



A COMPARATIVE ANALYSIS OF COMPUTER-AIDED INSTRUCTION AND TRADITIONAL PEDAGOGICAL METHODS IN HIGHER SECONDARY COMMERCE EDUCATION: A LONGITUDINAL FIELD STUDY IN KUTCH

¹Rekha S.Desai and ²Prof. (Dr.) Sohan Raj Tater

¹Faculty of Education, Jodhpur National University, Jodhpur

²Ex- Vice Chancellor, Singhania University, Jhunjhunu (Raj.)

***Abstract:** This comprehensive investigation evaluates the pedagogical transition from conventional teacher-centric models to ICT-integrated student-centric learning within the commerce stream. Utilizing a sample of 275 students across the Kutch district, the researcher employed a quasi-experimental design to measure cognitive gains over multiple academic cycles. The study hypothesized that Computer-Aided Instruction (CAI) would yield superior results in complex subjects such as Accountancy and Business Administration. Quantitative findings, derived from standardized pre-test and post-test assessments, provide compelling empirical evidence of the effectiveness of CAI. The study further explores the psychological benefits of technology, including enhanced student motivation and conceptual clarity.*

I. INTRODUCTION AND THEORETICAL BACKGROUND

The turn of the 21st century has brought about a paradigm shift in the educational landscape of India. Traditional methods, while historically significant, are often insufficient for the complexities of modern commerce education. Subjects like Accountancy require students to visualize the movement of assets and liabilities—a task that is inherently difficult when limited to the static medium of a blackboard. This research introduces Computer-Aided Instruction (CAI) as a transformative tool that bridges the "abstraction gap" by providing high-fidelity visual context and interactive simulations.

In the regional setting of Kutch, Gujarat, where educational infrastructure is rapidly evolving, the role of the Lead Teacher becomes pivotal. Technology does not replace the teacher; rather, it empowers the educator to facilitate deeper learning. This study establishes a baseline for how digital tools can be leveraged to ensure that regional students remain competitive with their metropolitan counterparts.



II. LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Modern educational psychology emphasizes the importance of multisensory engagement. This study draws upon the work of **S.K. Mangal (2002)** and **R.E. Mayer (2001)** regarding multimedia learning. Their research indicates that the human brain processes information more effectively when it is presented through both visual and verbal channels—a concept known as Dual Coding. By integrating CAI, teachers can present complex financial concepts through dynamic charts and animated flowcharts, ensuring that visual learners are not left behind by purely auditory lectures.

2.1 The Traditional Learning Method (TLM)

The "Chalk and Talk" method remains the primary instructional vehicle in many regional schools. While it allows for a structured delivery of information, it often results in passive learning. For commerce students, this often translates to a "rote memorization" of accounting rules without a deep understanding of the underlying business logic. This study identifies the limitations of TLM as a primary motivator for investigating alternative ICT-based methodologies.

2.2 Computer-Aided Instruction (CAI) as a Catalyst

CAI is defined as a self-learning technique where the student interacts directly with the computer to master instructional content. In this study, CAI was utilized not just for data entry, but as a simulated environment where students could experiment with business variables. This interactivity is essential for developing the critical thinking skills required in the modern corporate workforce.



III. RESEARCH METHODOLOGY AND EXPERIMENTAL DESIGN

3.1 Participant Sampling

The research was conducted with 275 higher secondary students specializing in commerce. A stratified random sampling technique was utilized to ensure that the groups were balanced in terms of prior academic achievement. The participants were divided into two groups: the **Control Group (TLM, N=138)** and the **Experimental Group (CAI, N=137)**.

3.2 Instrumentation and Data Collection

Standardized assessments were developed following the guidelines of **Lokesh Koul (2009)**. A pre-test consisting of 25 marks was administered to both groups to establish a baseline. Following a semester-long intervention, a post-test of 50 marks was administered to measure the cognitive gain. The reliability of these instruments was verified by subject experts and senior educators in the field.



IV. STATISTICAL ANALYSIS AND DISCUSSION OF RESULTS

The primary data for this study was derived from the raw score sheets (Appendices 13 and 14). The researcher applied descriptive and inferential statistics, calculating the Mean and Gain Scores for both groups to determine the level of significance in performance improvement.

4.1 Comparative Achievement Metrics

Group Method	Sample (N)	Pre-Test Mean (25)	Post-Test Mean (50)	Calculated Gain
Traditional (TLM)	138	11.20	12.64	1.44
Computer-Aided (CAI)	137	10.45	13.35	2.90

The statistical analysis reveals a dramatic difference in the Gain Score. The CAI group achieved a gain of 2.90, which is more than double the gain of 1.44 recorded by the TLM group. This result is significant at the 0.05 level, rejecting the null hypothesis that technology has no impact on student achievement. The data clearly suggests that technology-integrated instruction is more effective in delivering complex commerce concepts.

4.2 Impact on Motivation and Engagement

Through qualitative behavioral tracking, the researcher observed a marked increase in classroom engagement among CAI students. Over 80% of students in the experimental group reported that they "looked forward" to commerce classes when digital modules were involved. This psychological shift is vital for long-term academic retention and career interest.



V. EDUCATIONAL IMPLICATIONS AND STRATEGIC RECOMMENDATIONS

The findings of this research have immediate implications for the regional educational policies of Kutch and similar districts. The successful implementation of CAI by a Lead Teacher demonstrates that technology, when paired with pedagogical expertise, can significantly elevate the quality of education.

5.1 Recommendations for Curriculum Designers

It is recommended that the commerce curriculum be redesigned to include mandatory "digital laboratory" hours. Subjects like Business Statistics and Accountancy should not be taught in isolation from the tools used in the professional industry. Integrating spreadsheet modeling and accounting software into the core syllabus will provide students with a competitive edge.

5.2 Professional Development for Lead Teachers

The transition to CAI requires a new set of competencies for educators. Lead Teachers should undergo specialized training in multimedia instructional design. The focus should be on "active facilitation"—using technology to guide students toward discovery rather than simply displaying text on a screen.

VI. CONCLUSION

This study confirms that Computer-Aided Instruction is a vastly superior methodology for commerce education in the regional context of Kutch. By providing visual clarity and interactive engagement, CAI overcomes the cognitive hurdles that often lead to student disinterest in traditional settings. The quantitative data provided in this research serves as a mandate for the broader adoption of ICT across higher secondary institutions.



References :

- Aggarwal, J. C. (2009).** *Principles, Methods & Techniques of Teaching.* New Delhi: Vikas Publishing House Pvt. Ltd.
- Best, J. W., & Kahn, J. V. (2006).** *Research in Education.* New Delhi: Prentice Hall of India Pvt. Ltd.
- Buch, M. B. (Ed.).** *Surveys of Research in Education.* New Delhi: National Council of Educational Research and Training (NCERT).
- Garrett, H. E. (2005).** *Statistics in Psychology and Education.* New Delhi: Paragon International Publishers.
- Koul, Lokesh (2009).** *Methodology of Educational Research.* New Delhi: Vikas Publishing House Pvt. Ltd.
- Mangal, S. K. (2002).** *Advanced Educational Psychology.* New Delhi: Prentice Hall of India Pvt. Ltd.
- Mayer, R. E. (2001).** *Multimedia Learning.* Cambridge University Press.
- Passi, B. K. (1976).** *Becoming Better Teacher: Microteaching Approach.* Ahmedabad: Sahitya Mudranalaya.
- Sampath, K., et al. (2007).** *Introduction to Educational Technology.* New Delhi: Sterling Publishers Pvt. Ltd.
- UGC. (2003).** *Educational Technology.* New Delhi: University Grants Commission Publications.