

ASSESSMENT OF THE VALIDITY AND RELIABILITY OF PRE-SERVICE GEOGRAPHY TEACHERS' ATTITUDE QUESTIONNAIRE IN COLLEGES OF EDUCATION IN NORTH-WEST, NIGERIA

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Abstract

This study examined the validity and reliability of the pre-service geography teachers' attitudes questionnaire (PGTAQ). The instrument assesses the attitudes of pre-service Geography teachers in Colleges of Education in Northwest Nigeria. A survey research design was adopted and standard procedures for face, content, and construct validation, pilot testing, and reliability testing were followed. Content validity was established through expert judgment from specialists in geography education, science education, psychology, and test and measurement. The instrument was pilot-tested with a sample of pre-service Geography teachers, and the data were analysed using Cronbach's alpha to assess internal consistency. The findings revealed that the Average Expert-Level Face Validity Index (AELFVI) was 0.914, confirming that the questionnaire items were clear and appropriate for measuring pre-service Geography teachers' attitudes. A Scale Content Validity Index (S-CVI/Ave) of 0.93 further confirmed that the instrument adequately represented the intended construct. Principal Component Analysis (PCA) showed that seventeen (17) items with factor loadings greater than 0.40 were retained. The overall reliability coefficient obtained was 0.85, indicating that the instrument was reliable for data collection. Based on these findings, the study concluded that the instrument is valid and reliable to measure the attitudes and recommended that the PGTAQ can be used to assess pre-service Geography teachers' attitudes.

Keywords: Attitude, Validity, and Reliability.

Introduction

Attitude is a key psychological construct that influences teachers' instructional practices, professional commitment, and classroom effectiveness (Ajzen, 2001; Richardson, 1996). In teacher education, particularly in geography education, pre-service teachers' attitudes toward the subject and its teaching play a significant role in shaping their pedagogical competence, motivation, and future professional performance (Alazzi & Chiodo, 2004; Lambert & Morgan, 2010). Geography, as a multidimensional discipline that examines physical and human phenomena as well as human-environment interactions, requires teachers who possess not only sound content knowledge but also positive dispositions toward teaching the subject (Fien, 2011).

Attitude questionnaires are widely employed in educational research due to their efficiency and ability to capture latent psychological constructs; however, their usefulness depends largely on the robustness of their psychometric properties (DeVellis, 2017). Validity ensures that an instrument measures the construct it is intended to measure, while reliability refers to the consistency and stability of the measurement (Creswell & Creswell, 2018). Instruments that lack adequate validation may yield misleading results and weaken the credibility of research findings. Despite the importance of attitude measurement, there is limited availability of rigorously validated instruments specifically designed to assess the attitudes of pre-service geography teachers, particularly in colleges of education. This study therefore focuses on the validation and reliability of the Pre-service Geography Teachers' Attitude Questionnaire (PGTAQ) in order to provide a psychometrically sound instrument for research in geography education.

Statement of the Problem

Many attitude questionnaires used in educational research are adapted from other disciplines or applied without adequate psychometric evaluation (DeVellis, 2017). In geography education, there is a scarcity of standardized attitude instruments that have undergone comprehensive validity and reliability testing, particularly in colleges of education in Northwest Nigeria. The use of poorly validated instruments may result in inconsistent measurements and inaccurate interpretations of findings (Creswell & Creswell, 2018). Although several studies have focused on the development and validation of questionnaires, limited attention has been given specifically to the attitudes of pre-service geography teachers. For example, Bolaji et al. (2020) developed and validated a geography attitudinal scale, while Gurjiya and Danladi (2024) assessed the validity and reliability of a Geography Interest Questionnaire among pre-service teachers in colleges of education in Northwest Nigeria. Similarly, Otero-Batán et al. (2024) examined the validity and reliability of a questionnaire on attitudes, knowledge, and perceptions of pharmacy students regarding training on antibiotics and antimicrobial resistance. However, there is a need to establish the validity and reliability of a Pre-service Geography Teachers' Attitude Questionnaire to ensure accurate measurement and to strengthen empirical research in geography education within colleges of education.

Objectives of the Study

The objectives of the study are to:

1. Find out the face validity of the pre-service Geography teachers' attitude questionnaire in colleges of education in north-west, Nigeria.
2. Determine the content validity of the pre-service Geography teachers' attitude questionnaire in colleges of education in north-west, Nigeria.
3. Examine the construct validity of the of the pre-service Geography teachers' attitude questionnaire in colleges of education in north-west, Nigeria.
4. Assess the reliability (internal consistency) of the pre-service Geography teachers' attitude questionnaire in colleges of education in north-west, Nigeria.

Research Questions

This study answers the following research questions:

1. What is the face validity of the pre-service Geography teachers' attitude questionnaire in colleges of education in north-west, Nigeria?
2. To what extent does the pre-service Geography teachers' attitude questionnaire demonstrate content validity in colleges of education in north-west, Nigeria?
3. What is the construct validity of the pre-service Geography teachers' attitude questionnaire in colleges of education in north-west, Nigeria?
4. What is the reliability coefficient of the pre-service Geography teachers' attitude questionnaire in colleges of education in north-west, Nigeria?

Methodology

A survey research design was adopted to examine pre-service geography teachers' attitudes toward geography. The survey research design was considered appropriate because it enables the researchers to collect personal and social facts, beliefs, and attitudes of respondents (Oloyede et al., 2011). Another reason for adopting this method is that it involves gathering information or data from a large population by studying a representative sample of the entire group (Abdullahi et al., 2008). The participants comprised pre-service geography teachers from colleges of education in the Northwest Zone of Nigeria. Two (2) colleges of education participated in the study, and a total of two hundred (200) pre-service geography teachers were selected.

To assess the attitudes of pre-service geography teachers, the researcher adapted the Geography Attitude Scale developed by Bolaji et al., (2020) with permission and necessary modifications. The original instrument contained 22 items; however, after validation, it was reduced to 17. Responses were measured on a five-point Likert scale: 5 = Strongly Agree, 4 = Agree, 3 = Undecided, 2 = Disagree, and 1 = Strongly Disagree. The questionnaire was divided into two sections. Section A: demographic information of the respondents such as age, level of study, and the name of the college. Section B: assessed the attitudes of pre-service geography teachers. The instrument measured three attitude constructs: the affective component, comprising eight (8) items (Items 1, 2, 3, 4, 5, 6, 7, 8, and 9), the behavioural component, comprising three (3) items (Items 10, 11, and 12); and the cognitive component, comprising five (5) items (Items 13, 14, 15, 16, and 17).

To establish the face and content validity of the Pre-service Geography Teacher Attitude Questionnaire, ten (10) academic professionals, ranging in rank from Senior Lecturers to Professors, were selected from the Department of Science Education at Bayero University Kano, the Federal University of Technology Minna, Sule Lamido University Kafin Hausa, and the Department of Geography at Sa'adatu Rimi College of Education, Kano. The experts specialize in Geography Education, Science Education, Psychology, and Statistics, were asked to review the instrument at their convenience.

The experts were provided with the questionnaire and a validator's report form for scoring the instrument. They were requested to assess the instrument based on the simplicity of language, clarity of items, and appropriateness and adequacy for the target population. Their

observations, comments, corrections, and suggestions made during the validation process were incorporated into the final version of the questionnaire. To establish the reliability of the Pre-service Geography Teachers' Attitude Questionnaire (PGTAQ), a pilot test was conducted involving 20 pre-service Geography teachers from a public College of Education in the Northwest. The reliability coefficient for the PGTAQ was determined using Cronbach's alpha.

Results

Research Question 1: What is the face validity of the pre-service Geography teachers' attitude questionnaire in colleges of education in north-west, Nigeria?

Table 1: Face validity index of pre-service Geography teachers attitude questionnaire

Expert	CI (30%)	AP (30%)	A (40%)	E-LVI
1.	27	26	33	86
2.	26	30	36	92
3.	27	28	33	88
4.	23	27	36	86
5.	30	29	36	95
6.	27	27	39	93
7.	25	30	38	93
8.	30	29	40	99
9.	28	25	37	90
10.	29	24	39	92

AELFVI

914/10= 91.4

Key: CI: Clarity of Instructions, AP: Appropriate for the participant, A: Adequacy
E-LVI: Experts Logical Validity Index AELFVI: Average Expert Face Logical Validity Index

Table 1 presents the results of the face validity index of the Pre-service Geography Teachers' Attitude Questionnaire. The Average Expert-Level Face Validity Index (AELFVI), calculated from the ratings of ten experts, was 91.4, confirming that the instrument is suitable for pilot testing and full-scale data collection as recommended by Desai and Patel (2020). This high average score indicates that the experts strongly agreed that the questionnaire items are clear, appropriate for measuring pre-service geography teachers' attitudes, and sufficiently comprehensive in covering the construct of attitude.

Research question 2. To what extent does the pre-service Geography teachers' attitude questionnaire demonstrate content validity in colleges of education in north-west, Nigeria?

Table 2. Content validity of pre-service Geography teachers' attitude questionnaire

Items	E 1	E 2	E 3	E 4	E 5	E 6	E 7	E 8	E 9	E 10	E in A	I-CVI	Decision
1.	1	1	1	1	1	1	1	1	1	1	10	1	Retain
2.	1	1	1	1	1	1	1	1	1	1	10	1	Retain
3.	1	1	1	1	0	1	1	1	1	1	9	0.9	Retain
4.	1	1	1	1	1	1	0	0	1	1	8	0.8	Retain
5.	1	1	1	1	1	1	1	1	1	1	10	1	Retain
6.	1	1	1	1	1	1	1	0	1	1	9	0.9	Retain
7.	1	1	1	1	1	0	1	1	1	1	9	0.9	Retain
8.	1	1	1	1	1	1	1	1	1	1	10	1	Retain
9.	1	1	1	1	1	1	1	0	1	1	9	0.9	Retain
10.	1	1	1	1	1	0	1	1	1	1	9	0.9	Retain
11.	1	1	1	1	1	1	1	1	1	1	10	1	Retain
12.	1	1	1	1	0	1	0	1	1	1	8	0.8	Retain
13.	1	1	1	1	1	0	1	0	1	1	8	0.8	Retain
14.	1	1	1	1	1	1	1	0	1	1	9	0.9	Retain
15.	1	1	1	1	1	1	0	1	1	1	9	0.9	Retain
16.	1	1	1	1	1	1	1	1	1	1	10	1	Retain
17.	1	1	1	1	1	1	1	1	1	1	10	1	Retain
18.	1	1	1	1	1	1	0	1	1	1	9	0.9	Retain
19.	1	1	1	1	1	1	1	1	1	1	10	1	Retain
20.	1	1	1	1	1	0	1	1	1	1	9	1	Retain
21.	1	1	1	1	1	1	1	1	1	1	10	1	Retain
22.	1	1	1	1	1	1	1	1	1	1	10	1	Retain

S- 0.93
CVI/Ave

Key: E= expert, E in A= Expert in agreement, I-CVI= Item content validity index

Table 2 presents the results of the content validity analysis of the Pre-service Geography Teachers' Attitude Questionnaire. The findings indicate that all 22 items achieved acceptable Item Content Validity Index (I-CVI) values, ranging from 0.80 to 1.00. Consequently, all items were retained. At the scale level, a Scale Content Validity Index based on the average method (S-CVI/Ave) of 0.93 was obtained, confirming that the instrument adequately represents the construct of pre-service geography teachers' attitudes.

Research question 3: What is the construct validity of the pre-service Geography teachers' attitude questionnaire in colleges of education in north-west, Nigeria?

Table 3: Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity of pre-service Geography teacher attitude questionnaire

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.831
Bartlett's Test of Sphericity	Approx. Chi-Square	1988.614
	Df	66
	Sig.	.000

Table 3 presents the results of the Kaiser–Meyer–Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. The analysis revealed that the sample used in this study was adequate, with a KMO value of 0.831, degrees of freedom (df) = 66, and a significance level of $p = 0.000$. These results indicate that the data were suitable for factor analysis and could be used to determine the construct validity of the instrument using SPSS AMOS. To identify the items to be retained in the questionnaire, Principal Component Analysis (PCA) with the promax rotation method was employed. The results of this analysis are presented in table 4.

Table 4: Principal component analysis factor loading for pre-service Geography teacher attitude questionnaire

Pattern Matrix ^a		Component		
Items	Statement	1	2	3
AC1	I like Geography more than other subjects taught in the college.	.982		
AC2	I would like to have Geography lessons more often.	.954		
AC3	I always feel interested and engaged during Geography lessons.	.810		
AC5	Geography and nature are familiar and interested to me.	.976		

AC6	Geography is one of my favorite subjects.	.968
AC7	I perform well in Geography compared to other subjects.	.969
AC8	I feel confident when answering Geography questions.	.970
AC9	I work with maps, atlases, and globes during Geography lessons.	.976
AC10	I feel geographical knowledge can be used to solve problems related to the environment.	.969
BC1	I always take notes during Geography lectures.	.769
BC6	When I don't understand something in Geography, I ask the lecturer.	.959
BC7	I always pay attention during Geography lessons.	.893
CC1	I consider Geography a fundamental part of human life.	.999
CC4	I believe Geography can explain the impact of humans on nature.	.999
CC6	I think geographical knowledge is important for understanding other subjects.	.999
CC8	I will need geographical knowledge in my future job.	.986
CC9	Geography lessons develop my knowledge and skills about the environment.	.969

Key: AC: Affective Component, BC: Behavioral Component, CC: Cognitive Component

Table 4 presents the result of the Principal Component Analysis Factor Loading for the Pre-service Geography Teacher Attitude Questionnaire. As recommended by Hair et al., (2014), who suggested that an instrument with good construct validity should have loading values between ± 0.30 and above, is considered and used in this study; therefore, seventeen (17) items with a loading factor greater than 0.40 are selected.

Confirmatory Factor Analysis of Pre-service Geography Teachers' Attitude Questionnaire (PGTAQ)

The items loaded from the exploratory factor analysis are confirmed using confirmatory factor analysis in SPSS AMOS Version 25.0. Fit indices, including the ratio of chi-square to its degrees of freedom (χ^2/DF ratio), the goodness-of-fit index (GFI), the adjusted goodness-of-fit index (AGFI), the Tucker-Lewis index (TLI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA), were used to determine the model fit. The model is presented in Figure 1.

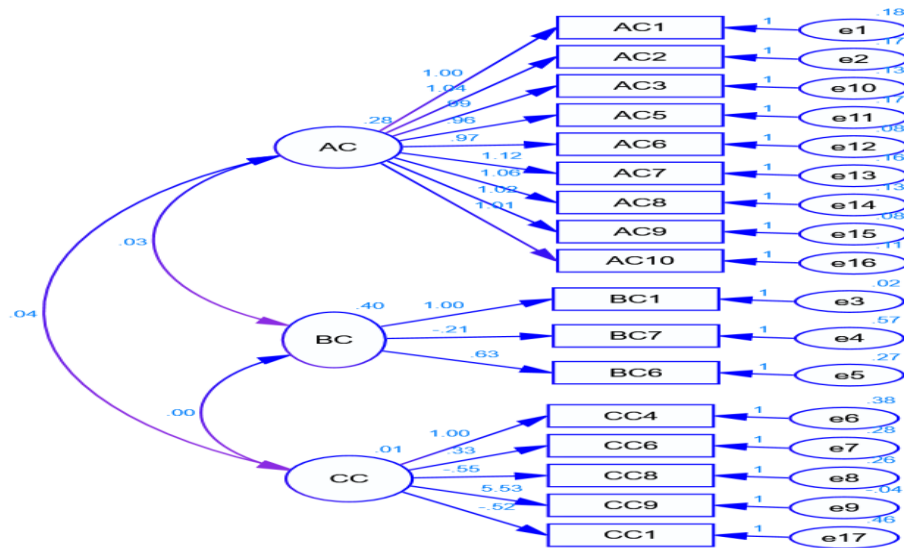


Figure 1: Confirmatory Factor Analysis Model of Pre-service Geography Teachers' Attitude Questionnaire

Key: AC: Affective Component, BC: Behavioral Component, CC: Cognitive Component

Figure 1 presents the Confirmatory Factor Analysis (CFA) model of the Pre-service Geography Teachers' Attitude Questionnaire (PGTAQ). After the removal of unloaded and cross-loaded items, the model fit indices fell within acceptable thresholds. This indicates that the CFA model demonstrates a good fit to the data. Consequently, the remaining seventeen (17) items were found to be appropriate and valid, and are therefore constitute the final version of the instrument.

Convergent Validity of Pre-service Geography Teachers' Attitude Questionnaire (PGTAQ)

To establish the convergent validity of the PGTAQ, Composite Reliability (CR) and the Average Variance Extracted (AVE) were used. Hair et al., (2019) recommended that convergent validity of the construct is achieved when the average variance extracted (AVE) is ≥ 0.50 and composite reliability (CR) value falls within the range of ≥ 0.70 . The result was calculated using Excel Tools, and the result is presented in Table 5.

Table 5: Composite Reliability (CR) and Average Variance Extracted (AVE) Value and Square Root of (AVE) for U, D, and RE and Inter-Factor Correlation of Pre-service Geography Teachers' Attitude Questionnaire (PGTAQ)

Factor	CR	AVE	AC	BC	CC
AC	0.902	0.710	0.842		
BC	0.920	0.671	0.244	0.812	
CC	0.921	0.669	-0.123	0.002	0.819

Table 5 presents the Composite Reliability (CR) and Average Variance Extracted (AVE) values for the PGTAQ. The analysis shows that the affective component (AC), behavioural component (BC), and cognitive component (CC) recorded CR values of 0.902, 0.920, and 0.921, respectively, all of which exceed the recommended threshold of 0.70, indicating satisfactory construct reliability. The table also indicates that the AVE values for AC, BC, and CC are 0.710, 0.671, and 0.669, respectively. These values are above the acceptable minimum of 0.50, suggesting that each construct explains more than 50% of the variance in its respective items. Therefore, based on the obtained CR and AVE values, the convergent validity of the PGTAQ is established. This confirms that the items within each construct adequately converge to measure the intended construct, rather than overlapping with items measuring other constructs.

Discriminant Validity of Pre-service Geography Teachers' Attitude Questionnaire (PGTAQ)

To establish the discriminant validity of the PGTAQ, the Fornell–Larcker criterion was employed. According to Fornell and Larcker (1981), discriminant validity is achieved when the square root of the Average Variance Extracted (AVE) for each construct is greater than its inter-construct correlations. The analysis was conducted using Excel tools, and the results are presented in Table 5. Table 5 also displays the square roots of the AVE values for the affective component (AC), behavioural component (BC), and cognitive component (CC). The bolded diagonal values represent the square roots of the AVEs, while the off-diagonal values indicate the inter-construct correlations. As required, the diagonal values are greater than the corresponding inter-construct correlations in their respective rows and columns. Based on these results, it is concluded that the three constructs (AC, BC, and CC) are empirically distinct from one another in the PGTPQ and thus demonstrate satisfactory discriminant validity.

Research question 4: What is the reliability coefficient of the pre-service Geography teachers' attitude questionnaire in colleges of education in north-west, Nigeria?

Table 6: Reliability of Pre-service Geography Teachers' Attitude Questionnaire (PGTAQ)

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.850	.870	20

Table 6 present the reliability coefficient for the PGTAQ, The internal consistency of the questionnaire items yielded a Cronbach's alpha of 0.85, indicating high reliability.

Discussion of Findings

The findings from Research Question One show that a Face Validity Index of 91.4% was obtained. This result is consistent with the recommendation of Desai and Patel (2020), who stated that an instrument with a face validity index of 90% to 100% is considered to have full face validity. The findings from Research Question Two indicate that all 22 items achieved acceptable Item Content Validity Index (I-CVI) values, ranging from 0.80 to 1.00. Consequently, all items were retained, and a Scale Content Validity Index based on the average method (S-CVI/Ave) of 0.93 was obtained. This finding agrees with Yusoff (2019), who recommended that acceptable cut-off scores for the CVI should be 0.78 or higher when at least nine experts are involved. Accordingly, this study adopted a cut-off score of 0.78 or above for the content validity index, based on evaluations from ten experts.

The findings from Research Question three shows that seventeen (17) items with factor loadings greater than 0.40 were selected and used in the final instrument. This result is consistent with the recommendation of Hair et al., (2014), who suggested that instruments with good construct validity should have factor loadings of ± 0.30 or higher. Based on this criterion, seventeen (17) items with factor loadings exceeding 0.40 were retained. The findings from Research Question Four indicate that the questionnaire's internal consistency yielded a Cronbach's alpha coefficient of 0.85, indicating high reliability. This finding aligns with Gay et al. (2009), who stated that instruments with Cronbach's alpha values between 0.80 and 0.90 are considered highly reliable.

Conclusion

The findings of this study provide strong empirical evidence supporting the validity and reliability of the Pre-service Geography Teacher Attitude Questionnaire. The instrument demonstrates a high level of face validity and is appropriate for measuring the intended construct. The items adequately represent the content domain and were therefore suitable for retention at the content validation stage. Additionally, the Principal Component Analysis (PCA) results revealed that seventeen items with factor loadings exceeding the recommended threshold of 0.40 were retained, thereby supporting the construct validity of the instrument. The internal consistency analysis further yielded a Cronbach's alpha coefficient of 0.85, indicating high reliability. Overall, these results confirm that the instrument is psychometrically sound and suitable for assessing pre-service geography teachers' attitudes.

Recommendations

Based on these findings, it is recommended that:

The instrument is valid and reliable to measure the pre-service geography teachers' attitude.

1. The instrument can be used to larger and more diverse samples to further confirm its stability and generalizability.
2. The questionnaire can be refined and revalidated in different cultural or institutional settings to enhance its broader applicability.
3. Researchers, Education stakeholders and teacher educators may use the instrument to measure pre-service geography teachers'.

References

- Abdullahi, A. B., Oluwo, S. K., & Idowu, F. O. (2008). *Research methods and documentation*.
- Ajzen, I. (2001). Nature and operation of attitudes. *Annual Review of Psychology*, 52(1), 27–58. <https://doi.org/10.1146/annurev.psych.52.1.27>
- Alazzi, K., & Chiodo, J. J. (2004). Students' perceptions of social studies: A study of middle school and high school students in Jordan. *International Journal of Scholarly Academic Intellectual Diversity*, 8(1), 1–11.
- Bolaji, A. E., Falaye, F. V., & Junaid, I. O. (2020). Design and validation of geography attitudinal scale. *International Journal of Scientific Research in Education*, 13(4), 689–694.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE.
- Desai, S., & Patel, N. (2020). ABC of face validity for questionnaire. *International Journal of Pharmaceutical Sciences Review and Research*, 65(1), 164–168. <http://www.globalresearchonline.net>
- DeVellis, R. F. (2017). *Scale development: Theory and applications* (4th ed.). SAGE.
- Fien, J. (2011). Education for sustainability in geography. In J. A. Lidstone & M. Williams (Eds.), *Teaching and learning geography* (pp. 89–102). Routledge.
- Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research*, 18(3), 382–388.
- Gay, L. R., Mills, G. E., & Airasian, P. (2009). *Educational research: Competencies for analysis and applications* (9th ed.). Pearson.
- Gurjiya, A. U., & Danladi, I. I. (2024). Assessment of validity and reliability of geography interest questionnaire among pre-service teachers in colleges of education, North-West, Nigeria. *Zamfara International Journal of Education*, 4(5), 49–56. <https://doi.org/10.5281/zenodo.15029263>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis* (7th ed.). Pearson Education.
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24.
- Lambert, D., & Morgan, J. (2010). *Teaching geography 11–18: A conceptual approach*. Open University Press.
- Oloyede, I. O., Okon, N., Okonkwo, C. A., & Salawu, I. O. (2011). *EDU 823: Educational research methods*. National Open University of Nigeria. <http://www.nou.edu.ng>
- Otero-Batán, P., Lens-Perol, G., Vázquez-Cancela, O., Salgado-Barreira, A., & Vázquez-Lago, J. M. (2024). Validity and reliability of a questionnaire on attitudes, knowledge, and perceptions of pharmacy students regarding the training received on antibiotics and antimicrobial resistance during their university studies. *Antibiotics*, 13(9), Article 811. <https://doi.org/10.3390/antibiotics13090811>

- Richardson, V. (1996). The role of attitudes and beliefs in learning to teach. In J. Sikula (Ed.), *Handbook of research on teacher education* (2nd ed., pp. 102–119). Macmillan.
- Yusoff, M. S. B. (2019). ABC of content validation and content validity index calculation. *Education in Medicine Journal*, 11(2), 49–54.
<https://doi.org/10.21315/eimj2019.11.2.6>