"Information & Communication Technology & Mathematics Teaching: an Interface and Its impact at Secondary Level Schools: A Study

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ABSTRACT

The application of modern technology represents a significant advance in contemporary Mathematics teaching methods. Indeed, Mohammad Reza Ahmadi (2018)maintains that electronic teaching programmes have become the predominant preference of instructors since they arguably boost positive student engagement with teachers and incentivize overall Mathematics learning.

Most contemporary Mathematics teachers now actively incorporate a range of technological aids designed to facilitate optimum teaching delivery. The current research therefore addresses various elements of the technology used in Mathematics teaching by devising innovative curricula which harnesses recent scientific and technical developments, equip instructors with the technological skills to ensure effective and quality subject delivery, provide technical media such as audio-visual and modern technical programmes, and create student-teacher platforms which maximize positive Maths learning outcomes.

For the purposes of this study, the relevant literature has to be reviewed, technology defined linguistically and conventionally, and correlated with modern teaching skills fully evaluated. In light of this, the researcher has to outline the fundamental research problem, elucidates the significance of the research objectives and hypotheses, and the findings. The paper will be concluded by offering a number of recommendations which may further contribute to the improvement of teaching methods by advancing the widespread application of modern technology.

Keywords*:modren,teaching,technology*

1.0 Introduction

The use of modern technology: Information& Communication Technology in teaching Mathematics is broadly understood to encompass an innovative application of methods, tools, materials, devices, systems, and strategies which are directly relevant to Mathematics teaching and lead to the achievement of the desired goals. Thus, while technology is now generally accepted as an important educational and auxiliary tool across a range of teaching and learning contexts, it is particularly true of Mathematics teaching since it affords a number of potential opportunities to enhance both the content and delivery of the pedagogies typically associated with traditional Mathematics instruction. This is primarily achieved by enabling the student and/or teacher to revisit problematic content time after time until it is fully understood and assimilated.

Familiarity with the concept of using modern technology is not merely limited to the use of modern appliances and devices, but rather obtains to the introduction of innovative systems and methods of teaching which facilitate faster and more comprehensive learning progression. According to prevailing pedagogical theories, in utilizing the learning potential of technology students are better able to acquire and hone their Maths knowledge and skills. The use of technology in teaching Mathematics consolidates the integrated view of the modern means system and association with other components which benefits students by achieving the required results.

The use of modern technology in Mathematics teaching has therefore become indispensable, especially in the wake of unprecedented developments across numerous fields and disciplines. It is essential that the education sector keep apace of the global technological revolution by adopting modern technological means such as computerization, multi-media devices, mobile phones, audio/visual effects applications, and social media, to optimize Mathematics instruction and equip teachers to connect with classroom Maths learners in a systematic and advanced way. The Internet provides easy, immediate, and virtually unlimited access to software, applications, and a host of ancillary platforms and materials which can expedite Mathematics teaching and learning. While these affordances may be widely available to all, it is noted that teachers often play a key role in operating the different tools and teaching methods. Moreover, many such programmes are specifically designed to promote effective Mathematics teaching whilst simultaneously increasing learner understanding and attainment of Mathematics skills.

Reasons for using I&C Technology in Mathematics Teaching

Jacqui Murray (2015) taxonomies the rationale for using technology in Mathematics teaching as follows:

1) Technology allows students to demonstrate independence.

2) Technology differentiates the needs of students.

3) Technology deepens learning by using resources that students are interested in.

4) Students actively want to use technology.

5)Technology gives students an equal voice.

6) Technology enables students to build strong content knowledge wherever they find it.

Merits of Using Technology in Mathematics Teaching

Mathematics-Maths students are highly implicated in and motivated by the use of the modern technology such as radio, TV, computers, the Internet, electronic dictionary, email, blogs, audio-visual aids, videos, and DVDs or VCDs (Nasser, 2017) as follows:

- The use of technology in teaching Mathematics is deemed interesting and motivating as the student reacts with the subject.
- Technology plays an important role in the process of teaching Mathematics by enhancing timely understanding, and thereby enabling students more learn more efficiently.
- Teachers perform more effectively when using modern technology since they can communicate with the students through a variety of ways.
- The use of modern technology enables both teachers and students to access a wealth of books, publications, and references which are directly relevant to the Mathematics curriculum.
- Modern technology encourages student self-sufficiency which better equips them for the future.
- Unlike traditionally passive teaching methods, modern technology teaching and learning aids incentivize both teacher and student.

Drawbacks of Using Technology in Mathematics Teaching

- Many teachers and students have limited access to modern technology.
- The role of the teacher can be relegated in cases where students become over-reliant on modern technology.
- It can reduce student social activities by consuming most of their free time.

2.0 Review of Related Literature

David Perry and Andy(2015) research article, Increasing Student Engagement, Self-Efficacy, and Meta-Cognitive Self-Regulation in the High School Geometry Classroom: Do iPads Help?, by Steck four questions were addressed. First, what is the effect of including iPads as part of geometry course instruction on student engagement? Secondly, what is the effect of including iPads as part of geometry course instruction on studentgeometry standards proficiency scores? Thirdly, what is the effect of including iPads as part of geometry course instruction on student self-reported levels of self-efficacy? Lastly, what is the effect of including iPads as part geometry course instruction on student self-reported levels of meta-cognitive self-regulation (Perry & Steck, 2015)? The study included 110 students along with two teachers that were broken up into two groups. One of

these groups consisted of 57 students that used the iPad in the geometry classroom whereas the other 53 students were in the non-iPad group. The iPad was used as the technology integration tool because of its portability, internet access, and because it is a user-friendly device. Both groups in the study were taught the same material but the presentation of the material along with student interaction with or without the iPad was the distinction between the groups. The premise behind the use of the iPad group was to engage the student with the belief that student engagement will bring a greater understanding of the material. Data was collected through teacher observation, student self-reporting, and student surveys. In response to the first question of student engagement, the iPad group confirmed the hypothesi

In another research article by Chen-Chung Liu, Chien-Chia Chou, Baw-Jhiune Liu, and Jui-Wen Yang (2006),wireless technology was hypothesized to assist students in the learning process and to assist in the studentteacher interaction. This particular study attempted to answer three questions that could assist in understanding the use of technology in the mathematics classroom, and especially with hearing-impaired students. The first question is doing the wireless technology used in the classroom increase the student-teacher interaction?

Secondly, did the use of the technology in the mathematics classroom enhance the learning of problem-solving techniques? Lastly, did the students adjust to the new technology? This study was conducted in a middle school classroom in Taiwan in one school year. There were 7 hearing-impaired students along with one hearing-impaired teacher that participated in this study. In general, the teacher in the classroom would use a whiteboard that would transfer to each student's tablet wherein each student could then work the problem individually and submit it back to the teacher. The teacher had the choice to view each student's work as a whole for the class to view or just send individual comments back to the student.

Stephen, Hegedus, Sara Dalton, and John Tapper (2015) In another study by in the article The Impact of Technology-Enhanced Curriculum on Learning Advanced Algebra in US High School Classrooms, discovered the implementation of technology in a high school mathematics classroom is beneficial to not only student engagement, but also to student learning. The participants for this study consisted of 606 algebras 2 students and the teachers for those classes in 7 different Massachusetts' schools over a 2-year period. In this study, the technology curriculum, namely SimCalc, was implemented in all classes at random times within the year for varied lengths of time in place of direct instruction. SimCalc curriculum is designed for students to use individually or in small groups to increase student-teacher interaction, increase student engagement, and for students to create, adjust, and run simulations on different algebraic functions. The study focused on the potential of students learning algebraic concepts with a deeper understanding when compared to traditional direct instruction. Teaching students' algebra and the skills associated with problem solving techniques learned in algebra can have the potential to help students not just in algebra for that year, but also for skills needed posthigh school since "high school algebra is a key predictor of college success" (Hegedus, Dalton, & Tapper, 2015,p. 204). The findings did support the hypothesis showing an improvement in student engagement, an improvement in teacher-student interaction, higher-order problem solving techniques were demonstrated, and student test results showed positive gains throughout the year when using the technology in the classroom.

Kilpatrick, Swafford & Findell (2001) Two central goals of mathematics education are to support students'development of the interconnected key competencies problem solvingand reasoning (Ball & Bass, 2003;; NCTM, 2000; Niss & Jensen, 2002). Students should be able to engage meaningfully in problem solving, which is solving a novel task for which the solution method is not known in advance (Schoenfeld, 1985), and in reasoning, which is "the explicit act of justifying choices and conclusions by mathematical arguments" (Boesen et al., 2014, p. 75). The last three decades, there has been an increase of mathematics education research.

This research has contributed with insights into how to improve teaching to help students develop their problem solving and reasoning competencies (Carpenter et al., 2004; Hiebert & Grouws, 2007; Niss, 2007).

Vanden Akker (2010). The teaching designs in the reviewed studies were analyzed based on their intervention goals, claims about how these goals were to be reached and arguments supporting these claims. This structure of goal, claim and supporting argument is borrowed from the area of design research. The research question guiding this study is presented in section Aim and research question. This review critically analyzes previous intervention study literature connected to mathematical problem solving and reasoning, and presents the goals, claims and arguments that predominate in related teaching designs.

3.0 Need and Significance of the Study

The topic of Mathematics teaching and learning has emerged as one of the central issues of contemporary educational debate as studies have consistently demonstrated poor standards of student achievement across all levels. Since the current era is epitomized by the ubiquitous use of technology, it follows that technology has penetrated the field of teaching on a worldwide scale. In fact, since most educational institutions have now absorbed such technology into current and future curricula, technological and/or media-based pedagogies have assumed considerable prominence due to proven enhanced learning outcomes, especially in comparison with traditional teaching methods. Obsolete teaching practices include a number of problems, as follows:

- Traditional methods lead students through precise curriculum content and rely on outdated learning aids such as blackboards and textbooks. As such, the teacher merely relays the information without accounting for positive or negative results.
- Traditional methods rely on simple strategies that do not meet the purpose of learning or basic needs in the process of teaching. Since such teacher-centred pedagogies situate the learner as a recipient, their overarching goal is the extent to which a student can replicate information without necessarily understanding it.
- Students rely on received sounds and images as opposed to interaction and discussion with the teacher.
- Student accreditation by means of set texts tend to foster boredom and loss of motivation and attention in attainment, as opposed to modern technological teaching methods which inhere numerous incentives that increase the likelihood of acquiring Mathematics skills in a timely and positive way.

In light of the above obstacles, the present study was undertaken to ring-fence the causes at the heart of the problem and attempt to resolve the issue by introducing a range of modern technologies into the context of Mathematics teaching.

The study aims to advance knowledge in a number of significant areas. In the first instance it will identify traditional teaching practice challenges which retard or obstruct the process of effective Maths learning in order formulate a range of solutions to update them with technological methods and aids. The research will also evaluate the scale of the difficulties confronted by Mathematics teachers who use modern technology and determine whether additional IT skill training is required. It is hoped that the ensuing data may be used as a reference guide for future researchers in the same field and context, along with a detailed analysis of the teaching and education sector as intrinsic to the infrastructure of any modern society.

Technology has become ubiquitous in all forms of contemporary life. Since the teaching process cannot be atomized from this global trend, this study further considers the impact of recent Mathematics teaching technology as compared to traditional practices which arguably render students passive, and prone to boredom. Indeed, this study demonstrates that the introduction of modern technological assistance yields timely learning progress and improved student proficiency across all Mathematics skills including writing, reading, and conversation. Ultimately, the research provides key educative stake-holders and authorities with practical solutions to tackle the problems related to the use of modern technology in Mathematics teaching for teachers and students alike.

4.0 Statement of the problem

The present study seeks to focus attention on studying the learning environment of the students belonging to Telugu and English medium schools in learning mathematics at school. Hence the problem has been stated as below

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5. 0 Operational Definitions of the study

What is the best definition of information? knowledge communicated or received concerning a particular fact or circumstance; news: information concerning a crime. knowledge gained through study, communication, research, instruction, etc.;

communication

the act or process of using words, sounds, signs, or behaviors to express or exchange information or to express your ideas, thoughts, feelings, etc., to someone else human communication nonverbal communication See More Examples. Parents need to have good communication with their children.

Technology

The definition of technology is science or knowledge put into practical use to solve problems or invent useful tools. ... Computers and the Internet - The ability to perform basic thinking processes much faster enables business, science and commerce to proceed much more efficiently.

Mathematics

the abstract science of number, quantity, and space, either as abstract concepts (pure mathematics), or as applied to other disciplines such as physics and engineering (applied mathematics).

Teaching

Teaching is the process of attending to people's needs, experiences and feelings, and intervening so that they learn particular things, and go beyond the given.

Interface

Think of an interface as a "face-to-face," a place where things, or people, or people and things (like you and your computer) meet. Any common boundary or area of convergence can be an interface. Used as a verb, interface means to merge or mingle, bonding and synthesizing by communicating and working together.

ICT: Information and Communication Technologies (ICTs) is a broader term for Information Technology (IT), which refers to all communication technologies, including the internet, wireless networks, cell phones, computers, software, middleware, video-conferencing, social networking, and other media applications and services ...

ICT in education

Information and Communications Technology (ICT) can impact student learning when teachers are digitally literate and understand how to integrate it into curriculum. Schools use a diverse set of ICT tools to communicate, create, disseminate, store, and manage information.

6.0 Objectives

1. To study an interface and its impact on ICT& Mathematics teaching at secondary level schools.

2. A study an interface and its impact on ICT & Mathematics teaching in relation to locality at secondary level schools.

3. A study an interface and its impact on ICT & Mathematics teaching in relation to Management at secondary level schools.

4. A Study an interface and its impact on ICT & Mathematics teaching in relation to Gender at secondary level schools.

5. A study an interface and its impact on ICT & Mathematics teaching in relation to Medium at secondary level schools.

7.0 Hypotheses

This study wanted to test the following hypotheses:

1. There will be no significance difference on the interface and its impact of ICT & Mathematics teaching among secondary level schools.
2. There will be no significance difference on the interface and its impact of ICT & Mathematics teaching in relation to Urban and Rural at secondary level schools.
3. There will be no significance difference on the interface and its impact of ICT& Mathematics teaching in relation to Government and Private at secondary level schools.
4. There will be no significance difference on the interface and its impact of ICT & Mathematics teaching in relation to Male and Female at secondary level schools.
5. There will be no significance difference on the interface and its impact of ICT & Mathematics teaching in relation to English and Telugu Medium at secondary school level.

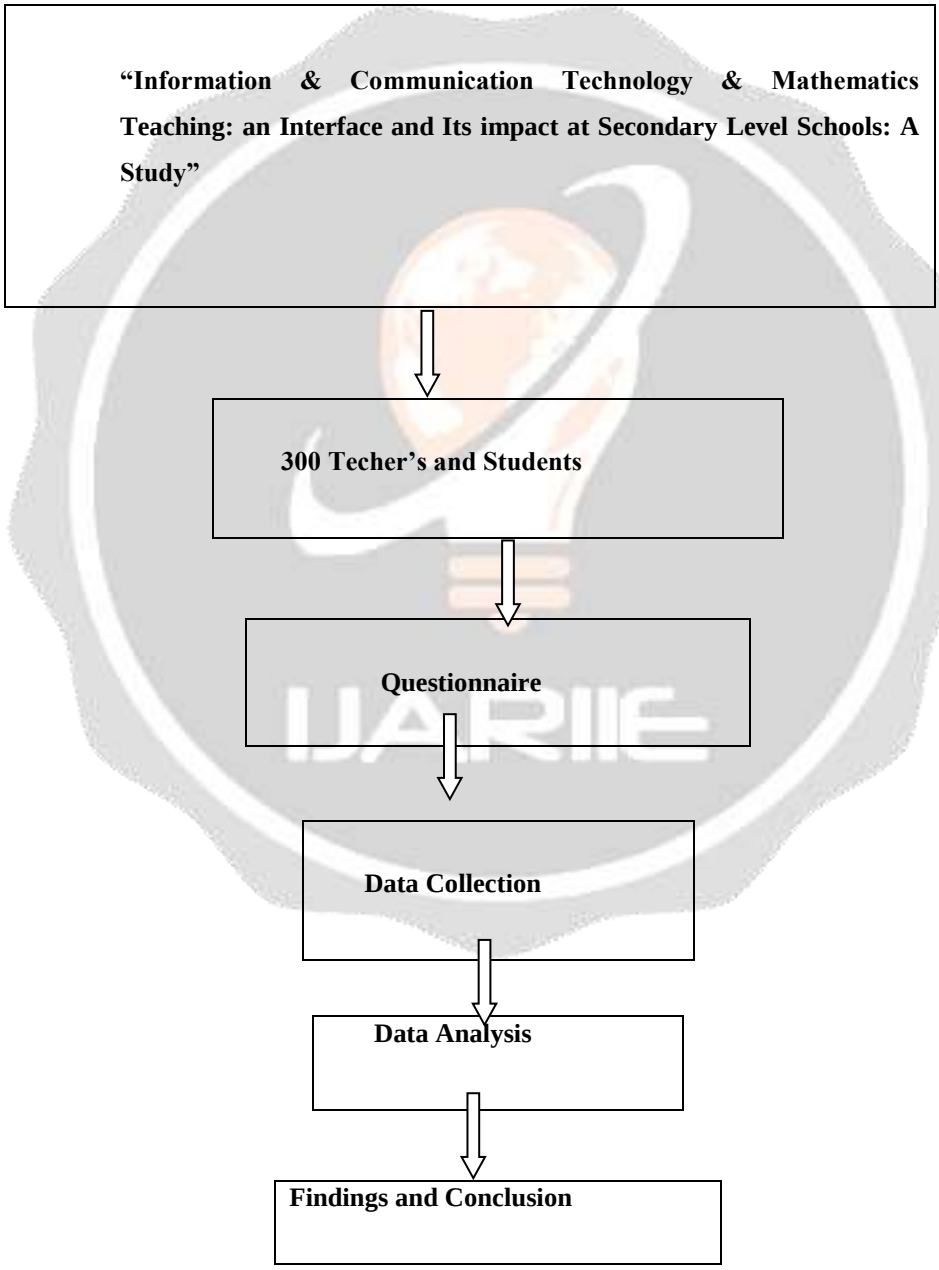
8.0 Variables involved in the study

Dependent Variable	**Independent Variable**

ICT Mathematics Teaching	1.Gender: Male/Female 2. .Locality: Rural/Urban 3.Management:Govt/Private 4. Medium: English/Telugu

9.0 Research Design

The design of the study can be represented as follows



The design shows the factors, which affect the learning environment of students belonging to Telugu medium and English medium students of both rural and urban area.

10.0 Research Methodology

The researcher intends to follow each of the following methodologies:

The present chapter devoted for the discussion of research procedure adopted for the study. A scientific approach adopted to investigation into the present research problem is explained in detailed in this chapter. For this the objectives, hypotheses, variables, operational definitions, sampling techniques, design of the study tools used to collect the data and the statistical techniques going to be adopted for the collected data to arrive the findings are discussed in the different sections for this chapter.

11.0Population and Sample of the study

the sample for the study has been selected from secondary school students of Rural and Urban, Telugu and English medium students of Warangal under urban area, and under Rural area. the sample was limited to 300 Teachers and students to English medium and student belong to Telugu medium schools.

TOOLS USED

After the specification of the formulation of hypotheses in the development of research design tools to be used for Collection of data had to be prepaired which would help of find out the actual information related to the present study. Since **Questionnaire** is the right tool used when actual information is desired and administered the same.

The general category of inquiry forms includes data gathering instruments through which respondents answer questions or respond to statement in writing. a questionnaire is used when factual information is desired.

Questionnaire administered personally to groups of individuals have a number of advantages of personnel administering the instrument has an opportunity to establish rapport, explain the purpose of the study and explain the meaningful items.

The availability of a number of respondents in one place makes possible an encouraging of time and expense and provides a high proportion of usable responses. questions are classified into two categories those are open ended and closed ended.

Questionnaires that call for short checkmark responses are known as the restricted/close form type. Here mark “Yes/No”, write short responses or check an item from a list of suggested responses.

12.0 Data Collection Procedure

the questionnaire was administered personally by the investigator to the student on separate dates and was collected from then after completion. the investigator visited Schools the student that are located in rural and urban areas of Warangal district.

the sample is belongs to English and Telugu medium was selected for the study. the data collected through questionnaire was edited first, then classified and tabulated. the problem in the question has been studied from different angles. the data was statistically analyzed, interpreted and conclusions were drawn.

13.0 Outcomes of the study

The Expected research results will show the uselessness of traditional Mathematics teaching methods and dissatisfied with the traditional methods. In contrast, students are more enthusiastic and interactive when using modern technology to absorb Mathematics.

It will be confirmed that a high percentage of those who learn Mathematics skills interact with modern technology means such as smart boards, computers and display screens compared to traditional teaching methods.

It will be observed that private schools that adopt the most modern means of technology and public schools that lack modern means by which attainment level of the students in private is high unlike those who are taught by traditional means, their achievement rates are very low.

In addition, the study and also it will be shown that students are more inclined to learn from E-curriculum and Mathematics teachers prefer to use modern technology rather than traditional teaching methods due to the students fast response and their interaction and educational attainment with high statistically rates.

In summary, it is clear that despite genuine efforts to modernize traditional methods of teaching Mathematics, residual obsolete practices should be phased out and replaced by the use of the available technology on offer via computer, smart devices, display, audio-visual materials, and electronic approaches.

This study underscores the vital educative potential and numerous benefits of technology in the Maths classroom for positive learning outcomes in the Maths classroom and the wider world, the financial implications

of setting up the infrastructure, and encouraging teachers to overcome their anxieties around of teaching technologies. Of course, the purpose of both traditional and modern technologies is to maximize students' Mathematics skills and provide a space where learning can be best facilitated. One of the ultimate goals of using modern technology is to actively engage them students in Maths learning and motivate them to acquire Mathematics skills in a practical and realistic way. This can be achieved through an open learning context which fosters openness and access to the subjects and information through modern technology means, wherein students are motivated and directed to communicate with each other. In terms of future development, it is clear that multimedia will be integral to the student-centred process of teaching Mathematics to modern standards. As such, the quality of teaching and application of students to modern educational foundations would benefit from an extensive survey of Mathematics skills in to improve overall communication proficiency.

In conclusion, we believe that this process can fully enrich student thinking and practical Maths skills and promote improved efficacy in overall teaching and learning. Indeed it is evident that many routine learning issues that can be overcome through the effective incorporation of technology and appropriately trained teachers, while funding ramifications can be addressed through ministerial planning and the establishment of an infrastructure which prioritizes the interests of effective learning

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