
Multimedia-Related Teaching Competency among Teachers in Amravati

Division: A Multidimensional Assessment

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Abstract

The integration of multimedia has transformed contemporary teaching from a predominantly verbal and textbook-oriented process into a technology-supported, interactive, and multimodal learning experience. However, the educational value of multimedia depends substantially on teachers' ability to combine technological knowledge with sound pedagogy and appropriate subject content. The present paper assesses the level of multimedia-related teaching competency among teachers in Amravati Division, Maharashtra, across multiple dimensions. The paper is developed from the empirical framework and data reported in the research study *Impact Study of Use of Multimedia on Teaching Competencies and Effectiveness*. The study covered the five districts of Amravati Division Amravati, Akola, Buldhana, Yavatmal, and Washim and employed a multidimensional assessment based primarily on the Teacher Competency and TPACK Assessment Survey (TCAS), supplemented by direct classroom observation through the Observation Schedule for Multimedia Classroom Instruction (OSMCI). The TCAS consisted of 28 items covering Technological Knowledge, Pedagogical Knowledge, Content Knowledge, and integrated Technological Pedagogical Content Knowledge. The teacher survey included 300 secondary-school teachers, equally divided between urban and rural locations, while 50 classroom sessions were directly observed. The observational findings showed mean achievement percentages of 69.10% for technical fluency, 78.20% for content appropriateness, and 62.30% for pedagogical integration, with an overall classroom observation achievement of 69.87%. A comparison of perceived and observed competency further indicated that teachers tended to report higher competency than was demonstrated in actual classroom practice. The findings suggest that teachers possess a reasonably functional foundation for multimedia use, but competency is comparatively weaker when technology must be transformed into interactive and pedagogically integrated learning experiences. The study highlights the need for continuous, practice-oriented professional development emphasizing TPACK, digital lesson design, troubleshooting, learner interaction, and context-sensitive multimedia integration.

Keywords: Multimedia, Teaching Competency, TPACK, Digital Competency, Teachers, Pedagogical Integration, Amravati Division, Educational Technology

1. Introduction

Education is fundamentally dependent upon the quality of interaction among the teacher, learner, and educational environment. The teacher remains a crucial agent because educational policies, curricula, resources, and technologies ultimately become meaningful to students through classroom implementation. Teaching competency therefore extends beyond possession of subject knowledge. It incorporates the knowledge, skills, attitudes, instructional abilities, and professional behaviours required to organize meaningful learning experiences. The emergence of multimedia has considerably expanded this competency requirement. Multimedia refers to the combined use of different communication forms such as text, graphics, images, animation, audio, video, and computer- or internet-based resources. The source study specifically recognizes smart classes, e-learning, and social media as important multimedia channels affecting education. Thus, teachers are increasingly required not merely to operate a projector or display a presentation but to determine why, when, and how a particular medium should be used.

This distinction is important because technical operation does not automatically constitute effective technology integration. A teacher may know how to open a presentation, play a video, or use an interactive display but may lack the pedagogical capacity to connect these resources with learning objectives, students' prior knowledge, classroom interaction, assessment, and differentiated learning. The Technological Pedagogical Content Knowledge (TPACK) framework developed by Mishra and Koehler (2006) offers an appropriate theoretical foundation for examining this issue. TPACK emphasizes that effective technology-integrated teaching emerges through the interaction of technological knowledge, pedagogical knowledge, and content knowledge rather than through technological skill in isolation.

2. Objectives of the Study

1. Assess teachers' technological competency for multimedia-supported teaching;
2. Examine competency relating to the selection and appropriateness of multimedia content;
3. Determine the level of pedagogical integration of multimedia in classroom instruction;
4. Examine the overall level of multimedia-related classroom teaching competency;
5. Compare teachers' self-reported multimedia competency with their observed classroom competency; and
6. Identify the dimensions in which further professional development is particularly required.

3. Significance of the Study

The study has considerable significance in the context of technology-driven educational reform. Investment in digital infrastructure alone cannot ensure improvement in teaching unless teachers possess the professional competency required to convert technological resources into meaningful learning experiences. The underlying research specifically identifies the practical problem of a possible disconnect between investments in digital

hardware and teachers' actual execution, particularly in areas such as content curation and pacing.

Second, multidimensional competency assessment can help teacher-education institutions move beyond generic computer-literacy training. A teacher who can technically operate multimedia equipment may still need support in designing interactive lessons, selecting appropriate content, managing cognitive load, integrating assessment, and sustaining student participation.

Third, the study is regionally significant because Amravati Division includes both urban and rural educational settings across five districts. The original methodological framework included 300 secondary-school teachers, comprising 150 urban and 150 rural teachers, specifically enabling investigation of geographical differences in digital competency.

Finally, the findings are useful for school administrators, teacher educators, educational planners, and professional-development agencies in designing competency-based multimedia training rather than one-time technology demonstrations.

4. Research Gap

A substantial body of educational technology research has examined the influence of multimedia on students' achievement, engagement, retention, and motivation. Comparatively less attention has been given to the actual competencies teachers require to transform multimedia resources into pedagogically effective instruction.

A second gap concerns the dependence on self-report measures. Teachers may report confidence in using digital resources, yet perceived competence does not necessarily correspond to actual classroom performance. The source research explicitly recognized this methodological problem and therefore treated self-reported TCAS data as perceived competency requiring calibration against direct OSMCI classroom observation.

A third gap is contextual. Generalized national or international findings may not adequately capture the educational and infrastructural circumstances of divisions such as Amravati, where institutions operate across diverse urban and rural environments.

The present study addresses these gaps by combining a multidimensional TPACK-based competency assessment with direct observation of actual multimedia classroom practice.

5. Research Methodology

Research Design

The study adopted a descriptive-survey approach supplemented by structured classroom observation. The broader source investigation followed a pragmatist, multi-tool research design incorporating descriptive survey, quasi-experimental, observational, and institutional-audit components. For the present paper, only the components directly relevant to teacher multimedia competency have been extracted.

Population and Sample

The geographical area comprised the five districts of Amravati, Akola, Buldhana, Yavatmal, and Washim. The TCAS component included 300 secondary-school teachers, with equal

representation of 150 urban and 150 rural teachers. A matched observational component involved 50 classrooms/teachers, comprising 25 urban and 25 rural cases.

Research Tools

The principal instrument was the Teacher Competency and TPACK Assessment Survey (TCAS). The instrument contained 28 items on a five-point Likert scale organized into four domains.

Dimension	Items	No. of Items	Competency Assessed
Technological Knowledge (TK)	1–6	6	Digital operation and troubleshooting
Pedagogical Knowledge (PK)	7–11	5	Teaching strategies and learner-responsive pedagogy
Content Knowledge (CK)	12–16	5	Mastery and organization of subject content
Integrated TPACK	17–28	12	Integration of technology, pedagogy, and content
Total	1–28	28	Multimedia-related teaching competency

The instrument was the **Observation Schedule for Multimedia Classroom Instruction (OSMCI)**. Fifteen observable behaviours were distributed across three indicators: Technical Fluency, Appropriateness and Quality of Selected Content, and Pedagogical Integration and Engagement Strategies. The maximum overall observation score was 60.

Statistical Techniques

Data were analyzed through mean, standard deviation, achievement percentage, independent-samples *t*-test where applicable, and paired-samples comparison for perceived versus observed competency. The broader analysis was conducted using IBM SPSS Statistics Version 26.0 and R Version 4.2.1.

6. Data Analysis and Interpretation

The data collected from the selected teachers were systematically analyzed to assess their level of multimedia-related teaching competency. Descriptive statistical measures such as mean, standard deviation, percentage, and achievement percentage were used for analysis. The major dimensions considered were technical fluency, appropriateness of multimedia content, and pedagogical integration. In addition, teachers' self-reported competency was compared with their actual classroom performance. The statistical analysis helped to identify the relative strengths and competency gaps of teachers in effectively integrating multimedia into the teaching-learning process.

Table 1: Observed Level of Multimedia-Related Teaching Competency

Competency Dimension	Maximum Score	Mean	SD	Achievement %	Interpretation
Technical Fluency	20	13.82	3.41	69.10%	Moderate to Proficient
Content Appropriateness	20	15.64	2.85	78.20%	Comparatively High
Pedagogical Integration	20	12.46	3.12	62.30%	Moderate
Overall Classroom Competency	60	41.92	8.15	69.87%	Proficient/Moderate-High

Table 1 reveals considerable variation among competency dimensions. Content Appropriateness recorded the highest achievement percentage (78.20%), with a mean score of 15.64 out of 20. This indicates that teachers were comparatively successful in selecting multimedia resources aligned with instructional content and classroom requirements.

Technical Fluency produced an achievement level of **69.10%**, indicating that teachers generally possessed functional operational competency but still encountered scope for improvement in seamless multimedia handling and troubleshooting.

The lowest achievement was observed in Pedagogical Integration (62.30%). This is particularly important because pedagogical integration represents the point at which technology moves from being a presentation device to becoming an instructional instrument. The lower percentage suggests that interactive questioning, learner manipulation of digital resources, discussion around multimedia, and integration between traditional and digital strategies remain comparatively weaker.

The overall observation mean was 41.92 (SD = 8.15) out of 60, corresponding to 69.87% achievement. Thus, multimedia-related competency can broadly be described as functional and developing rather than uniformly advanced.

Table 2: Comparative Ranking of Observed Competency Dimensions

Rank	Dimension	Achievement %	Gap from Highest Dimension
1	Content Appropriateness	78.20	—
2	Technical Fluency	69.10	9.10 percentage points
3	Pedagogical Integration	62.30	15.90 percentage points

The 15.90 percentage-point difference between content appropriateness and pedagogical integration demonstrates that knowing what digital material to use does not necessarily mean that teachers know how to transform it into an interactive learning experience.

This is one of the most important findings of the study.

Table 3: Self-Reported versus Observed Multimedia Competency

Competency Domain	Self-Reported Mean	TCAS	Observed Mean	OSMCI	Difference
Technical Operating Skills	78.40%		69.10%		+9.30%
Pedagogical Integration	74.20%		62.30%		+11.90%
Overall Competency Profile	76.30%		69.87%		+6.43%

Table 3 reveals a consistent difference between perceived and demonstrated competency. Teachers reported technical operating competency of 78.40%, whereas observed technical fluency was 69.10%, representing a 9.30 percentage-point difference.

The difference was even larger for pedagogical integration. Self-reported competency was 74.20%, compared with 62.30% in direct observation, producing an 11.90 percentage-point gap. The overall self-reported profile was 76.30%, compared with an observed score of 69.87%.

These results indicate that self-reported technological confidence should not be treated as a complete substitute for classroom-based competency assessment.

7. Discussion

The results reveal a multidimensional pattern of multimedia competency rather than a simple classification of teachers as technologically competent or incompetent. The strongest area was content appropriateness. Teachers demonstrated considerable ability to identify and use digital content related to classroom objectives. This may reflect growing availability of ready-made presentations, educational videos, digital repositories, animations, and online learning materials. The challenge, therefore, is increasingly shifting from simple resource access to sophisticated pedagogical utilization.

Technical fluency occupied an intermediate position. Teachers were generally capable of routine operation, but the score of 69.10% indicates that technology was not always used with complete operational confidence. This has practical consequences because even minor hardware, connectivity, or software problems can interrupt lesson continuity.

Most importantly, pedagogical integration was the weakest dimension. The source study's discussion similarly observes that teachers sometimes used advanced multimedia equipment primarily as a digital substitute for a blackboard rather than exploiting interactive simulations, digital formative assessment, or inquiry-oriented applications.

This finding is consistent with the TPACK framework of Mishra and Koehler (2006). Technology knowledge alone is insufficient. Effective multimedia teaching requires the intersection of technological knowledge, pedagogical knowledge, and content knowledge. A teacher must be able to select a resource, align it with an objective, determine its appropriate timing, connect it with questioning and discussion, monitor students' cognitive responses, and assess learning.

The self-report–observation discrepancy further strengthens this interpretation. The 11.90 percentage-point gap in pedagogical integration indicates that some teachers may equate frequent technology use with effective pedagogical integration. However, playing a video, displaying slides, or projecting textbook material represents a different level of competency from creating learner-centred multimedia experiences.

Consequently, teacher professional development should move beyond introductory courses on operating computers, projectors, and smartboards. Training should involve lesson planning, multimedia content evaluation, micro-teaching, interactive digital assessment, troubleshooting exercises, peer observation, and feedback on actual classroom performance.

8. Major Findings

1. Teachers in Amravati Division demonstrated an overall observed multimedia teaching competency achievement of 69.87%, indicating a generally functional level of competency.
2. Content Appropriateness was the strongest competency dimension, recording a mean of 15.64 out of 20 and an achievement level of 78.20%.
3. Technical Fluency recorded 69.10% achievement, showing that teachers possessed reasonable operational skills but had scope for strengthening troubleshooting and seamless technology handling.
4. Pedagogical Integration was the weakest dimension at 62.30%, indicating that teachers require greater support in transforming multimedia from a presentation resource into an interactive pedagogical tool.
5. There was a 15.90 percentage-point difference between the strongest observed dimension, Content Appropriateness, and the weakest, Pedagogical Integration.
6. Teachers' self-reported technical competency (78.40%) exceeded observed technical competency (69.10%) by 9.30 percentage points.
7. The largest perception–practice discrepancy appeared in Pedagogical Integration, where the self-reported score of 74.20% exceeded the observed score of 62.30% by 11.90 percentage points.
8. Overall perceived competency was 76.30%, compared with an observed competency level of 69.87%, producing a 6.43 percentage-point gap.
9. The findings demonstrate the importance of combining self-assessment with direct classroom observation when evaluating multimedia-related teaching competency.
10. The results support a shift in teacher professional development from basic ICT literacy toward TPACK-oriented, classroom-based and pedagogically focused digital competency development.

9. Conclusion

The study concludes that teachers in Amravati Division possess a meaningful foundation of multimedia-related teaching competency, but their abilities are not equally developed across all dimensions. Teachers demonstrate their strongest competency in selecting and using appropriate multimedia content, followed by technical operation. Pedagogical integration

remains comparatively less developed. The overall observed achievement level of 69.87% suggests that multimedia has entered classroom practice to a considerable extent, but effective integration should not be interpreted merely in terms of access to technology or frequency of use. The central challenge is to move from technology-supported presentation to technology-enabled pedagogy.

The difference between self-reported and observed competency further demonstrates that evaluation based solely on teacher perception can overstate practical proficiency. Direct classroom observation, therefore, provides an important complementary mechanism for assessing actual multimedia teaching competence. Professional development programmes should consequently emphasize integrated TPACK competencies: multimedia lesson design, content curation, interactive pedagogy, formative assessment, technical troubleshooting, cognitive-load management, learner participation, and reflective evaluation. Teachers should be provided opportunities to demonstrate these skills through micro-teaching and authentic classroom practice rather than merely attending theoretical ICT workshops.

In this sense, the future of multimedia-based education in Amravati Division depends not simply on supplying schools with digital equipment but on developing teachers capable of using those resources purposefully, critically, creatively, and pedagogically. Strengthening the weakest dimension pedagogical integration can help convert existing digital resources into more interactive, meaningful, and effective teaching-learning experiences.

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