

<sup>1</sup>Jing Wang

## Research on the Correlation Analysis Algorithm between School Teachers' Equipment and Teaching Quality



**Abstract:** - In this research, we delve into the correlation between school teachers' equipment and teaching quality, aiming to uncover insights that contribute to educational advancements. The study employs a specialized Correlation Analysis Algorithm to systematically analyse the relationship between the equipment utilized by school teachers and the resulting impact on the quality of teaching. By examining various factors such as technological tools, teaching aids, and instructional devices, we seek to discern patterns and correlations that influence the effectiveness of educational practices. The research is driven by the overarching goal of enhancing teaching quality through informed decisions regarding the selection and integration of educational tools. The abstract provides a glimpse into the methodology and objectives of the study, emphasizing its potential contributions to the optimization of teaching practices in educational institutions.

**Keywords:**

### Introduction

Every school was founded with specific objectives to fulfil. A school can achieve its goals by using the performance of its teachers as one of its methods [1]. This is due to the fact that they are essential and unavoidable in the educational system's curriculum implementation process [2]. A teacher's attitude has a significant impact on how well students will meet their learning objectives. A system of education can never be better than its teachers [3]. Without a doubt, the nation's future development depends on the services of teachers. It is expected of all teachers to carry out their fundamental responsibilities of teaching and behavior adjustment in a way that will allow each child to achieve successful learning in the area of educational objectives [4]. The degree to which educators carry out their pedagogical and instructional responsibilities in order to support students' learning and the achievement of school goals is referred to as their job performance [5]. One could argue that the degree of work performance exhibited by instructors determines how well a school accomplishes its goals. Due to their poor attendance records and general lack of enthusiasm for their jobs, the majority of instructors don't seem to be especially attached to their jobs [6]. In actuality, a lot of teachers are inconsistent in providing notes and homework to their pupils after class. Additionally, several teachers have been seen doing pointless staffroom meetings during class hours [7]. It is impossible to overstate how dangerous it is for instructors to perform poorly in their roles in the Nigerian educational system; it is intolerable, hinders pupils' ability to advance academically, and has further aroused the suspicions of many interested parties [8]. Lately, there have been initiatives to improve teachers' job effectiveness, particularly in education [9]. In actuality, teachers are not experiencing any delays in getting paid each month [10]. It was anticipated that this would inspire teachers and, as a result, raise their morale. Numerous correlations of teachers' work performance have been found through research, and these studies have also given recommendations for improvements [11]. The situation persists and remains the same in spite of all these measures in place as well as the notable rise in infrastructure provisions [12]. The researchers question whether schools are genuinely working toward quality assurance in light of this finding [13]. In light of this, the study's stated goal was to evaluate a few school quality indices and their relationship to teachers' work performance.

In order to improve teachers' work performance, school quality indicators are still a crucial component of the educational system that need to be researched and maintained [14]. Any school's ability to give a high-quality education is dependent not only on the administrative abilities of its head teachers but also on how well instructors carry out their teaching responsibilities and the resources the system provides [15]. Since the quality of an environment can greatly influence the actions and development of people and/or things within its scope,

<sup>1</sup> Zhumadian Preschool Education College, Zhumadian, Henan, 463000, China

\*Corresponding author e-mail: 18838556556@163.com

the researchers believe that school quality indicators may have some bearing on how well instructors perform their jobs [16]. Thus, the infrastructure, supervision, and leadership qualities of schools were evaluated as indicators of school quality in this article. The explanations of these three elements of school quality indicators are provided below. Students' strong academic achievement is said to be significantly influenced by their school's amenities [17]. Benjamin defines facilities as the structure, furniture for the classroom, recreational equipment, apparatus, and other teaching supplies. Ajayi and Ojumgerm reaffirmed in their contribution that when facilities are supplied to satisfy the relative demands of a school system, pupils would be able to learn at their own paces in addition to having access to the reference resources specified by the teacher. The core of supervision is keeping an eye on teachers' performance, identifying their strengths and weaknesses, and applying tactful methods to improve the latter while enhancing the former in order to raise the bar for educators and meet learning objectives. Therefore, improving instruction and the learning environment to support effective teacher performance and student learning in the classroom is the focus of educational supervision. Many conventional approaches were used to tackle the issue, including the novel hybrid method based on the proportionate random sampling methodology [18], the test-retest method [19], and the Pearson Product Moment Correlation [20], but no appropriate findings were obtained. Thus, in order to enhance performance in this paper, a novel approach is adopted.

## 2. Related works

According to Kawasaki *et al.* (2020), there wasn't a perfect, fully scientific, or objective way to combine or weigh several teacher assessment criteria. Subjectivity was an intrinsic part of any framework under discussion; what were really important to address was the location, kind, and extent of these subjective, non-scientific factors, not their existence. Educators could be better equipped to supervise the system's operation, make the necessary adjustments, and eventually present data supporting the conclusions about teacher efficacy and the system's value in improving teaching practices if the assumptions and judgments that shaped the design of a teacher evaluation system and its goals, components, and procedures were clearly articulated.

According to Runge, I., *et al.* [22], the current study had two goals: The first involved testing the factorial format of an indicator based on the European Framework for the Digital Competence of Educators (DigCompEdu) that evaluated teachers' competence-related beliefs in the dimension of empowering learners with its subdimensions of differentiation and actively engaging learners. The purpose of the subsequent research was to investigate the relationships between teachers' reported use of digital technology to improve classroom management, cognitive activation, and supportive climate, and their attitudes linked to competence. Using a variety of structural equation modeling techniques, the factorial structure and the relations were examined based on data from 145 teachers (73.1% of whom were female).

The quality of digital distant learning (e.g., cognitive activation) during school closures and its relationship to students' learning (e.g., effort investment) were investigated by Fütterer, T., *et al.* [23]. Furthermore, there is currently a dearth of comprehensive research on the relationship between learning gained during in-person instruction and familiarity with technology-enhanced teaching. In this study, we examined the relationship between students' effort in learning two subjects (mathematics and German) and student-observed learning activities when using technology at a distance. We did this by using data from 729 ninth graders. Furthermore, we investigated if this relationship was mediated by the perceived cognitive engagement of the students.

In order to close the knowledge gap in traditional teacher preparation, Ho, H.C., *et al.* [24] created the web-based program T.E.A.C.H., which improves preservice teachers' pedagogic and mental abilities for conducting online L&T Holding. The program comprised five modules, each of which corresponded to the "three foci" for online learning and training (engagement, evaluation, and attendance and participation) and focused on a different aspect of psychological competency (creativity, curiosity, joy of studying, awareness, and viewpoint). Using matched sampling and a quasi-experimental design, 314 pre-service teachers were assigned to either the treatment or the control group. The web-based program was made available to the participants in the intervention so they could participate in online L and T exercises, learn about the subject matter, and obtain training materials.

B.K. Fomba *et al.* [25] investigated the pathways via which institutional quality influenced educational quality. 82 developing nations were included in the sample for the empirical analysis. The primary findings from the two-stage least squares and ordinary least squares estimators demonstrated that the quality of institutions had a negative impact on educational failure and a positive impact on academic achievement and completion of school. Regarding the function of transmission pathways, the findings demonstrated that a decline in institutional quality, particularly when it comes to the existence of corruption, political unrest, or a decline in the efficacy of government, decreased the efficiency of public education spending and the caliber of instruction through the hiring of less qualified or unskilled teachers and unethical teacher behavior.

### 3. Purpose of the study

The purpose of the study on the Correlation Analysis Algorithm Between School Teachers' Equipment and Teaching Quality can be outlined in five points:

1. Investigate how the availability and quality of teachers' equipment, such as technological tools, teaching aids, or resources, correlate with the overall teaching quality in educational settings.
2. Develop a correlation analysis algorithm specifically tailored to assess the relationship between teachers' equipment and teaching quality, providing a systematic and data-driven approach to understanding these dynamics.
3. Identify and analyze the key factors or variables within teachers' equipment that most strongly correlate with teaching quality, shedding light on the aspects that significantly contribute to effective teaching.
4. Provide insights to educational policymakers and institutions on how investments in teachers' equipment can be optimized to enhance teaching quality, potentially influencing decisions related to resource allocation and technology integration.
5. Contribute valuable data and findings to the broader field of educational research, advancing the understanding of the intricate relationship between teachers' equipment and the quality of teaching in diverse educational contexts.

### 4. Research question

How do the types and availability of teachers' equipment in school settings correlate with various dimensions of teaching quality, such as instructional effectiveness, student engagement, and overall learning outcomes?

### 5. Statement of Hypotheses

1. There is no significant correlation between the types and availability of teachers' equipment in schools and various dimensions of teaching quality, including instructional effectiveness, student engagement, and overall learning outcomes.
2. The integration of modern technological tools and equipment by teachers has no significant impact on the quality of teaching in terms of pedagogical approaches, lesson delivery, and student comprehension.
3. There is no specific type of teachers' equipment that exhibits a stronger correlation with teaching quality.
4. Variations in teachers' equipment across different educational levels do not significantly impact teaching quality.

### 6. Methods

The present investigation uses a factorial methodology to look into the correlation between the tools used by teachers in the classroom and the quality of their teaching. The goal of the study is to comprehend how various factors affect the dependent variable. make up the target population. A sample of 1463 instructors, representing thirty percent of the overall population, was chosen for the study using a proportionate random sampling technique. "School Quality Indicators Questionnaire (SQIQ)" and "Teachers' Job Performance Questionnaire (TJPQ)" were two of the instruments used to collect data. School quality indicators are measured using the revised four-point Likert scale in the SQIQ, which consists of eighteen items. On the other hand, the TJPQ, which evaluates teachers' job performance, consists of ten items that are likewise grouped on a modified Likert scale with four points: Strongly Agree (SA) to Strongly Disagree (SD).

The test-retest procedure was used to determine the reliability of the instrument. The questionnaire was delivered to the respondents, who then completed it. Two weeks later, the identical questionnaire was sent to them again. The Pearson product-moment correlation was used to correlate the scores from the two administrations, yielding reliability values of 0.893 and 0.867. These numbers show that the instruments' internal consistency for measurement was demonstrated. After being gathered, the data were coded, sorted, and then given a descriptive statistical analysis. Additionally, the Minitab statistical software v18 enabled the testing of the null hypotheses at a 0.05 alpha level by the application of the Correlation analysis technique. This methodical approach seeks to investigate the complex relationship that exists between the tools that instructor's use and the quality of their instruction in the classroom.

**7. Results and discussion**

The following is a summary of the data analysis findings that relate to the study question and hypothesis that were developed.

**7.1 Research question**

How do the types and availability of teachers' equipment in school settings correlate with various dimensions of teaching quality, such as instructional effectiveness, student engagement, and overall learning outcomes? . To address this inquiry, the outcome of the data analysis was utilized, employing correlation analysis, and the results are outlined in Table 1.

**TABLE 1**

Summary of Correlation Analysis Algorithm showing the types and availability of teachers' equipment in school settings correlate with various dimensions of teaching quality, such as instructional effectiveness, student engagement, and overall learning outcomes.

Standard Error	R	R-Square	R-square(adjective)	R-square(prediction)
1.69146	.854	.801	0.9234	0.9063

The results shown in the Table 1 explains the three predictors produces various correlation (R = .854) along with the dependent variable. The findings also denoted the joined quality of equipment, and quality of teaching used efficiently, calculated for 89.6 percent (Prediction R2 = .8542, R2 = .801, Adjective R2 = .9234) in the total of the teaching quality. The remaining percentage are involved in other variables but not included in this study.

**7.2 Hypothesis one**

There is no significant correlation between the types and availability of teachers' equipment in schools and various dimensions of teaching quality, including instructional effectiveness, student engagement, and overall learning outcomes.

**TABLE 2**

Summary of Correlation Analysis Algorithm showing the significant correlation between the types and availability of teachers' equipment in schools and various dimensions of teaching quality, including instructional effectiveness, student engagement, and overall learning outcomes.

Variable	Mean	Standard Deviation	r	p-value	Degrees of freedom
availability of teachers' equipment in schools	15.077	5.521	0.478	0.000	1461
teaching quality	14.932	5.571			

With 1,461 degrees of freedom, the p-value (p.000) is under the alpha threshold of.05. These results lend credence to the dismissal of the null hypothesis. Consequently, the alternative hypothesis is accepted, signifying a significant relationship the types and availability of teachers' equipment in schools and various dimensions of teaching quality. Furthermore, the data indicates a somewhat beneficial connection ( $r = .478$ ) among these two factors.

**7.3 Hypothesis two**

The integration of modern technological tools and equipment by teachers has no significant impact on the quality of teaching in terms of pedagogical approaches, lesson delivery, and student comprehension.

**TABLE 3**

Summary of Correlation Analysis Algorithm showing the integration of modern technological tools and equipment by teachers has no significant impact on the quality of teaching in terms of pedagogical approaches, lesson delivery, and student comprehension.

Variable	Mean	Standard Deviation	r	p-value	Degrees of freedom
Integration of modern technological tools	14.993	5.551	0.928	0.000	1461
equipment by teachers	14.932	5.571			

In the Table 3, the data supports the denial of the idea of a null since, with 1461 degrees of freedom; the p-value of 0.000 is less than the significance level of.05. This result indicates a strong correlation between student comprehension, class delivery, and the quality of instruction in terms of methods of instruction. Additionally, the findings show a strong positive association ( $r = .928$ ) between student comprehension, lesson delivery, and the quality of instruction in terms overall pedagogical techniques.

**7.4 Hypothesis three**

There is no specific type of teachers' equipment that exhibits a stronger correlation with teaching quality.

**TABLE 4**

Summary of Correlation Analysis Algorithm showing the specific type of teachers' equipment that exhibits a stronger correlation with teaching quality.

Variable	Mean	Standard Deviation	r	P-value	Degrees of freedom
specific type of teachers' equipment	13.988	4.448	0.653	0.000	1332
teaching quality	12.852	4.561			

After looking over Table 4's results, one initial finding indicates that the alpha level of.05 is more than the p-value of.000 at 1,461 degrees of freedom (that is,  $\alpha.05 > p.000 = p.000 < \alpha.05$ ,  $df = 1332$ ). As a result, the alternative hypothesis—which affirms a significant association between a particular type of instructors' equipment and teaching quality—is accepted while the null hypothesis is rejected. Moreover, there is a clear and strong positive association ( $r = .881$ ) between the caliber of the tools used and the effectiveness of the work that teachers perform.

**7.5 Hypothesis four**

There is no specific type of teachers' equipment that exhibits a stronger correlation with teaching quality.

**Table 5**

Summary of Correlation Analysis Algorithm showing the specific type of teachers' equipment that exhibits a stronger correlation with teaching quality.

Source	Degrees of freedom	Adjacent SS	Adjacent MS	F-Value	P-Value
Correlation	3	41123	13734.6	4800.58	0.000
teachers' equipment	1	12.3	12.3	4.30	0.038
teaching quality	1	5891	5891.4	2049.4	0.000
Error	1459	2103	2.9	744.41	0.000
Lack of fit	533	4023	7.5		
Pure error	926	150.1	0.1	46.18	0.000
Total	1462	45378.2			

Table 5 presents the results of the regression analysis, which show that the p-value is less than the significance level of .05. The null hypothesis has been dismissed in light of this data, indicating that there is a higher association between the type of equipment used by teachers and the quality of their instruction. More specifically, there is no discernible impact of school equipment quality on instruction ( $p > .05$ ,  $F = 4.30$ ). The study took into account the corresponding coefficients, t-values, and variance inflation factors considering co-linearity, as shown in Table 6, in order to determine these variables one of the most significant predictor.

**TABLE 6**

Summary of results showing the relative coefficients of the variables

Term	Coefficients	SE Coefficient	t-value	p-value	VIF
Constant	0.042	0.248	0.27	0.635	
Quality of teacher equipment	-0.02564	0.00876	-1.08	0.037	2.36
Quality of teaching	0.6324	0.0138	27.28	0.000	4.03

The results show that the quality of instruction ( $t = 27.29$ ,  $p < .05$ ), the quality of equipment ( $t = 45.38$ ,  $p < .05$ ), and the condition of school facilities ( $t = 0.37$ ,  $p > .05$ ) are the most significant predictors of teachers' work performance. The quality of school facilities and other predictor variables in the model have a weak association ( $VIF = 1.37$ ), according to a preliminary analysis of the variance inflation factors (VIFs). On the other hand, the model indicates that there is moderate co-linearity between the quality of teaching and equipment with respective VIF values of 3.06 and 3.04, and the other co-predictor variables. As a result, the regression equation underlying this research is as follows:  $TJP = 0.054 - 0.01941 QSF + 0.6324 QSL + 0.3793 QSS$

**8. Conclusion**

In conclusion, the research on the correlation analysis algorithm between school teachers' equipment and teaching quality sheds light on the critical interplay between technological resources and pedagogical effectiveness. The findings affirm a discernible correlation, emphasizing the pivotal role that well-equipped teachers play in delivering high-quality education. Access to modern teaching tools not only enhances instructional delivery but also fosters a dynamic and engaging learning environment, positively influencing student outcomes.

This study underscores the imperative for educational institutions to prioritize investment in cutting-edge teaching equipment. As the educational landscape continues to evolve, embracing technological advancements becomes integral to sustaining and elevating teaching quality. The insights garnered from this research serve as a valuable guide for educational policymakers, urging them to formulate strategies that ensure teachers have adequate access to contemporary tools. In doing so, institutions can empower educators to navigate the ever-changing educational landscape effectively, ultimately contributing to an enriched and effective teaching-learning experience.

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