Learning Innovations of Massive Open Online Courses Integrated Hybrid Learning as an Acceleration to Increasing Professional Capability of Prospective Vocational Teachers in the Industrial Revolution 4.0

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Abstract: This study aims to: (1) map the level of professional ability needs of prospective vocational teachers; (2) developing integrated learning innovations with MOOCs hybrid learning; and (3) testing the attractiveness of learning innovations with MOOCs integrated hybrid learning. This research uses the method of research & development (R & D). This research was conducted in state universities in East Java. Data on professional capability level is obtained by questionnaire method. While the data from the learning innovation attractiveness test is done by learning media expert test and material expert test. The data in this study were analyzed descriptively quantitatively. The results of this study indicate that: (1) the component of the level of need for professional abilities of prospective vocational teachers includes broad vocational insights (87.5%), mastery of the principle of vocational learning (85%), curriculum development (83.3%), mastery process learning (87.2%), development of potential students (88.1%), mastery of communication with students (91.6%), and evaluation (88.4%); (2) the content and content of the material on the product that has been developed as an average score of test results on e-learning media design experts of 3.7 or an acceptance rate of 91.7%. This shows that MOOCs integrated hybrid learning product innovation has a high level of attractiveness. In testing by material experts, it was shown that the average score on each test indicator was 3.6 or 90% acceptance rate. This shows that the material presented in the product developed is quite good; and (3) learning innovations with integrated hybrid integrated MOOCs need to be further developed with broader research objects.

1   INTRODUCTION

In this era of industrial revolution 4.0, science and technology developed very rapidly, especially in the world of education (Pieroni, Scarpato and Brilli, 2018; Philbeck and Davis, 2019; Vu and Le, 2019). The impact of this makes it more open and the spread of various information globally in the world of education. Its influence is very broad in various aspects of the education sector, especially in the field of vocational education (Irdianto and Putra, 2016; Putra, Irdianto and Mukhadis, 2016; Mukhadis *et al.*, 2018). In the role, education has a duty as a means of building human resources in a country. Through education, it is expected that students will be able to solve life problems and community problems by presenting high-level thoughts (Al-samarraie, Teng and Alzahrani, 2017; Chan, 2019; Deschaine, Tomaselli and Cavanagh, 2019). True vocational education is a planned effort to create a learning atmosphere and learning process that actively develops the potential of students to be able to develop self-control, personality, intelligence, noble character, and special skills in accordance with the competencies needed by the business world and the industrial world (Mukhadis *et al.*, 2018; Suswanto *et al.*, 2018; Putra *et al.*, 2019).

On the other hand, various obstacles in the field of vocational education emerged specifically related to the development of the capability of prospective teachers in the field of vocational education (Gonçalves, 2018; Li, Ren and Wang, 2018; Wang, 2019). The educational institutions that print prospective teachers (vocational fields) have not been fully capable of producing capable vocational field educators. Also, graduates of prospective vocational teacher do not have high motivation in innovation (Bozkurt, Akgün-Özbek, and Zawacki-Richter, 2017; Zhu, 2018; Cohen *et al.*, 2019). Some researchers explain that the average level of innovation motivation of students is still below 70% (Mukhadis *et al.*, 2018; Putra *et al.*, 2019).

The root of this urgent problem is one of them, which is still not maximally innovative learning media that they use in the learning process in the classroom (Violante and Vezzetti, 2015; MayTruong, 2016; Uppal, Ali and Gulliver, 2017; Simarmata *et al.*, 2018). Supposedly, the learning process for prospective vocational field teachers on campus must prioritize the level of novelty of the media used. In this case, lecturers need to work more actively in stimulating vocational field prospective student teachers to think creatively. This can be done with a scheme of introduction and habituation of prospective vocational teacher students with up-to-date learning innovations (Al-samarraie, Teng and Alzahrani, 2017; Fırat, Kılınç and Yüzer, 2018; Elsawy and Ahmed, 2019).

One form of learning innovation that is currently popular is the Massive Open Online Courses (MOOCs). MOOCs is a system and learning media consisting of online course services with various features and content (Lambert and Alony, 2015; Bozkurt, Akgün-Özbek and Zawacki-Richter, 2017; Hew, Qiao and Tang, 2018; Garrido *et al.*, 2019). Until now, MOOCs are still an effective learning media in developing the level of independence and capability of students, especially prospective vocational students. In MOOCs, learning or courses using video and assisted with animations that can encourage students to increase the power of analyzing their brains (Pan *et al.*, 2017; Huisman *et al.*, 2018; Verstegen *et al.*, 2019). At MOOCs, there is also weekly assessment every week in the form of quizzes and final examinations at the end of each course to determine the graduation of students. Some experts explained that at MOOCs, participants who have passed the week test and final test with a passing grade of 50% could also get a certificate (Zhu, 2018; Douglas *et al.*, 2019).

In addition to the use of learning media such as MOOCs, knowledge transactions in the classroom must also be supported by the right learning model. At present, with all the development of the advanced learning model, it is not feasible if the learning process in the classroom is still monotonous so that the acceleration of the improvement in the capabilities of the students is relatively low (Bonk *et al.*, 2018; Li, Ren and Wang, 2018; Spyropoulou, Pierrakeas and Kameas, 2019). Learning in the world of vocational education has been facilitated, as is the case with blended learning. According to some experts, blended learning is a face-to-face learning process and virtually (e-learning) (Jani *et al.*, 2018; Elyakim *et al.*, 2019; Leeuwen *et al.*, 2019).

Online learning or e-learning in blended learning is a natural extension of conventional classroom learning that uses face-to-face learning. In blended learning, students can learn interactively, which approaches face-to-face learning (Uppal, Ali and Gulliver, 2017; Bartolomé-pina, García-ruiz and Aguaded, 2018; Fırat, Kılınç and Yüzer, 2018; Jani *et al.*, 2018; Elsawy and Ahmed, 2019). Also, students also need no difficulty when they want to consult with the lecturers because it can be done via online. This will certainly be very effective if classroom learning transactions are carried out with blended learning models using MOOCs learning innovations. The impact of this will certainly improve solitary two-way communication and will add attention to students as learning individuals (Fırat, Kılınç, and Yüzer, 2018; Elyakim *et al.*, 2019; Montgomery *et al.*, 2019).

2 METHOD

In this study, the method used is research and development (R & D). Before product development, the initial step taken by the researcher was to map the level of the professional abilities of prospective teacher students qualitatively. The initial activity was carried out by interview, surveillance, and documentation. Informants at the initial activity included students, lecturers, and university stakeholders. The next step is the product development stage. In the product development stage (MOOCs) the process includes literature study, needs analysis, design development, product testing, product revision, media expert validation, material expert validation, and final product revision. In the chart, the process of product development stages is shown in Figure 1.
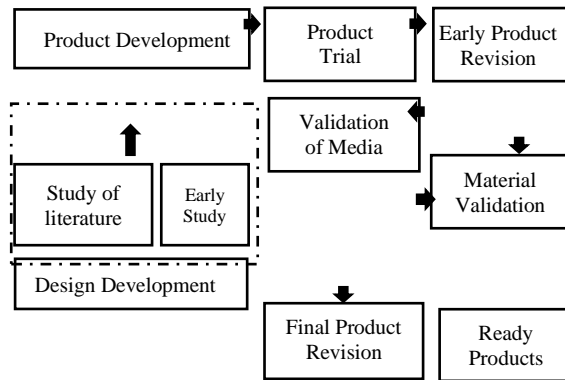
Figure 1. Mechanism of the process of product development stages.

In this study, the attractiveness test was carried out with two processes. The first process is the validation of media experts. The selected media experts are e-learning media experts. Media experts are carried out by two experts. The second process is the validation of material experts. The chosen material experts are material experts related to vocational education. Each validator expert is two people who come from different institutions/agencies.

3 RESULT

In this research, there are several findings related to the level of professional ability needs of prospective vocational teacher students. These requirements consist of seven main components. These components include mastery of broad vocational insights, mastery of the understanding of the principles of vocational learning, innovative curriculum development, classroom learning management skills, expertise in developing student potential, mastery of communication with students, and expertise in learning evaluation. The percentage level of each component is shown in Figure 2.

In Figure 2, it is shown that there are seven components of the professional ability needs of prospective vocational teacher students. The percentage of each component is mastery of broad vocational insight (87.5%), mastery of the principle of vocational learning (85%), innovative curriculum development (83.3%), learning management skills in the classroom (87.2%), expertise in developing student potential (88.1%), mastery of

communication with students (91.6%), and expertise in conducting learning evaluations (88.4%).
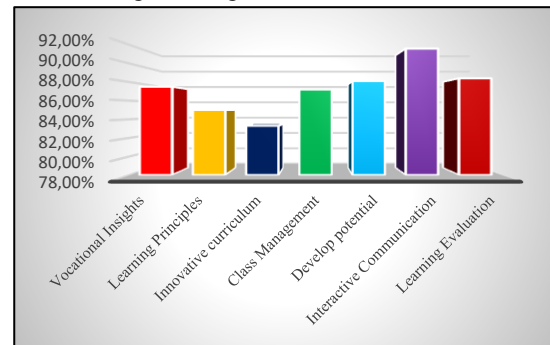

Figure 2. Percentage of components at the level of student professional ability needs

Furthermore, the validation results from e-learning media design experts are shown in Table 1. Based on Table 1, the mean score of the test results on e-learning media design experts is 3.7 or the acceptance rate is 91.7%. This shows that MOOCs integrated hybrid learning product innovation has a high level of attractiveness. If studied more deeply, out of the ten indicators there are three indicators that get the maximum score (100%). These indicators include: (1) the attractiveness of the design and conformity with the user; (2) the use of narrative explanations for each content; and (3) ease of operation of the product.

Table 1. Results of Validation of e-learning media design experts

No	Indicator Item	Score	%
1	Attractive and Appropriate Design	4.00	100.00
2	Suitability of symbols and icons	3.33	83.33
3	A combination of colors, text, images	3.50	87.50
4	The sentence is easy to understand	3.33	83.33
5	Communicative language	3.50	87.50
6	Use of active sentences	4.00	100.00
7	The sentence used in the media	3.33	83.33
8	Ease in operating the media	4.00	100.00
9	Ease of navigation menu functionality	3.50	87.50
10	The media can be operated properly using the mobile phone (mobile) / mobile gadget media	4.00	100.00

. Furthermore, the results of validation from vocational field material experts are shown in Table 2.

Table 2. Results of Validation of vocational field experts

No	Indicator Item	Score	%
1	Compatibility of material with user competence	3.33	83.33
2	Material presented with a clear logic flow	3.20	80.00
3	Material is equipped with pictures	3.00	75.00
4	Material is equipped with real examples in life	4.00	100.00
5	Conformity of material	3.33	83.33
6	Depth of material presented	3.80	95.00
7	The purpose is at the beginning of the web	4.00	100.00
8	Users can share material	3.33	83.33
9	The material presented follows the latest developments	4.00	100.00
10	The material is integrated with era of industrial revolution 4.0	4.00	100.00

Based on Table 2, it can be interpreted that the average score on each test indicator is 3.6 or 90% acceptance rate. This shows that the material presented in the product developed is quite good. If studied more deeply, out of the ten indicators tested, there are four indicators that get the maximum score (100%). The indicators include: (1) the completeness of integrated real-life material; (2) material presentation as intended; (3) material up to date; and (4) material integration with the reality of 4.0 industrial revolution.

4 DISCUSSION

This study produced three important findings. The findings include: (1) the components of the professional ability need of prospective teachers in the field of vocational education; (2) the degree of attractiveness of MOOCs products developed; and (3) the level of presentation of the material displayed on MOOCs products developed. The first finding implies that students have a significant need for professional abilities as prospective teachers (educators). The findings in this study reveal seven important components in the professional ability of prospective vocational teachers. These components include mastery of broad vocational insights, mastery of learning principles in the field of vocational, innovative curriculum development, classroom learning management skills, expertise in developing student potential, mastery of communication with students, and expertise in learning evaluation.

4.1 Component of Prospective Vocational Teachers Professional Skills Needs

The first component of the professional ability of prospective vocational teachers is the mastery of broad vocational education insights. In this domain, prospective students in vocational fields should master the knowledge in the fields of science, technology, and art related to vocational education (Richardson, Mcgowan, and Styger, 2017; Brien, 2018; Mulrennan, 2018; Stoszkowski *et al.*, 2018). Some experts explain that the insights of vocational education at least include assumptions about students, the social context of vocational education, the economic dimension of vocational education, and the employment context of vocational education

(Irdianto and Putra, 2016; Mukhadis *et al.*, 2018; Suswanto *et al.*, 2018; Putra *et al.*, 2019). Vocational education is an effort to realize students become productive human beings, to fill the need for roles related to increasing the economic value of society (Bacca, Baldiris and Girona, 2018; Dang, Wang and Kang, 2019; Mesfin and Niekerk, 2019). In this framework, it can be said that graduates of vocational education should have economic value faster than general education.

Figure 3. Components of Prospective vocational teachers' Professional Capability Requirements.

Mastery related to the principle of learning in the vocational field. This became important when students as prospective vocational field teachers in the era of industrial revolution 4.0. The development of learning in the field of vocational education must be balanced with the mastery of innovative principles in the learning system. Some experts state that the learning process in the field of vocational training will be efficient if the environment in which students are trained is a replica of the environment where they will later work (Lang *et al.*, 2017; Yousaf, Ashfaq and Ahmad, 2018; Haris *et al.*, 2019; Lin, 2019). In addition, the learning principle of the vocational field explains that effective learning will be given if the training tasks are carried out in the same way, tools, and machines as applied in the workplace (Forster and Bol, 2018; Newton *et al.*, 2018).

The ability to develop innovative curricula is also a vital component of the professional competency requirements of vocational prospective teacher students. An innovative curriculum must contain training experience to formwork habits and correct thinking habits so that they are by what is needed

later in work (Bacca, Baldiris and Girona, 2018; Journal and Journal, 2018; Thunqvist, Tønder and Reegård, 2019). In the era of industrial revolution 4.0 prospective student students must often innovate related to online learning. The blended learning model must be the main focus of the formation of an innovative and mutually effective curriculum. This will also have an impact on the management ability to learn in the classroom. Some experts state that classroom learning should be emphasized in "learning by doing" and "hands-on experience" (Journal and Journal, 2018; Dang, Wang, and Kang, 2019; Hashim *et al.*, 2019; Kintu, Kitainge and Ferej, 2019). It will be effective if educators can cultivate each to develop their interests, knowledge, and skills at the highest level.

The component of the need for professional skills in other vocational field teachers is expertise in developing the potential of their students (Jossberger *et al.*, 2018; Kintu, Kitainge and Ferej, 2019). The prospective professional teacher should have many successful experiences in applying skills and knowledge by their fields (Forster and Bol, 2018; Jossberger *et al.*, 2018; Newton *et al.*, 2018; Smirnova *et al.*, 2019). That will lead to trust by the students. Not only that, in the era of industrial revolution 4.0, prospective students in vocational fields must understand the characteristics of their students (Forster and Bol, 2018; Journal and Journal, 2018; Loeb and Gustavsson, 2018; Haris *et al.*, 2019; Hashim *et al.*, 2019). The prospective professional teacher understands the needs of their students in a particular occupation. The learning process will be efficient if the teaching methods used and personal relationships with students consider the characteristics of these students (Lang *et al.*, 2017; Newton *et al.*, 2018; Placklé *et al.*, 2018).

4.2 MOOCs Integrated Blended Learning

The product developed is a learning media in the form of MOOCs that are integrated with blended learning. The content and material content of the products that have been developed is designed based on mapping the level of professional ability needs of prospective vocational teacher students. Based on the results of validation, the average score of the test results on e-learning media design experts is 3.7 or the acceptance rate is 91.7%. This shows that MOOCs integrated hybrid learning product innovation has a high level of attractiveness. In testing by material experts, it was shown that the average score on each test indicator was 3.6 or 90%

acceptance rate. This shows that the material presented in the product developed is quite good.

The attractiveness test on MOOCs products developed is by the roles and functions of MOOCs as an innovative learning media. MOOCs can be interpreted as a new way of learning that is centered on students and uses technology with an unlimited reach (Zhu, 2018; Douglas *et al.*, 2019; Garrido *et al.*, 2019; Verstegen *et al.*, 2019). The basic principle is that MOOCs cross the boundaries of classrooms, schools, campuses and even the state, allowing students to be able to acquire knowledge and skills quickly and even be taught by experts. MOOCs is one student-centered learning, whereas has been done by various studies that student-centered learning has various advantages (Li, Ren, and Wang, 2018; Cohen *et al.*, 2019; Wang, 2019; Wenting and Lijuan, 2019). Some of these advantages include learners can be more active in constructing their knowledge, especially when integrated with blended learning models. Also, students can also think more critically and analytically, can develop problem-solving skills and so on (Gonçalves, 2018; Ding and Liu, 2019; Ma and Lee, 2019; Spyropoulou, Pierrakeas and Kameas, 2019).

In testing by material experts, the score is mostly above 75%. It is certainly integrated with other MOOCs principles. Some experts state that MOOCs have the principle of infinite scalability. The point is that MOOCs have an unlimited scale. The number of MOOCs participants can reach hundreds of thousands of people for each lecture (Bozkurt, Akgün-Özbek, and Zawacki-Richter, 2017; Zancanaro, Nunes and Domingues, 2017; Hew, Qiao and Tang, 2018; Huisman *et al.*, 2018). This is because technically there are no obstacles that can limit the number of participants. There are no special requirements for joining MOOCs. Regarding blended learning, MOOC media is the media that is most suitable and relevant to the learning model

Some experts explain that MOOCs have a main component which includes: (1) learning videos, usually divided into several sections with a duration of 5-10 minutes per video; (2) assessment, using (a) automatic assessment of multiple choice questions, and (b) peer-reviewed assessments where participants assess each other based on specified criteria; (3) forums, where participants can interact with other participants and with instructors; (4) reading, which is available online or provided by the instructor; (5) live video sessions (live), in addition to where participants can interact via video conference directly with the instructor (Antonaci *et al.*, 2017; Wu and Chen, 2017; Bonk *et al.*, 2018;

Huisman *et al.*, 2018; Sullivan *et al.*, 2019; Verstegen *et al.*, 2019). These components are more easily synchronized with the blended learning model which is actually a combination learning model between face to face and face to face online (Jani *et al.*, 2018; Han and Ellis, 2019; Kong, 2019; Leeuwen *et al.*, 2019).

5 CONCLUSIONS

In this study, several conclusions can be formulated. First, the components of the level of professional ability needs of prospective vocational teacher students include broad vocational insights (87.5%), mastery of the principle of vocational learning (85%), curriculum development (83.3%), mastery of learning processes (87.2%), developing potential students (88.1%), mastering communication with students (91.6%), and evaluating (88.4%). Second, the content and content of the material on the product that has been developed as an average score of the test results on e-learning media design experts of 3.7 or an acceptance rate of 91.7%. This shows that MOOCs integrated hybrid learning product innovation has a high level of attractiveness. Third, in testing by material experts, it was shown that the average score on each test indicator was 3.6 or 90% acceptance rate. This shows that the material presented in the product developed is quite good. Fourth, learning innovations with integrated hybrid integrated MOOCs need to be further developed with broader research objects.

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