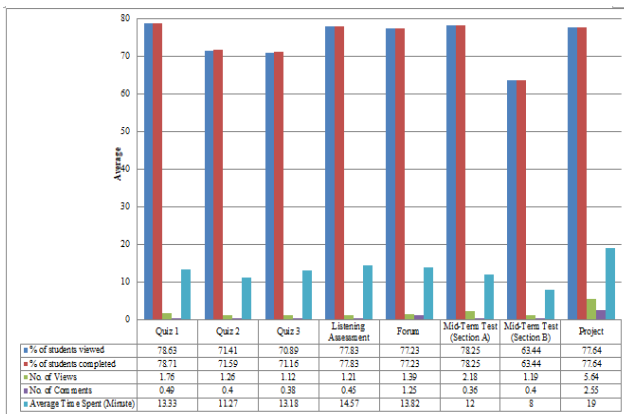


Figure-6. Student engagement results of applying social learning strategies and learner characteristics factors for cohort 6 in MOOC for language learning.

Self-Assessment efforts via MOOC require students to have high memory retention to learn using the Project by analyzing the fact and personal meaning. It is expected that students would spend on Project more than once. From the average time spent on project, we can conclude that each student learns by repeating the Project 2 to 3 times considering an average duration of a project is 19 minutes.

5. CONCLUSIONS

This study presents the findings on the development of an adaptive Self-Assessment model based on social learning and learner characteristics factors for improving student engagement in language learning using MOOC. The result from the MOOC platform in language learning shows the student engagement in the average result for no. of views, time spent, no. of comments, % of completed and % of students viewed.

FUTURE SCOPE

In the future, student performance will be investigated using that Self-Assessment MOOC model in language learning based on social learning and learner characteristic factors.

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Conflict of Interest: The main contribution of this paper is proposed a Self-Assessment design that considers social learning and learner characteristic factors.

REFERENCES

- [1] Admiraal W., Huisman B. & Ven M. Van De. 2014. Self- and Peer Assessment in Massive Open Online Courses. *International Journal of Higher Education*. 3(3): 119-128.
- [2] Wong B. T. 2016. Factors leading to effective teaching of MOOCs. *Asian Association of Open Universities Journal*. 11(1): 105-118.
- [3] Tenório T., Bittencourt I. I., Isotani S. & Silva A. P. 2016. Does peer assessment in on-line learning environments work? A systematic review of the literature. *Computers in Human Behavior*. 64(2016): 94-107.
- [4] Wang Z. 2016. Structured Knowledge Tracing Models for Student Assessment on Coursera. *Proceedings of the 2016 Third ACM Conference on Learning @ Scale*. Edinburgh, UK.
- [5] Lisitsyna L. S. & Evgenii A. E. 2017. Making MOOCs More Effective and Adaptive on Basis of SAT and Game Mechanics. *Smart Education and E-Learning 2017, Smart Innovation, Systems and Technologies*. 75, 75.
- [6] Pilli O. & Admiraal W. 2017. Students' Learning Outcomes in Massive Open Online Courses (MOOCs): Some Suggestions for Course Design. *Journal of Higher Education*. 7(1): 46-71.
- [7] Cartner H. C. & Hallas J. L. 2017. Challenging teachers' pedagogic practice and assumptions about social media. *Online Learning Journal*. 21(2).
- [8] Bozkurt A., Akgün-özbek E. & Zawacki-Richter O. 2017. Trends and patterns in massive open online courses: Review and content analysis of research on MOOCs (2008-2015). *International Review of Research in Open and Distance Learning*. 18(5): 120-147.
- [9] Marzano G. & Ochoa-Siguencia L. 2017. Challenges of Web-Based Participatory Learning. *Society Intergration Education. Proceedings of the International Scientific Conference*. 2, 458.
- [10] Henry M. & Marrs D. 2015. Cada Día Spanish: An analysis of confidence and motivation in a social learning language MOOC. *Proceedings of the International Conference on E-Learning 2015, E-LEARNING 2015 - Part of the Multi Conference on Computer Science and Information Systems*. 2015, 105-112.
- [11] Zhu T., Wang W., Zhao W. & Zhang R. 2017. Participation Prediction and Opinion Formation in MOOC Discussion Forum. *International Journal of*



- Information and Education Technology. 7(6): 417-423.
- [12] Manathunga K., Hernández-Leo D. & Sharples, M. 2017. A social learning space grid for MOOCs: Exploring a FutureLearn case. Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 10254 LNCS, 243-253
- [13] Orooji F. & Taghiyareh F. 2018. Peer Assessment and Self-Assessment in Social Learning Environments Through a New Crowd-Sourced Mechanism. IEEE Access : Computer Science. 6, 7321-7339.
- [14] Brinton C. G., Chiang M., Jain S., Lam H., Liu Z. & Wong F. M. F. 2014. Learning about social learning in MOOCs: From statistical analysis to generative model. IEEE Transactions on Learning Technologies. 7(4): 346-359.
- [15] Crossley S. A. 2014. Predicting Success in Massive Open Online Courses (MOOCs) Using Cohesion Network Analysis. CSCS 2017 Proceedings. 103-110.
- [16] Park Y., Jung I. & Reeves T. C. 2015. Learning from MOOCs: a qualitative case study from the learners' perspectives. Educational Media International. 52(2): 72-87.
- [17] Hone K. S. & El Said G. R. 2016. Exploring the factors affecting MOOC retention: A survey study. Computers and Education. 98, 157-168.
- [18] Lever-Duffy J. & B.McDonald J. 2009. Teaching and Learning With Technology (3rd ed.). Boston: Pearson.
- [19] Mohamad S. N. M. 2014. Model for Online Teaching Tools Based on Interpersonal, Visual and Verbal Intelligence. Universiti Teknikal Malaysia Melaka.
- [20] Zainudin A. B. & Ali R. 2016. Learning Style Construct in Student ' s Learning. Jurnal Indonesia Untuk Kajian Pendidikan. 1(2): 213-222.
- [21] Sadhasivam J. & Babu R. 2017. MOOC : A Framework for Learners Using Learning Style. International Education and Research Journal. 3(2): 21-24.
- [22] Fasihuddin H., Skinner G. & Athauda R. 2017. Towards adaptive open learning environments: Evaluating the precision of identifying learning styles by tracking learners' behaviours. Education and Information Technologies. 22(3): 807-825.
- [23] Abante M. E. R., Almendral B. C., Manansala J. E. & Manibo J. 2014. Learning Styles and Factors Affecting the Learning of General Engineering Students. International Journal of Academic Research in Progressive Education and Development. 3(1): 16-27.
- [24] Hmedna B., Mezouary A. El, Baz O. & Mammass D. 2016. A Machine Learning Approach to Identify and Track Learning Styles in MOOCs. Proceedings of the 2017 International Conference on Multimedia Computing and Systems. Marrakech, Morocco.
- [25] Al-Azawei A., Parslow P. & Lundqvist K. 2017. Investigating the effect of learning styles in a blended e-learning system: An extension of the technology acceptance model (TAM). Australasian Journal of Educational Technology. 33(2): 1-23.
- [26] Rohaniyah J. 2017. Integrating Learning Style and Multiple Intelligences in Teaching and Learning Process. Jurnal Pemikiran Penelitian Pendidikan Dan Sains. 5(1): 19-27.
- [27] Mealor A. D., Simmer J., Rothen N., Carmichael D. A. & Ward J. 2016. Different dimensions of cognitive style in typical and atypical cognition: New evidence and a new measurement tool. PLoS ONE. 11(5): 1-21.
- [28] Simuth J. & Sarmany-Schuller I. 2014. Cognitive Style Variable in E-learning. Proceedings of the 2014 Social and Behavioral Sciences, 116. Rome, Italy.
- [29] Koc-Januchta M., Hoffler T., Thoma G.-B., Prechtel H. & Leutner D. 2017. Visualizers versus verbalizers: Effects of cognitive style on learning with texts and pictures - An eye-tracking study. Computers in Human Behavior. 68, 170-179.
- [30] Jablokow K., Defranco J. F., Jablokow K., Defranco J. F., Richmond S. S., Piovoso M. J. & Bil S. G. 2015. Cognitive Style and Concept Mapping Performance. Journal of Engineering Education. 104(3): 303-325.
- [31] Mukherjee S. 2016) Learning Style of Humanities, Commerce and Science Students : A Study on Higher Secondary Students from West Bengal. The International Journal of Indian Psychology. 3(3): 15-22.



- [32] Baneres D., Caballé S. & Clarisó R. 2016. Towards a Learning Analytics Support for Intelligent Tutoring Systems on MOOC Platforms. Proceedings of the 2016 International Conference on Complex, Intelligent, and Software Intensive Systems. Country, United States.
- [33] Heinrich W. F. & Rivera J. E. 2016. A Framework for PLA in Traditional Higher Education : Experiential Learning Assessment for Embedded Outcomes. Prior Learning Assessment Inside Out. 5(5): 1-5.
- [34] Gikandi J. W., Morrow D. & Davis N. E. 2011. Online formative assessment in higher education : A review of the literature. Computers & Education. 57(4): 2333-2351.
- [35] Chan H. P. & King I. 2019. Leveraging social connections to improve peer assessment in MOOCs. 26th International World Wide Web Conference 2017, WWW 2017 Companion. 341-349.
- [36] Bearman M., Dawson P., Boud D., Hall M., Bennett S., Molloy E. & Joughin G. 2014. Guide to the Assessment Design Decisions Framework.
- [37] Hayat Y., Ali W., Hayat S., Rahman A. U., Shahzad S. & Hussain Z. 2013. Studying Behavior Attributes and Student's Academic Performance. Sarhad J. Agric. 29(3): 461-467.
- [38] A. Bandura. 1977. Social learning theory. in Social Learning Theory. pp. 1-46.
- [39] Ruby Spencer. 2015. How to Apply Social Learning Theory for Effective E-Learning, <https://www.trainingindustry.com/blog/e-learning/how-to-apply-social-learning-theory-for-effective-e-learning/>, retrieved on 4th Nov 2017
- [40] Al-Azawei A., Al-Bermani A. & Lundqvist K. 2016. Evaluating the effect of arabic engineering students' learning styles in blended programming courses. Journal of Information Technology Education: Research. 15(2016): 109-130.
- [41] Garner-O'Neale L. D. & Harrison S. 2013. An Investigation of the Learning styles and Study Habits of Chemistry Undergraduates in Barbados and their Effect as Predictors of Academic Achievement in Chemical Group Theory. Journal of Educational and Social Research. 3, 107-122.
- [42] Hashim H., Salam S. & Mohamad S.N.M. 2017. Investigating learning styles for adaptive Massive Open Online Course (MOOC) learning. Journal of Advances in Humanities and Social Sciences. 3(5).
- [43] Holmes N. 2018. Engaging with assessment: Increasing student engagement through continuous assessment. Active Learning in Higher Education. 19(1): 23-34.