Developing An Instrument To Measure The Pre-Service Teacher’s Personality Competence In The Industiral Revolution 4.0

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**Abstract.** The purpose of this study was to develop an instrument to measure pre-service teacher's personality competence in the insdustrial revolution 4.0. The case-based instruments form the main part of the pre-service teacher's competence evaluation model (undergraduate students of educational studies). The measurement results can be used as reccomendation for the curriculum designers and the lecturers of the undergraduate of educational studies level. This research was conducted at Universitas Negeri Yogyakarta with 107 student respondents. The draft instrument consists of five factors and has 34 items. The instrument draft was validated with content validity using the Aiken formula, construct validity using exploratory factor analysis continued with confirmatory factor analysis, while reliability was estimated using the Cronbach Alpha technique. The result showed that the instrument used to measure the pre-service teacher's personality competence in the insdustrial revolution 4.0 had 29 items that grouped into five factors, namely: (1) act according to the norm, (2) present themselves as individuals who can be role models, (3) present themselves as individuals who are steady and authoritative; (4) show a high work ethic and responsibility, and (5) uphold the code of ethics of the teaching profession. The instrument developed has high validity and reliability.

**Keywords:** Instrument, pre-service teacher’s personality competence in the industrial revolution 4.0.

**Introduction**

In the era of the industrial revolution 4.0, the demand for qualified teachers, especially those with good personalities, must be fulfilled immediately. The facts show that there are still teachers who have personalities who do not deserve to be role models. For example, the results of Kartowagiran's research [1] show that there are still teachers who cannot give satisfying answers when asked by students, instead the teacher's response makes students embarrassed. This is in line with Primardiana's research [2] which found that when teaching in class, the facial expressions of German language teachers were less pleasant. Therefore the teacher's personality must be prepared from the beginning, that is since undergraduate students of educational studies level. They must be coached so that later they have a good personality and have the ability needed in insdustrial revolution 4.0. The coaching of pre-service teacher is carried out in education, namely pre-service teacher education at undergraduate level.

According to Jones [3], education in the twenty-first century prioritizes individual and social development, as well as adequate skills complemented by the ability to think critically, creatively, adaptability and entrepreneurship. This is in line with the World Economic Forum/WEF [4] which explains *“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”.* In addition, teachers in the industrial revolution 4.0 must also understand the three literacies, namely digital literacy, data literacy, and humanity literacy.

Coaching materilas for the pre-service teachers who are currenly studying at the Educational Institutions and Educational *Personnels* or *Lembaga Pendidikan dan Tenaga Kependidikan* (LPTK) is teacher competence, especially personality competence. The term of personality comes from the Latin, namely *personal* or mask used by actors in a game or performance. In the concept of general society, the term personality is used to describe a person's identity in the form of behavior exhibited in a social environment, a person's general impression of yourself or others, and healthy or problematic personality functions.

According to Allport [5], personality is a dynamic organization of individual physical psycho systems to adapt to their environment in unique ways. Meanwhile, Cattel [6] states that personality is a matter that determines behavior in a given situation and in a determined mental awareness. Burger [7] defines personality as original patterns of behavior that persist in individuals.

Atkinson [8] argues that personality is a different form of thought patterns, emotions, and behavior and is a characteristic that determines an individual's personal style and influences their interactions with the environment. The definitions of personality above can be interpreted as an outward manifestation of someone even though it does not necessarily describe the actual situation, the ability of a person to adapt to their field of work, the quality of themself or the nature of them that shows their position and lifestyle.

A mature personality according to Allport [9] is an individual who directs his attention and efforts for the common interest; individuals who are able to see their abilities objectively; and individuals who have a philosophy of life. This is in line with Hurlock [10] which states that a steady personality can be seen including: being able to judge themself; assess the situation; assessing achievement; accept responsibility; independence; able to control emotions; goal oriented; social acceptance; have a philosophy of life; and happy.

Meanwhile, Premuzic and Furnham [11] state that personality is used to describe and explain the behavior and internal characteristics of a situation or context. Personality emphasizes the differences in individual characteristics and elaborates the taxonomy of personality, for example the classification of temperament. Personality theorists have sought to identify, assess, explain and predict systems of differences and similarities between individuals, looking for fundamental and general causes of human behavior. Specifically, they aim to (a) identify dimensions and things in different or comparable people, (b) test that these dimensions have remained relatively stable over time, and (c) explain the etiological basis of universal and stable differences between individuals.

Meanwhile, in the Constitution of The Republic of Indonesia [12], it is explained that personality competence is a strong, noble, wise, and authoritative personality ability and is a role model for students. This personality competence is clarified in Minister of National Education Regulation No. 16 of 2007 regarding Teacher Competence Standards [13], it is stated that the personality competence includes five indicators, namely: (1) act in accordance with Indonesian national religious, legal, social and cultural norms; (2) presents themselves as honest, noble, and role models for students and the community; (3) present themselves as a stable, mature, wise, and authoritative person; (4) shows work ethic, high responsibility, pride in being a teacher, and self-confidence; and (5) upholds the code of ethics of the teaching profession.

The measurement of the pre-service teacher's personality competence in the industrial revolution 4.0 is important to do first in order to do coaching appropriately. But unfortunately, there are no instruments that can be used to measure it. Therefore, this study aims to develop valid and reliable instruments to measure the pre-service teacher's personality competence in the industrial revolution 4.0.

**Research Methods**

This research is research development that develops an instrument to measure the pre-service teacher's personality competence in the industrial revolution 4.0. The procedure for developing this instrument is: 1) determining the objectives, 2) determine the scope, namely the teacher's personality that includes WEF's top ten which includes complex problem solving, critical thinking, creativity, people management, coordinating with others, emotional intelligence, judgment and decision making, service orientation, negotiation, and cognitive flexibility; also includes three literacies namely digital literacy, data literacy, and humanity literacy, 3) compiling a grid that can be used as a guide so that the items of the instrument include personality competencies, WEF's top ten, and three literacies, 4) writing instrument items, 5) focus group discussion (FGD), 6) instrument readability test and revision, 7) instrument trials, and 8) revision and assembly.

The instrument items are arranged on a case-based, not the usual choice of answers. Meanwhile, the FGD was conducted by the Research Team by involving 15 experts in the fields of psychology, education, and psychometrics. FGD participants gave corrections to the instrument. The correction was used to revise the instrument before it was tested. The instrument was tested on 107 fifth semester students majoring in Mathematics Education, Indonesian Language Education, and English Language Education. The trial data were analyzed by exploratory factor analysis (EFA) followed by confirmatory factor analysis (CFA).

**Results and Discussion**

The results of this study are instruments that will be used to measure the pre-service teacher's personality competence in the industrial revolution 4.0. This instrument was developed from five indicators, namely: (1) act in accordance with Indonesian national religious, legal, social and cultural norms; (2) presents themselves as honest, noble, and role models for students and the community; (3) present themselves as a stable, mature, wise, and authoritative person; (4) shows work ethic, high responsibility, pride in being a teacher, and self-confidence; and (5) upholds the code of ethics of the teaching profession. The instrument grid is shown in Table 1.

Table 1. The Instrument Grid of Personality Competence World Economici Forum’s Top Ten-Top ten from World Economic Forum/WEF [18]

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Variable** | **Indicator** | **Top Ten Numbers** | **Literature of RI 4.0 Numbers** | **Item Number** |
| PERSONALITY COMPETENCE | **Indicator 1** Act in accordance with Indonesian national religious, legal, social and cultural norms | 3, 4, 5, 6, 8, 9, 10 | L2 and L3 | 1 - 6 |
| **Indicator 2**Presents themselves as honest, noble, and role models for students and the community | 4, 5, 6, 8, 9 | L2 and L3 | 7 - 13 |
| **Indicator 3**Present themselves as a stable, mature, wise, and authoritative person | 1, 2, 3, 4, 8, 10 | L1, L2, L3 | 14 - 19 |
| **Indicator 4**Shows work ethic, high responsibility, pride in being a teacher, and self-confidence | 1, 2, 3, 8, 9, 10 | L1, L2, L3 | 20 - 24 |
| **Indicator 5**Upholds the code of ethics of the teaching profession | 3, 4, 5, 7, 9, 10 | L1, L2, L3 | 25 - 29 |
| Topten 1. Complex problem solvingTopten 2. Critical thinkingTopten 3. CreativityTopten 4. People managementTopten 5. Coordinating with othersL1 = Digital literacyL2 = Data LiteracyL3 = Humanity Literacy  | Topten 6. Emotional intelligenceTopten 7. Judgment and decision makingTopten 8. Service orientationTopten 9. Negotiation, andTopten 10. Cognitive flexibility |

The instruments compiled in this study were initially 34 items. After reviewing and evaluating by 13 experts then calculated using Aiken's Formula, the number of items becomes 32. According to Aiken [15], if the instrument rater is 13 and the thera are 5 choices for each item, then the minimum V value is 0.75. The results of Aiken's Formula analysis on this instrument show that items number 22 and 24 do not meet the minimum V value (0.38 and 0.5).

Furthermore the instrument was validated by the construct using exploratory factor analysis (EFA) techniques. This construct validation shows that there are 3 conflicting items because anti images are less than 0.5; so the remaining items are 29 items. EFA analysis of the instrument continued by considering the value of the Kaiser-Mayer-Olikin Sample Sufficeiency of Sampling (KMO) with a standard of 0.510. Each item of this instrument has an anti-image coefficient of >0.5, meaning that all items meet the requirements in factor analysis. The results of the analysis with the second EFA showed that all items were accepted because they had a minimum load factor of 0.311 [16]. The variants issued by the five factors are only 50.53%, so that about 47% of pre-service teacher's personal competence are explained by other factors.

The EFA results above can be widely applied if a confirmatory factor analysis (CFA) has been carried out. This is in accordance with Cramer [17] which states that EFA explores theories and CFA tests theories. The result of the confirmatory factor analysis with CFA is shown in Figure 1.

Figure 1. The result of the confirmatory factor analysis with CFA



Figure 1 shows that Chi-square is smaller than 2 df (333.3 <2x372) [18], p-value = 0.923 (> 0.05 [19]), RSMEA = 0.00 (<0,08 [20]). This means that the developed instrument has good construct validity. Meanwhile, the results of the estimated reliability with Cronbach Alpha show the number 0.32 (quite reliable) [21]. The final product of this study is an instrument used to measure the pre-service teacher's personality competence in the industrial revolution 4.0 (presented in Table 2).

Table 2. The Pre-Service Teacher's Competence Personality Instruments in The Industrial Revolution 4.0

|  |  |  |
| --- | --- | --- |
| **Indicator** | **Item** | **Loading Factor** |
| Act in accordance with Indonesian national religious, legal, social and cultural norms | 1. Treat students with the same treatment despite having different beliefs.
 | 0,20 |
| 1. Conduct learning activities without differentiating the ethnicity, customs, and region of origin of students.
 | -0,27 |
| 1. Treat students without gender discrimination.
 | -0,33 |
| 1. Behave according to the religious norms adopted.
 | -0,55 |
| 1. Behave according to social norms prevailing in society.
 | -0,47 |
| 1. Able to collaborate with others in maintaining and developing Indonesian culture.
 | -0,57 |
| Presents themselves as honest, noble, and role models for students and the community | 1. Able to produce work objectively and ethically.
 | 0,42 |
| 1. Behave decisively in making decisions based on data.
 | 0,32 |
| 1. Having self-awareness that reflects devotion to God.
 | 0,33 |
| 1. Provide services to students who reflect noble character.
 | 0,41 |
| 1. Appreciate students in interacting both inside and outside the classroom.
 | -0,43 |
| 1. Respect others according to the norms prevailing in society.
 | -0,28 |
| 1. Actively participating in community activities.
 | 0,17 |
| Present themselves as a stable, mature, wise, and authoritative person | 1. Having a firm stand.
 | 0,22 |
| 1. Having stable emotions both inside and outside the school environment.
 | 0,45 |
| 1. Willing to accept criticism and advice from others.
 | 0,27 |
| 1. Able to solve problems wisely.
 | 0,26 |
| 1. Present themself as a mature teacher.
 | -0,56 |
| 1. Present themselves as wise and authoritative teacher figures.
 | 0,48 |
| Shows work ethic, high responsibility, pride in being a teacher, and self-confidence | 1. Having enthusiasm in carrying out his duties as a teacher.
 | 0,28 |
| 1. Demonstrate systematic and documented performance.
 | -0,25 |
| 1. Familiarize themself to improve the ability to master Information Technology (IT) that supports the task as a teacher.
 | 0,25 |
| 1. Having creativity to develop teaching media.
 | 0,74 |
| 1. Mastering the competencies needed to complete assignments as a teacher.
 | 0,27 |
| Upholds the code of ethics of the teaching profession | 1. Understand the values contained in the code of ethics of the teaching profession
 | 0,47 |
| 1. Implementing the values of the teacher profession code of ethics in utilizing technology
 | 0,51 |
| 1. Implement the values of the teacher professional code of ethics in social life.
 | 0,18 |
| 1. Maintaining good relations with parents of students to foster participation and a sense of responsibility in education.
 | 0,32 |
| 1. Creating a school atmosphere that is conducive to supporting effective learning.
 | 0,50 |

Table 2 shows that the developed instrument consisted of 5 factors and had 29 items. This instrument has a high content and construct validity, but its reliability is of a categorized as moderate, with a reliability value of 0.293. This result is certainly interesting to discuss.

The instrument is said to be good if it has high validity and reliability. The question posed is what if the instrument's validity is high but its reliability is low? This certainly does not happen, because based on Salkind [22], low reliability instruments will damage their validity. According to classical test theory [23,24] the magnitude of the Standard error of measurement (SEM) can be calculated by the formula (1)

$SEM=S\_{x}\sqrt{\left(1-r\_{xx'}\right)}$ (1)

In this case SEM is the standard error of measurement, Sx is the standard deviation of the test score, and rxx, is the test reliability coefficient [25,26]. Based on the formula (1) can be seen that the lower the reliability, the higher the SEM price which means the smaller the accuracy or the validity of the instrument. This is in line with Wilson & Reynold [27] which explains that without reliability there will be no validity.

The above statement is a warning that low reliability will harm the instrument. Therefore it must be sought so that the reliability of the developed instrument is high. Referring to Tapia & Marsh [28], there are ways to improve the quality of reliability by adding items to the origin of the item added with an internal consistency (total-item correlation) greater than 0.5. Instrument reliability can also be improved by reducing the items in the instrument, as long as the items have low consistency. This is based on the classical test theory which says the degree of test reliability (ρ) can be defined as the ratio between pure score variance (τ) and visible score variance (x) written in the form of the formula ρ2XT = σ2τ / σ2x .... (2) [29]. This formula shows that to increase reliability, the price σ2x or the variant of the observation score must be reduced. Variants of the measurement results must be homogeneous, variations in the score results of measurements must be small. If the measurement score variant is small, the reliability will be high.

Table 2 also shows that the scores of the measurement results of the pre-service teacher personality competence items vary greatly. This has caused in low instrument reliability. In addition, the answers given by respondents to some items are very small, some are even negative. This shows that this respondent has low personal competence or even does not match the personality as a pre-service teacher. The results of this study are a consequence that coaching pre-service teachers in LPTK must be carried out properly and continuously.

Pre-service teacher personality development must be carried out systematically and carefully, because this is an attitude that is not too easy to change. Attitudinal abilities are almost identical to personal characters that include the dimensions of moral reasoning, moral feeling, and moral action. It is understood that it often takes long to change from moral reasoning to moral action [30]. This personality development can be done through design, learning implementation, and through assessment. This is in line with Kartowagiran and Maddini's [31] research which shows that a factor that greatly influences student behavior is the learning process, the teacher gives examples and verbally presents them.

**Conclusion**

This research produces instruments that have good content and construct validity. The validity of the contents was proven through expert judgment and then calculated by the Aiken formula, apparently from 34 knockouts 5. Next, the instrument was validated using the construct validity technique using exploratory factor analysis (EFA) and proceeded to confirmatory factor analysis (CFA). Meanwhile, the reliability of this instrument is categorized as moderate = 0.293. This is because the mean scores on item one with other items very greatly.

**Suggestion**

If it is to be used, it is better for this instrument to be trialled again, to respondents of pre-service teachers in industrial revolution 4.0 in semester 6 or 7 so that they have understood their position, namely pre-service teacher. They already understand the personality competencies that must be mastered by the teacher.

**References**

[1] Kartowagiran., Hadi, S., Wahyuni, N., Alfarisa, Widowati. Effectiveness of the AA “4C” Authentic Assessment Model : A Single-Case-Research (SCR). The New Educational review. DOI: 10.15804/tnet.2019.57.316 (2019)

[2] Wijayati, P.H., Rofiah., & Fauzi, A. “My lecturer’s expressionless face kills me!” An evaluation of learning process of German language class in Indonesia. REiD (Research and Evaluation in Education), 4(2), 2018, 94-104 (2018)

[3] Jones, A. Vocational education for the twenty-first century. The University of Melbourne. August. (2018)

[4] Gleason, N.W. (Ed). Higher Education in The Era of The Fourth Industrial Revolution. Singapore: Springer Published. (2018)

[5] Corr, J. And Mattews, G. The Cambridge Handbook of Personality Psychology. New York: Cambridge University Press. (2009)

[6] Cattel, R.B. The Scientific Analysis of Personality. New York: Penguin. (1965).

[7] Burger, J. M. Increasing compliance by improving the deal: The that's-not-all technique. *Journal of Personality and Social Psychology, 51*(2), 277–283. [https://doi.org/10.1037/0022-3514.51.2.277](https://psycnet.apa.org/doi/10.1037/0022-3514.51.2.277) (1986)

[8] Atkinson, et.al. Pengantar Psikologi (Terjemahan Nurdjanah Taufiq, Rukmini Barhana, Agus Dharma, dan Michael Adryanto). Jakarta: Erlangga. (1998)

[9] Allport, G. W. The Ego in Contemporary Psychology. *Psychological review, 50(5), 451.* (1943)

[10] Hurlock, E. B. Developmental Psychology: A Life-Span Approach. New York: McGrawHill. (1980)

[11] Chamoro-Premuzic, T dan Furnham, A. Personality and Intellectual Competence. London. LEA. (2005)

[12] Republic of Indonesia. RI Law Number 14, 2005, concerning Teachers and Lecturers. (2005)

[13] President of the Republic of Indonesia. Minister of National Education Regulation Number 16, 2005, Regarding Teacher Competence Standards. (2007)

[14] Gleason, B. Thinking in hashtags: exploring teenagers’ new literacies practices on Twitter. Learning, Media and Technology, 43(2), 165-180 (2018).

[15] Aiken, L.R. Three coeficients for analyzing the reliability and validity of ratings. Educational and psychological measurement. 1985, 45., pp 131-142. (1985).

[16] Hair, J. F., et al. Multivariate Data Analysis 6 th Edition. New Jersey: Pearson Education Inc. (2007)

[17] Cramer, D. Advanced Quantitative Data Analysis. McGraw-Hill Education (UK) (2003)

[18] Arbuckle, Jarnes L. AMOS user's guide. Version 3.6. Chicago: Smallwaters. (1997)

[19] Phedazur, Elazar J. Multiple Regression in Behavioral Research: Explanation and Prediction, Second Edition, New York: CBS College Publishing (1982)

[20] Ferdinand, Augusty. Structural equation modeling dalam penelitian manajemen. Semarang: Badan Penerbit Universitas Diponegoro (2002).

[21] Cronbach, L. J. Essential of psychological testing. New York: Harper and Ross. (1985)

[22]Salkind, N. J. Encyclopedia of Measurement and Statistics. SAGE. (2007)

[23][25] Crocker, L. M., & Algina, J. Introduction to Classical and Modern Test Theory. Cengage Learning. (2006)

[24][26][29] Allen, M. J., & Yen, W. M. Introduction to Measurement Theory. Wadsworth Pub Co (1979)

[27] Willson, V., Livingston, R.B., Reynold, C., Measurement and assessment in education. Wasington, DC: Pearson (2008).

[28] Tapia, M., & Marsh G. An Instrument to Measure Mathematics Attitudes. mtaphia@berry.edu and gemarsh@che.ua.edu. Berry College and University of Alabama. (2007)

[30] Lickona, T. Educating For Character: How Our Schools Can Teach Respect And Responsibility. Bantam (2009).

[31] Kartowagiran, & Maddini, H. Evaluation model for Islamic Education Learning in Junior High School and its Significance to Student’s Behviours, American Journal of Eductional research 2015, vol 3, No. 8 (2015).

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