

RESEARCH ARTICLE

A study on the challenges faced by teachers in the effective implementation of blended teaching methods (flipped, game-based and peer-to-peer teaching) in various colleges of Tumkur city

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Abstract: The rapid shift towards digital education has forced colleges in Tumkur to adopt blended teaching methods; yet, teachers struggle to bridge the gap between traditional lecturing and interactive pedagogies like Flipped, Game-Based and Peer-to-Peer teaching. While these methods aim to improve student engagement, their success is often hampered by a "digital divide" where rural student demographics lack the consistent access to internet required for out-of-class learning components. Consequently, educators face a triad of challenges: insufficient technical training, a rigid academic syllabus that leaves little room for innovation and a lack of institutional infrastructure to support modern classroom dynamics. This study empirically examined the barriers to adopting blended teaching methods among college educators in Tumkur city. A quantitative survey design was employed, involving faculty members from 11 colleges representing Arts, Science and Management disciplines. Data were collected using a structured questionnaire based on a 5-point Likert scale and responses were analysed using descriptive statistical techniques, including percentage-based interpretation. The sample comprised early-career (25–35 years) and senior (>45 years) educators, with teaching experience ranging from 6–10 years to over 15 years. Findings indicated that while all respondents were aware of blended teaching strategies and acknowledged their pedagogical benefits, actual classroom adoption remains limited. Specific challenges associated with each blended teaching method were identified. In the case of the *Flipped Classroom*, effective implementation was found to rely heavily on students' prior engagement with pre-class learning materials. Inadequate preparation by students often reduced the effectiveness of in-class activities, thereby limiting opportunities for higher-order cognitive engagement. Additionally, the development of high-quality instructional content required substantial time investment and advanced digital competencies. *Game-Based Learning*: Teachers highlighted difficulties in identifying or designing instructional games that are pedagogically aligned with curriculum objectives. Such activities were not seriously considered and learners faced financial constraints and limited access. *Peer-to-Peer Teaching*: Challenges included potential misinformation among students, social issues and distractions and difficulty in ensuring equal participation. These results provide actionable insights for policymakers, institutional administrators and faculty training entities to develop targeted interventions that support teachers in effectively implementing blended methodologies, thereby promoting more inclusive and experiential learning environments.

Keywords: Flipped learning, Game-based, Peer-to-Peer, Challenges, Effectiveness, India

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Introduction

The landscape of higher education is undergoing a paradigm shift from traditional teacher-led instruction to student-centric models, accelerated by the global integration of Information and Communication Technology (ICT). In the context of Tier-2 cities like Tumkur, Blended Learning—defined as a formal education program that combines traditional classroom methods with online digital media—has emerged as a vital bridge to modernise pedagogy (Garrison & Kanuka, 2004). This method seeks to optimise the "synchronous" interaction of the classroom with the "asynchronous" flexibility of digital platforms, theoretically enhancing student engagement and learning outcomes.

Categories of blended teaching methods

Effective implementation in various colleges often utilises specific sub-models, each carrying unique pedagogical goals:

Flipped classroom

This model reverses the traditional instructional cycle. Students gain first exposure to new material outside of class (via videos or readings) and use class time for active learning, such as problem-solving or debates (Lage et al., 2000). Research suggests this promotes higher-order thinking, yet its success depends heavily on student self-discipline and pre-class preparation.

Game-based learning

Game-Based Learning (GBL) integrates game characteristics and principles into learning activities to increase motivation and provide immediate feedback (Plass et al., 2015). In the competitive academic environment of Tumkur, GBL can reduce "learning anxiety", though it requires teachers to possess high technological pedagogical knowledge.

Peer-to-peer teaching

Based on Vygotsky's (1978) Social Constructivism, Peer-to-Peer (P2P) teaching involves students instructing one another under faculty supervision. This method leverages the "Zone of Proximal Development", where students often grasp complex concepts more easily when explained by a peer who shares a similar cognitive framework.

In recent years, Tumkur has emerged as a major educational hub in Karnataka, driven by its proximity to Bangalore and rising demand for higher education. This growth highlights the need for sustainable development within institutions, especially in promoting quality education. Innovative blended teaching methods—such as flipped, game-based and peer-to-peer learning—are crucial for achieving this.

This study examines the organisational conditions and difficulties teachers encounter in implementing blended methods, evaluates current practices and proposes practical improvements. The conceptual framework draws on the TPACK model and UTAUT theory to analyse factors influencing effective technology integration in Tumkur's educational context.

Building a research gap requires demonstrating that while the benefits of blended learning are well-documented, the organisational conditions often fail to support the teacher in the field. Below is the background of organisational difficulties as reported in existing literature, which sets the stage for your specific study in Tumkur.

Organisational conditions and difficulties encountered by teachers

Previous research indicates that the transition to blended learning is not merely a pedagogical shift but a complex organisational challenge. Studies have identified three primary categories of difficulties that create an "implementation gap":

Institutional readiness and infrastructure constraints

Literature consistently reports that a lack of "Institutional Maturity" is a primary barrier (Haber & Mills, 2008). In the Indian context, the 'Digital Divide' remains the most significant organisational hurdle. Research highlights that while colleges may have centralised Wi-Fi, the lack of "equitable access" for students—especially those from rural backgrounds—prevents teachers from making online components mandatory (Bhadri & Patil, 2022). This creates a condition where teachers are forced into "double-teaching"—delivering content online and then repeating it in class for those who could not access it.

Systemic rigidity and time-workload pressures

A major organisational difficulty reported is the Syllabus-Time Paradox. In many Indian higher education institutions, the academic calendar is rigid, focusing on "covering" the syllabus for university examinations rather than "uncovering" concepts through active learning (Agarwal & Purohit, 2019). Studies show that teachers perceive methods like Game-Based Learning and P2P as "time-consuming" luxuries that the organisational structure does not reward. Furthermore, the lack of specialised administrative support for content creation often results in a massive increase in teacher workload, leading to "techno stress" and resistance to change (Ye et al., 2022).

Professional development and technical support gaps

Research underscores that "sporadic training" is insufficient for effective implementation. The TPACK Gap—a disconnect between subject expertise and technological-pedagogical skill—is often ignored by organisations that provide "one-size-fits-all" ICT workshops (Mishra & Koehler, 2006). Previous studies in Karnataka specifically highlight that while 95% of institutions claim to adopt modern methods (NEP 2020), less than 50% of students meet competency levels because the organisational support for sustained teacher mentoring is missing (PARAKH Report, 2024).

Introduction to the TPACK framework

The TPACK (Technological Pedagogical Content Knowledge) framework is a seminal theoretical model designed to explain the complex set of knowledge required by teachers to integrate technology effectively into their classrooms. Developed by Punya Mishra and Matthew J. Koehler in 2006, the framework builds upon Lee Shulman's idea of Pedagogical Content Knowledge (PCK). It posits that effective technology integration is not about using digital tools in isolation, but rather about the dynamic intersection of three primary forms of knowledge: Content, Pedagogy and Technology.

At its core, TPACK suggests that teachers must understand how these three domains interact to create a meaningful learning experience. It moves away from the "techno centric" view—where the tool is the focus—and emphasises that the choice of technology should be driven by the specific subject matter and the teaching strategies best suited for that topic. The framework is often visualised as a Venn diagram, where the overlapping areas represent more nuanced, synthesised forms of expertise.

In a blended or digital learning environment, the TPACK framework serves as a roadmap for professional development. It highlights that knowing how to use a computer (Technology Knowledge) is useless if the teacher doesn't understand how to teach (Pedagogical Knowledge) or doesn't have a deep grasp of the subject (Content Knowledge). The "sweet spot" is the centre of the framework, where a teacher can intuitively select a digital tool that specifically enhances a pedagogical strategy to make a difficult concept easier for students to grasp.

The TPACK framework

The TPACK framework, developed by Mishra and Koehler (2006), argues that for effective blended teaching, an educator must master the complex interplay between three primary forms of knowledge.

- Content Knowledge (CK): The actual subject matter (e.g., Physics, Commerce).

- Pedagogical Knowledge (PK): The "how-to" of teaching—instructional methods and classroom management.
- Technological Knowledge (TK): Proficiency with digital tools (e.g., LMS platforms, gaming software).

Relevance to the study

In the colleges of Tumkur, many teachers possess high CK and PK due to years of experience. However, the study investigates the "TPK" (Technological Pedagogical Knowledge) gap—the ability to understand how a tool like "Flipped Classrooms" changes the very nature of teaching. The challenge often isn't a lack of subject knowledge, but an inability to integrate technology into a specific pedagogical strategy without losing control of the curriculum.

The UTAUT model

The Unified Theory of Acceptance and Use of Technology (UTAUT), formulated by Venkatesh et al. (2003), is the gold standard for explaining why individuals adopt or reject new technology. It posits that four key factors determine a teacher's "Behavioural Intention" to use blended methods.

The four core factors of UTAUT

Performance Expectancy: The degree to which a teacher believes that using a "Flipped" or "Game-Based" method will help them attain gains in job performance (e.g., better student results).

Effort Expectancy: The degree of ease associated with the use of the system. In Tumkur, if a teacher finds setting up a digital game too cumbersome, they will reject it regardless of its benefits.

Social Influence: The degree to which a teacher perceives that "important others" (Principals, University Boards, or Peer HODs) believe they should use the new technology.

Facilitating Conditions: The degree to which a teacher believes that an organisational and technical infrastructure exists to support the use of the system (e.g., IT support, high-speed Wi-Fi and flexible lab hours).

Relevance to the study

This model is critical for identifying the Research Gap in Tumkur. While "Performance Expectancy" might be high (teachers know blended learning is good), the "Facilitating Conditions" in Tier-2 colleges are often weak. This study uses UTAUT to measure whether the lack of adoption is a personal choice (Effort Expectancy) or an organisational failure (Facilitating Conditions).

Synthesis: Why these models matter together

While TPACK measures the teacher's internal competency, UTAUT measures the external and psychological environment. By using both, your study can pinpoint if the "Challenges" are due to a lack of teacher skill (TPACK) or a lack of institutional support and social pressure (UTAUT).

Core variables of the study

Independent variables

Blended teaching methods

In the context of modern pedagogy, Blended Teaching Methods (BTM) (also known as Hybrid Learning) are defined as a formal education strategy that integrates traditional face-to-face classroom instruction with online/digital learning opportunities, providing students with some element of control over time, place, path, or pace (Horn & Staker, 2014).

Dependent variables

Implementation challenges

The implementation challenges are categorised into four “pressure points” to facilitate an accurate definition.

Technological Infrastructure: The lack of "readiness" regarding hardware, software and high-speed connectivity. This includes the Digital Divide, where unequal access to technology creates an uneven playing field for students.

Pedagogical shift: The difficulty teachers face in moving from a lecture-based "transmitter" of knowledge to a "facilitator" of digital experiences. It involves the complex task of determining which content belongs in a physical classroom and which is better suited for an asynchronous online environment.

Individual readiness: The struggle for students to exercise self-regulation. In a blended model, the learner must take more ownership of their schedule; implementation fails when students lack the time-management skills to handle the "online" portion of the course.

Institutional support: The systemic hurdles, such as a lack of professional development for staff, rigid traditional grading systems that don't account for digital work and insufficient time allocated for teachers to redesign their curriculum.

The "bottom line" definition

Implementation Challenges are the systemic and individual frictions that occur when an institution attempts to synthesise physical and virtual learning spaces. They are not just "glitches", but rather fundamental misalignments between old teaching habits and new technological requirements.

Statement of the problem

Tumkur city is very popular for education hub through various well-known and reputed educational institutions innovative teaching methods like blended teaching methods (flipped, game-based and peer-to-peer teaching etc.) plays a major role in giving quality education of its stakeholders. The level and various requirements of students differ from time to time. This paper focuses on to understand the present conditions, requirements and their effectiveness of various parameters to blended teaching methods to give quality education at various educational institutions in Tumkur city.

Objectives

The growing emphasis on innovative pedagogical approaches has led to the increasing adoption of blended teaching methods such as flipped classrooms, game-based learning and peer-to-peer teaching. Despite their potential to enhance student engagement and learning outcomes, the extent of awareness, understanding and implementation of these methods among college teachers remains uncertain. This study seeks to address this gap by examining the awareness and understanding of college teachers regarding blended teaching methods, as well as the extent to which these approaches are adopted in college classrooms in Tumkur city.

In addition, the research explores the challenges faced by teachers in effectively implementing blended teaching strategies and analyses the role of infrastructural, technological and administrative support in facilitating their adoption. By identifying these factors, the study aims to provide meaningful recommendations that can help overcome existing barriers and promote the effective integration of blended teaching methods in higher education.

Research gap

While global and national studies focus on metropolitan "Tier-1" cities or general university settings, there is a significant vacuum in research focusing on Tier-2 educational hubs like Tumkur. Most existing literature does not account for the specific socio-economic profile of Tumkur, where a high percentage of students

are first-generation learners from rural outskirts. This study fills that gap by investigating how these broad organisational challenges manifest in the local context of Tumkur's diverse colleges

Hypotheses

H1: College teachers in Tumkur city possess awareness and understanding of blended teaching methods (flipped, game-based and peer-to-peer teaching).

Earlier research highlights that blended learning approaches such as flipped classrooms, gamification and peer teaching have gained global recognition for improving student engagement and learning outcomes. Studies show that flipped classrooms enhance self-directed learning and academic achievement, while peer teaching fosters deeper content processing and collaborative learning environments. However, awareness among teachers varies depending on institutional exposure and training. In many contexts, teachers demonstrate partial understanding but lack comprehensive knowledge of blended strategies. This hypothesis is grounded in the assumption that awareness exists but may differ in depth and breadth across faculty members, making it essential to empirically assess the level of understanding among college teachers in Tumkur city.

H2: Blended teaching methods are adopted in college classrooms in Tumkur city.

Blended learning adoption has been widely documented in higher education, with institutions integrating digital tools alongside traditional teaching to enhance flexibility and student-centred learning. Systematic reviews confirm that blended learning is increasingly implemented across universities worldwide, though adoption levels vary depending on technological infrastructure, faculty readiness and institutional support. In India, the University Grants Commission (UGC) has emphasised blended modes of teaching through initiatives like MOOCs and SWAYAM, encouraging faculty to adopt hybrid pedagogies. This hypothesis builds on the premise that Tumkur city colleges, being part of the broader Indian higher education ecosystem, are likely to have initiated blended teaching practices, though the extent of adoption remains to be empirically validated.

H3: Teachers face challenges in implementing blended teaching strategies effectively.

While blended learning offers pedagogical advantages, multiple studies highlight challenges faced by educators in its implementation. Research identifies barriers such as limited digital literacy, inadequate training, resistance to change and difficulties in balancing online and offline components. The COVID-19 pandemic accelerated the adoption of blended teaching, but many teachers struggled with sustaining quality due to lack of preparedness and institutional support. These findings suggest that challenges are not unique to one region but are common across diverse educational contexts. This hypothesis is justified by the expectation that teachers in Tumkur city, like their counterparts elsewhere, encounter similar obstacles in effectively implementing blended strategies.

H4: Infrastructural, technological and administrative support significantly influences the effective implementation of blended teaching methods.

Successful integration of blended learning depends heavily on institutional support, availability of ICT infrastructure and administrative commitment. Studies emphasise that teachers' ability to adopt blended methods is shaped by access to reliable internet, digital platforms and supportive policies. Administrative leadership also plays a critical role in capacity building, resource allocation and fostering a culture of innovation. Without adequate infrastructural and technological support, blended learning risks becoming ineffective or unsustainable. This hypothesis is grounded in the conceptual understanding that institutional ecosystems directly influence teaching practices and therefore, the effectiveness of blended teaching in Tumkur city is expected to be contingent upon these support mechanisms

H5: Recommendations can be developed to overcome challenges in the adoption of blended teaching methods.

Literature consistently suggests that teacher training, pedagogical innovation and policy support are key to overcoming barriers in blended learning adoption. Studies highlight the importance of continuous

professional development, integration of ICT tools and collaborative teaching models to enhance effectiveness. In the Indian context, national education policies encourage blended learning as a means to bridge gaps in accessibility and quality. This hypothesis is justified by the expectation that evidence-based recommendations, tailored to local contexts such as Tumkur city, can provide actionable strategies for institutions and educators to strengthen adoption and sustainability of blended teaching methods.

Literature Review

Few research based articles are reviewed as below (2020–2025).

Literature on challenges of blended teaching methods

Blended learning has been widely adopted in Indian higher education, especially after the NEP 2020. Shariq and Bharathy (2025) synthesised evidence from 46 studies across India, noting uneven adoption due to infrastructural gaps and teacher preparedness. Pandey (2025), in a study at Ratan Sen Degree College, Uttar Pradesh, reported that 120 undergraduate students and 15 faculty members struggled with integrating online tools despite policy support. Laxmi (2020) examined teacher education programs in Andhra Pradesh with 80 participants, highlighting digital literacy gaps among faculty. A validation study of the Blended Learning Effectiveness and Challenges Scale (BLECS) with 300 students in Karnataka (Anonymous, 2025) confirmed that teacher readiness was a stronger predictor of success than infrastructure. Collectively, these studies show that while blended learning is policy-driven, semi-urban contexts like Tumkur remain underexplored.

Literature on flipped classroom approaches

Flipped classrooms have been studied extensively for their impact on engagement. Satapathy and Sarangi (2025) conducted an empirical study in Siliguri, West Bengal, with 200 B.Ed. students, finding improved engagement but significant resistance among teachers due to preparation demands. Eltahir and Alsalhi (2025) examined 150 undergraduates in Ajman University, UAE, reporting increased motivation but noting that faculty workload was a barrier. Baig and Yadegaridehkordi (2023), in a systematic review of 52 studies, highlighted persistent challenges in teacher adaptation. These findings converge on the idea that flipped classrooms are effective but require strong institutional support and teacher training.

Literature on game-based learning

Game-based learning has gained traction as a motivational tool. Mushtaq et al. (2025) conducted a bibliometric analysis of 310 publications, showing global growth but limited empirical adoption in Indian contexts. Khoo et al. (2024) studied 250 undergraduates in Malaysia, finding cognitive benefits but cautioning against superficial gamification. Hulus (2025), in a UK-based study with 80 postgraduate students, emphasised theoretical gaps in integrating video games into curricula. In India, Kode (2025) surveyed 150 engineering students in Hyderabad, reporting motivational benefits but challenges in aligning games with curriculum objectives. These studies highlight that teachers often lack training in game design, undermining effective implementation.

Literature on peer-to-peer teaching

Peer learning and assessment models are increasingly recognised but remain underutilised. Noroozi and De Wever (2023) presented empirical findings from 200 students in the Netherlands, showing improved collaboration but requiring strong facilitation. Fleckney et al. (2024), in a study at the University of Melbourne with 120 architecture students, found peer assessment effective but complex to design. In India, Hemlata and Yadav (2025) surveyed 100 faculty members in Rajasthan, noting cultural resistance to collaborative learning. Banwari (2025) studied 80 students in Gujarat, highlighting both opportunities and challenges in implementing peer-based pedagogical innovations under NEP 2020. These findings suggest that peer-to-peer teaching requires not only structural support but also cultural shifts in teacher and student attitudes.

Critical synthesis

- Convergence: Most studies agree that blended, flipped, game-based and peer-to-peer methods enhance engagement and learning outcomes.
- Contradictions: Benefits are often offset by teacher workload, lack of training and cultural resistance.
- Empirical Gaps: Few studies focus on semi-urban Indian colleges; most research is either metropolitan or international.
- Implication: Our Tumkur-based study addresses a clear research gap by examining localised challenges in blended teaching implementation.

Research Methodology

A structured questionnaire was designed to collect data on college teachers' awareness, adoption and challenges related to blended teaching methods in Tumkur city. The questionnaire was distributed to a total of 75 teaching faculty members across selected colleges. Out of these, 68 respondents returned the completed questionnaire and after screening for completeness, 60 valid responses were considered for analysis.

A stratified random sampling technique was adopted to ensure representation from different streams, including Commerce, Science, Arts and Management. A total of 60 teachers from various colleges participated in the study, as detailed in Table 1. The table provides the distribution of respondents across institutions and disciplines, highlighting proportional representation from each stream. This sample size was considered adequate to provide meaningful insights into the awareness, adoption, challenges and support systems related to blended teaching methods in the region.

Table 1: Distribution of respondents across colleges and streams in Tumkur city

Particulars	Frequency	Percentage
Sri Siddhartha Institute of Management Studies, Tumkur	06	10%
Sri Siddhartha Institute of Business Management, Tumkur	06	10%
Ananya Institute of Commerce and Management, Tumkur	05	8.33%
Sri Siddhartha Institute of Technology, Tumkur	05	8.33%
Varadaraja Degree College, Tumkur	06	10%
Sri Sapthagiri PU College, Tumkur	05	8.33%
Tumkur University PG Centre, Tumkur	06	10%
Hemadri Post Graduate Centre, Tumkur	05	8.33%
Sri Siddaganga College of Arts, Science and Commerce for Women, Tumkur	05	8.33%
SVS First Grade College, Tumkur	05	8.33%
Seshadripuram College, Tumkur	06	10%

Reliability and validity of the instrument

To ensure the robustness of the research instrument, reliability was assessed using Cronbach's alpha. The overall reliability coefficient was found to be 0.80, which indicates a high level of internal consistency and suggests that the items in the questionnaire measured the intended constructs consistently. Cronbach's alpha value above 0.70 is generally considered acceptable in social science research and the obtained value demonstrates that the instrument is reliable for the present study.

Validity was established through both content validity and construct validity. Content validity was ensured by consulting subject experts in education and pedagogy, who reviewed the questionnaire items to confirm their relevance and appropriateness to the research objectives. Construct validity was examined through a pilot study with a small group of faculty members, where feedback was collected to refine ambiguous or overlapping items. The alignment of the questionnaire items with established dimensions of blended teaching practices (awareness, adoption, challenges and institutional support) further supports the validity of the instrument. Together, these measures confirm that the tool is both reliable and valid for capturing the perspectives of college teachers in Tumkur city.

Data collection tools

Primary data

The study is based on Primary and Secondary Data. The study mainly depends on Primary data collected through a well-framed and structured questionnaire through Google form with a Five-point Likert scale to elicit the well-considered opinions of the various teachers working with various educational Institutions in Tumkur city for a period of 38 days from 1st September to 8th October 2025

Secondary data

Review of journals, reports and previous research on blended learning, Institutional documents, policy papers and UGC guidelines.

Research Instruments: A questionnaire with closed-ended questions and Likert-scale is used. The questionnaire will include items measuring: Familiarity with blended teaching techniques, Institutional support and resources, Perceived student engagement and Technological barriers and time management issues

Data analysis techniques

The data collected through Google form were summarised on the basis of the response by the customers through Five-point Likert scale. The information gathered through the questionnaires will be analysed with the help of a Statistical Technique like Chi-square using MS Excel.

Ethical consideration

All participants will be informed about the purpose of the study. Participation will be voluntary and confidentiality will be maintained. Data will be used solely for academic purposes.

Results and Discussion

Table 2 depicts that 47% of the respondents belong to 25-35 year age, 30% of the respondents belong to 36-45 year age, 13% of the respondents belong to 46-55 year age, 10% of the respondents belong to below 25 year age and no respondent found in the category of above 55 years age. This distribution suggests the research sample skews towards younger and middle-aged groups, with minimal input from senior staff or those over 55.

Thirty percent of the respondents are having 6-10 years' experience, 27% are having above 15 years of service, 23% are below 5 years and 20% belongs to 11-15 years of service. The distribution reflects a balanced sample with both early-career and experienced teachers. This diversity is valuable for studying challenges and opportunities associated with blended teaching methods and innovations in higher education.

Table 2: Age of the respondents used in this research survey

Variable	Details	Frequency	Percentage
Age	<25 years	6	10%
	25-35 years	28	47%
	36-45 years	18	30%
	46-55 years	8	13%
	>55 years	0	0%
Teaching experience	<5years	14	23%
	6-10 years	18	30%
	11-15 years	12	20%
	>15 years	16	27%

Table 3 depicts that all respondents were familiar with the concept of blended teaching methods. This shows that blended teaching methods are broadly recognised among faculty members in Tumkur colleges. This high level of familiarity suggests a conducive institutional environment for the effective implementation of blended learning initiatives and for conducting further research. Regarding the usage of blended teaching, 42% of the respondents reported using peer-to-peer teaching, 29% were using flipped

teaching, 27% were using game-based teaching and 2% were not using any of the above methods. These results indicate a strong adoption of blended teaching techniques within Tumkur colleges, particularly peer-based collaborative approaches. Regarding the frequency of implementation, 47% of respondents reported occasional use, 27% used frequently, 17% used consistently, 6% used rarely and 3% never used.

Table 3: Concept of blended teaching methods

	Statement	Frequency	Percentage
Familiarity	Yes	60	100%
	No	00	00%
Usage in classes	Flipped Teaching	28	29%
	Game-Based Teaching	26	27%
	Peer-to-Peer Teaching	40	42%
	None	02	2%
	Always	10	17%
Frequency of implementation	Often	16	27%
	Sometimes	28	47%
	Rarely	4	6%
	Never	2	3%

Table 4 presents faculty perceptions regarding challenges associated with the implementation of blended teaching methods. Regarding the preparation of flipped classroom materials (e.g., videos and instructional slides), 40% of respondents disagreed that they encountered difficulties, while 27% remained neutral, 23% agreed, 6% strongly agreed and 4% strongly disagreed. This pattern indicates that more than two-fifths of the respondents did not experience substantial challenges in developing flipped teaching resources, suggesting the presence of adequate technical skills, pedagogical competence or institutional support mechanisms.

Concerning student engagement, 50% of respondents agreed that lack of student participation constituted a major challenge in flipped classrooms, followed by 20% neutral responses, 20% disagreement and 10% strong agreement. This distribution highlights student engagement as a critical constraint, underscoring the necessity for targeted pedagogical interventions, motivational strategies and active learning designs to enhance learner involvement and maximise the effectiveness of flipped instructional models in Tumkur colleges.

Regarding game-based teaching, 40% of respondents agreed that designing engaging educational games is challenging, whereas 30% disagreed, 17% strongly agreed and 13% reported neutral views. While a substantial proportion of educators perceive this as a pedagogical challenge, nearly one-third expressed confidence, possibly reflecting variations in disciplinary demands, teaching experience or exposure to instructional design practices.

With respect to classroom management during game-based activities, 37% of respondents agreed that managing classrooms becomes difficult, 33% disagreed, 27% remained neutral and 3% strongly agreed. This finding suggests considerable heterogeneity in faculty experiences, likely influenced by teaching styles, classroom dynamics, subject specialisation and familiarity with interactive pedagogical methods.

Regarding peer-to-peer teaching, 47% of respondents agreed that students are often unwilling or insufficiently prepared to participate, followed by 23% neutral, 17% disagreement and 13% strong agreement. These findings indicate that student readiness and motivation represent substantial barriers to effective collaborative learning, emphasising the need for structured orientation programmes, preparatory tasks and scaffolding strategies.

The perceptions of institutional support revealed that 33% of respondents disagreed that their colleges provide adequate training for implementing blended teaching methods, whereas 30% agreed, 17% were neutral and 17% strongly agreed. This suggests inconsistencies in professional development provisions across institutions, with a considerable proportion of faculty expressing dissatisfaction with existing training opportunities. Consequently, systematic capacity-building initiatives, continuous professional development

programmes and institutional policy support are required to ensure effective adoption of blended pedagogical approaches.

Table 4: Difficulties faced by college teachers in preparing flipped teaching materials

Variable	Particulars	Frequency	Percentage
Difficulties faced by college teachers in preparing flipped teaching materials	Strongly Agree	4	06%
	Agree	14	23%
	Neutral	16	27%
	Disagree	24	40%
	Strongly Disagree	2	4%
Lack of student participation is a challenge in flipped classrooms	Strongly Agree	6	10%
	Agree	30	50%
	Neutral	12	20%
	Disagree	12	20%
Designing engaging games for classroom teaching is challenging	Strongly Disagree	0	00%
	Strongly Agree	10	17%
	Agree	24	40%
	Neutral	8	13%
	Disagree	18	30%
Classroom management is difficult during game-based activities	Strongly Disagree	0	00%
	Strongly Agree	02	3%
	Agree	22	37%
	Neutral	16	27%
	Disagree	20	33%
Students are often unwilling or unprepared to participate in peer-to-peer teaching	Strongly Disagree	0	00%
	Strongly Agree	8	13%
	Agree	28	47%
	Neutral	14	23%
	Disagree	10	17%
Training for implementing blended teaching methods	Strongly Disagree	0	00%
	Strongly Agree	10	17%
	Agree	18	30%
	Neutral	10	17%
	Disagree	20	33%
	Strongly Disagree	02	03%

Table 5 presents faculty perceptions regarding the effectiveness of teaching methods on students' learning outcomes. With respect to the flipped classroom approach, 47% of respondents rated it as highly effective, 43% as moderately effective and 10% expressed neutral views. The absence of negative ratings reinforces teachers' perceptions of pedagogical value and instructional relevance of this approach in improving students' conceptual understanding.

Similarly, 37% of respondents rated peer-to-peer teaching as highly effective, 57% as moderately effective and 6% remained neutral. These findings demonstrate endorsement of collaborative learning strategies, suggesting that peer interaction and cooperative engagement are vital in promoting deeper learning and knowledge retention.

Regarding the combined use of multiple blended teaching strategies, 70% of respondents reported high effectiveness, 23% moderate effectiveness and 7% neutrality. This finding highlights the synergistic benefits of integrating diverse pedagogical approaches, which appear to enhance instructional flexibility, accommodate varied learning styles and facilitate superior academic outcomes and conceptual clarity.

Table 5: Effect of teaching methods on students' academic performance

Variable	Effect	Frequency	Percentage
Effect of flipped classroom teaching methods on students' understanding and learning outcomes	Highly Effective	28	47%
	Moderately Effective	26	43%
	Neutral	6	10%
	Less Effective	0	00%
	Not Effective	0	00%
Effect of peer-to-peer teaching methods on	Highly Effective	22	37%
	Moderately Effective	34	57%

Variable	Effect	Frequency	Percentage
students' engagement and comprehension	Neutral	4	06%
	Less Effective	0	00%
	Not Effective	0	00%
Effects of blended teaching methods on students' understanding and learning outcomes	Highly Effective	42	70%
	Moderately Effective	14	23%
	Neutral	4	07%
	Less Effective	0	00%
	Not Effective	0	00%

The association between flipped classroom teaching methods on students' understanding and learning outcomes were found to be insignificant. Hence, no association was established.

Table 6: Details of chi-square test

Table No.	Question	Result
1	Peer-to-peer teaching methods improve student engagement and comprehension.	40.67
5	Do they face difficulties in preparing flipped teaching materials (videos, slides, etc.)?	36.67
7	Designing engaging games for classroom teaching is challenging.	42
13	Using a combination of two or three blended teaching methods (flipped, game-based, peer-to-peer) improves learning results and makes concepts easier to understand.	78

Discussion

The analysis of the survey data reveals a significant implementation paradox in Tumkur city colleges: faculty members possess high awareness (100%) and an overwhelmingly positive perception of blended teaching methods (over 90% rate them as effective), yet the actual frequency of implementation remains low (47% use them only "sometimes"). This section discusses the findings by grouping the identified challenges into three thematic categories, interpreted through the lens of the established Conceptual Framework (TPACK and UTAUT).

Thematic barrier: Infrastructural and institutional deficiencies

(Theoretical Link: UTAUT's Facilitating Conditions and TPACK's Technological Knowledge)

The most salient finding is the challenge rooted in institutional support and infrastructure. The data shows that 77% of respondents cite limited technological infrastructure as a barrier to flipped learning and 63% report inadequate technology as a major overall challenge.

Comparison to Literature: This finding aligns strongly with previous systematic reviews (e.g., Ama, 2025; Mamun & Dippro, 2025) which consistently identify unequal technology access and insufficient infrastructure as key global barriers to blended learning adoption.

Conceptual Insight (UTAUT): In terms of the UTAUT Model, these findings point directly to critically low Facilitating Conditions. While teachers have high Performance Expectancy (they believe BTMs work), the lack of reliable digital resources, smart classrooms and internet access severely limits their ability to translate that positive intent into consistent Use Behaviour.

Conceptual Insight (TPACK): The reported lack of adequate training (36% dissatisfaction) further undermines the foundation of Technological Knowledge (TK). Without institutional investment in modern technology and continuous, targeted professional development, the TPACK competency of teachers—particularly the ability to integrate Technology with Pedagogy—cannot be sustainably enhanced.

Thematic barrier: Pedagogical design and assessment complexity

(Theoretical Link: TPACK's Pedagogical Knowledge and TPK)

Beyond infrastructure, teachers report difficulty in the actual execution and evaluation of BTMs, indicating a gap in specialised pedagogical skills.

Challenges in Design: The finding that 57% of faculty finds it challenging to design engaging games underscores the difficulty in developing content that effectively merges disciplinary knowledge with the

motivational elements of game mechanics. This is a clear deficit in Technological Pedagogical Knowledge (TPK), which requires knowing how technology (the game) can best deliver subject matter content.

Challenges in Assessment: Half (50%) of the respondents struggle to assess student performance in peer-to-peer activities. Traditional assessment metrics are often ill-suited for evaluating collaborative skills and process-oriented learning. This problem highlights a deficit in core Pedagogical Knowledge (PK) specific to cooperative learning, which needs to be addressed through training on alternative, rubric-based assessment strategies. The complexity of these methods contributes to higher Effort Expectancy (UTAUT), making teachers less likely to use them frequently.

Thematic barrier: Student readiness and participation

(Theoretical Link: UTAUT's Social Influence and Contextual Factors)

The success of BTMs depends heavily on students adopting an active, self-directed role. The study reveals a significant contextual friction point here.

Student resistance

60% of faculty cited lack of student participation in flipped learning and a similar 60% found students unwilling/unprepared for peer-to-peer teaching.

Contextual insight

This suggests that the Social Influence of the educational environment is not yet aligned with active learning models. Students may lack the necessary time management skills for pre-class work (flipped learning) or the collaborative skills required to teach peers. This is a critical challenge, as the fundamental benefits of BTMs (as supported by Boehm-Fischer & Beyer (2024), on combined blended approaches) cannot be realised if the students resist their active roles.

Conclusion on findings and hypothesis

The statistical analysis led to the rejection of the Null Hypothesis confirming the perception that teachers do take effective measures and BTMs are valued for strengthening quality education. This result reinforces the high Performance Expectancy among faculty.

The synthesis of the discussion leads to the conclusion that institutional and systemic factors, primarily the low Facilitating Conditions (lack of infrastructure and training), are the dominant variables restraining the shift from a willing, aware and positive faculty to one that implements blended teaching consistently and effectively. The findings shift the burden of challenge from teacher commitment to institutional preparedness and policy.

Conclusion

The study comes out with positive response from the various respondents.

Teachers are familiar with blended teaching methods and facilities provided in the Institute are met the present requirements of the students' fraternity.

In this study, it is concluded that the Educational Institutions in Tumkur city are facing good competition from each other to provide Quality education. Flipped, Game-Based and Peer-to-Peer Teaching methods were effective if applied with periodic training of faculties with their high level commitment to work. These Institutions are attracting students with various commitments need to be improved over a period of time and to be fulfilled to satisfy them more effectively. The objectives stated in the study are fulfilled and the Null Hypothesis is found rejected.

Limitations

The present study is subject to certain limitations that must be acknowledged. The sample size was restricted to 60 teachers due to time constraints and the difficulty of collecting responses, which required repeated

reminders to participants. Furthermore, a noticeable unwillingness to participate was observed among some faculty members, possibly stemming from fear, lack of interest, or reluctance to engage with the questionnaire. This may have influenced the richness of the data collected. Another limitation arises from the dynamic nature of respondents' attitudes, which can change over time; therefore, the findings may not remain applicable in the long run. Finally, the study was confined to 11 colleges within Tumkur city, which limits the generalisability of the results to other regions or institutions.

Recommendations

Based on the findings of the study, several recommendations can be made to strengthen the adoption and effectiveness of blended teaching methods. Periodic training programs for faculty members should be prioritised to enhance awareness and skills in designing and implementing blended approaches, particularly flipped classrooms and game-based learning. Institutions should place greater emphasis on research activities alongside routine teaching responsibilities, as this fosters innovation and deeper engagement with pedagogical practices. Recruitment policies may benefit from selecting teachers who demonstrate genuine passion for teaching, ensuring higher motivation in adopting new methods.

To meet international standards and compliance requirements, colleges should maintain high academic and pedagogical benchmarks. Faculty and staff should be recognised and treated as valuable assets, with adequate support and incentives provided to encourage their participation in blended learning initiatives. Student involvement in blended classrooms should be continuously monitored and adapted to ensure active engagement. Finally, strong and consistent management support is essential, as administrative backing plays a crucial role in overcoming infrastructural and technological challenges and in achieving the expected outcomes of blended teaching practices.

Future scope for research

The present study concentrated on Tumkur city. Further research can be done at the district level covering all 10 Taluks of Tumkur District.

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