



Validity and Reliability Study of Teacher Competency Instruments

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Abstract

Teacher competence is the key to success in the learning process. There are several teacher competencies, including pedagogical competency, personality competency, social competency, and professional competency. Therefore, a measuring tool is needed that can measure teacher competence, one of the measuring tools that can be used is a questionnaire. This research discusses analysing question items that will be used as instruments in assessing teacher competency. Analysis of the question items was carried out by testing validity and reliability. This test aims to determine the appropriateness of the question items, as well as whether they can be trusted and relied upon to be used as instruments in a study. This research used a quantitative approach with a development method with 51 elementary school teachers as respondents in Nagari Lubuk Basung, Agam Regency. To find out whether the statement is valid or not, the corrected item's total correlation value is > 0.30 . In testing the validity of this research, 38 statements were valid. It is proven that all items in the statement have a corrected item-to-total correlation value > 0.30 . Measuring the reliability value of research variables uses the Cronbach's alpha value method. A construct or variable is said to be reliable if it provides a Cronbach alpha value > 0.60 . Based on the output in this study, the Cronbach's Alpha value for each variable was > 0.70 . So that each variable is declared reliable.

Keywords: *Questionnaire; Reliability Test; Teacher Competency; Validity Test*

Introduction

Globalisation of education requires future-oriented competencies, which prepare teachers to adapt to the changing educational landscape (Ludwikowska, 2019). Teacher competence is the key to success in the learning process. Competent teachers not only master the subject matter but also have the ability to manage the class, communicate with students, and develop their potential (Caena & Redecker, 2019). Furthermore, teachers are also responsible for preparing the environment and opportunities for in-depth learning experiences that can reveal and enhance students' capacities. Therefore, teachers must not only act as facilitators but also demonstrate creativity in the learning process (Liebech-Lien, 2021; Selkrig & Keamy, 2017).

Having teachers who have competence will have an impact on students' academic achievement (Aidoo *et al.*, 2022; Koleva & Stoyanova-Warner, 2018) So it can be concluded that by having competent teachers, they are able to create an effective learning environment and facilitate students to achieve their best potential.

Many factors influence teacher competence, both internal and external factors, such as work discipline (Boström & Bostedt, 2020) school environment conditions (Benevene, De Stasio & Fiorilli, 2020; Toropova, Myrberg & Johansson, 2021), Leadership (Day, Sammons & Gorgen, 2020) and Training.

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Furthermore, Popova *et al.* (2022); Sancar, Atal and Deryakulu (2021); Zhang, Admiraal and Saab (2021) also explained that the still low quality of formal education in colleges and universities, the still low motivation and work ethic of teachers, and the lack of training and professional development for teachers are also factors that affect teacher performance. This indicates that efforts to improve teacher competence must be carried out comprehensively, involving various stakeholders, and paying attention to both internal and external aspects.

Teacher competence includes general teaching abilities, subject-specific knowledge, and pedagogical skills necessary for effective instruction (Ludwikowska, 2019). It is often categorised into various dimensions, such as personal characteristics, essential knowledge, and essential skills, which collectively influence instructional practices (Kiymet, 2010). Teacher competence is a comprehensive set of abilities possessed by a teacher to carry out his/her duties effectively. This ability is not only limited to knowledge of the subjects taught but also includes various other aspects that support the learning process.

Pedagogical competence refers to the ability of educators to effectively facilitate learning and manage educational environments. It encompasses a range of skills and knowledge necessary for teaching, including understanding student characteristics, applying learning theories, and developing curricula. This competence is crucial for preparing future professionals, particularly in technical fields, where effective communication and collaboration are essential for success (Myastkovska & Kobylanska, 2022). Competency variables are measured using 4 indicators, namely 1) Ability to understand, 2) Ability to make plans, 3) Ability to carry out learning, 4) Ability to develop students (Beena & Suresh, 2023; Pereira, Amaral & Mendes, 2022)

Social competence is defined as the ability to engage effectively in social interactions, which includes a range of skills necessary for meaningful relationships (Dirks, 2024). Social competence in educational settings is essential to foster effective communication and interaction between students, educators, parents, and the community. This competence encompasses a range of skills that contribute to positive relationships and successful educational outcomes. The following section outlines key indicators of social competence in these interactions. Personality competence variables are measured by three variables: communicating with students, interacting with fellow educators, and engaging with parents and the community (Junge *et al.*, 2020; Christine *et al.*, 2021; Jurkic, Halliday, & Hascher, 2023).

Teacher professional competence is a dynamic process that improves the quality of teaching through continuous development, effective teaching methods, and a supportive environment. This includes mastery of educational processes and resources and the ability to motivate students in an educational context (Channa *et al.*, 2025). Furthermore, Turlybekov (2024) considers professional competence a "unity of three areas": motivational (motives, needs), technical-operational (knowledge, skills, and professionally important qualities), and self-awareness. The professional competence variable is measured from the collaboration of 3 components, namely Knowledge Acquisition, Competency Mapping, and Performance Standards (Ștefănică *et al.*, 2017; Tirado *et al.*, 2007; Kizi, 2022).

Alexa (2018), Teacher personality competence is a personal ability that reflects a steady and stable personality, a mature personality, a wise personality, a dignified and noble personality. To become an exemplary teacher is not easy. Personality competence variables are measured by 4 variables, namely 1) Polite personality 2) Mature personality, 3) Wise personality, 4) Authoritative personality (Sagala, 2010)

Given the complexity of teacher competencies and the limitations of time and resources, this study will focus on testing the validity and reliability of the four dimensions of teacher competencies that are considered the most fundamental, namely professional, pedagogical, personality, and social. This limitation is carried out with the aim of gaining a deeper understanding of the quality of the instruments used in measuring the four aspects of teacher competency.

Without validity and reliability tests, the research instruments used have the potential to produce inaccurate and inconsistent data. This will have a significant impact on the quality of the research

(Kimberlin & Winterstein, 2008; Mohamad *et al.*, 2015; Salmond, 2008). So, it can be concluded that validity and reliability testing is a very important step in research to avoid mistakes in decision-making that have an impact on the quality of learning.

Table 1: Indicator Variable

Variable	Operational Definition	Indicators
Pedagogical competence (X ₁)	Pedagogical competence refers to the ability of educators to effectively facilitate learning and manage educational environments. It encompasses a range of skills and knowledge necessary for teaching, including understanding student characteristics, applying learning theories, and developing curricula. This competence is crucial for preparing future professionals, particularly in technical fields, where effective communication and collaboration are essential for success (Myastkovska & Kobylyanska, 2022).	1) Ability to understand, 2) Ability to make plans, 3) Ability to carry out learning, 4) Ability to develop students (Myastkovska & Kobylyanska, 2022).
Personal ability (X ₂)	Alexa (2018), a personal ability that reflects a steady and stable personality, a mature personality, a wise personality, a dignified and noble personality, to become an exemplary teacher is not easy.	1) Polite personality 2) Mature personality, 3) Wise personality, 4) Authoritative personality (Kartowagiran <i>et al.</i> , 2020; Robertson & Kinder, 1993)
Social competence (X ₃)	Social competence is defined as the ability to engage effectively in social interactions, which includes a range of skills necessary for meaningful relationships (Dirks, 2024).	Communicating with students, interacting with fellow educators, and engaging with parents and the community (Junge <i>et al.</i> , 2020; Christine <i>et al.</i> , 2021; Jurkic, Halliday, & Hascher, 2023)
Professional competence (X ₄)	Teacher professional competence is a dynamic process that improves the quality of teaching through continuous development, effective teaching methods, and a supportive environment. This includes mastery of educational processes, resources, and the ability to motivate students in an educational context (Channa <i>et al.</i> , 2025)	Knowledge Acquisition, Competency Mapping, Performance Standards (Ștefănică <i>et al.</i> , 2017; Tirado <i>et al.</i> , 2007; Kizi, 2022)

Table 1 explains the indicators used in each research variable. In Pedagogical Competence (X₁) and Personality Competence (X₂), four indicators are used; for Social Competence (X₃), three indicators are used; and for Professional Competence (X₄), two indicators are used.

Methodology

According to Bernard (1996) and Dul and Hak (2008), quantitative data is a type of research that is based on positive (concrete) data. It is research data that comes in the form of numbers that will be measured using statistics as a test tool for math and can be used to draw a conclusion about the problem being studied. However, in this study, the author only tested the validity and reliability of all the instruments used. Population is a generalisation area consisting of objects/subjects that have certain qualities and characteristics that are determined by researchers to be studied and then conclusions drawn (Shenk & Westerhaus, 1991). The population in this study was 104 PNS/PPPK teachers at elementary schools in Lubuk Basung Village, Agam Regency. A sample is a part of a population taken through certain methods that have certain characteristics. Clear and complete samples are considered capable of accurately representing the population. According to Saunders, Lewis and Thornhill (2019), a sample is a part of a population that is a source of data in a study, where the population is part of the number of characteristics possessed by the population. Based on calculations with a population of 104 PNS/PPPK teachers at elementary schools throughout Lubuk Basung Village, Agam Regency, the

sample size obtained was 50.9 people, then rounded up to 51 people. Sampling technique is a sampling technique to determine the sample to be used in research (Kumar, 2018). In this study, the author used random sampling, namely taking sample members from the population, which is done randomly without paying attention to the strata in the population (Kumar, 2018). The data was obtained by researchers using a survey method, where they distributed questionnaires to respondents directly and via online questionnaires (Google Form).

Results

Validity Test

A validity test is a test used to determine and test the accuracy and precision of a measuring instrument to be used as a measurer of something that should be measured (Cohen, Manion & Morrison, 2017). Instrument validity, which is related to the level of accuracy in measuring something to be tested, determines whether an instrument is good or not. When an instrument can reliably and harmoniously provide varying data from existing scenarios, it is considered authentic. To find out whether the statement is valid or not, the corrected item total correlation value is > 0.30 . The data was processed using SPSS. The following is a recapitulation of the results of the validity test of the statement items on the teacher competency questionnaire (see Table 2).

Table 2: Recapitulation of Research Instrument Validity Test Results

Variable	Indicator	Question Item	Validity Rating for Every Question	Information
Pedagogical Competence (X1)	a) Ability to understand	X1.1	0.554	valid
	b) Ability to make plans	X1.2	0.523 0.765 0.787 0.665	valid
	c) Ability to implement learning	X1.3	0.760 0.709	valid
	d) Ability to develop students	X1.4	0.481 0.633 0.670	valid
Personality Competence (X2)	a) Polite personality	X2.1	0.734 0.628	valid
	b) Mature personality	X2.2	0.691 0.744 0.694	valid
	c) Wise personality	X2.3	0.774 0.741	valid
	d) Authoritative personality	X2.4	0.652 0.823 0.702	valid
Social Competence (X3)	a) communicating and interacting effectively with students	X3.1	0.652 0.832	valid
	b) communicating and interacting effectively with fellow educators and education personnel	X3.2	0.816 0.715 0.690	valid
	c) communicating and interacting effectively with parents or guardians of students and the surrounding community	X3.3	0.685 0.725 0.559	valid
Professional Competence (X4)	a) Mastering the Curriculum.	X4.1	0.739 0.864 0.744 0.816	valid

			0.807	
	b) Mastering the Structure and scientific methods	X4.2	0.667 0.828 0.737 0.793 0.815	valid

Pedagogical Competence

The pedagogical competence variable uses 4 indicators with 10 statements. The first indicator, the ability to understand, uses one statement and is declared valid. While the second indicator, the ability to make plans, uses 4 questions and is declared valid. The third indicator, the ability to carry out learning, has two questions and is declared valid. While the fourth indicator, the ability to develop students, uses three questions and is also declared valid.

Personality Competence

Personality competency variables use 4 indicators with 10 statements. The first indicator, "polite personality," uses two questions and is declared valid. The second indicator, Mature Personality, uses four valid questions. The third indicator, Wise Personality, uses two valid questions. The fourth indicator, "authoritative personality," uses three valid questions.

Social Competence

The Social Competence variable uses 3 indicators with 8 statements. The first indicator of effective communication and socialising with students uses 2 questions that are declared valid. The second indicator, effective communication and socialising with fellow educators and education personnel, uses three questions that are declared valid. While the third indicator of effective communication and socialising with parents or guardians of students and the surrounding community uses 3 questions that are declared valid.

Professional Competence

Competency variables use two indicators. The first indicator, Mastering the Curriculum, uses five statements that are declared valid. While the second indicator, Mastering the Structure and Scientific Method, uses five statements that are declared valid,

Reliability Test

Reliability in measurement instruments is crucial for ensuring consistent results across various applications. It refers to the degree to which an instrument yields the same results under consistent conditions, indicating its repeatability (Zohrabi, 2013; Clark & Watson, 2019). When an instrument can provide reliable results, the instrument is considered reliable. Meanwhile, reliability is said to be one way of measuring a questionnaire that consists of indicators of a variable or construct (Pallant, 2013). Cronbach's alpha coefficient is the most widely used inter-item consistency and reliability measure. Consequently, Cronbach's alpha coefficient was used in this study to assess the internal consistency of the instrument (Sekaran, 2018). Cho and Kim (2015) state that a construct or variable is said to be reliable if it provides a Cronbach's alpha value > 0.60. The results of the reliability test on all research variables can be seen in Table 3 below:

Table3: Reliability Test Results

Variable	Cronbach Alpha	Decision
Teacher Performance	0.813	Reliable
Pedagogical Competence	0.900	Reliable
Personality Competence	0.926	Reliable
Social Competence	0.905	Reliable
Professional Competence	0.948	Reliable

Source: Processed primary data, 2024

Based on the results of the reliability test in Table 3. above, it can be seen that the 5 (five) variables have a Cronbach Alpha value > 0.70, so the 3 (three) variables are declared reliable.

Discussion

Teacher competence is very important in the world of education, apart from being able to determine the success of student learning, it also shapes student character (Bancin & Naibaho, 2024). Furthermore, an important reason for presenting the reliability and validity values of the questionnaire is so that other researchers have confidence in the quality of the data they will obtain later (Miller, 2012). Since there is no validated instrument or instrument that fits the study's purpose, the researcher must develop one. In this study, the validity test on the four variables used, namely pedagogical competence, personality competence, social competence and professional competence, the value of data processing using SPSS obtained a corrected item total correlation > 0.30, which means that all question items were declared valid. A construct or variable is said to be reliable if it provides a Cronbach alpha value >0.60. Meanwhile, for the reliability test in this study, the Cronbach Alpha value was found to be between 0.813 and 0.948. This is considered quite acceptable (Muijs, 2010; Nunnally & Bernstein, 1978), stating that a test is said to be internally consistent if the value must be more than 0.7. In addition, the value can provide sufficient information regarding the validity of the construct even though meaningful interpretations by researchers are also considered.

Conclusion

This study successfully developed and validated an instrument to measure teacher competence in various dimensions, namely pedagogical, personality, social, and professional. The results of the analysis show that this instrument has high validity and reliability values, so it can be used to measure teacher competence accurately and reliably. Thus, this instrument can be a valuable tool for schools, teacher training institutions, and policymakers to evaluate teacher competence, identify professional development needs, and design more effective training programs. In addition, this study also opens up opportunities for further research, for example, by adapting this instrument to different cultural contexts or by testing the relationship between teacher competence and student performance.

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Conflict of Interest

The authors affirm that there are no conflicting objectives.

References

- Aidoo, B., Macdonald, A., Gyampoh, A. O., Baah, K. A., & Tsyawo, J. (2022). Factors influencing teachers' online teaching competence in higher education. *Social Education Research*, 148-160. <https://doi.org/10.37256/ser.3120221315>
- Bancin, W. E., & Naibaho, D. (2024). Membangun kualitas pendidikan: Hubungan antara kompetensi kepribadian guru PAK dengan pembentukan karakter siswa [Building the quality of education: The relationship between the personality competencies of PAK teachers and the formation of student character]. *Jurnal Penelitian Pendidikan Indonesia*, 1(2), 218. <https://doi.org/10.62017/jppi.v1i2.295>
- Beena, B. R., & Suresh, E. S. M. (2023). Competency evaluation using graduate attributes—a comparative study. *Journal of Engineering Education Transformations*, 36(Special Is), 202-206. <https://doi.org/10.16920/jeet/2023/v36is2/23028>
- Benevene, P., De Stasio, S., & Fiorilli, C. (2020). Well-being of school teachers in their work environment. In *Frontiers in Psychology*, 11, 1239. Frontiers Media SA. <https://doi.org/10.3389/fpsyg.2020.01239>
- Bernard, H. R. (1996). Qualitative data, quantitative analysis. *CAM Journal*, 8(1), 9–11. <https://doi.org/10.1177/1525822X960080010401>
- Boström, L., & Bostedt, G. (2020). What about study motivation? Students and teachers' perspectives on what

- affects study motivation. *International Journal of Learning, Teaching and Educational Research*, 19(8), 40–59. <https://doi.org/10.26803/ijlter.19.8.3>
- Caena, F., & Redecker, C. (2019). Aligning teacher competence frameworks to 21st century challenges: The case for the European Digital Competence Framework for Educators (Digcompedu). *European journal of education*, 54(3), 356-369. <https://doi.org/10.1111/ejed.12345>
- Channa, W. M., Almulla, M. O., Sahito, Z., Alismail, A. M., & Karlygash, S. (2025). *Professional Competencies of English Language Teachers : A Literature Review*. 15(1). <https://doi.org/10.5430/wjel.v15n1p479>
- Cho, E., & Kim, S. (2015). Cronbach's coefficient alpha: Well known but poorly understood. *Organizational Research Methods*, 18(2), 207–230. <https://doi.org/10.1177/1094428114555994>
- Christine, M., Baxter., Cori, M., More., Tracy, G., Spies., Chyllis, E., S. (2021). Social competence of bilingual and monolingual native English speaking preschoolers: a comparison of parent and teacher perspectives. *Early Child Development and Care*, 191(4), 1–14. <https://doi.org/10.1080/03004430.2019.1630830>
- Clark, L. A., & Watson, D. (2019). Constructing validity: New developments in creating objective measuring instruments. *Psychological Assessment*, 31(12), 1412–1427. <https://doi.org/10.1037/pas0000626>
- Cohen, L., Manion, L., & Morrison, K. (2017). Validity and reliability. In *Research Methods in Education* (pp. 245–284). Routledge.
- Day, C., Sammons, P., & Gorgen, K. (2020). Successful School Leadership. In *Education Development Trust*. ERIC. Retrieved from: <https://eric.ed.gov/?id=ED614324> . Accessed on 12th Oct 2024.
- Dirks, M. A. (2024). *Social competence* (W. Troop-Gordon & E. W. B. T.-E. of A. (Second E. Neblett (eds.); pp. 503–512). *Academic Press*. <https://doi.org/10.1016/B978-0-323-96023-6.00077-4>
- Dul, J., & Hak, T. (2008). *Case Study Methodology in Business Research* (1st ed.). Elsevier Ltd.
- Junge, C., Valkenburg, P. M., Deković, M., & Branje, S. (2020). The building blocks of social competence: Contributions of the Consortium of Individual Development. *Developmental Cognitive Neuroscience*, 45, 100861. <https://doi.org/10.1016/J.DCN.2020.100861>
- Jurkic, A., Halliday, S. E., & Hascher, T. (2023). Early Childhood Research Quarterly The relationship of language and social competence of preschool- and kindergarten-age single and dual language learners in Switzerland and Germany. *Early Childhood Research Quarterly*, 64(January), 72–83. <https://doi.org/10.1016/j.ecresq.2023.02.003>
- Kartowagiran, B., Hamdi, S., Jaedun, A., & Laliyo, L. A. (2020). European Journal of Educational Research. *European Journal of Educational Research*, 9(4), 1749-1763. <https://doi.org/10.12973/eu-jer.9.4.1749>
- Kimberlin, C. L., & Winterstein, A. G. (2008). Validity and reliability of measurement instruments used in research. *American journal of health-system pharmacy*, 65(23), 2276-2284. <https://doi.org/10.2146/ajhp070364>
- Kiyimet, S. (2010). Teachers' competencies. *Cultura. International Journal of Philosophy of Culture and Axiology*, 7(1), 167–175. Retrieved from: https://www.pdcnet.org/cultura/content/cultura_2010_0007_0001_0167_0175. Accessed on 12th Oct 2024.
- Kizi, C. Z. T. (2022). Development of professional competence as an important task of the higher education process. *Current Research Journal of Pedagogics*, 3(09), 74-81. <https://doi.org/10.37547/pedagogics-crijp-03-09-13>
- Koleva, N., & Stoyanova-Warner, M. (2018). 'A New Way for New Talents in Teaching' or the Impact of Targeted Recruitment, Rigorous Selection, Innovative Training, and Ongoing Professional Support on Beginner Teachers' Performance. *Bulgarian Comparative Education Society*. Retrieved from: <https://eric.ed.gov/?id=ED586175>. Accessed on 12th Oct 2024.
- Kumar, R. (2018). *Research methodology: A step-by-step guide for beginners*. YKING BOOKS
- Liebeck-Lien, B. (2021). Teacher teams – A support or a barrier to practising cooperative learning? *Teaching and Teacher Education*, 106. <https://doi.org/10.1016/j.tate.2021.103453>
- Ludwikowska, K. (2019). Teacher competence inventory: An empirical study on future-oriented competences of the teaching profession in higher education in India. *Education+ Training*, 61(9), 1123-1137. <https://doi.org/10.1108/ET-12-2018-0266>
- Miller, M. J. (2012). Reliability and validity. *Western International University*, 1-3. Retrieved from:

<https://posc3410.svmler.com/reliable-valid/posc3410-lecture-reliable-valid.pdf> . Accessed on 10th Oct 2024.

Mohamad, M. M., Sulaiman, N. L., Sern, L. C., & Salleh, K. M. (2015). Measuring the validity and reliability of research instruments. *Procedia-Social and Behavioral Sciences*, 204, 164–171. <https://doi.org/10.1016/j.sbspro.2015.08.129>

Muijs, D. (2010). *Doing quantitative research in education with SPSS*. Sage.

Myastkovska, M., & Kobylanska, I. (2022). Педагогічна компетентність як необхідна складова професійної компетентності майбутніх фахівців технічних спеціальностей [Pedagogical competence as a necessary component of professional competence of future specialists in technical specialties]. *Pedagogy of safety*, 7 (1-2), 30-35. <https://doi.org/10.31649/2524-1079-2022-7-1-030-035>

Nunnally, J. C., & Bernstein, I. (1978). Psychometric theory (2nd Edition). In *Intentar embellecer nuestras ciudades y también las*. MacGraw-Hill.

Pallant, J. (2013). *SPSS Survival Manual. A Step by Step Guide to Data Analysis Using IBM SPSS*. Open University Press.

Pereira, T., Amaral, A., & Mendes, I. (2022). A competency definition based on the knowledge, skills, and human dispositions constructs. In *International Conference on Internet of Everything* (pp. 29-38). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-25222-8_3

Popova, A., Evans, D. K., Breeding, M. E., & Arancibia, V. (2022). Teacher professional development around the world: The gap between evidence and practice. *The World Bank Research Observer*, 37(1), 107–136. <https://doi.org/10.1093/wbro/lkab006>

Robertson, I. T., & Kinder, A. (1993). Personality and job competences: The criterion-related validity of some personality variables. *Journal of Occupational and Organizational Psychology*, 66(3), 225–244. <https://doi.org/10.1111/j.2044-8325.1993.tb00534.x>

Sagala, S. (2010). *Supervisi Pembelajaran dalam profesi pendidikan*. Alfabeta.

Salmond, S. S. (2008). Evaluating the reliability and validity of measurement instruments. *Orthopaedic Nursing*, 27(1), 28–30. <https://doi.org/10.1097/01.NOR.0000310608.00743.54>

Sancar, R., Atal, D., & Deryakulu, D. (2021). A new framework for teachers' professional development. *Teaching and Teacher Education*, 101. <https://doi.org/10.1016/j.tate.2021.103305>

Saunders, M.N.K., Lewis, P., & Thornhill, A. (2019). Research Methods for Business Students. In *Synthese* (8th ed.), pp. 1–867. Pearson. Retrieved from: <https://www.slideshare.net/slideshow/research-methods-for-business-studentspearson-education-2019pdf/253605104>. Accessed on 2nd Oct 2024.

Sekaran, U. (2016). *Research Methods for Business: A Skill Building Approach*. John Wiley & Sons.

Selkrig, M., & Keamy, K. (2017). Creative pedagogy: a case for teachers' creative learning being at the centre. *Teaching Education*, 28(3), 317–332. <https://doi.org/10.1080/10476210.2017.1296829>

Shenk, J. S., & Westerhaus, M. O. (1991). Population definition, sample selection, and calibration procedures for near infrared reflectance spectroscopy. In *Crop science*, 31(2). Wiley Online Library. <https://doi.org/10.2135/cropsci1991.0011183X003100020049x>

Ștefănică, F., Abele, S., Walker, F., & Nickolaus, R. (2017). *Modeling, Measurement, and Development of Professional Competence in Industrial-Technical Professions BT - Competence-based Vocational and Professional Education: Bridging the Worlds of Work and Education* (M. Mulder (ed.); pp. 843–861). Springer International Publishing. https://doi.org/10.1007/978-3-319-41713-4_39

Tirado, L. J., Estrada, J., Ortiz, R., Solano, H., González, J., Alfonso, D., Restrepo, G., & Felipe, J. (2007). Competencias profesionales: una estrategia para el desempeño exitoso de los ingenieros industriales [Professional competencies: A strategy for successful performance of industrial engineers]. *Revista Facultad de Ingeniería*, 4(123–139), 123–139. <https://www.doi.org/10.17533/udea.redin.20154>

Tropova, A., Myrberg, E., & Johansson, S. (2021). Teacher job satisfaction: the importance of school working conditions and teacher characteristics. *Educational Review*, 73(1), 71–97. <https://doi.org/10.1080/00131911.2019.1705247>

Turlybekov, B. (2024). Development of professional-pedagogical competence in future English language teachers. *International Journal of Innovative Research and Scientific Studies*, 7(March 2021), 1009–1016.

<https://doi.org/10.53894/ijirss.v7i3.3009>

Zhang, X., Admiraal, W., & Saab, N. (2021). Teachers' motivation to participate in continuous professional development: relationship with factors at the personal and school level. *Journal of Education for Teaching*, 47(5), 714–731. <https://doi.org/10.1080/02607476.2021.1942804>

Zohrabi, M. (2013). Mixed method research: Instruments, validity, reliability and reporting findings. *Theory and Practice in Language Studies*, 3(2), 254–262. <https://doi.org/10.4304/tpls.3.2.254-262>