

# ICT Skills Among Secondary Teachers in Tamil Nadu and Kerala

Dr. Ethan Carter

Department of Digital Systems  
Toronto School of Engineering, Canada

## ABSTRACT

Information and Communication Technology (ICT) has become integral to contemporary schooling in India, yet disparities in teachers' digital competencies continue to influence classroom practice. This study investigates the level, patterns, and determinants of ICT skills among secondary school teachers in Tamil Nadu and Kerala—two southern states with contrasting governance models but comparable human development indicators. Using a cross-sectional survey of 300 teachers (150 from each state) complemented by semi-structured follow-ups, the research measures four dimensions of ICT competence: basic operational literacy, pedagogical integration, content creation, and digital citizenship/ethics. Descriptive statistics, composite skill indices, and independent sample t-tests reveal that while both cohorts demonstrate adequate basic literacy, Kerala teachers score significantly higher on pedagogical integration and digital ethics, whereas Tamil Nadu teachers show marginally better proficiency in multimedia content creation.

Regression analysis highlights prior formal training, institutional ICT infrastructure, and peer support communities as significant predictors of higher ICT skill indices. Qualitative insights underscore time constraints, exam-centric culture, and language barriers as persistent obstacles. The study concludes with recommendations for continuous, context-sensitive professional development, school-level mentoring structures, and state-led frameworks for open educational resources (OER) in local languages. The findings contribute evidence for policy harmonization and scalable teacher capacity-building in India's digital education ecosystem.

## KEYWORDS

*ICT skills; secondary teachers; Tamil Nadu; Kerala; digital pedagogy; teacher professional development; survey research*

## INTRODUCTION

The rapid infusion of Information and Communication Technology (ICT) into education has redefined how classrooms are organized, how content is delivered, and how student learning is assessed. In India, government initiatives—ranging from the National Policy on ICT in School Education to state-specific digital classrooms—have attempted to mainstream technology use. Yet, teachers' ICT skills remain the linchpin determining whether infrastructure translates into meaningful learning experiences. Secondary school teachers, straddling adolescence and board examination pressures, must simultaneously manage curricular demands and integrate digital tools purposefully.

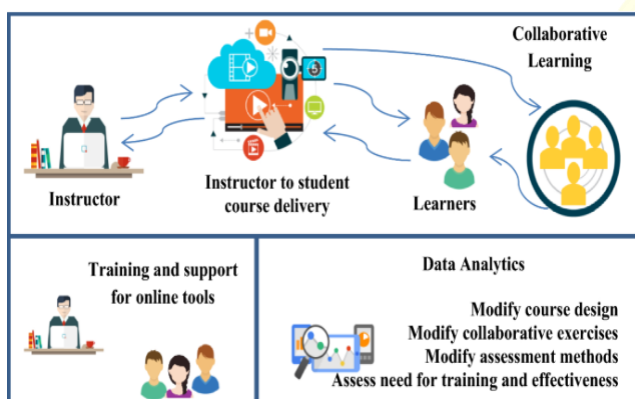


Fig.1 ICT Skills Among Secondary Teachers, [Source\(\[1\]\)](#)

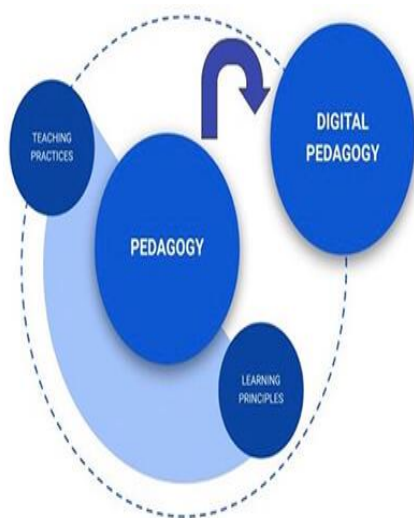


Fig.2 Digital pedagogy, [Source\(\[2\]\)](#)

Tamil Nadu and Kerala present compelling cases for comparative inquiry. Both states boast high literacy rates and proactive welfare policies. Kerala is celebrated for its grassroots participatory planning and a strong public education ethos, while Tamil Nadu is recognized for its large-scale schemes (e.g., free laptops to students) and competency-based training programs. Understanding teachers' ICT skill levels in these contexts can reveal transferable practices and persistent gaps.

This manuscript aims to (a) profile ICT skill levels among secondary teachers in the two states, (b) compare differences across key dimensions, (c) identify institutional and personal predictors of higher competence, and (d) recommend policy and practice interventions. The research adopts a survey-based methodology, complemented by limited qualitative probes, to provide a holistic picture.

## LITERATURE REVIEW

### 2.1 ICT Competence Frameworks in Education

Global frameworks (e.g., UNESCO's ICT Competency Framework for Teachers) emphasize three progressive stages: technology literacy, knowledge deepening, and knowledge creation. Indian scholarship has adapted these ideas, underscoring contextual constraints such as multilingual classrooms, uneven infrastructure, and examination culture.

Studies in metro cities show teachers often use ICT for presentation and information retrieval rather than for student-centred, collaborative learning.

### 2.2 Indian State-Level Initiatives

Kerala's IT@School (now KITE) has been praised for distributed training models, free software advocacy, and integrating ICT into lesson plans. Tamil Nadu's initiatives, including mandatory ICT training modules for B.Ed. students and the provision of hardware to schools, have focused on access and initial familiarity. However, systematic assessments of teachers' post-training competencies are sparse.

### 2.3 Barriers to ICT Integration

Barriers identified across Indian contexts include lack of time, insufficient technical support, limited pedagogical models for ICT use, and fear of loss of control in classrooms. Teacher beliefs, perceived usefulness, and school culture significantly affect adoption. Language plays a role, as many resources remain English-centric, posing challenges in vernacular-medium schools.

### 2.4 Gaps Identified

Existing research seldom compares states with similar development indicators but differing policy trajectories. Few studies disaggregate ICT competence into nuanced domains beyond "basic" and "advanced." Additionally, there is limited integration of quantitative findings with teacher narratives to yield actionable recommendations. This study addresses these gaps by constructing a multidimensional index and situating statistical patterns alongside teachers' voices.

## METHODOLOGY

### 3.1 Research Design

A descriptive-comparative survey design was employed. The primary instrument was a structured questionnaire with Likert-type items and performance-based self-report

checklists. An embedded qualitative component used open-ended prompts to capture contextual challenges and supports.

### 3.2 Sampling and Participants

Using stratified random sampling, 300 secondary teachers were selected: 150 from Tamil Nadu and 150 from Kerala. Strata included school management type (government, aided, private) and urban–rural location. Inclusion criteria were: (i) actively teaching Classes IX–XII, and (ii) at least one year of service in the current school.

### 3.3 Instrumentation

The questionnaire comprised five sections:

1. **Demographics & Professional Background:** age, gender, subject, years of experience, prior ICT training.
2. **Basic Operational Literacy (BOL):** operating devices, file management, internet navigation (10 items).
3. **Pedagogical Integration (PI):** using ICT for lesson planning, formative assessment, collaborative activities (12 items).
4. **Content Creation & Multimedia (CCM):** creating presentations, screencasts, interactive quizzes, OER adaptation (8 items).
5. **Digital Citizenship & Ethics (DCE):** copyright, data privacy, cyberbullying awareness, responsible communication (6 items).

Items were scored on a 5-point scale (1 = Not competent, 5 = Highly competent). Cronbach's alpha for the overall scale was 0.87, indicating good internal consistency. A pilot with 30 teachers (excluded from final sample) was conducted to refine ambiguous items.

### 3.4 Data Collection Procedure

Data were collected between January and March 2025. Surveys were administered both online (Google Forms) and

offline (paper-based) depending on school connectivity. Consent forms assured anonymity and voluntary participation. Follow-up phone calls/virtual interviews (n = 24) probed reasons behind high/low usage patterns.

### 3.5 Data Analysis

Descriptive statistics (means, standard deviations) were computed for each domain. A composite ICT Skill Index (ICTSI) was created by averaging standardized domain scores. Independent samples t-tests compared state-wise means. Multiple linear regression examined predictors (training hours, infrastructure adequacy, peer support, attitude scores) on ICTSI. Qualitative responses were thematically coded.

## RESEARCH CONDUCTED AS A SURVEY

The survey asked teachers to rate their competence and frequency of ICT use in classroom tasks. Sample items included: "I can design a quiz on a digital platform and analyze responses to inform remedial teaching" (PI domain) and "I am aware of Creative Commons licensing and can attribute digital resources properly" (DCE domain). In addition to self-ratings, respondents reported access indicators (number of functional computers per class, availability of projectors, internet reliability) and professional development experiences.

To reduce social desirability bias, items were framed around specific tasks rather than generic attitudes. The inclusion of open-ended questions allowed triangulation of self-reports with narratives about actual classroom implementation.

## RESULTS

### 5.1 Descriptive Profiles

- **Basic Operational Literacy (BOL):** Overall mean = 4.08 (SD = 0.54). No significant difference between states (TN = 4.05; KL = 4.11).

- **Pedagogical Integration (PI):** Overall mean = 3.32 (SD = 0.71). Kerala mean (3.48) higher than Tamil Nadu (3.16),  $t(298) = 3.19, p < .01$ .
- **Content Creation & Multimedia (CCM):** Overall mean = 3.01 (SD = 0.80). Tamil Nadu mean (3.12) slightly higher than Kerala (2.90),  $t(298) = 2.05, p < .05$ .
- **Digital Citizenship & Ethics (DCE):** Overall mean = 3.55 (SD = 0.65). Kerala mean (3.69) higher than Tamil Nadu (3.41),  $t(298) = 2.98, p < .01$ .
- **ICT Skill Index (ICTSI):** Kerala = 0.21 (z-score), Tamil Nadu = -0.21; difference significant at  $p < .01$ .

## 5.2 Predictors of ICT Skills

Regression analysis ( $R^2 = 0.41$ ) indicated:

- **Formal ICT Training Hours ( $\beta = 0.29, p < .001$ ):** The strongest predictor.
- **Infrastructure Adequacy ( $\beta = 0.22, p < .01$ ):** Composite of device-student ratio, internet uptime.
- **Peer Support/Communities of Practice ( $\beta = 0.18, p < .05$ ):** Participation in WhatsApp/Telegram teacher groups or in-school mentoring sessions.
- **Teacher Attitude Toward ICT ( $\beta = 0.15, p < .05$ ):** Measured via a 5-item scale adapted from Technology Acceptance Model constructs.

## 5.3 Thematic Insights

Qualitative coding produced three dominant themes:

1. **Time and Curriculum Pressure:** Teachers reported difficulty redesigning lessons due to board exam schedules.
2. **Language and Resource Localization:** Lack of high-quality Tamil/Malayalam OER pushed teachers to rely on English materials.

3. **Supportive School Culture:** Schools with ICT coordinators or informal peer mentors showed more sustained integration.

Illustrative quote: “I know how to make a quiz, but finding time to review analytics with 60 students per class is tough.” (Tamil Nadu teacher)

## 5.4 Challenges and Opportunities

Challenges included intermittent power/internet, fear of technology failure during observed classes, and inadequate recognition for digital innovation. Opportunities cited were state MOOCs for teachers, student digital clubs, and collaboration with local NGOs for content development.

## DISCUSSION

The findings confirm that basic operational literacy is no longer the principal hurdle; instead, pedagogical integration and ethical/digital citizenship dimensions need targeted attention. Kerala’s higher scores in these domains may reflect its long-standing emphasis on integrating ICT into curricular processes rather than treating it as an add-on. Tamil Nadu’s comparative strength in content creation suggests that access to devices and software (owing to state distribution schemes) has translated into practical multimedia skills, though not always into pedagogically transformative practices.

The predictors highlight that one-off workshops are insufficient: sustained training hours, coupled with meaningful infrastructure and collaborative communities, pave the way for deeper ICT adoption. Importantly, attitudes still matter; teachers who perceive ICT as enhancing learning outcomes invest more effort in integration.

The thematic insights resonate with existing literature on Indian schooling: exam-centric culture compresses teachers’ experimentation time; language accessibility of digital content remains a barrier; and school culture mediates individual motivation. Therefore, policies must address systemic pressures, not merely individual skill deficits.

## CONCLUSION

This study mapped ICT skills among secondary teachers in Tamil Nadu and Kerala through a multidimensional lens. Both states display strong basic literacy, but diverge in pedagogical use and ethical awareness. Kerala's emphasis on participatory, curriculum-integrated ICT appears to yield higher pedagogical and digital citizenship competence. Tamil Nadu's mass provisioning has built hardware familiarity and content creation skills, yet requires more structured pedagogical support.

Key recommendations include:

1. **Continuous Professional Development:** Shift from episodic workshops to modular, credit-bearing micro-courses with mentoring.
2. **School-Level ICT Mentors:** Identify and incentivize "ICT champions" to sustain peer support.
3. **Localized OER Development:** Encourage teachers to co-create Tamil/Malayalam resources under open licenses.
4. **Assessment Reform:** Align board assessments with digital pedagogy to reduce exam-driven resistance.
5. **Ethics and Safety Modules:** Integrate digital citizenship topics into both pre-service and in-service training.

Future research could explore longitudinal impacts of these interventions and extend comparisons to other Indian states. Mixed-methods designs with classroom observations would enrich understanding of actual practice versus self-report. Ultimately, enhancing teachers' ICT competencies is not just a technical challenge; it is a cultural and systemic endeavor that requires coherent policy, supportive school ecosystems, and teacher agency.

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