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The readiness of prospective teachers based on online teaching competencies and learning activities in COVID-19 pandemic: A cluster analysis-based approach

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ABSTRACT

Many things should be done to prepare prospective teachers for providing qualified teachers. The COVID-19 pandemic is forcing teachers, including prospective teachers, to improve competency and online teaching activities. This quantitative research aims to map the readiness of prospective-teacher students of Office Administration (OA) Department related to online learning by measuring their teaching competencies and learning activities. These two variables are considered capable of measuring online teaching readiness. The research sample is 72 students. The data were collected using a questionnaire distributed via a Google Form and analyzed using K-Means with SPSS 24.0 software. The results showed that the number of clusters at low readiness level was 11 students (10 female and one male) or 15%, the number of clusters at moderate readiness level was 38 students (32 female and six male) or 53%, and the number of clusters at moderate level high readiness was 23 students (18 female and five male) or 32%. These findings show that the OA Department's prospective teachers still need to be provided with online teaching materials or skills, considering that only 32% of respondents have a high level of readiness for online learning. The community is the indicator that needs improvement for OA Department prospective teachers' readiness. It can be pursued by forming the latest and most trusted community.

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INTRODUCTION

The COVID-19 pandemic forces various activities to take place online. In the education sector, the consequences of this pandemic have resulted in extensive school closings and have made the learning and teaching process be conducted online. This transition to online teaching implies the need for a faster and more diverse transformation of technological innovation and digitization (McFarlane, 2019; Selwyn, 2012). As a result, digitalization in schools is a crucial problem considering that many areas are left behind concerning information and communication technology (Hermawan et al., 2018). Parsanlal (2020) supported that differences in household income and resources also prevent thousands of students from accessing education online. Also, teachers' notes reveal that participation in online classes tends to be low due to a lack of parental supervision, Internet access, resources, and teacher expertise (Kalloo et al., 2020).

The solution to these problems is that teachers must use various digital tools and resources to solve existing problems and apply new teaching and learning approach (Eickelmann & Gerick, 2020). Beyond instructional goals, teachers must maintain relationships with their students. Thus,

increasing teachers' competence and skills is very much needed. One of the important competencies today is digital competence. It is understood as using technology to live, work, and learn. Digital competence is also understood as a set of teacher capacities, abilities, and knowledge to solve educational problems by integrating ICT (Hatlevik et al., 2018). Sholikah and Harsono (2021) also add that ICT will cheaply and easily remove space and time constraints limiting education. Thus, integrating technology efficiently in teaching should be considered.

It should be noted that teachers and students' unpreparedness towards online learning is also a problem that should be addressed (Wicaksono, 2012). It can be said that their readiness is the demand for online learning. Readiness is a person's overall condition that makes him ready to respond/answer in a certain way to a situation (Slameto, 2015). It is a willingness to respond or react. Willingness arises from within a person, also related to maturity because maturity means readiness to carry out skills. Readiness, in this case, needs to be considered in the learning process because if students learn and there is a readiness in them, the learning outcomes will be better.

OA Department students as the prospective teachers should have started preparing themselves to adapt to the current conditions and situations. Educational institutions should also start evaluating students to become teachers to teach in online learning conditions as is currently happening. They should master online teaching knowledge and skills to prepare for good teaching, including the mastery of IT, computers, software, and hardware to support the manufacture of various learning media.

During the COVID-19 pandemic, education system should be ready to leap a step in transforming online learning for all students and by all teachers. It is very important because the world of education is entering a new era, i.e., building creativity, sharpening student skills, and improving self-quality with changes in systems, perspectives, and patterns of interaction with technology. Thus, readiness and courage to step in to make online learning an opportunity to transform education today are very important. There has been a change in the role of the teacher from being originally only required to master conventional learning techniques, to being required to know ICT-based learning techniques (Rusman, 2013). However, the facts show that face-to-face learning activities with teachers have proven to be more effective than online learning activities.

Kemp and Grieve (2014) compared the preferences of undergraduate students in Australia regarding online and face-to-face learning. The results indicated that students preferred to participate in face-to-face rather than online learning activities because they felt more involved and received more direct feedback than in online learning and discussion. It is in line with Alghamdi et al. (2020) who found that students feel less focused on doing assignments online because they tend to do multiple tasks at once while using a computer, which results in decreased academic achievement. It was reinforced by an education expert from Universitas Brawijaya (UB), Aulia Luqman Aziz, on the 2020 National Education Day, who stated that full online learning had recently caused many complaints from students and parents. Some teachers in schools admit that online learning is not as effective as conventional learning (face-to-face learning) because some materials should be explained face-to-face for ease of understanding. Besides, the material presented online may not be understood well by all students. Based on the experience of online teaching, this system is only effective in giving assignments and the possible results of doing these assignments are given when students will enter so making assignments may only pile up.

Teachers should also be prepared to use the latest technology. They should be able to make learning models and strategies following their students' character in their schools. The use of several applications in online learning will greatly help them in this learning process (Sholikah & Harsono, 2021). They should be accustomed to teaching by utilizing complex online media, packaged effectively, easily accessible, and understood by their students. Thus, they must design online teaching that is lightweight and effective by utilizing the right online tools or media and by the material being taught. Although online learning will provide wider opportunities to explore the material to be taught, teachers also need to limit the extent of the material's scope and determine the appropriate application of the learning materials and methods used.

The success of teachers in conducting online teaching in the COVID-19 pandemic situation is their ability to innovate, design, and compile materials learning methods and determine what applications are following the materials and methods. Creativity is the key to success for teachers to motivate their students to stay enthusiastic about learning online and to make learning online not become a psychological burden. For this reason, the readiness and provisions of competent prospective teachers need to be improved so that they are better prepared to face any situation so that the objectives of learning can be achieved properly. This study aims to cluster the readiness of prospective teacher students of the department of office administration.

Online Learning in the COVID-19 Pandemic

The COVID-19 pandemic has posed unprecedented challenges requiring teachers to adapt to online teaching and learning. The online learning situation until November 2020 was dominated by the number of students joining online classrooms according to the schedule where teachers often delivered subject matter theoretically. Students only listened to the explanation of the material from their teacher (Lipowsky & Rzejak, 2015). School closings for teachers, students, and parents are new (Huber & Helm, 2020). Continuous teaching and learning processes were only possible through alternative means. Teachers should shift to online teaching, which required them to use various digital tools and resources to solve problems and implement new teaching and learning strategies (Eickelmann & Gerick, 2020).

Digitalization Transformation in the Education System

The COVID-19 pandemic has resulted in an unpredictable and rapid transition from face-to-face teaching and learning to online teaching and learning. One of the reasons for this shift to online education system is the broader process of digital technology transformation in education system (McFarlane, 2019), so digitalization in schools has recently become more familiar. Thus, skills development is needed by both students and teachers (Kozma, 2011). Teleconference technology (interactive online conference) is worth trying and developing in education development since it can save time, teaching staff, and learning room capacity, and it does not recognize geographic location (Hamdani, 2013). The school curriculum should also be improved and integrated with information and communication technology, where students should be allowed to use technological tools and digital resources for creative and innovative problem solving (Kozma, 2011).

An example of the online teaching implementation is what has been implemented in Germany, which reveals that the need for the readiness of students and teachers for digital literacy plays an important role. It is because digital readiness and literacy can help schools develop digital competencies in students and teachers. According to Chauhan (2017) digital technology provides new opportunities for teaching and learning, where the use of distance learning by utilizing ICT is becoming increasingly popular in Indonesia, starting from basic education to higher education. Thus, teachers and students are encouraged to optimize digital tools and resources.

Based on the International Computer and Information Literacy Study (ICILS) research, proficiency in the digital field of most teachers and students did not reach level 2; that is, they lacked digital competence. The course raises concerns. It requires further investigation of the teaching and learning process and how teachers can integrate technology in a pedagogical context (Baker et al., 2018). Teachers and students should also learn digital competencies to implement school digitization better and be better prepared (König et al., 2020).

The Importance of Online Teaching Competencies for Teachers

All educational institutions are currently facing challenges in innovating in the implementation of education, especially given the ongoing technological, economic, and social changes (Cabero-Almenara et al., 2020), to educate new generations for uncertain and unpredictable futures. The diversity of ICT is currently widely available because technology is duplicated at high

speed due to digitization, resulting in trans-media, which displays various media content on different devices. This fact also affects the way students interact and find sources of information (Cabero-Almenara et al., 2020; Vázquez-Cano et al., 2020). The course will cause ongoing problems as technological developments (Kluzer & Priego, 2018). Therefore, competency development should be understood as the idea of lifelong learning. Umbara et al., (2021) state that competent teachers will be better able to create an effective learning environment and manage the class to optimize student learning outcomes.

Furthermore, the prediction of Industrial Revolution 4.0 explains that most future jobs will require digital skills (Williamson et al., 2019). One of the ways to fulfill this need is through competency development related to digital technology (Tafazoli et al., 2019). Through developing digital skills, individuals will achieve success in work and creativity. The role of teachers in the 21st century is not just teaching (transfer of knowledge) but also learning managers (Rusman, 2013). In this case, each teacher is expected to integrate ICT in learning activities, create learning conditions that challenge student creativity and activities, motivate students, and use multimedia, multi methods, and various learning resources to achieve the expected learning objectives.

In teachers' professional competence, digital skills are related to their professional activities in the classroom, so it is very different from the aspects of using technology tools given to them in the household environment (Blau & Shamir-Inbal, 2017). Thus, educational institutions in the modern era need the addition of current digital technology. Teachers need to have significant digital competence to master technology by integrating it into the instructional process (Hatlevik et al., 2018; Roig-Vila et al., 2015). This competency is defined as teachers' abilities, knowledge, or skills in solving educational problems by integrating digital technology (Hatlevik et al., 2018).

Student Online Learning Activities

Activity theory aims to describe, analyze, and understand a person's mental capabilities. Activity theory analyzes cultural and technical aspects and individual actions in their activities. According to Chen et al. (2011), three indicators of online learning activity variables are here, including: (1) technology level, (2) individual level, and (3) community level. Guan et al. (2014) reported that online discussion between students through social learning communities connected through mobile learning communities improved students' social relationships, self-esteem, and learning performance. Preston and Colman (2000) found that nearly 70% of students stated that they did well in online learning communities such as WhatsApp groups, Facebook communities, Twitter chat, and Google + communities, as they did in lectures held in class with other students. Handel also carried out online learning activities for prospective mathematics teachers (Händel et al., 2020). The results showed that online mathematics learning activities had significant mean differences. This difference may be due to differences in the attitudes of prospective teachers towards the use of technology in mathematics learning.

METHOD

The data collected came from undergraduate students of Universitas Negeri Semarang, Central Java, Indonesia. The research sample was students of office administration education (prospective teachers) who did online teaching practice in 2020.

Table 1. Demographic Data of Respondents

Attribute	Classification	Percentage (%)
Gender	Male	16.67
	Female	83.37
Age (year)	20	5.56
	21	72.22
	22	19.44
	23	2.78

Respondents received an online questionnaire via broadcast from WhatsApp. The questionnaire consisted of statements prepared by referring to the Likert scale. The questionnaire was distributed to respondents, and 72 respondents returned the questionnaire. All of the worked-out questionnaires were valid for further analysis. Table 1 shows the demographic data. There are 72 students as the respondents consisting of 16.67% male and 83.33% female students. The average age of the respondents is 21 years.

Measurement

Table 2. Variable Measurement

Variable	Indicator		Statement
Online teaching competencies (Koran, 2002)	Learning materials and evaluation questions	OTC 1.1	I uploaded course materials to make it easier for students to access them.
		OTC 1.2	I share material from various sources on the Internet with students.
		OTC 1.3	I test students online via Google form or email.
		OTC 1.4	I do assessments and evaluations online.
	Community	OTC 2.1	I have a joint WhatsApp Group or telegram group with other teachers to discuss online learning.
		OTC 2.2	I join the community on FB or other social media related to online learning.
		OTC 2.3	I am actively involved in the learning community group discussion.
		OTC 2.4	I find it helpful to get teaching inspiration because of the learning community.
		OTC 2.5	I apply what I get from the community to online teaching.
	Opportunity to work together	OTC 3.1	I regularly use Zoom or Google Meet, or Microsoft Teams in teaching.
		OTC 3.2	I explain the learning material via Google meet or Zoom, or Microsoft Teams to interact directly with students.
		OTC 3.3	I explain the learning material via Google meet or Zoom, or Microsoft Teams to interact directly with students.
	Online teacher	OTC 4.1	My students and I joined the WhatsApp Group as an online communication medium.
		OTC 4.2	I allow students to ask questions on the WHATSAPP GROUP, and I will try to answer them even if it is not during class time.
		OTC 4.3	I always have an Internet package so that students can easily contact me.
		OTC 4.4	I feel I should always be online for the online learning process.
	Multimedia	OTC 5.1	Before teaching students, I prepare assistive media for learning, such as PPT, video, or web URL.
		OTC 5.2	I use various sources in the form of the web, videos, or other sources from the Internet to deliver course material.
		OTC 5.3	I am skilful at making precise and attractive PPTs.
		OTC 5.4	I am skilful at making good and interesting learning videos.
		OTC 5.5	I upload media (PPT slides or Videos) to YouTube to make it easier to send links to students.
Online learning activities (Bertelsen & Bødker, 2003)	Technology level	OLA 1.1	When working on a lecture assignment in front of a computer/laptop, I also chat online with my friends, so I forget to do the assignment.
		OLA 1.2	When completing college assignments, I work in front of a computer/laptop to search the Internet.
	Individual-level	OLA 2.1	I was looking for specific answers to questions on coursework on the Internet, and once I found the answers, I stopped looking.
		OLA 2.2	I looked for information related to lecture materials on the Internet to make it easier to understand the concept in question.
		OLA 2.3	I am actively looking for learning resources (links, videos, and websites) to help me study course materials.
	Community-level	OLA 3.1	When I find good online study resources for course materials, I save them somewhere to access them later.
		OLA 3.2	I use collaborative tools like Google docs or wikis to work with my friends on classwork and projects in office administration.
		OLA 3.3	I share online resources (links, documents) for studying office administration with my classmates.
		OLA 3.4	I have online office administration group discussions/video conferences on assignments/projects with faculty and students.

The question items were compiled based on a five-point Likert scale (1 = never; 2 = rarely; 3 = sometimes; 4 = often; 5 = always). It was developed to measure and ensure the construction of a research model based on the literature tailored to the research object.

Table 2 shows the measurement of variables. The measurement variables in this study consist of online teaching competencies (Koran, 2002) and online learning activities (Bertelsen & Bødker, 2003). The online competence variable consists of five indicators: (1) learning materials and evaluation questions, (2) community, (3) opportunity to work together, (4) online teacher, and (5) multimedia. Learning materials and evaluation have four statements, the community has five statements, the opportunity to work together indicator has three statements, the online teacher indicator has four statements, and the multimedia indicator has five statements. Then, the online learning activities variable consists of three indicators; i.e., (1) technology level, (2) individual level, and (3) community level. The technology level has two statements, the individual level has five statements, and the community-level indicator consists of four statements.

Data Analysis

The data in this study were analyzed using clustering analysis with the help of SPSS 24.0 software. It aims to observe whether there are similarities or differences in one group. The greater the homogeneity in the group and the greater the heterogeneity between groups, the better the clustering will be (Gudono, 2017). Johnson and Johnson (2002) state that the fundamental purpose of cluster analysis is to find groupings of items (variables). This analysis begins with developing a quantitative scale to measure the similarity between objects and explaining an algorithm for sorting objects into groups.

The data were analyzed using clustering from assumption tests, clustering, and K-Means. First, the assumption test aims to carry out cluster analysis process. The assumption criteria that should be met are: (1) the sample taken can truly represent the existing population (representativeness of the sample) so that the results can be generalized; (2) there is no multicollinearity (there is no correlation between one data and another); and (3) there are no outliers in the independent variable (Gudono, 2017). Second, clustering is one of the multivariate techniques of the interdependence method (interdependence) so there is no distinction between independent and dependent variables. This cluster analysis is used to classify observational data based only on the information found in the data, where the data should describe the observations and their relationships. Third, K-Means is a method that aims to minimize errors due to partitioning n objects into k clusters. Zhang et al. (2015) reveal that in K-Means, cluster solutions are obtained by reassigning observations to clusters until a measure of heterogeneity or similarity in clusters is reached.

FINDINGS AND DISCUSSION

Findings

Based on the clustering analysis, the research results are explained including the results of the assumption test, clustering, and K-Means.

Assumption Test Results

The result of the assumption test shows that the sample taken represents the provisions of students who have taken online the teaching practice program (TPG) 2020 online in the Office Administration Education study program.

Multicollinearity

The multicollinearity test results in the form of tolerance and VIF values on the online teaching competency variable are 0.573 and 1.746, respectively. Meanwhile, on the online learning activity variable, the tolerance value and VIF value are 0.573 and 1.746, respectively. Ghozali

(2016) states that the tolerance value should not be less than 0.10. The result of the multicollinearity test output is presented in Table 3.

Table 3. Multicollinearity Test Results

Model	T	Sign	Collinearity Statistics	
			Tolerance	VIF
(Constant)	2.829	0.006		
Competency	-0.892	0.376	0.573	1.746
Activity	-0.054	0.957	0.573	1.746

Outlier Data

The outlier data test in this study showed that the online teaching competency variable (X1) was between -2.36074 to 1.95479. The online learning activity variable (X2) had a score between -2.19780 to 2.07323. Hair in Ghozali (2016) states that for the case of a small sample (less than 80), the standard score is -2.5 to 2.5. Therefore the data in this study did not show any outlier data. The result of the outlier data calculation is presented in Table 4.

Table 4. Calculation of Outlier Data (N = 72)

	Min.	Max.	$\bar{x}$	SD
Zscore (competency)	-2.36074	1.95479	0.000	1.000
Zscore (activity)	-2.19780	2.07323	0.000	1.000
Valid N (listwise)				

Cluster Analysis

Data Centroid

At this stage, the data analysis of Office Administration Education students of 2017 who took the online teaching practice program (TPG) in 2020 was carried out based on their readiness as a candidate for office administration teachers during the COVID-19 pandemic. In applying the K-means algorithm, a midpoint or centroid value was generated from the data obtained, provided that the desired clusterization was 3. The data obtained were processed using a questionnaire. In this study, three clusters were formed, consisting of the low-level readiness cluster (C1), the medium-level readiness cluster (C2), and the high-level readiness cluster (C3). Thus, there would be three midpoint values or centroids. The determination of the cluster point was done by taking the smallest (minimum) value for C1, the average (average) value for C2, and the largest (maximum) value for C3. The data centroid point value is as shown in Table 5.

Table 5. Data Centroid Points (Final Cluster Centers)

	Cluster		
	1	2	3
Competency	68	83	96
Activity	31	34	39

Data Clustering

By using these centroids, the researchers clustered the data obtained into three clusters. The clustering process was carried out by taking the closest distance from each processed data. The result of clustering can be seen in Table 5. The table shows that each of clusters 1, 2, and 3 has 11 students in the C1 category, 38 students in the C2 category, and 23 students in the C3 category. The members for each cluster are presented in Table 6.

After the clustering process was completed, it was advisable to check how high the clustering quality was by looking at the "capability" of the cluster. It distinguishes existing data per variable or characteristic regarding the subject used for clustering (Gudono, 2017). Table 6 shows

that the variables of online teaching competence (X1) and online learning activities (X2) can be used to distinguish each cluster. It is because the significance value is below 0.05. Table 7 shows K-means ANOVA, which can be used as a reference for examining the ability of clusters determined by the K-Means method.

Table 6. Total of Cluster

Number of Cases in Each Cluster		
Cluster	1	11.000
	2	38.000
	3	23.000
	Valid	72.000
	Missing	0.000

Table 7. K-Means ANOVA

	Competency	Activity
Cluster Mean Square	309.741	335.307
Df	2	2
Error Mean Square	17.118	12.844
Df	69	69
f	181.076	26.105
Sig	0.000	0.000

This study found that three clusters of the readiness of prospective office administration teachers were formed during the COVID-19 pandemic based on the results of data clustering. The number of clusters of the low, medium, and high readiness levels are respectively 11 students (10 female and one boy) or 15%, 38 students (32 female and six male) or 53%, and 23 students (18 female and five men) or 32%. This depiction is presented in Figure 1.

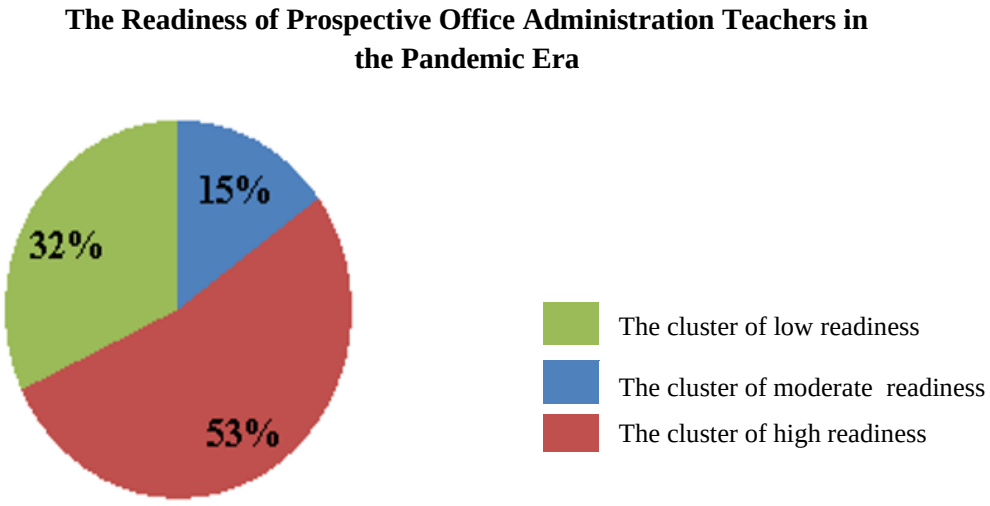

Figure 1. Readiness of Prospective OA Teachers during the COVID-19 Pandemic

Discussion

Prospective teachers should adapt to the changes nowadays due to online learning. Future teachers must manage the class well even without face-to-face learning. It is widely known that starting in March 2019 Indonesia was hit by the outbreak of COVID-19 and classroom learning was finally eliminated, and students studied at home with their families. By establishing this policy, schools must alter and conduct activities based on online learning.

Online learning has its challenges due to its characteristics which are different from those of face-to-face learning. Teachers are demanded to have online teaching competencies, which are expected to support online teaching preparation. These online teaching competencies include indicators of learning material and evaluation questions, community, opportunities for collaboration, online, and multimedia teachers (Koran, 2002). Furthermore, activity theory attempts to analyze cultural and technical aspects and the individual actions in their activities. The measurement of online learning activities is measured by indicators of technology level, individual level, and community level.

Prospective teachers must adapt to learning applications because mastery of technology is inseparable from teacher online teaching competencies. Based on the data analysis, 11 students (10 female and one male) or 15% are in the low readiness level cluster, 38 students (32 female and six male) or 53% are in the moderate readiness level cluster, and 23 students (18 female and five male) or 32% are in the high readiness level cluster. This indicates that 53% of prospective teachers have moderate readiness. They have the competency in teaching and online learning activities; however, they are not very skillful. They can utilize some platforms to support the teaching-learning process, such as Zoom, GMeet, Educational Videos, and other learning media. As youngsters, they can be skillful at using IT media, but still, they need time or opportunity, and encouragement to be ready to become professional teachers in the future.

Furthermore, 32% of respondents have a high level of readiness, which implies that they can conduct online learning. They can be creative in designing learning media in videos or slides that are attractive to students as it is known that creating learning videos is not easy. Based on the preparation stage, they should be ready in terms of material and equipment and explain skills under the lesson plan that has been prepared. Also, they have to do hours of editing to perfect the video, which then they upload and share with the students concerned. In this regard, it requires IT skills as well as conscientiousness.

Fifteen percent of the respondents are with a low level of readiness. This implies that they are not ready for online teaching. They are still in the learning stage of creating videos or learning media with not many online learning activities. It is the basis for educational institutions to provide material and skills related to online teaching. As pre-service teachers, semester seven OA students understand the current conditions and situations that require them to conduct learning effectively and efficiently even though they are online. Without being taught by the lecturers, they have taken the initiative to learn to make learning videos and PPT media and manage Google Classrooms or GoogleMeet. However, various obstacles can emerge; one respondent argued that one of the obstacles in creating good online learning media was supporting devices/facilities (laptops and Wi-Fi)

Furthermore, with regard to online teaching competence, the lowest indicator in the respondent's description is the community shown in the OCT2.2 item: "I joined a community on Facebook or other social media related to online learning". Whereas in the online learning activity variable, the lowest indicator based on the descriptive percentage is shown on the technology level indicator with the item OLA1.1: "When I am completing a lecture task in front of a computer/laptop, I can chat online with my friends so then I do not do it". According to Rohani, psychologically, if a person focuses on something, all unnecessary stimuli do not enter his or her conscious mind (Rohani, 2010). The result of this situation is that the observation is very careful and runs well.

Furthermore, the indicator that most respondents have mastered the online teaching competency is multimedia shown in item OTC5.1: "I prepare media such as PPT or video or web URL before teaching students". Daryanto (2012) argues that learning using multimedia aims to facilitate the learning process and foster creativity and innovativeness of teachers in designing communicative and interactive learning and a problem path in the middle of teachers' activities. Meanwhile, the indicators mostly carried out in online learning activities are shown at the individual level indicator with the item OLA1.6: "When I find out the online learning resources related

to good lecture materials, I store them somewhere and access them later on". Majid points out that learning resources will be meaningful for students and teachers if organized through a design that allows the individual to utilize them as learning resources (Majid, 2008).

CONCLUSION

This study aims to map respondents, i.e., prospective teachers of the Department of Office Administration Education (OA), in the future in which they are demanded to carry out effective and efficient online learning. In this case, three clusters of student readiness for OA prospective teachers emerged. The low readiness cluster has 11 students (10 female and one male) or 15%, the moderate readiness level has 38 students (32 female and six male) or 53%, and the high readiness level has 23 students (18 female and five male) or 32%.

Teachers need various infrastructure and support in the preparation of online learning. The related educational institutions need to equip students with essential equipment such as cameras, Wi-Fi networks, computer facilities, and other supporting facilities (e.g. learning media laboratories). Prospective teacher students can access online and offline various facilities and infrastructure to support their readiness when they graduate and undergo online teaching. Despite the barriers highlighted above, the indicator that should be improved is the community. Therefore, it is recommended that educational institutions strengthen online learning communities through trusted social networks. The formed community is expected to be a place to exchange ideas for better online learning.

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