

Factors Associated With Teaching Competence Of B.Ed. Biological Science Student Teachers.

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Abstract:

The present study investigated the factors associated with the teaching competence of B.Ed. Biological Science student teachers. Using the survey method, data were collected from 313 second-year B.Ed. Biological Science students from Colleges of Education in four districts of Tamil Nadu. A Teaching Competency Scale developed and validated by the investigator was used for data collection. The tool demonstrated strong psychometric properties, including excellent internal consistency (Cronbach's $\alpha = 0.973$), high test-retest reliability ($r = 0.875$), and satisfactory concurrent validity ($r = 0.897$). Chi-square analysis revealed that age, habit of watching educational videos, and familiarity with online teaching tools had significant associations with teaching competence, indicating that maturity, technological exposure, and engagement with instructional media contribute positively to professional skills. In contrast, monthly family income showed no significant association, suggesting that socio-economic background does not determine teaching competence. The findings emphasize that experiential growth and digital engagement play a crucial role in enhancing teaching competence among prospective teachers and highlight the need for technology-integrated and practice-oriented teacher education programmes.

Keywords: Teaching Competence; B.Ed. Biological Science Student Teachers; Educational Videos; Online Teaching Tools; Teacher Education...

INTRODUCTION

Teaching competence is a crucial professional attribute that determines the effectiveness of a teacher in facilitating meaningful learning experiences. It encompasses subject mastery, pedagogical skills, classroom management, communication ability, professional ethics, and the capacity to integrate technology into teaching. Competent teachers not only demonstrate mastery of subject matter and pedagogical strategies but also reflect adaptability, technological proficiency, and lifelong learning dispositions that enable them to meet diverse learner needs (Vieira et al., 2024). In the context of pre-service teacher education, understanding the factors that contribute to the development of teaching competence is essential, as this competence shapes future educators' effectiveness in real classroom environments. B.Ed. Biological Science students, as future science educators, are expected to demonstrate not only conceptual clarity but also the ability to adopt innovative instructional strategies and digital tools. In the contemporary educational landscape, competence is no longer limited to traditional classroom practices; it also includes adaptability to technology, self-learning habits, and professional maturity. Factors such as age, socio-economic background, engagement with educational media, and familiarity with online teaching tools may influence the development of teaching competence. Understanding how these variables are associated with teaching competence helps teacher educators design appropriate training interventions. Hence, the present study investigates the association between teaching competence and selected variables such as age, monthly family income, habit of watching educational videos and familiarity with online teaching tools among the B.Ed. Biological Science students.

2. Objectives of the Study

To find out if there exists any significant association between teaching competence of B.Ed. Biological Science students and their age.

To find out if there exists any significant association between teaching competence of B.Ed. Biological Science students and their monthly family income.

To find out if there exists any significant association between teaching competence of B.Ed. Biological Science students and their habit of watching educational videos.

To find out if there exists any significant association between teaching competence of B.Ed. Biological Science students and their familiarity with online teaching tools.

3. Hypotheses of the Study

H₀₁: There is no significant association between teaching competence of B.Ed. Biological Science students and their age.

H₀₂: There is no significant association between teaching competence of B.Ed. Biological Science students and their monthly family income.

H₀₃: There is no significant association between teaching competence of B.Ed. Biological Science students and their habit of watching educational videos.

H₀₄: There is no significant association between teaching competence of B.Ed. Biological Science students and their familiarity with online teaching tools.

4. Methodology

4.1 Method Used for the Study

The present investigation adopted the survey method. This method was considered most appropriate because the study aimed at collecting systematic data from a large group of respondents in order to examine the existing level of teaching competence and its association with selected background and academic variables.

4.2 Population of the Study

The population of the study comprised all II Year B.Ed. Biological Science student teachers studying in Colleges of Education in Thoothukudi, Tirunelveli, Tenkasi, and Kanyakumari districts of Tamil Nadu. Second-year B.Ed. students were considered ideal for the study because they had completed major theoretical components of the teacher education programme and had also undergone school internship and teaching practice. At this stage, student teachers possess adequate exposure to classroom realities, lesson planning, instructional strategies, evaluation methods, and classroom management. Hence, they are in a better position to demonstrate their actual level of teaching competence, making them a suitable population for the investigation.

4.3 Sample and Sampling Technique

From the defined population, a sample of 313 II Year B.Ed. Biological Science student teachers was selected for the study using Simple Random Sampling Technique. The sample represented student teachers from various Colleges of Education across the four districts included in the study. Care was taken to ensure representation of students belonging to different age groups, socio-economic backgrounds, and levels of exposure to educational technology, so that the findings could meaningfully reflect variations in teaching competence.

4.4 Tool Used for the Study

To collect data for the present investigation, the investigator used a Teaching Competency Scale constructed and validated specifically for II Year B.Ed. Biological Science student teachers. Teaching competence is a multidimensional construct that includes instructional skills, classroom management, communication ability, subject mastery, use of teaching aids, assessment practices, and professional behaviour. Although several standardized tools exist, many are designed either for in-service teachers or for general teacher education contexts. Hence, a context-specific tool was required to accurately measure the teaching competence of pre-service Biological Science student teachers. Therefore, the investigator developed a suitable scale based on theoretical foundations and practical teaching requirements.

4.5 Pilot Study and Item Analysis

Before administering the Teaching Competency Scale to the final sample, a pilot study was conducted to ensure the clarity, suitability, and psychometric soundness of the instrument. The draft Teaching Competency Scale was administered to a randomly selected sample of 60 II Year B.Ed. Biological Science student teachers drawn from selected Colleges of Education. These students were not included in the final sample of the study. To assess the internal consistency of the scale, Cronbach's alpha coefficient was computed. Further, item analysis was carried out using Item–Total Correlation. As a result of this process, 48 items were deleted from the initial pool. The deletion of these items led to an increase in the Cronbach's alpha value from 0.964 to 0.975, which indicates

excellent internal consistency.

4.6 Validity

Face validity was determined by presenting the tool to experts in education, educational psychology, and teacher education, who examined the relevance, clarity, and appropriateness of the items. Based on their suggestions, minor modifications were made, and all experts agreed that the items adequately represented the construct of teaching competence. Concurrent validity was established by correlating the scores of the investigator-developed scale with the standardized Teaching Competency Scale by K. S. Mishra (2008). Both scales were administered to the same group of B.Ed. student teachers, and the Pearson's Product Moment Correlation coefficient obtained was 0.897, indicating a strong positive relationship and confirming that the scale measures teaching competence effectively.

4.7 Reliability

Reliability of the tool was established using both internal consistency and test-retest methods. The Cronbach's alpha coefficient of the final scale was 0.974, indicating excellent internal consistency among the items. To determine stability over time, the test-retest method was employed by administering the scale to 60 B.Ed. Biological Science student teachers and re-administering it after an interval of 15 days. The correlation coefficient between the two sets of scores was 0.875, showing high stability. These results confirm that the Teaching Competency Scale is both reliable and valid for assessing the teaching competence of B.Ed. Biological Science student teachers.

5. Results

Variable	Category	χ^2 Value	P Value	Results
Age	Less than 25 Years	10.334	0.035*	Significant
	25–30 Years			
	Greater than 30 Years			
Monthly Family Income	Below ₹30,000	0.448	0.978	Not Significant
	₹30,000–₹50,000			
	Above ₹50,000			
Habit of Watching Educational Videos	Daily	16.004	0.012*	Significant
	Few times a Week			
	Occasionally			
	Rarely			
	Never			
Familiarity with Online Teaching Tools	Very High	18.501	0.012*	Significant
	Moderate			
	Low			
	None			

(* indicates that the p value is significant at 0.05 level)

6. Interpretation and Discussion

The findings show that age is significantly associated with teaching competence among B.Ed. Biological Science student teachers ($\chi^2 = 10.334$, $p < 0.05$). Competence levels vary across age groups, with students above 30 years more represented in the high competence category, while younger students are largely in the average group. This suggests that maturity, life experience, responsibility, and emotional stability positively influence teaching competence. Vidushy and Kishor (2020) similarly reported that teaching experience significantly affects competence, which indirectly relates to age.

In contrast, monthly family income has no significant association with teaching competence ($\chi^2 = 0.448$, $p >$

0.05), as competence levels are distributed similarly across income groups. This indicates that teaching competence depends more on professional preparation and personal attributes than socio-economic background.

A significant association exists between watching educational videos and teaching competence ($\chi^2 = 16.004$, $p < 0.05$). Students who regularly engage with educational videos show higher competence, likely due to exposure to instructional demonstrations and innovative strategies that enhance pedagogical skills and classroom readiness. Narayanan and Rao (2021) also found that reflective practices supported by instructional tools improve teaching behaviour.

Similarly, familiarity with online teaching tools is significantly associated with teaching competence ($\chi^2 = 18.501$, $p < 0.05$). Greater digital proficiency supports effective lesson delivery and adaptability to modern classrooms. This aligns with Nurgaliyeva et al. (2023), who reported that technological competence influences professional functioning, and Monicka and Jayachithra (2020), who showed that technology-enriched instruction improves teaching competency.

Overall, personal and professional development factors—age, educational video engagement, and digital tool familiarity—have stronger influence on teaching competence than economic background, highlighting the importance of technological exposure and continuous learning in teacher education.

7. Recommendations

Strengthen Technology Integration in Teacher Education

Since familiarity with online teaching tools significantly enhances teaching competence, B.Ed. programmes should include structured training on digital platforms, virtual classrooms, educational apps, and multimedia lesson design.

Promote Use of Educational Videos

Institutions should encourage student teachers to regularly engage with quality educational videos, demonstration lessons, and recorded model classes to improve pedagogical understanding and classroom practices.

Provide Experience-Oriented Training

As age and maturity relate positively to teaching competence, teacher education programmes should incorporate more practical exposure such as micro-teaching, peer teaching, internships, and simulated classroom situations to accelerate professional growth among younger trainees.

Develop Digital Pedagogical Literacy

Training should move beyond basic tool usage to focus on pedagogical integration of technology - how, when, and why to use digital tools for effective learning outcomes.

Establish Resource Centres in Colleges

Colleges of education should maintain digital resource libraries with access to e-content, teaching demonstrations, lesson repositories, and open educational resources.

8. Conclusion

The present study examined the factors associated with the teaching competence of B.Ed. Biological Science student teachers and revealed that competence is influenced more by developmental and professional exposure variables than by economic background. Age showed a significant association with teaching competence, indicating that maturity, life experience, and psychological readiness contribute positively to professional skills. Similarly, the habit of watching educational videos and familiarity with online teaching tools were found to significantly enhance teaching competence, emphasizing the importance of digital exposure, reflective learning, and technology integration in teacher preparation. In contrast, monthly family income did not show any significant relationship with competence levels, suggesting that socio-economic status alone does not determine teaching effectiveness. Overall, the findings highlight that teaching competence is shaped by experiential growth and engagement with modern instructional resources. Therefore, teacher education programmes should strengthen opportunities for technology-based learning, professional exposure, and continuous skill development to enhance the teaching competence of future educators..

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