DEVELOPING THE TEACHER'S SOCIAL COMPETENCY ASSESSMENT INSTRUMENT IN THE FOURTH INDUSTRIAL REVOLUTION ERA

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ABSTRACT

The purpose of the study was to develop instruments for measuring teacher candidates' social competence in the Fourth Industrial Revolution (the fourth I.R.) era. The instrument was developed by referring to Indonesian Law Number 14 of 2005 concerning Teachers and Lecturers and the Regulation of the Minister of National Education Number 16 of 2007 to strengthen some special competence of teacher candidates in the fourth IR era. Limited instrument testing was carried out to 107 test subjects for the 6th-semester undergraduate education program at Yogyakarta State University, consisting of three study programs: Mathematics Education, Indonesian Language Education, and English Language Education study programs. The results of the content validity analysis of 30 instrument items obtained the Aiken V index between 0.61 - 0.93, with 29 items valid, and one invalid item. The construct validity analysis with EFA showed 25 valid items and five invalid items, with a KMO value of 0.504. The significance of Bartlett's test was p = 0.000. Meanwhile, the construct validity analysis with CFA showed the model fit, with a Chi-Square value = 290.35 (p> 0.05). The reliability results show that the Cronbach's Alpha coefficient is 0.40 (moderate category). This shows that the social competency assessment instruments for teacher candidates in the fourth IR era developed are feasible to use, with several improvements.

Keywords: *instruments, social competence, teacher candidates, the fourth industrial revolution era, ConQuest*

INTRODUCTION

The teacher is a professional position, so that a teacher must be able to carry out his duties professionally. A person was considered a professional if he was able to carry out a task by always holding to professional ethics, independent, productive, effective, efficient and innovative and based on the principles of excellent service based on the elements of systematic science or theory, professional authority, public recognition, and regulatory code of ethics (Sulipan, 2007).

This is following the Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System, which states that the position of a teacher as an educator is a professional position. For this reason, professional teachers are required to continuously develop following the times, science, and technology, as well as the needs of the community, including having the capability to compete in regional, national, or international forums. This is reaffirmed by the Law of the Republic of Indonesia Number 14 of 2005 concerning Teachers and Lecturers, which states that the teaching profession is a profession that is equal to lecturers in higher education institutions.

Education has a very important role in the life of a nation. Through education, humans can find breakthroughs to make life easier. However, the quality of education in Indonesia is currently still low. The results of the Trend in International Mathematics and Science Study (TIMSS) show that students' abilities are still low (Scientific Literacy, October 24, 2014). Likewise, the results of the 2015 PISA (International Program for Student Assessment) also show that Indonesia ranks 63rd out of 72 countries evaluated with a score of 386. This score is far below the international average score of 494 (Organisation for Economic Co-operation and Development, 2016).

Meanwhile, 21st-century learning aims to develop 4C capabilities, namely: Communication, Collaboration, Critical Thinking, and Problem Solving, Creativity, and Innovation. The ability to think critically is an ability to process mental operations, including knowledge of perception and creation (Arifin, 2017, p. 93). The 4C competencies are very important to be taught to students in the context of core subject areas and themes in the 21st-century. Assessment and Teaching of 21st-Century Skills (ATC21S) categorize 21st-century skills into four categories, namely: (1) way of thinking; (2) way of working; (3) tools for working; and (4) skills for living in the world (Griffin, et al. 2012). The way of thinking includes creativity, innovation, critical thinking, problem-solving, and decision making. The way of working includes the skills to communicate, collaborate, and work in teams. Furthermore, working tools include awareness as a global and local citizen, life and career development, and a sense of responsibility as a person and socially. Meanwhile, skills for living in the world are skills based on information literacy, mastery of new information and communication technology, and the ability to learn and work through digital social networks.

Likewise, the big challenge that Indonesia is also facing is the presence of the fourth industrial revolution era where all machines are connected, relying on a cyber-physical system, and will radically change the way humans live, work and communication. Machines and information technology have replaced work that was originally done manually by relying solely on human labor. This change has an impact on the process of education, and the main key is the need to improve teacher quality.

Meanwhile, Jones (2018) explains that education in the fourth industrial revolution (IR) era must prioritize individual and social development and adequate skills equipped with critical thinking, creativity, adaptability, and entrepreneurial skills. This is in line with Gleason's (2018) presentation at the World Economic Forum (WEF), which explains as follows.

> *The top ten skills that will be needed in order of priority by employers by 2020 are: complex problem solving, critical thinking, creativity, people management, coordinating with others, emotional intelligence, judgment and decision making, service orientation, negotiation, and cognitive flexibility.*

This condition raises challenges, especially for the Teacher Education Institutions, to produce professional teachers who have good personalities, teaching materials mastery, are skilled in using various media and teaching methods, and can communicate well. The teacher education institutions must be able to produce teachers who have four competencies mastery, namely personality competence, social competence, pedagogical competence, professional competence, and special competencies needed by a teacher in the fourth IR era. As a breakthrough in improving teacher graduates' quality from the Teacher Education Institutions

(TEI), it is necessary to develop a competency evaluation model for teacher candidates in the fourth IR era. This evaluation model must be able to describe the level of competency of teachers who graduated from TEI according to the competency demands of the fourth IR era and describes the sub-competencies that have not been mastered related to the competencies of teachers needed in the fourth IR era.

The purpose of this study was to develop a social competency assessment instrument as a part of the development of a teacher competency evaluation model in the fourth IR era accurately and reliably and based on IT. It is hoped that the developed model will be able to produce social competency profiles of teacher's candidates accurately and reliably and describe the shortcomings when viewed from the competence of teachers in the fourth IR era. Furthermore, the teacher social competency assessment results can be used to evaluate and improve teacher preparation programs in the TEI.

Competence means skills or abilities and authority. If a person can work in a certain field, he is declared to be competent. Teacher competence can be defined as an ability or skill manifested in the form of knowledge, skills, and behaviors that teachers own and controlled by teachers in carrying out their professional functions (Suwardi, 2007, p. 4). Competence can also be understood as a specification of the knowledge, skills, and attitudes that a person has and their application in work, following the work standards required by society or the world of work (Danim, 2011, p. 111).

Teacher competence is a set of knowledge, skills, and behaviors that must be possessed, lived, and mastered by teachers in carrying out their professional duties. According to Law of the Republic of Indonesia No. 14 of 2005 concerning Teachers and Lecturers, teacher competence must include pedagogical competence, professional competence, personal competence, and social competence obtained through professional education. However, teacher competence must be dynamic, develop according to the development of science and technology, especially in the fourth IR era.

Specifically, Popkova, et al. (2018) explain that the fourth industrial revolution is a trend related to the "digitalization" of economy and society, including the development of smart services, smart data, cloud technology, digital networks, digital science, digital education, and the digital environment for life. Meanwhile, Ghorbani, et al. (2018) explained that "the teachers of the 21st-century should educate students in a way that they can learn how to be in today". The same thing was also conveyed by Van Hong, et al. (2018), who revealed that teachers in the fourth IR era are required to have at least three special competencies, one of which is the ability to apply information technology in teaching.

The four competencies contained in Law of the Republic of Indonesia No. 14 of 2005, which is further translated into the Regulation of the Minister of Education and Culture No. 16 of 2007, need to be strengthened and supported by the information technology mastery so that each competency can be applied by maximizing media and technology following the demands of the fourth IR era. Another thing that needs to be considered by a professional teacher is understanding their students' development and characteristics. This is following the results of research conducted by La Velle & Flores (2018) that professional teachers should not assume that the development of students' knowledge from year to year remains the same because this assumption is only based on past empirical data, without seeing directly the development of participants students today who are greatly influenced by the rapid development of information technology.

In the fourth industrial revolution and the current disruption era, in addition to the four main competencies, teachers are also required to master ten skills of the fourth IR as conveyed by Gleason (2018) in the world economic forum, namely, complex problem solving, critical thinking, creativity, people management, coordinating with others, emotional intelligence, judgment and decision making, service orientation, negotiation, and cognitive flexibility. Therefore, the scope of teacher competence in the fourth IR era does not only cover the four

teacher competencies as stipulated in the Law of the Republic of Indonesia No.14 of 2005 concerning Teachers and Lecturers and Regulation of the Minister of Education and Culture No. 16 of 2007, but must be supported by special competencies, which included in the top ten skills that will be needed in order of priority by employers by 2020. This concept is referred to in developing instruments to measure teacher competence in the fourth IR Era.

Research results from Chai, et al. (2019); Tican & Deniz (2019); Ismail, et al. (2018); Jima'ain, et al. (2019); Chou, et al. (2018); Van Hong, et al. (2018) show that the importance of improving teacher professionalism in learning in various fields by utilizing technology that emphasizes the pedagogic aspect. These results strengthen this research regarding the importance of developing a teacher competency evaluation model according to the fourth IR era's demands. The evaluation model developed has the advantage of being limited to learning competencies but more comprehensive, including four competencies: pedagogical competence, professional competence, personality competence, and social competence, which are adjusted to this era.

These four competencies have important roles and complement each other. In this case, teachers' social competence is also very important in addition to the other three competencies. This is following the opinion of Friedlander, et al. (2018), which states that the teacher's job is to teach students while still paying attention to the balance of knowledge development in schools with the development of students' social attitudes in their community.

Social competence is very important and must be possessed by a teacher in addition to the other three competencies, namely pedagogical, professional, and personality competence. This competence is considered very important and must be possessed by a teacher because the teacher itself is part of a society where the community itself is a consumer of education. Both teachers and schools must be able to communicate well and effectively with the community. Otherwise, the school or teachers who cannot communicate well with the community tend to be left behind, considering that educational institutions and teachers are a forum to be able to prepare a student as a good member of society and be able to face future problems.

Social competence is the character, attitude, and behavior or willingness and ability to build nodes of cooperation with others which are relatively stable when facing problems in the workplace which are formed through synergy, self-concept, internal motivation, and the capacity of social knowledge (Chouhan & Srivastava, 2014). Meanwhile, Uno (2011) states that teachers' social competence is the teacher's ability to understand himself as an inseparable part of society and be able to develop duties as members of society and citizens. Deeper in this social ability includes the ability to adapt to the demands of work and the environment when carrying out their duties as a teacher. This means that social competence is related to teachers' ability as social beings to interact with others. As a social being, the teacher must behave politely, be able to communicate and interact with the environment effectively and attractively, and have a sense of empathy for others. Thus, teacher's ability refers to the ability of the teacher to communicate and interact effectively and attractively with students, fellow educators, and education personnel, parents and guardians of students, the school community and the surrounding community where the educator lives, and with parties with interest in the school (Suharsaputra, 2010, p. 208).

Social competence includes a set of behaviors that involve interactive abilities, namely abilities that support the effectiveness of interactions with others such as self-expression skills, effective speaking, understanding other people's roles towards oneself, interpreting other people's motives, achieving a sense of security with others. Teacher social competence is also closely related to the ability of teachers to communicate with the community around the school and the community where the teacher lives. Thus, the indicator of a teacher's social ability is being able to communicate and get along with students, fellow educators and education personnel, parents and guardians of students, the community and the surrounding environment, and able to develop networks.

The aforementioned definition is in line with Law of the Republic of Indonesia No. 14 of 2005; and Regulation of the Minister of Education and Culture No. 16 of 2007, that social competence is the ability of teachers to communicate and socialize effectively with students, education staff, parents/guardians of students, and the surrounding community. Teachers' social competence indicators include: (1) being inclusive, acting objectively, and not discriminating due to considerations of gender, religion, race, physical condition, family background, and family social status; (2) communicating effectively, emphatically, and politely with fellow educators, educational staff, parents and the community; (3) adapting to a place of service throughout the territory of the Republic of Indonesia which has socio-cultural diversity, and (4) communicating either orally or in writing.

RESEARCH METHOD

Research on developing social competency assessment instruments for teacher candidates in the fourth IR era is a part of the research on developing a competency evaluation model for teacher candidates in the fourth IR era. This research focused on the development of instruments to measure the social competence of teacher candidates based on the Regulation of the Minister of Education and Culture Number 16 of 2007, and strengthened by competency indicators relevant to the top ten skills demanded in the fourth IR era.

Instrument development was carried out in the following steps: (1) developing instrument constructs, (2) developing instrument grids, (3) writing instrument items, (4) analyzing instrument items and testing content validity, (5) revising instruments based on analysis of items, and (6) limited testing and development for the construct validity of instruments. The development of the instrument construct refers to the indicators of social competence of teacher candidates according to the Regulation of the Minister of Education and Culture Number 16 of 2007, which is strengthened by the six competencies of the top ten relevant skills needed by teacher candidates in the fourth IR era proposed by Gleason (2018), namely people management, coordinating with others, emotional intelligence, judgment and decision making, service orientation, and negotiation.

Therefore, the construct of social competency instruments for teacher candidates in the fourth IR Era will reflect the four indicators of social competence for teacher candidates as stated in the Law of the Republic of Indonesia No. 14 of 2005 on Teachers and Lecturers and Regulation of the Minister of Education and Culture No. 16 of 2007, imbued with six relevant aspects of the top ten skills. The construct of an instrument to measure teacher candidates' social competence in the fourth IR era includes four dimensions, which are broken down into 15 indicators. The four dimensions include (1) being inclusive, acting objectively, and not discriminating due to considerations of gender, religion, race, physical condition, family background, and family social status; (2) being able to communicate effectively, emphatically, and politely with fellow educators, educational staff, parents and the community; (3) adapting to the place of duty throughout the Republic of Indonesia which has socio-cultural diversity; and (4) being able to communicate well orally and in writing.

FINDINGS AND DISCUSSION

The validity of the instrument was tested in terms of content and construct validity. The content validity was tested through a study involving seven experts and analyzed using Aiken's formula. Retnawati (2014) states that items can be declared valid if they have a minimum V Aiken coefficient in the medium category, which is at least 0.60. Items having a V Aiken coefficient < 0.60 are considered invalid. The results of the analysis using the Aiken formula are presented in Table 1.

Table 1. Results of Content Validity Analysis with V Aiken

Item	n = 7							Aiken V	Validity
	R1	R2	R3	R4	R5	R6	R7		
1	3	4	4	4	5	5	3	0.750	Valid
2	3	4	4	4	4	5	4	0.750	Valid
3	4	4	5	4	4	4	4	0.786	Valid
4	5	5	4	5	5	5	4	0.929	Valid
5	3	3	4	2	5	5	4	0.679	Valid
6	4	4	4	3	4	5	4	0.750	Valid
7	5	5	4	5	5	5	3	0.893	Valid
8	5	5	5	4	5	5	4	0.929	Valid
9	4	5	2	4	2	5	3	0.643	Valid
10	5	4	4	4	5	4	4	0.821	Valid
11	5	5	5	2	4	5	3	0.786	Valid
12	5	5	4	4	5	5	4	0.893	Valid
13	4	5	2	5	5	4	4	0.786	Valid
14	4	5	4	4	5	5	4	0.857	Valid
15	3	4	4	4	4	5	4	0.750	Valid
16	4	5	3	4	4	4	3	0.714	Valid
17	5	5	3	4	4	4	3	0.750	Valid
18	4	4	2	2	4	4	4	0.607	Valid
19	4	4	2	1	2	4	3	0.464	Invalid
20	4	4	5	5	2	4	4	0.750	Valid
21	5	5	4	5	4	5	3	0.857	Valid
22	5	4	4	3	5	5	3	0.786	Valid
23	4	3	4	4	1	5	3	0.607	Valid
24	4	3	5	5	5	5	4	0.857	Valid
25	4	5	4	4	4	4	3	0.750	Valid
26	5	4	3	4	2	5	4	0.714	Valid
27	4	5	5	4	4	4	2	0.750	Valid
28	4	5	5	2	1	3	4	0.607	Valid
29	5	3	5	5	3	4	5	0.821	Valid
30	5	2	4	5	2	4	4	0.679	Valid

Based on the results of the calculation of the Aiken V coefficient, 29 items are valid (having an Aiken V coefficient > 0.60), and one item is declared invalid because it has an Aiken coefficient V = 0.46 < 0.60. The invalid items are item number 19, which describes the indicator of involving parents of students in preparing school development programs. The aspect of the 21st-century skills that animates these items is people management, namely the ability to manage school human resources to contribute to school development.

In this study, the construct validity analysis of the social competency assessment instruments for teacher candidates in the fourth IR era was carried out using exploratory (EFA) and confirmatory (CFA) model factor analysis. Exploratory factor analysis is a factor analysis technique in which some of the factors that will be formed are latent variables that cannot be determined before the analysis is carried out. Meanwhile, Wagiran (2015, p. 300) says that exploratory factor analysis is carried out to ascertain whether certain items support the factors and these factors support the variables. The criteria for exploratory factor analysis according to Wagiran (2015, p. 303) are as follows: (1) has a Keyser Mayer Oikin (KMO) value > 0.50; (2) Barlett's Test of Sphericity < 0.05; (3) Anti image correlation MSA > 0.5; and (4) Eigenvalue > 1.0.

Based on the results of the exploratory factor analysis, 25 valid instrument items were obtained, while the other five items were declared invalid. The invalid items were items 11, 16, 24, 29, 30. Fulfillment of the exploratory factor analysis criteria showed the value of KMO = 0.504; Chi-Square = 450.879; Bartlett's test sign. = 0.00.

Furthermore, from 25 valid instrument items, the confirmatory factor analysis (CFA) was carried out. Joreskog and Sorbom (2003) state that with the confirmatory factor analysis model, one will be able to describe or explain empirical data concerning the parameters constructed in a model. The model is structured based on theory (a priori information) about empirical data structures based on theories or hypothetical models. The results of content validity analysis with CFA resulted in an empirical construct, as shown in Figure 28

Likewise, Byrne (Ghozali and Fuad, 2005, p. 32) states that an RMSEA value of less than 0.05 indicates that the model is fit, and an RMSEA value of around 0.08 indicates that the model has a reasonable error estimate. On a similar note, MacCallum et al. (Ghozali & Fuad, 2005 p. 32) state that the RMSEA ranges from 0.08 to 0.1, indicating that the model built has a fairly adequate fit (mediocre), while the RMSEA value> 0.1 indicates that the model built has a bad fit. Besides, to determine the fit or not a model can also be done by using confidence intervals to assess the accuracy of the RMSEA estimation, where the model is declared fit if it has an RMSEA value that lies in the 90% confidence interval.
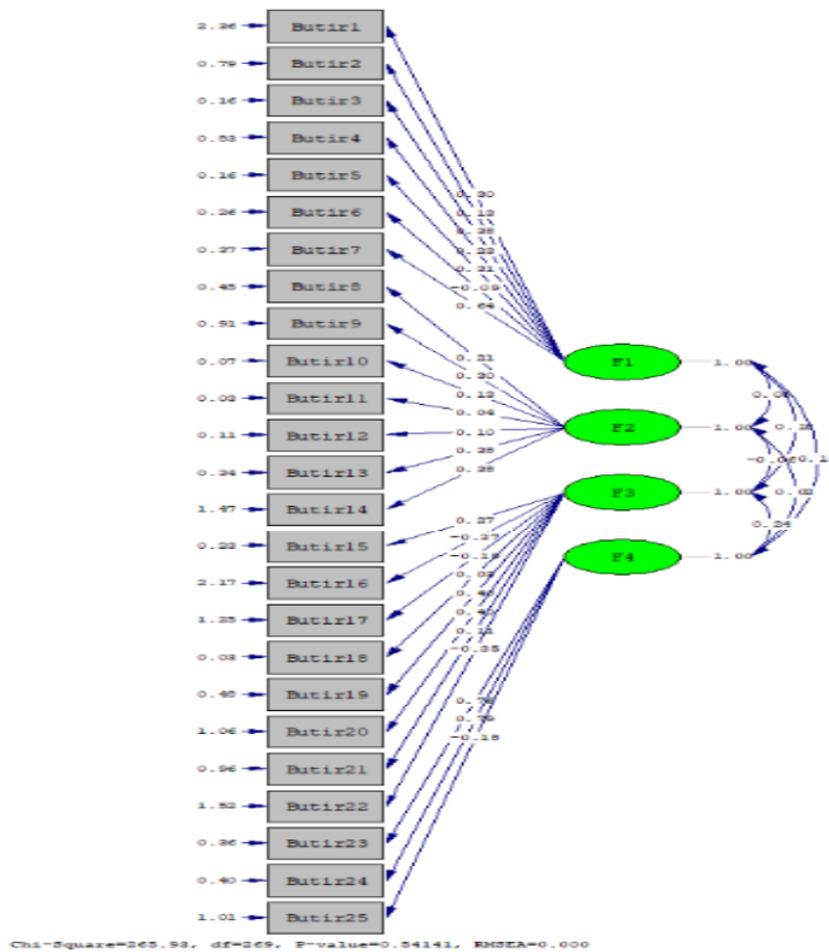

Figure 1. The Construct of the Instrument for Assessment of Social Competence for Teachers in the Fourth IR Era

Based on the criteria that have been set, the construct of the social competence instrument for teacher candidates in the fourth I.R. era which is validated can be declared fit, because it has a value of $\chi 2count = 290.35$ with p-value $= 0.18$ (p> 0.05); RMSEA $= 0.00$; GFI $= 0.83$; and AGFI $= 0.80$; and the RMSEA value which lies at a 90% confidence interval. In the next stage, for instrument items that have been declared valid, their reliability is estimated. The criteria for determining the reliability of the instrument are based on the Alpha-Cronbach coefficient, with the criteria for an Alpha coefficient > 0.5 (Wagiran, 2015).

Based on the results of the exploratory factor analysis, it can be concluded that the instrument for assessing the social competence of teacher candidates in the fourth IR era has 25 valid items. The confirmatory factor analysis of the 25 items that have been declared valid can be stated that the model is declared fit. Furthermore, the results of the instrument reliability analysis with the Cronbach Alpha formula obtained a reliability coefficient of 0.40 (low category). Thus, the development of a social competency assessment instrument for teacher candidates in the fourth IR era produces a set of valid instruments, both in terms of content and construct. However, the instrument that has been developed has fairly low reliability, which is only 0.40, and needs to be refined.

The low level of reliability of the instrument being developed is likely to be caused by many factors. Sugiyono (2010) states that if the measurement results on the same measuring object between one item and another item contradict each other or are inconsistent, it does not mean that the measuring object is wrong, but the measuring instrument was used is not reliable for the object that he measured. Meanwhile, Murti (2011) states that low reliability can occur due to the observer's inconsistency, the instability of the attributes of the measured subject, and unsupportive measurement situations.

In a similar vein, Matondang (2009) states that for reliability based on the test items' internal consistency, the instrument's reliability will be related to the stability or consistency between the items in a test. In other words, for the same measuring object, reliability will be good if the measurement results of one item do not contradict the results of measuring the other items.

Meanwhile, Friedenberg (1995) states that two factors greatly influence the instrument's reliability, namely the aspects of sampling factors or the number of items and changes in the performance of test-takers. In the first aspect, namely the number of instrument items, teacher candidates' social competency assessment instrument has been developed is only 25 items. In this case, the number of items is directly proportional to the reliability of an instrument. If the number of items increases, the reliability of the instrument will be higher. The second factor is the test-takers' inconsistent performance, which can be caused by the guessing aspect. This usually happens if the test is too difficult, so the test taker will tend to guess the answer.

In a similar vein, Jacobs (1991) states that the following factors influence an instrument's reliability. The first factor is the number of instrument items. Increasing the number of instrument items will reduce the number of respondents guessing in their answers. However, these items' quality must also be considered because if not, the number of items given will make the respondent exhausted. The second factor is the composition of the sentence construct of the instrument. Ambiguous sentences can affect the respondent's interpretation or lead to different interpretations in providing answers, which can affect reliability. The third factor is the atmosphere of the test. The sentence of instruction that is not clear or the atmosphere is noisy and not conducive can influence the respondent when answering. The fourth is the level of difficulty of a test. Variation in the scores of a test will affect reliability. These instruments will have good reliability if the scores obtained are spread out or well-distributed to show differences between test-takers. The fifth is the test taker's condition. Test-takers' conditions, such as fatigue, anxiety, and sick test-takers, will cause low reliability because it affects their performance or performance in taking the test.

The instrument developed is an instrument for assessing teacher candidates' social competence in the fourth IR Social competence is one of the most important competencies of teacher candidates because it is closely related to the duties of teachers as educators and role models for students. In this case, Rosyada (2016) states that teachers are a unique profession because there are so many competencies they must master in carrying out their duties as educators to prepare future generations.

One of the competencies that every teacher must have is social competence, namely the ability to manage social relations, which requires various skills, skills, and capacities to solve problems that occur in interpersonal relationships (Boucher, 2012). The significance of social competence for teachers can be felt in many social contexts. One of them is with school stakeholders, including school customers, school graduate users, and community leaders who are very influential in the process of school advancement. Significance was also felt with their colleagues at school and students whose performance was in the hands of the teachers themselves.

Teachers' social competencies are closely related to the six top ten skills competencies of the 21st century that animate them, namely: people management, coordinating with others, emotional intelligence, judgment and decision making, service orientation, and negotiation. People management competence is the ability of teachers to manage and utilize human resources owned by schools to contribute to school development.

Coordinating with other competence describes the teacher's strong interpersonal skills and was able to collaborate with colleagues to solve work problems. Interacting with other people, working with various personality types, and having the flexibility to cope with changing circumstances will also be factors that determine teachers and school organizations' success. Emotional intelligence reflects a person's persuasion ability, emotional intelligence, and the ability to invite others to achieve common goals or organizational goals. Judgment and decision-making describe a person's ability to analyze available data in an organization and convert large amounts of data into information needed to direct an organization's strategic decisions. Service orientation reflects a person's ability to spend time, think about, and reflect on customer needs, both current and future. This insight will lead a person to develop new and better products and services to satisfy customers. Negotiation is the ability to match the services provided with customer needs so that an agreement can be reached that provides customer satisfaction and goal achievement.

CONCLUSION

Based on the research findings, the following conclusions can be drawn. First, the instrument for assessing teacher candidates' social competence in the fourth IR era, which has been developed, was valid both in terms of content and construct. Second, the reliability of the social competency assessment instrument for teacher candidates in the fourth IR era, which has been developed, has low reliability. For this reason, this instrument still needs improvement, especially by increasing the number of instrument items, and improving the sentence construct of the instrument, thereby minimizing the guessing factor.

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