PREFACE TO THE EDITION

We are pleased to present this new issue of the **International Journal of Teacher Education Research Studies (IJTERS)**, a platform dedicated to advancing scholarly work in the field of teacher education, pedagogy, and educational innovation. This edition features a diverse collection of articles that contribute to the continuous development of educational theory, practice, and policy, with a focus on equipping educators to meet the dynamic needs of learners and society.

The featured research articles in this issue offer critical insights across a wide spectrum of educational concerns. From the evaluation of performance competencies among university teaching staff as a foundation for total quality in higher education, to the effectiveness of Brain Gym strategies in enhancing cognitive achievement among secondary students, these studies offer practical and evidence-based contributions for educators and institutions alike.

This issue also explores the ethical dimensions of emerging educational technologies, highlighting the need for responsible innovation in digital learning environments. An investigation into self-efficacy among graduate student teachers in Kerala provides valuable understanding into psychological readiness in teacher preparation programs. Additionally, a critical analysis of the persistent barriers to girls' education in rural India underscores the urgent need for inclusive and equitable educational reform.

We believe the work featured in this volume not only enriches the academic discourse but also informs practice and policy, offering meaningful directions for educators, researchers, and stakeholders committed to shaping the future of teacher education. As always, we remain committed to publishing high-quality, peer-reviewed research that promotes innovation and integrity in education worldwide.

We extend our sincere thanks to all contributors, reviewers, and editorial board members for their dedication and scholarly commitment in bringing this issue to fruition.

Dr. Premachandran P
Chief Editor

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Achieving Comprehensive Quality in Higher Education Institutions According to the Performance Competencies of University Teaching Staff

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Abstract

The ongoing criticism of higher education institutions for producing low-quality work that does not meet the demands of the job market led to the introduction of the Total Quality Assurance Concept in these institutions. A member of the teaching staff, or faculty, is a crucial cog in the wheel of higher education's declared mission. To evaluate his teaching profession in light of the requirements of the century and become an input to attain quality assurance in Higher Education, he must limit his tasks, responsibilities, and competencies that should be found in a faculty. This poses a problem that could influence society's construction. That is why we set out to address these questions in our research:

- What are the roles of a faculty member and his tasks that should be performed at University?
- How can faculty members be involved in ensuring quality in institutions of higher learning?
- How did the reasons and procedures used to establish faculty professions impact the assurance of quality in higher education?

The analytic descriptive method of research is applied in introducing the concepts, experiences, studies and attitudes in this respect and fulfill the answer to the three afore posed questions. As for the first question, the many responsibilities of faculty members are laid out in response, along with the skills that should be present in a academics to successfully carry out his responsibilities. For the subsequent question, it's clear that the programs, curricula, teaching staff, university buildings, student support, evaluation procedure, and feedback make up Total Quality. The relationship among these criteria and the faculty effect the performance development in their institutions, and this will help them to reach beyond their traditional skills and tasks in their job and achieve quality assurance and provide funding resources for the institutions.

In response to the third question, it is found that faculty development should be built on a strategy plan taking into account the effecting factors, involving faculty in planning the training programs to meet their needs and funding, and emphasizing the importance of training as a promotion prerequisite for the faculty. In the light of these findings, suitable conclusions and recommendations are put forward in terms of developing faculty teaching performance and achieving Total Quality.

Keywords: - Comprehensive Quality , Performance Competencies , University Teaching Staff.

I. INTRODUCTION

The duties and responsibilities bestowed upon university faculty members reflect the very heart of what it means to provide a high-quality education, and as such, they are believed to play a pivotal and fundamental part in this endeavor. Especially since achieving quality is organically linked to the culture of quality, developing teamwork, and spreading the leadership spirit, given that comprehensive quality in itself is an intellectual revolution that requires all officials to carry out their responsibilities to the fullest extent. Therefore, this study addresses the necessity of developing the professional performance competencies of faculty members as an entry point to achieving quality in higher education. It seeks to answer the following questions:

- What are the roles of a faculty member and the tasks he performs at the university?
- How do faculty members relate to the requirements for quality in higher education?
- How may enhancing faculty members' professional development contribute to higher education quality?

- What are the reasons for and methods of this?

There was a sea change in pedagogy, syllabi, and academic disciplines in the last 25 years of the 20th century. Several factors, including the great knowledge boom, rising demand for educational technology, and technological advancements in the classroom, contributed to this shift in higher learning. Aside from the fact that economic competitiveness in global marketplaces is dependent on the extent to which human knowledge can produce, the rise of new industries, globalization, and the formation of economic blocks have all contributed to a concentration of investment in the areas of knowledge and scientific research. Consequently, there is a greater need than ever before for higher learning to devote its full resources to human investment by creating new specializations that meet the needs of the times, enhancing human skills, and graduating human cadres with the ability to adapt to any change that may occur. We are living through it.

One of the most prominent challenges of this era is the issue of the quality of higher studies, which is now a problem for those in charge of higher education institutions. Many educational conferences at the global and regional levels took the initiative to raise this topic in order to draw the serious attention of those in charge of education to it, and this was confirmed at the UNESCO conference. What should governments and educational institutions do about the tyranny of quantity in higher studies in the twenty-first century? In particular, given the overwhelming demand for these institutions, there must be an ongoing effort to improve the scientific and professional abilities of university faculty (Abdel Dayem, 2000).

Although there is an interest in preparing faculty members, university education cannot overcome its problems without them. Consequently, we must work to improve their abilities so that they can fulfill their roles in an approach that is in line with current demands and contribute effectively to the achievement of high-quality education. Although it has been around for a while, its early days were characterized by sluggish progress and a concentration on colleges in the United States and Great Britain.

Interest in university professors dates back to the eighteenth century, when new needs for academic preparation arose as a result of advances in science, education, and psychology. Gliper made the astute observation that most university professors in the United States had not received the specialized training necessary to effectively teach their students. This, he said, is the primary cause of the dismal quality of university instruction in the country. American, British, Canadian, and French universities, as well as those in the Arab world (particularly in the Gulf nations, Egypt, Jordan, Algeria, and Iraq), have placed a premium on teacher skill development. (Per Morrisi, 2002).

Since individuals bear the primary responsibility for attaining high-quality higher education, efforts were focused on enhancing their skill sets. Edward A. Salies says, “Investing in people is built on the experience of successful institutions, where it has been confirmed that a motivated and skilled workforce is important for their success. Investors in people provide a methodology for developing employees in ways that help achieve the institution’s goals, and the essential elements that must be achieved in a university in order to become a university.” Investing in people, from his point of view, is:

- A firm resolve to help each person grow professionally so that the company can reach its objectives.
- The presence of a well-thought-out strategic plan outlining the organization's objectives and the resources to be allocated to effectively accomplish them.
- Conduct periodic reviews to train and develop employees on an ongoing basis.
- Assessing the return on investment (ROI) of development and training initiatives for staff members (Sales, 1999).

This study aimed to shed light on the significance of faculty performance competency development and its consequences for quality in higher education. It also highlighted the key techniques and methods that can be used in this field, with a focus on faculty members' renewable roles that align with current needs and trends. These roles should be evident in the educational outcomes that determine the level of education excellence.
The goals of the study are as follows:

- Clarifying the roles and tasks of the faculty member at the university,
- Elaborating on the criteria for excellent higher learning and how they relate to faculty members' responsibilities;
- outlining the ways in which instructors can enhance their professional growth and how it affects the standard of education

II. DEFINITION OF TERM

2.1 Performance Evaluation

It is intended to reach specific value judgments for university activities and programs through the use of some reference standards that help to understand and realize the relationship between the various elements of the evaluation. The evaluation is based on specific standards to which all components of university work that can be measured are subject, so that it enables. Through these criteria, the university’s performance and its ability to advance its mission specified in its basic stated goals are judged. Quality is described as adherence to certain requirements or specifications, but the American National Standards Institute characterizes it as a collection of qualities and attributes of a product or service that enable it to fulfill particular needs. Total Quality in education refers to a comprehensive set of characteristics that accurately encapsulate the essence and status of education, encompassing all dimensions: inputs, processes, outputs, feedback, and the ongoing interactions that facilitate the attainment of universally suitable objectives.

2.2 Quality Control

It means a system that achieves desired levels in the product by examining samples of the product. Other dictionaries define it as supervising production processes to achieve the production of a commodity at the lowest cost and with the required quality in accordance with objective standards for the quality of production.

2.3 Standards

These are standards for comparison used to set goals and evaluate achievement. These standards may be the current levels of achievement in the institution (for example, the percentage of students who have completed the study of business administration). These standards may also be levels set by an external party or levels of achievement in an institution. Others are selected for comparison (for example, the number of research publications conducted by each full-time faculty member at such and such university).

2.4 Accreditation

The term denotes the comprehensive procedures and operations executed by the accreditation body to verify that the institution has fulfilled the qualitative standards endorsed by evaluation entities, whereas the Commission on Higher Education defines it as practices undertaken by an external entity, It is an accrediting body that supports analogous institutions in the sector by evaluating their applications for accreditation and enhancing their educational aims. It is a method employed by the educational community to self-organize and assess the quality and effectiveness of education, hence enhancing its credibility and diminishing external oversight. Faculty members refer to educators who perform instructional responsibilities, possess a master's degree or doctorate, and have an academic title such as professor, assistant professor, or instructor.

2.5 Study Method

The study adopts the descriptive analytical approach in presenting concepts, experiences, results of studies, and trends in this field.

2.5.1 First

Answering the first study question: What are the roles and tasks of a faculty member at the university?
Numerous researchers assert that there is a consensus regarding the university's primary tasks, which are confined to three principal areas:

- Education to prepare manpower.
- Scientific research.
- Community service. (Morsi, 2002).

These roles are predominantly allocated to faculty members, as they constitute the foundation of the university's operations; the institution cannot fulfill its functions and attain its objectives effectively without access to qualified human resources and requisite financial resources. Consequently, universities aim to delineate the tasks and responsibilities of faculty members. The teaching faculty is anticipated to fulfill their responsibilities either individually or collaboratively, so enabling the investment process in higher education institutions to attain its intended objectives (Matero et al., 2000). The faculty individual's job is fundamental to the establishment of the university, extending beyond mere instruction to shaping students' personalities through the academic programs and activities he diligently implements. It is important to highlight. The function of the faculty member differs based on the university's size, its responsibilities, and the variations in the systems its use to establish its philosophy and objectives. His responsibilities are focused on teaching, scientific research, writing and translation, and offering.

In addition , a staff member also exercises administrative roles through his participation in various committees at the university and providing advice to state institutions and students. McKenzie and his companions believe that a faculty member must have university teaching competencies, continue scientific research, pay attention to administrative matters, and write in his field of specialization and be able to play the role of mentor. He advises his students and provides consultations to government institutions (Hayawi, 1987).

Through reviewing many sources that dealt with the role of the faculty member, it became clear that his role towards himself was not addressed, and the researcher attributes this matter to the general understanding and mistake of the aura that dominates the faculty member after he obtains his doctorate degree, as there is no longer room for doubting his abilities. Therefore, the researchers classify the roles of the faculty member into the following main areas:

- His roles towards his students, which include teaching, evaluation, counseling and guidance, supervising students' research and studies whether in the first university stage or the following stages, facilitating and facilitating the learning process, and preparing educational materials and study guides.
- His roles towards the institution in which he works, including administrative processes, including participation in decision-making, policy-making, planning programs and plans, participation in meetings, committees and specialized bodies at the university, and representing the university or its colleges in official or popular forums.
- His roles towards the surrounding community include serving relevant institutions in the local community, spreading culture, providing consultations, conducting studies and research that address the problems that the community suffers from, strengthening the university's relationship with local community institutions, and activating the role of governmental and private institutions in serving university students.
- His roles towards himself, which include his endeavor to raise his level of qualification, and develop himself professionally through reading and research, participating in conferences, organizing visits, attending discussion circles, training courses, and exchanging visits with colleagues in other universities.
- It is important to acknowledge that these roles are mutually reinforcing, and it is evident that the responsibilities of faculty members are confined to teaching, scientific research, and community service. Given the ongoing scientific and technological advancements, as well as economic and political transformations globally, faculty members must serve as influential agents in society. Consequently, it is imperative for them to continually enhance their skills and fulfill their roles in alignment with contemporary demands.

Consequently, a faculty member must possess the personal, cognitive, and performance qualities necessary for effective role execution. Gouel says that the significance of the contemporary university educator has escalated in this century, since their function extends beyond only imparting knowledge to encompass broader contributions. To transform the educational system for effective and relevant education, the modern university educator must be dedicated to a society grounded in justice and equality, thereby striving to reinforce these values and disseminate knowledge and skills within the community" (Abu Nawar et al., 1990).

2.5.2 Second

Answer to the second study question: "What are the elements and standards of quality of higher education and their relationship to faculty members?"

Numerous initiatives have been undertaken by educational institutions in America and Europe to adapt the principles of comprehensive quality management from the industrial sector to the educational sector. Numerous institutions have endeavored to cultivate Stuart's industrial model, while educational establishments in both Britain and America have commenced the implementation of the Deming model in education. To enhance and modify educational conditions (Basiouni, 2001).

Consequently, numerous endeavors have been made to delineate the notion of quality within the educational system, including its components and standards; yet, the overarching objective of implementing the quality system continues to reflect the cumulative efforts of educational institutions as a whole. Some believe that the term "quality in education" refers to the overall efforts made by employees (professors and administrators) in the educational institution to raise the level of educational outcomes in a manner commensurate with the requirements of society. (Joely, 2001)

The elements of comprehensive quality mostly address programs, curricula, teaching staff, university facilities, administrative processes, student support and support, and evaluation and feedback processes. Considering the educational process as a system, comprehensive quality focuses on the inputs, processes and outputs of the educational system.

Therefore, it is believed that employees, including faculty members and administrators, bear the burden and responsibility for achieving comprehensive quality. Therefore, they hold the key to success or failure in achieving quality according to their culture, motivation, readiness, and belief in what they do. Doherty says that comprehensive quality management is "that every member of the organization, at any level, is individually responsible for managing the quality of his own processes that It contributes to the provision of the product or service" (Doherty, 1999).

Hence, quality represents a cooperative work in which employees engage and continuously use their talents, abilities, and creativity. Thus, total quality management is based on three basic components to ensure its success: participatory management, the use of work teams, and continuous improvement in operations (Ahmed, 2003).

Many researchers in the field of quality education in higher education have emphasized the role of faculty members, considering that they are a target element in the quality system.

They bear the task of meeting several educational quality criteria as they are the most significant representatives. The quality of inputs, determined by their roles, directly influences the quality of the outputs. Farman asserts that the quality criteria pertaining to the teaching personnel should concentrate on:

- ❖ Faculty testing standards include:
  - Their qualifications and level of preparation.
  - Their experiences.
  - Their scientific production.
  - Their skills.
- ❖ The availability of their development requirements.
- ❖ The method of monitoring their performance. This requires determining which of the following areas need to be monitored: teaching methods, the method of providing students with feedback, the method of monitoring learners' progress, the method of conducting examinations to ensure that the educational program meets the needs of the learner, the method of evaluating learners, and the type of contents of the records that are kept by Faculty members (Ferman, 1995).

While others believe that the quality of faculty members is also related to their education and promotion procedures, the extent of their contribution to community service, and the effectiveness of their participation in scientific committees and bodies. (Salama et al., 1997).

This is why we see that the quality standards of higher education begin with faculty members in many of the models adopted by universities, and Kogi believes that "quality cannot be enhanced through regulations and laws but through professional commitment." (Naidoo, 2002).

In higher studies, there are a number of quality guidelines that pertain to the faculty, such as:

- The level, reputation, and fame of the academic and administrative body.
- Ratio of students to faculty members.
- Academic body record at the university.
- The accessibility of faculty members to accommodate the university's diverse programs and areas of expertise.
- How much faculty members value their students' opinions and ideas.
- How many professors work full-time.
- How well-educated the teachers are.
- The number of committees, councils, and professional and scientific organizations in which faculty members are actively involved.

- The faculty members' scholarly output, including the kind of study and research they do for the benefit of the institution and the surrounding community (Abu Fara ,2003).

The significance of instructors in attaining quality is demonstrated here. Here, Goupe thinks that higher education officials have a challenge in achieving educational quality; how much of an impact this has on teaching staff is directly related to how seriously they take quality into consideration, since they are factors affecting the growth of performance in their respective departments. Because of this, they are able to broaden their horizons beyond their usual job responsibilities and excel in areas such as program management, quality assurance, strategic planning, and generating revenue for their employers through consulting and research (Naidoo, 2002).

Likewise, the British model BS5750 emphasizes the significance of faculty skills in its eighth part. Farman states that it is often not possible to specify many of the specifications of service operations in detail, but quality assurance can be done through selecting and developing teaching staff. (Ferman, 1995).

It is evident from the foregoing that faculty members are directly related to the quality of higher studies The most crucial component in attaining comprehensive excellence is their involvement and the tasks they do both inside and outside of the university.

2.5.3 Third

Answer to the third study question: "What are the justifications and means of professional development for faculty members and its impact on quality in higher education?"

Given the rapid growth of information, advancements in communication, the rise of globalization, educational reform efforts, and new studies and research in the field of education, it is crucial to train teaching bodies that can adjust to these changes. This is particularly important now that administrations at universities recognize the importance of performance evaluations. Members of the faculty are integral to the academic community and the university's standing in the community. Because most universities base faculty evaluations on three primary areas—teaching, scientific production, and performance in activities—faculty individuals hold the firm belief that the university's reputation is derived from their high status and high performance in these areas. Others inside and outside the university. That is according to (Al-Makhlafi 2002).

Thus, it is essential to provide instructors with training so they can enhance their talents. The introduction of quality in education has heightened the urgency of the need for conditioning. This is because training programs aim to help individuals and groups in colleges, departments, and course preparation teams gain a better understanding of their work, grow in their perspective on it, and adapt to the constant changes and transformations in the field. Perpetually embracing change can pose risks to individuals, organizations, and society as a whole. Consequently, the most important signs for faculty growth include gaining a critical knowledge, which will allow them to assess change, think about its purposes, and either fully implement or make necessary adjustments to it. (Parington et al., 1997).

The third study question will be answered according to the following main axes: Firstly: Justifications for professional development for faculty members.

In the middle of the last century, universities in the United Kingdom, the United States, and a few other European nations began to implement professional growth initiatives for faculty members after realizing its significance in developed nations. In addition, several developing nations experienced.

Arabic universities across Egypt, the Gulf nations, Iraq, Jordan, and Algeria saw the need for it in the 1970s and 1980s. According to Onishkin, there are a number of reasons why there is a worldwide interest in enhancing the abilities of university faculty members, and the professional growth of instructors was not only a reaction to personal intentions but also a result of many of these factors (Grew, 1996).

❖ Technological development and its implications on the educational process, in terms of employing information and communication technology and learning and teaching techniques. Information and computer technology have radically affected education systems and methods, which required helping students acquire the skills of self-learning, cooperative learning, and distance learning, in addition to increasing attention to the professional growth of faculty staff in order to improve the effectiveness of educational outcomes (Madani, 2002).

The change that occurred in the roles of faculty members. The development of communication technologies and the multiplicity of learning sources led to fundamental changes in the requirements of the educational situation in terms of means of transferring knowledge and the roles of faculty members, which were transformed from traditional roles that considered the teacher merely a transmitter of knowledge to a facilitator and Despite this, he is a facilitator, guide, and mentor to his students , Research has shown that the majority of Western university professors do not have formal training in classroom instruction; sadly, the same is true in Arab colleges.

In this regard, Paul Clapper, says, "The main reason for the inefficiency of teaching in our universities and colleges today is not the large numbers of students, nor the lack of experience of the teaching staff, the length of the university day, or the load of teaching work. These are all supplementary factors, but the primary cause of ineffective university teaching and the undermining of educational initiatives is that faculty members are not teaching anymore. We have put our faith in the old adage that excellent teachers are born, not made, and this is probably the most crucial reason for this (Morsi, 2002).

Robert Making notes that professors at universities have always taught their students the way they themselves learnt, without providing students with the chance to apply their intellects to new situations, hence teachers should be ready by participating in professional development courses (Ali ,2002). Therefore, it is necessary to organize professional growth initiatives based on effective training for the purpose of professional development of teaching instructors so that they can vary teaching approaches and apply educational technologies.

❖ The lack of sufficient numbers of qualified university professors in various specializations, compared to the high percentage of teachers who are new to teaching, and this group lacks the skills and experience necessary to exercise their roles effectively.

❖ Cognitive growth in all specializations and fields, which requires the faculty member to follow up on scientific developments in his field of specialization, considering this a necessity to improve teaching competencies.
❖ The firm belief among university instructors that continuous professional development is crucial for their success in the classroom.
❖ Worldwide, the need for faculty members with a wide range of qualifications and areas of expertise has grown in recent decades due to the rising number of students enrolled in higher education programs.
❖ The challenge of quality in higher education. Achieving quality in education has become a challenge facing officials of higher education institutions (Naidoo, 2002).

The quality of education, according to some, is just as important as the availability of funding when it comes to the problems that universities and colleges face today, particularly those in the Arab world (Al-Hawat, 2002).

Consequently, if we want to see higher education become more efficient and of higher quality, we need to invest heavily in both teaching and research, create strategies to improve faculty performance and credentials over the long term, fund training scholarships, and lay the groundwork for collaborative partnerships with leading universities (Morsi, 2002).

Therefore, professional development constitutes a basic requirement for providing an appropriate climate for a culture of quality that is reflected in caliber, taking into consideration its importance in providing a suitable basis for employing quality processes, in addition to bringing about intellectual and practical changes that classify the total quality management system. (Mustafa & Al-Ansari, 2002).

All of the above highlights how seriously the quality issue takes the influence on faculty professionals' professional growth. This is particularly true given that quality necessitates a shift in perspectives, responsibilities, levels of performance, and relationships within the workplace. Giving professors the information, tools, and mindset they need to do their jobs well is one of the primary goals of professional development programs and the principles.

Therefore, we should be keen on the professional growth of faculty instructors as they are tools to achieve the goals of universities. They constitute the most important inputs to the educational system, and based on their performance levels, many educational outcomes are determined.

secondly. Professional development for faculty members: its means, conditions for success, and its impact on quality in higher education:

Higher education institutions in several Arab nations, as well as those in the United States, Canada, Australia, and Europe, have made significant strides in recent years to improve the professional competence of their teaching staff. To that end, universities in these nations have set up specific centers to help instructors grow professionally. These centers are responsible for developing, launching, and assessing various development initiatives. Professional in the fields of teaching methods and the use of educational technologies, Measurement and evaluation, the role of the faculty member in raising the level of his students' achievement, and the requirements of the university teacher's advisory roles, in addition to administrative areas, the use of computers and other topics (Grio, 1996).

These centers have started to take on more meaningful roles as higher studies moves towards quality, particularly when quality is, according to the opinions of the early pioneers, led by Deming, requires the need to pay attention to professional development because it constitutes a basic requirement for achieving quality, so that it is done through training to create opportunities. To make the most of the efforts of employees at various levels, Calling for work to design a strong program for education and training in order to keep pace with developments and developments that lead to developing performance levels. (Mustafa & Al- Ansari, 2002).

In most cases, faculty instructor's growth opportunities have concentrated on: 1_ Self-development based on the personal efforts of the faculty member through reading and listening to seminars and lectures, attending conferences and discussion panels, conducting studies and research, and writing and translating (Morsi, 2002).

Third. Institutional development: This is the development that is planned and supervised by a specialized unit in the educational institution, which can employ continuous training courses, workshops, discussion panels, hosting visiting professors, and exchanging visits and research contributions. Training is considered the most important means of professional development.

It is defined as "a dynamic process that aims to bring about changes in the information, experiences, behavior methods, and attitudes of trainees in order to enable them to exploit their potential and latent energies, in a way that helps raise their competencies in carrying out their work in a regular manner and with high productivity" (Al-Taani, 2002).

Consequently, training is seen as a tool rather than a goal with the objective to improve the skills of college employees, particularly those who have committed to quality work. This is because training represents one of the components that employees bring to the table, and faculty members are the ones who lead the charge in this endeavor. Professionally, instructors, particularly those responsible for evaluation and control, lack substantial and ongoing professional development opportunities. Maybe the training they receive, how well it works, and the amount of it all contribute to excellent evaluation methods and improved ways to train teachers. (Partington et al., 1997) Consequently, universities that prioritize quality must meticulously plan a program Staff employees receive ongoing instruction from instructors. That is especially true because fostering a quality culture is the starting point for every effort to achieve quality.

Deming and Other Quality Science Pioneers Crosby had stressed in their works the need of a quality culture as a prerequisite to giving the institution a chance to succeed in its attempts to raise the bar for education (Taiyara et al.,2003). Only through training is this to be accomplished. Therefore, training should center on meeting present and future skill demands. What ought to be learned in terms of conduct, opinion, value, and attitude is determined by one's personal and professional qualities. Thus, high-quality programs recognize the difficulty of changing long-standing habits. Achieving success, however, requires continuous training that is centered on the organization's primary needs (Dayan & Griggs, 1995).

Marsh pointed out that it has been proven by experience that those who wanted change and self-development are the ones who excelled in comprehensive quality, and he stressed that comprehensive quality requires that individuals challenge their previously accustomed ways of working and assumptions, and therefore movement towards the goal is based on a stable foundation. From administrative leadership, training, exercise and strong encouragement of individuals to apply their knowledge on a sound basis (Marsh, 1999).

Everyone knows that teachers need to take part in professional development if they want to see a noticeable improvement in the education of pupils, and that the quality of education as a whole can only be raised by the people who teach. According to Patricia and B. Brown, quality concerns should be at the center of growth for educators, and vice versa. By bringing these two aspects together, they believe that a substantial improvement in student learning can be achieved (Partington,et.al,1997).

Grafth was a supporter of this relationship, as he considered that the focus in quality assurance should be on the "customer", the employees and their needs, continuous planning, and setting specific, measurable results. Therefore, achieving quality assurance requires a system with good dissemination and a culture that encourages Excellence. (Naidoo, 2002).

Staff development, in Willson's view, is all about improving quality, and training and development as a whole aims to raise the bar and boost efficiency. Education, research, and community involvement are all ways in which employees grow professionally, and they all help push the quality mission forward. According to Al-Mikhlafi, numerous studies have demonstrated a favorable relationship between competent teaching, student accomplishment, and teaching competencies (Al-Mikhlafi, 2002). According to (Hijazi & Al-Tamimi ,1996), there are multiple academic axes that can be used to manage the educational results we desire and accomplish high-quality higher education. On one hand, we have the selection of teachers, students, and administrators; on the other hand, we have ongoing training, the upkeep of study programs, and the provision of food. Consider administrative and budgetary considerations alongside scientific research review and planning (Naji, 1998).

(Farrugia,1996) believes that training university lecturers gives them a high sense of independence, which leads to academic achievements. University instructors shouldn't be scared to affirm excellence since, with the right goals in mind, it can only help them rise in the ranks of their profession by drawing attention to the value they provide to teaching and research.

This, of course, confirms that professional development for employees represents the main link between employees and quality because it provides the foundations for ensuring it through a culture of quality, improving performance, raising the level of belief in goals, and enhancing the sense of responsibility in achieving them, while emphasizing the spirit of teamwork.

The following key elements highlight the various ideas that should underpin the development process for faculty individuals' professional growth if it is to accomplish its goals:

➢ A flexible strategic plan should underpin the development process, including all impacting elements, development entitlements and requirements, and the desired outcomes. Therefore, the general training policy for professional development should be based on the following assumptions:

- Considering training as an integral component of management quality.
- Training should lead to continuous improvement in the performance of individuals and the institutions in which they work.
- Assuming that all employees have the right to get training from the company.
- Organization-specific training is essential.
- Taking into account the multiple forms and means of training (John and Matthias, 1999).

➢ That faculty members be involved in planning and selecting the training programs that should be provided by the educational institution (Hayawi and Hagras, 1996).

➢ The development process should be characterized by continuity, so that development programs stem from the principle of lifelong learning.

➢ The training adequately addresses the actual requirements of instructors. Training requirements are defined as a set of indicators that show how individuals are not performing up to their desired standards, which leads to deficiencies in their knowledge, abilities, and skills as well as their behavior and tendencies. Regarding this matter, it was proposed (Beethes, 1994) that many sources be used to ascertain the training requirements of faculty members, including:

- Asking many questions to the target group.
- Benefiting from feedback from the field.
- Meetings and meetings with faculty members.
- Participation of the teaching staff in planning and implementing development programs.
- Using questionnaires.

And regulations for evaluating faculty members, through which data of importance and impact on development can be obtained (Naidoo, 2002).

➢ Organizing courses for professional development through the provision of private financial resources.

Financial incentives should be provided to the participants, and many researchers considered it necessary to consider training as one of the requirements for the promotion ladder in universities or for transferring from a teacher position to a high administrative position. The effectiveness of a faculty member does not depend on academic qualification and securing buildings, facilities, and learning resources, but rather it should be accompanied by This is a comprehensive system for the professional growth of faculty instructors (Al-Fawarea, 1991). Abdel Dayem says, "How can these professors play a double role in renewing others and developing other frameworks if they themselves do not possess the means to renew themselves? Perhaps what confronts us in this regard is the belief of faculty members that they do not need the best knowledge and preparation and that they possess the maximum amount of knowledge." And among the experiments he called, this is the

killing of every scholar." (Abdel Dayem, 2000). As a result, training should be mandatory for faculty members and included in the promotion process so that he may be taken seriously and has credibility.

- Disseminating the culture of development and clarifying the relationship between it and the growth of education, the growth of the institution, and achieving quality.
- Adopting clear strategies to evaluate the benefits of investing in professional development processes.
- Plan programs for continuing education for professionals that are credible and recognized as appropriate and necessary for all employees in higher education institutions.

III. CONCLUSIONS

Based on what was presented above, the researcher summarizes the following basic conclusions:

- Since the inception of quality assurance in higher education, universities have recognized the importance of investing in their faculty members' professional development. This demand has grown in recent years, prompting the establishment of professional development centers within universities. The training has resulted in, drawing from the experiences of numerous American, British, and Arab colleges:

  - Generating positive attitudes towards quality.
  - Enhancing faculty members' self-confidence.
  - Emphasis on professionalism in higher education.
  - Improving one's abilities as a teacher and in the creation of instructional materials.
  - Encouraging the utilization of communication and educational technology.
  - Enhancing the sense of self and national responsibility.
  - Strengthening the spirit of cooperative (collective) work.
  - Emphasizing the role, importance and necessity of professional development at the personal and institutional levels.
  - Contributing to unleashing individuals' energies and abilities and improving their level of job satisfaction.
  - Developing faculty members' skills in administrative and student support fields.

- The areas of development of teaching staff in many universities around the world included topics such as teaching methods, quality, evaluation methods, computers and the Internet, statistical analysis, writing and translation, advising and directing students, using and employing educational technologies, scientific research, evaluating research, and supervising study students. Higher education, in addition to administrative topics related to the roles of faculty members.
- Faculty advancement is clearly not a goal in and of itself., but rather a means to modify ideas and develop teaching and learning in order to achieve comprehensive quality, as it should appear in meeting the needs and aspirations of the beneficiaries, whether they are learners, institutions, or the local community.
- The professional advancement of faculty instructors reflects positively on the standards of quality and its fields in higher education to the extent that the development has had an impact on the information, skills and attitudes of those targeted, and not merely by attendance, considering that it is a formal administrative requirement. Consequently, the following components represent the training of instructors on educational quality:

  - Personality: Regarding the development of a functional sense of morality and self-confidence, an optimistic orientation toward a culture of excellence and standards, an increased feeling of personal accountability, faith in the power of collaboration and its impact on success, and so on.
  - Teaching: This element relates to diversifying teaching methods, accepting and practicing feedback, using educational techniques, and developing intellectual and competitive skills among students.
  - Evaluation: It includes focusing the evaluation methods on higher mental goals.
  - Guiding and guiding students.
  - Producing educational materials according to quality specifications, including academic curricula, media, study guides, etc.
  - Scientific research, in terms of research design, supervision of graduate students, research evaluation, and statistical analysis.
  - Administrative operations: entrusted to faculty members in terms of preparing student records, participating in meetings, managing departments or colleges, planning and providing consultations.

3.1. Recommendations :

The researcher concludes from the foregoing that faculty instructors urgently need chances for professional growth in order to meet the challenges posed by the educational system and the changes taking place around it, especially the quality challenge. Professional development programs aim to equip faculty members with the information, abilities, values, and attitudes necessary to fulfill their roles and responsibilities in ensuring a high-quality education for students. To achieve this goal, it is crucial for higher education institutions to foster a development culture among their employees, while also carefully determining the most appropriate means to support this process. The following suggestions have been put up by the researchers in this area:

- Establishing professional development centers for workers in higher education institutions.
- Adopting participation in development courses as a condition for academic promotions in universities.
- Disseminating a culture of quality and professional development among employees.

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Effectiveness of Brain Gym Strategy on Achievement in Social science Among Secondary School Students

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Abstract
Students' performance in social science classes at the secondary level was examined in this research to determine whether the Brain Gym method improved their grades. Using a quasi-experimental design, seventy students from St. Mary's HSS School in Vallakom were split into two groups: one to act as the subject of experimentation and another to act as a control. The participants in the experiment engaged in Brain Gym activities, whereas the control group adhered to conventional Activity-Oriented Methods. Pre-test and post-test evaluations assessed students' accomplishments in multiple cognitive domains: recall, comprehension, application, and analysis. The findings indicated that the Brain Gym strategy significantly enhanced students' academic performance in social science, with notable improvements observed in all cognitive components assessed. Better engagement and learning outcomes were found when physical movement was incorporated into educational practices, according to the study. Next, we talked about what this means for administrators, parents, and teachers, and we proposed some studies to look at how well Brain Gym works in the long run and how we can adapt it to different subjects and student populations.

Keywords: - Brain Gym, Social Science Education, Academic Achievement, Secondary Education, Cognitive Development, Teaching Strategies

I. INTRODUCTION

The use of creative teaching methods in the classroom has grown in significance as teachers look to improve academic achievement and student engagement. The Brain Gym is one such tactic that incorporates brain-enhancing exercises into the teaching-learning process. The idea behind this strategy is that exercise can improve learning results by stimulating cognitive processes (Jensen, 2005). A more dynamic and productive learning environment is what educators hope to achieve by involving students in activities that encourage both mental and physical involvement. There is evidence that students' focus, memory, and overall academic performance can be significantly improved through the incorporation of movement into the classroom. For instance, (Ratey & Hagerman, 2008) found that students' comprehension and memory retention were both improved when they used brain-based learning techniques.

This is especially important in courses like the social sciences, where grasping difficult ideas and using success requires the ability to think critically. The Brain Gym approach provides a useful framework for incorporate these ideas into lessons in the classroom. Finding effective ways to teach that pique students' interest and boost their learning has become an urgent matter in the dynamic subject of education. Pupils may not be adequately prepared for the complicated nature of modern society if they are taught through traditional pedagogical approaches that rely on passive learning and rote memorization. To combat these issues, more and more educators are looking into innovative approaches that integrate physical exercise with cognitive learning. A particular strategy that integrates brain-enhancing activities and exercises into the learning process is the Brain Gym concept. Students' mental and physical health, along with their academic performance, can be substantially improved by incorporating this strategy.

Empirical research in various fields has shown a positive correlation between physical activity and academic success. For instance, (Donnelly et al.,2016) found that including physical activity in the educational program improved students'

attention and academic performance. There is a noticeable absence of targeted studies examining the specific impacts of physical activity on social science proficiency, despite the fact that prior research highlights the benefits of physical activity in general education settings. These void calls attention to the fact that this area desperately needs more studies on the efficacy of brain-enhancing activities. Additionally, as educational institutions prioritize holistic learning methods, it is crucial to recognize that bodily fitness impacts cognitive development. The Brain Gym method does more than just improve students' grades; it also promotes their physical and mental health by getting them involved in the learning process. All things considered, Brain Gym has the makings of a game-changing approach to secondary education, particularly in the humanities and other fields where active student engagement significantly affects final grades. The goal of this research is to determine the efficacy of the Brain Gym method in improving the social science performance of secondary school students. The study's overarching goal is to provide empirical evidence regarding the impact of this strategy on students' motivation, engagement, and ability to retain information in the social sciences. Improving instructional strategies and creating a more engaging learning environment for students are the primary objectives of this study. Insightful information about innovative methods of teaching will be provided.

II. BACKGROUND OF THE STUDY

A more information-driven society has emerged during the past decade. We are beginning to see a dramatic paradigm change in pedagogical practices to better suit the needs of the contemporary classroom, driven in large part by the pervasiveness and economic importance of computers and other types of electronic communication. Traditional classroom practices alone will not be enough to equip today's youth to compete in the global economy. Conventional teaching methods will need to be either modified or replaced with extraordinary educational experiences if these needs are to be met. The idea of incorporating movement into the classroom as a means to enhance cognitive function and academic performance is gaining increasing amounts of attention. Brain Gym, a set of physical exercises designed to stimulate the brain, is one approach that is gaining traction in many educational settings. (Williams, 2018) states that this method is founded on the premise that physical and mental stimulation substantially improves learning outcomes, particularly in fields such as the social sciences that demand understanding and analysis. Despite its widespread application, there is a lack of evidence showing its effectiveness in specific academic domains. For many students, the challenges they face in social science classes stem from a lack of interest, memory problems, or stress. In order to produce well-informed people who can actively participate in societal issues, social science education is essential, making the resolution of these challenges of paramount importance. Improving pupils' engagement and performance in social science requires the creation of highly successful treatments. Social science curricula may benefit greatly from the Brain Gym method. By making the classroom more interactive through physical activities, teachers can improve not only their students' academic performance but also their health, motivation to study, and overall sense of well-being. Teachers and students alike would benefit from a deeper understanding of these strategies' effectiveness in the classroom so that they can be more widely used.

Students gain the understanding and skills necessary to engage with the complexity of human society through social science education, an essential component of the academic program. Several academic disciplines are encompassed by it, including sociology, psychology, history, geography, economics, and politics. Students should be able to question assumptions, evaluate evidence, and understand multiple perspectives; this is the fundamental purpose of the social science curriculum (NCERT, 2021). This method of teaching not only helps students become more aware of social issues, but it also prepares them to participate actively in democratic processes and civic engagement. Beyond its obvious importance in preparing students to be productive members of society, social science education is crucial in fostering critical thinking and ethical behavior. Learners understand the interplay of local and global dynamics via investigation of historical, social, and cultural backgrounds. To effectively teach students about the world's many cultures and ways of thinking, social science curricula must emphasize empathy and respect for diversity. Students are more engaged and have a better grasp of social studies concepts when teachers use innovative methods like thematic learning, project-based learning, and cooperative learning. Strengthening the relevance and impact of the learning experience, these approaches encourage students to actively participate in their own education and work together.

III. RESEARCH QUESTIONS

The following research questions were developed based on the studies cited:

- How can apply Brain Gym strategy for teaching Social Science at secondary schools?
- Does the Brain Gym approach have a different impact on social science achievement than the activity-oriented method of teaching?
- Is there any significance difference in the effectiveness of the Brain Gym strategy on social science achievement between male and female secondary school students?

IV. NEED AND SIGNIFICANCE OF THE STUDY

The need for innovative pedagogical practices that boost pupil performance has increased in today's classrooms. Traditional methods of instruction often fail to captivate students, leading to diminished intrinsic motivation and poor performance in the classroom. By incorporating brain-enhancing exercises and activities into the learning process, the Brain Gym approach provides a workable alternative. According to (Jensen, 2005) and (Donnelly et al.,2016), these methods can improve academic performance by improving cognitive abilities like memory, attention, and problem-solving. Using secondary school students' social science classes as a case study, this research will look into how well the Brain Gym method works. The most compelling aspect of this study is its ability to connect theoretical concepts with real-world classroom

practices. There is a dearth of research into the specific ways in which bodily exercise enhances cognitive development across disciplines, particularly in the social sciences, despite the overwhelming body of evidence showing that exercise promotes better overall cognitive development. By looking at how participating in Brain Gym activities affected students' performance in social science classes, this study hopes to offer concrete findings which can inform educational practices and curriculum development. To maximize pupil participation and educational outcomes, it is crucial for educators to comprehend how brain-enhancing activities work.

Not only does this study focus on individual academic achievement, but it also addresses broader educational goals that align with the National Education Policy (NEP) 2020. The focus of NEP 2020 is not on rote memorization but on the cultivation of analytical and problem-solving skills. Through examining how Brain Gym affects cognitive abilities like memory, attention, and problem-solving techniques, this study intends to advance the creation of research-based teaching strategies that promote students' overall growth. Prior research has demonstrated encouraging outcomes on Brain Gym's beneficial effects on a variety of learning domains, such as enhanced reading and math proficiency. Additionally, this study aims to fill in any deficiencies in the body of knowledge regarding the application of Brain Gym in social science education. There is ample evidence to support its use in other fields, but less is known about its capacity to raise students' performance in the field of social sciences. The goal of the research in this area is to generate empirical data that can inform instructional strategies and bolster an all-encompassing educational philosophy that integrates physical and cognitive development. The findings align with the NEP 2020's focus on interdisciplinary and multidisciplinary learning, and educators and policymakers seeking to enhance educational outcomes in a variety of fields may find them helpful.

V. RESEARCH GAP

The lack of information on the effectiveness of Brain Gym activities in improving academic achievement, particularly in the area of social science education, is the study's research gap. Although numerous investigations have looked at the benefits of Brain Gym in terms of enhancing cognitive skills and learning outcomes in subjects like reading and math, there is a glaring lack of empirical research specifically addressing the program's effects on social science disciplines. Many questions remain unsolved despite the growing popularity of the Brain Gym method as a means to enhance academic performance, particularly in domains such as the social sciences. Researchers have found that exercise improves memory, attention, and other cognitive functions; however, the effects of exercise on the performance of students majoring in social science have received comparatively less scrutiny. Most recent studies have concentrated on subjects like mathematics, where Brain Gym treatments have shown promising results. However, such targeted research is noticeably lacking in the field of social science education. Brain Gym has mainly been studied for its broad benefits, which include improving students' cognitive abilities (memory, attention, etc.), reducing stress and anxiety, and increasing neural connections and neuroplasticity through physical and mental movement. All of these things matter for students' overall performance in school, but they don't address the question of how Brain Gym can improve students' performance in economics, history, geography, politics, and other social science classes. Because of this void, teachers don't have a solid understanding of how to successfully integrate movement-based strategies into social science courses. Furthermore, there is a lack of specific information regarding the efficacy of Brain Gym in educational contexts, although there is substantial evidence that it may improve cognitive abilities such as memory, attention, and problem-solving abilities. This leaves a gap in our knowledge of how to customize brain-enhancing exercises to raise student engagement and academic achievement in the social sciences. Although Brain Gym exercises have been shown to improve general cognitive function, there is little scientific data evaluating their direct effect on social science achievement.

Additionally, we need longitudinal studies to determine how effective Brain Gym programs are in the long run in terms of students' academic performance. Incorporating these strategies into regular teaching procedure may have long-term advantages, but most recent research has focused on immediate results. The effectiveness of Brain Gym as a learning tool depends on whether or not its benefits persist after brief assessments. Research on the potential effects of demography elements on the efficacy of Brain Gym methods in social science classes is lacking in the literature. These factors include students' age groups, males and females and learning styles. We can gain a better understanding of how to modify these strategies for different types of students if we keep these things in mind. This study attempts to close these important research gaps by methodically examining how well secondary school students' social science achievement is affected by the Brain Gym technique. By adopting rigorous approaches and concentrating on this particular topic, the research aims to offer insightful information that can guide curriculum design and educational practices.

VI. STATEMENT OF THE PROBLEM

Academic Achievement is critical component of student success particularly in subjects such as social science which require analytical thinking and comprehension. Despite the recognized importance of these skills, many secondary school students struggle to perform well academically, often due to inadequate cognitive engagement and motivation. Traditional teaching methods may not effectively address these challenges leading to a gap in students understanding and retention of material. Therefore, the present study addresses the necessity of looking into the **"**Effectiveness of brain gym strategy on achievement in social science among secondary school students."

VII.OPERATIONAL DEFINITION OF KEY TERMS

7.1 Effectiveness

When one variable's impact is conditional on another variable's existence or absenteeism, the study's effectiveness is defined as the result. How well an intervention, like the Brain Gym strategy, accomplishes its goals is what this term alludes to in this research.

7.2 Brain Gym Strategy

In this study, the Brain Gym strategy refers to the incorporation of specific brain-enhancing activities and physical exercises into the teaching-learning process, aimed at improving cognitive functions such as memory, attention, and overall academic performance in social sciences. These activities are designed to stimulate both hemispheres of the brain, promoting better integration and enhancing learning capabilities.

7.3 Achievement

Achievement refers to the measurable performance of students in educational settings, typically assessed through grades, test scores, and overall understanding of the curriculum. In this study, achievement will specifically focus on students' performance in social science subject, evaluated through assessments and examination.

Social Science: Social science encompasses a range of disciplines that study human society and social relationships, including subjects such as history, geography, economics, and political science. In the context of this study, social science achievement will be measured to assess the effectiveness of Brain Gym in enhancing students' understanding and performance in these areas.

7.4 Secondary School Students

Secondary school students are individuals enrolled in educational institutions that provide secondary education, typically ranging from ages 12 to 18. In this study the experiment was conducted among the 9th standard students who follows SCERT Kerala Syllabus.

VIII. RESEARCH QUESTIONS

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XII. OPERATIONAL DEFINITION OF KEY TERMS

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12.5. Secondary School Students:

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XIII. VARIABLES OF THE STUDY

According to (Best, 2016), "the independent variables are the conditions or characteristics that the experimenter manipulates or controls in his/her attempt to ascertain their relationship to observed phenomena." Accordingly, an independent variable is one that the researcher manipulates or that is thought to be the source of the experiment. The experimenter has

direct control over it and can change it in any direction. In the research titled "Effectiveness of Brain Gym Strategy on Achievement in Social Science among Secondary School Students", Brain Gym Strategy and the Activity oriented method are the two independent variables. Achievement in Social Science is the dependent variable here; it is a measure of how well pupils in secondary school do academically in social science classes, as measured by their performance on standardized tests that test their knowledge and ability to retain it.

XIV. SCOPE OF THE STUDY

Researchers in the current investigation set out to determine whether the Brain Gym approach had any positive effect on students' performance in social science courses taken at the secondary school level. The program Brain Gym is known to include brain-enhancing exercises, and the approach used in this study was to incorporate these exercises with brain-enhancing activities that encouraged student engagement in the learning process. This strategy can help the students to learn more meaningful and effectively the concept in Social Science. The study would help the Social Science teachers to understand the effectiveness of Brain Gym strategy and the necessity of application of their new techniques in the teaching of Social Science. Educators and curriculum developers can use the results of the investigation to inform pedagogical decisions and improve student learning. To sum up, everyone involved in education is expecting that the study's findings will be really useful.

XV. OBJECTIVES OF THE STUDY

The objectives of the study are:

- To develop a Brain Gym approach for educating social science in the ninth grade.
- To determine whether the Brain Gym Strategy improves students' performance in social science courses taken at the secondary level.
- To find out the effectiveness of Activity Oriented Method of Instruction on Achievement in Social Science of Students at Secondary school Students.
- To compare the following aspects of Brain Gym Strategy's impact on the performance of pupils in social science classes at the secondary level: Acquiring, Recalling, Applying, and Experimenting
- Determine, with regard to the following factors, the efficacy of the activity-oriented method of instruction on the following aspects of social science achievement among secondary school education pupils: Acquiring, Recalling, Applying, and Experimenting
- To compare the efficacy of Brain Gym strategy on Achievement in Social Science of Secondary School pupils with Activity Oriented Method of Instruction on Achievement in Social Science of Secondary School pupils.
- In order to compare the impacts of the Brain Gym strategy and the Activity-Oriented Method of Instruction on the following aspects of social science achievement: remembering, understanding, applying, and analyzing, on secondary school pupils.

XVI. HYPOTHESES OF THE STUDY

The following are the working hypotheses of the investigation:

- The Achievement in Social Science of Secondary School pupils taught through Brain Gym strategy is significantly higher than that of those who taught through Activity -oriented method of teaching Social Science.
- The Achievement in Social Science of secondary school students taught through Brain Gym strategy is significantly higher than that of those who taught through the Activity-oriented method of teaching social science with respect to the following instructional objectives namely: Remembering, Understanding, Applying and Analysing.

XVII. METHODOLOGY

Quasi-Experimental method was selected for the present study. The design adopted was non-equivalent pre-test post-test control group design. The study was conducted on a sample of 70 students of standard IX of which 35 students from division B and 35 students from division C of St. Mary's HSS Vallakom, Kerala, India. One group was selected at random as Experimental group and other as the Control group. The tools and materials used were lesson transcripts based on Brain Gym strategy include from the Social Science text books of standard IX of Kerala state syllabus and an achievement test in Social Science. Same achievement test was given to both the groups as pre-test and post-test. The experimental group was taught through Brain Gym strategy include brain enhancing exercises and activities. The Control group was taught with lesson transcript based on the Activity-oriented method of teaching. When all these classes were over, the achievement test was administered to experimental and control group.
The Tools and Materials used in the study were:

- Lesson transcripts based on Brain Gym strategy, which include, Brain enhancing exercises and activities incorporated to the topic "Land grants and the Indian Society" and "Peninsular plateau where Indian History Slumbers" developed by the investigators.
- Lesson transcripts based on Activity-oriented method of teaching developed by the investigators.
- Achievement test in Social Science developed by the investigators.
  Ethical considerations were rigorously followed. Informed consent was obtained from students, parents, and school authorities before participation. Confidentiality was maintained by anonymizing student data, and participation was entirely voluntary, with the option to withdraw at any time. The intervention adhered to educational ethics guidelines,

ensuring non-invasive, age-appropriate activities. Additionally, students in the control group were provided access to the Brain Gym strategies after the study to ensure fairness in learning opportunities.

XVIII. STATISTICAL TECHNIQUES APPLIED

For this research, the descriptive statistics measures of normality such as Skewness and Kurtosis were used. Also, the investigator made a preliminary analysis of the data using measures of central tendency like Arithmetic Mean and Median, Mode and measures of dispersion like Standard Deviation. The following Inferential Statistics were used to draw inferences or conclusions from the data obtained through research.

- Paired t-test to find the significance of the difference between means of scores in each group.
- Independent t-test to find out the significance difference between groups subjected to the experiment and those under control.
- ANCOVA used in order to determine how well the Brain Gym Method works.

XIX. DELIMITATIONS OF THE STUDY

This study's delimitation signifies the precise limits and restrictions that determine its scope, guaranteeing a concentrated examination of the Brain Gym strategy's impact on social science achievement among pupils in secondary schools. Important delimitations of this research are outlined below:

- Time constraints meant that the study could only be conducted at one school, and the number of respondents were reduced to 35 students from two standard IX divisions.
- Time constraints meant that only 20 transcripts of lessons from two chapters of the standard IX social science textbook could be produced.
- The current classroom arrangement does not allow for selecting of one-to-one equated groups. Thus, for the experiment, two categories of unbroken groups were chosen.
- The researcher was unable to control for influence factors such as students' study habits, socioeconomic status, etc. The study intends to stay on track by clearly outlining these limitations; further research is needed to address more extensive applications and impacts, though.

XX. FINDINGS OF THE STUDY

- What follows is a summary of the most important results derived from the exam results:
- Impact of Brain Gym Techniques on Academic Performance in Social Science among Secondary School Pupils.

Conclusion 1: The Brain Gym Strategy effectively enhances achievement in Social Science among secondary school pupils. The conclusion is substantiated by the subsequent findings. The statistical significance test for the variations in pre-test and post-test means of scores in Achievement in Social Science for the Experimental group (paired t-test) was significant at the 0.05 level. (M1 pre-test mean = 11.3, M2 post-test = 43.4, t =50.3, for df = 1/34 $p<0.05$). The same has tabulated at Table1.

Table 1: Effect of Brain Gym Strategy on Achievement in Social Science of Secondary School Students

Group	Pre-test Mean (M1)	Post-test Mean (M2)	t-value	df	p-value
Experimental	11.3	43.4	50.3	1/34	<0.05

Conclusion 2: Brain Gym Strategy effective in enhancing Achievement in Social Science of Secondary School Students under the component -Remembering. The Conclusion is substantiated by the following findings.The statistical significance test for variations in pre-test and post-test means of scores on Achievement in Social Science under the component of Remembering of Experimental group (paired t-test) was significant at 0.05 level. (M1 pre-test mean = 3.89, M2 post-test = 12.03, t =27.5, for df = (1/34) $p<0.05$). The same has tabulated at Table 2.

Table 2: Effect of Brain Gym Strategy on Achievement in Social Science under the Component - Remembering

Group	Pre-test Mean (M1)	Post-test Mean (M2)	t-value	df	p-value
Experimental	3.89	12.03	27.5	1/34	<0.05

Conclusion 3: Brain Gym Strategy is effective in enhancing Achievement in Social Science of Secondary School Students under the component -Understanding. The Conclusion is substantiated by the following findings. The significance test for variations in pre-test and post-test means of scores on Achievement in Social Science under the component of Understanding of Experimental group (paired t-test) was significant at 0.05 level. (M1 pre-test mean = 3.63, M2 post-test = 13.29, t =28.0, for df = (1/34) $p<0.05$). The same has tabulated at Table 3.

Table 3: Effect of Brain Gym Strategy on Achievement in Social Science under the Component - Understanding

Group	Pre-test Mean (M1)	Post-test Mean (M2)	t-value	df	p-value
Experimental	3.63	13.29	28.0	1/34	<0.05

Conclusion 4: Brain Gym Strategy is effective in enhancing Achievement in Social Science of Secondary School Students under the component -Applying. The Conclusion is substantiated by the following findings. The significance test for variations in pre-test and post-test means of scores on Achievement in Social Science under the component of Applying of Experimental group (paired t-test) was significant at 0.05 level. (M1 pre-test mean = 2.91, M2 post- test = 11.54, t =29.7, for df = (1/34 p<0.05). The same has tabulated at Table 4.

Table 4 : Effect of Brain Gym Strategy on Achievement in Social Science under the Component - Applying

Group	Pre-test Mean (M1)	Post-test Mean (M2)	t-value	Df	p-value
Experimental	2.91	11.54	29.7	1/34	<0.05

Conclusion 5: Brain Gym Strategy is effective in enhancing Achievement in Social Science of Secondary School Students under the component -Analysing: The Conclusion is substantiated by the following findings. The significance test for variations in pre-test and post-test means of scores on Achievement in Social Science under the component of Analysing of Experimental group (paired t-test) was significant at 0.05 level. (M1 pre-test mean = 0.886, M2 post- test = 6.543, t =24.4, for df = (1/34) p< 0.05). Comparison of the Effectiveness of Brain Gym Strategy and Activity oriented method of instruction on Achievement in Social Science of Secondary School Students. The same has tabulated at Table 5.

Table 5: Effect of Brain Gym Strategy on Achievement in Social Science under the Component - Analysing

Group	Pre-test Mean (M1)	Post-test Mean (M2)	t-value	df	p-value
Experimental	0.886	6.543	24.4	1/34	<0.05

Conclusion 6: Brain Gym Strategy is more effective than the Activity Oriented Method of instruction on Achievement in Social Science of Secondary School Pupils. The conclusion is supported by the following findings. The Analysis of Co-Variance of the pre-test and post-test scores on Achievement in Social Science of students in Experiment and Control category showed that there was significant difference between their mean (F= 254.55, df =1/67; p<.001). The Experiment category is superior to the Control group.

20.1 Comparison of Effectiveness of Brain Gym Strategy over Activity Oriented Method of instruction on Achievement in Social Science under different categories of objectives:

- Component 1: Remembering: Conclusion 7:
  Teaching using Brain Gym Strategy is more effective than Activity Oriented Method Teaching on Achievement in Social Science under the objective- Remembering. The Analysis of Co-Variance of the pre-test and post-test scores on Achievement in Social Science under the component of Remembering of pupils in Experimental and Control groups showed that a significant disparity was observed between their means (F= 78.43, df=1/67; p<.001). The Experimental team outperforms the Control group.

- Component 2: Understanding: Conclusion 8:
  Teaching using Brain Gym Strategy is more effective than Activity Oriented Method of Instruction on Achievement in Social Science under the objective- Understanding. The Analysis of Co-Variance of the pre-test and post-test scores on Achievement in Social Science under the component of Understanding of students in Experimental and Control groups showed that there was significant difference between their mean (F= 44.51, df=1/67; p<.001). The Experiment category is superior to the Control group.

- Component 3: Applying: Conclusion 9:
  Teaching using Brain Gym Strategy is more effective than Activity Oriented Method of Instruction on Achievement in Social Science under the objective- Applying. The Analysis of Co-Variance of the pre-test and post-test scores on Achievement in Social Science under the component of Applying of students in Experimental and Control groups showed that there was significant difference between their mean (F= 145.45, df=1/67; p<.001). The Experimental category is superior to the Control group.

- Component 4: Analysing: Conclusion 10:
  Teaching using Brain Gym Strategy is more effective than Activity Oriented Method of Instruction on Achievement in Social Science under the objective- Analysing. The Analysis of Co-Variance of the pre-test and post-test scores on Achievement in Social Science under the component of Analysing of students in Experimental and Control groups showed that there was significant difference between their mean (F= 188.40, df=1/67; p<0.001). The Experimental category is superior to the Control group.

XXI. TENABILITY OF THE HYPOTHESIS

Hypothesis 1: The first hypothesis formulated is, “The Achievement in Social Science of Secondary School students taught through Brain Gym strategy is significantly higher than that of those who taught through Activity oriented method of teaching Social Science”. The above hypothesis is converted into null hypothesis for the purpose of statistical Inference. "There is no significant difference in Achievement in Social Science of Secondary School students taught through the Activity Oriented method of Instruction and those who taught through the Brain Gym Strategy," becomes the statistical hypothesis. After the experiment, students in the experimental group demonstrated a significantly higher level of Achievement in Social

Science compared to students in the control group, according to a test of significance test of variation between the mean post-test scores of the two groups (M experimental = 43.4, M control = 26.1, t = 15.5, p<.001). Therefore, the null hypothesis can be stated as: "There is no significant difference in Achievement in Social Science of Secondary School students taught through Brain Gym Strategy and those who taught through the Activity Oriented method of Instruction". The result of a significance test for variation between the mean post-test scores of students in both the groups (M experimental = 43.4, M control = 26.1, t = 15.5, p<.001) revealed that experimental group students have significantly higher level of Achievement in Social Science than the control group students after the experiment. To determine whether there was a statistically significant difference between the two groups, we compared both the experiment and control category's mean Achievement in Social Science gain scores. A statistically considerable variation is observed between the control and experimental groups with respect to the mean gain scores of the students. (Test = 15.4, p<.001), with a M gain of 32.1 and a M gain of 14.5 under control. There was a considerable variation between the means of the Experimental and Control groups when the Analysis of Co-Variance of the pre-test and post-test scores on Achievement in Social Science were compared (F= 254.55, df=1/67; p<.001). There is a significant difference between the Experiment and Control groupings. The findings from the research clearly show that, compared to students trained using the Activity-oriented method, those in secondary school who were taught using Strategy using Growth Mindset had substantially better Achievement in Social Science. So, we can say that the statistical hypothesis is not true. As a result, we accept hypothesis 1.

Hypothesis 2: With regard to the following learning outcomes-Remembering, Understanding, Applying, and Analyzing pupils in secondary schools whose social studies classes used the Brain Gym approach performed much better than those whose classes used the Activity-oriented approach. For the sake of mathematical inference, the previously stated hypothesis is transformed into the null hypothesis. Hence, we can put forward the null hypothesis as follows: Considering the following goals namely- Remembering, Understanding, Applying, and Analyzing- there is no statistically crucial distinction between the two approaches to teaching social science in secondary schools: The Brain Gym Strategy and the Activity Oriented method. The results of the significance test for the previous assumption are detailed below. Keep in mind: (F = 78.43, df = 1/67; p<.001). With this provision, we dismiss the null hypothesis. Gaining comprehension: (F = 44.51, df = 1/67; p<.001). With this provision, we dismiss the null hypothesis. (F = 145.45, df = 1/67; p<.001) was used. With this provision, we dismiss the null hypothesis. Looking at the data: (F = 188.40, df = 1/67; p<.001). With this provision, we dismiss the null hypothesis. Under the components of Remembering, Understanding, Applying, and Analyzing, the F value obtained from the Evaluation of Covariance of the scores obtained before and after the test of the experiment team is important. So, we can say that the null hypothesis is not true. Therefore, we accept hypothesis 2.

XXII. IMPLICATIONS OF THE STUDY

The findings of the study "Effectiveness of Brain Gym Strategy on Achievement in Social Science among Secondary School Students" have important ramifications for educators, parents, administrators and pupils in the realm of education. The Brain Gym method has the potential to significantly impact learning outcomes and personal growth because of its emphasis on bodily activity to improve cognitive functions. The significance of students participating in activities that enhance the way they feel physically and mentally has been emphasized by this research. Incorporating Brain Gym exercises into social science lessons can help students concentrate, remember information, and grasp complex ideas. By encouraging students to see learning as an ongoing process, this method improves their academic engagement and positivity toward schoolwork. The findings of this study can be used by educators to improve their teaching methods. Teachers can create an engaging classroom setting that encourages physical activity and cognitive growth by incorporating Brain Gym activities into the curriculum. In addition to helping students succeed in social science classes, these strategies promote their overall growth by making it easier for them to focus and lessen their anxiety. When it comes to their children's education, parents are indispensable. The importance of parents promoting physical exercise and the advantages of Brain Gym techniques at home is highlighted by this study. Parents can teach their children to love learning and improve their study habits by setting a good example themselves and encouraging a healthy lifestyle. The results highlight the need of integrating Brain Gym principles into school policies and curricula, which administrators should take into consideration. To help educators learn how to use these tactics in the classroom, professional development programs can be created. Executives should think about ways to evaluate students' progress in the classroom that take into consideration their academic performance as well as the positive effects of exercise on students' final grades.

Overall, this study emphasizes the transformative potential of integrating Brain Gym strategies into education. It requires a concerted effort from all parties involved students, educators, parents, and administrators to foster an atmosphere where physical activity boosts cognitive capacities, ultimately resulting in higher social science proficiency and equipping students to confidently and resiliently confront potential obstacles.

XXIII. RECOMMENDATIONS

The researcher noted that there are still a number of unanswered questions in light of the current research's limitations and results. Here are a few recommendations for subsequent studies:

- Researchers in the future can look at how Brain Gym techniques affect students' performance in social science over the long run. We can learn a lot about the initiatives' long-term effects on learning outcomes by tracking their impact as time goes on.
- Although the social sciences are the primary focus of this study, other fields of study, like math, science, or language arts, could benefit from the application of Brain Gym techniques. The method's generalizability could be better gauged with this information.

- Raising the age range of participants from elementary school to high school will allow us to compare the efficacy of Brain Gym techniques across different phases of development.
- Additional studies could examine how Brain Gym techniques affect learners from a variety of socioeconomic backgrounds, those with learning disabilities, and gifted children.
- If we want to know what kinds of professional development programs work, we should look at how teaching teachers Brain Gym principles affects their classroom practices and the results the pupils get. Better use of Brain Gym techniques in the classroom may be possible with the help of research into teachers' perspectives on the value of physical movement as a learning tool (see point 6).
- Investigating the role of parental support and reinforcement of Brain Gym principles at home could add another dimension to understanding the broader influences on students' learning experiences and outcomes.
- Research could examine how technology-based interventions, such as apps or online platforms that incorporate Brain Gym exercises, can complement classroom instructional strategies, particularly in social science.
- Conducting comparative studies to evaluate the effectiveness of Brain Gym strategies against other pedagogical approaches, such as inquiry-based learning or cooperative learning, could provide nuanced insights into best practices.
- To make the results more applicable to a global scale, it would be beneficial to study how cultural variables impact the use and success of Brain Gym techniques in various countries or regions.
- Further studies could look at how Brain Gym interventions influence students' mental health, social abilities, and outlook on learning and difficulties in general, not only their academic performance.

If these questions are adequately answered through subsequent investigations, we will have a better grasp of how to use Brain Gym techniques in social science classrooms to help students succeed academically and personally. This research in no way implies that the proposed course of action is exhaustive. Nonetheless, it's a top-notch method for teaching social studies in secondary schools that incorporates theories of brain-enhancing strategies. The Brain Gym Strategy, according to the investigator, will help advance social science education. On top of that, it will help clear the way for more educational research in the future.

XXIV. CONCLUSION

The research on the efficacy of the Brain Gym approach for improving social science performance among pupils in secondary schools has produced strong proof that highlights the necessity of incorporating creative educational techniques into educational practices. The results demonstrate that pupils utilizing the Brain Gym approach attained superior scores relative to their counterparts instructed through conventional activity-based methods, and exhibited notable enhancements across multiple cognitive domains, including recall, comprehension, application, and analysis. This indicates that integrating physical movement into learning can improve cognitive function and retention, resulting in a more dynamic and effective educational experience. Teachers must always keep in mind that students' physical and mental health have a significant impact on their learning. Educators are encouraged to embrace methods that promote full participation and holistic development, according to the outcomes of this study, which call for a fundamental change in teaching strategies. The importance of instructors establishing classroom settings that encourage physical exercise and intellectual development is further underscored by these results, which have ramifications beyond the performance of pupils in the classroom. Educators can create an educative atmosphere that boosts performance in school, decreases anxiety, and increases motivation by incorporating Brain Gym exercises into lesson plans. Students are more likely to have a positive outlook on their studies and participate fully in the educational program when they are encouraged to see learning as an active process through this method. Looking ahead, investigations examining the long-term effects of Brain Gym strategies on various subjects and levels of education are crucial. The long-term effects on educational achievement of these initiatives can tell us a lot about how well they work and whether they are sustainable. Further validation of Brain Gym strategies' potential as a versatile instructional approach can be achieved by investigating their applicability to diverse student populations, including those with varying learning needs. Ultimately, this study is a strong indication of how revolutionary new approaches to education, such as Brain Gym, can be. In order to help our learners succeed in school and in life, we should use these strategies to design engaging lessons that help them overcome obstacles in their academic pursuits while also encouraging them to keep growing and improving as individuals. Our students will be better prepared to adapt to a dynamic and unpredictable world if we work toward an educational system that places equal emphasis on academic success and personal growth.

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Tech and Integrity: Exploring the Intersection of Tech and Ethics

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Abstract

With the rapidly revolutionizing technological advancements, artificial intelligence and emerging technologies are finding strong footprints in all possible domains of life, leading to transformative industrialization and daily life. The article also serves to explore the major drivers of educational tech upsurge, fostering responsible innovation and digital citizenship. However innovative and life-transforming these technologies may be, they are prone to potential ethical interrogations which require cautious attention. This article dives into examining the different ethical considerations especially for digital educational solutions and suggests further directions of research in ethical considerations. By giving due regard to these ethical considerations and finding justified ways to address them, we can offer better directions to sail through the darker shades and the brighter tones presented by the emerging technologies, thus establishing a balanced and innovative future for both the teaching and the learning community at large.

Keywords: - Ethical considerations, emerging technologies, educational technology, digital educational solutions, transformations, digital era

I. INTRODUCTION

Modern society is comprised of digital natives and digital citizens with high levels of exposure to technological interventions across many sectors of life. Technology has brought every one of us to a crossroads when it comes to its utility. In fact, within the realm of education, technological interventions have always been welcomed with the view to aid in facilitating the instructional process that comprises teaching, learning, and evaluation with appropriate remedial actions. This in turn demands for capturing and processing of lots of user-based information in many ways (Marín & Tur, 2024). In such a scenario, ethics play a substantial role in placing innovative technologies into practice with due consideration in various dimensions. This chapter explores the significance of considering ethics in implementing technological interventions in education.

II. THE ASCENT OF EDUCATIONAL TECHNOLOGY

The landscape of education has been dramatically swept by adopting innovative technologies post-COVID pandemic in specific. 'Access data at any time and from anywhere' has become the tagline for the concept of educational technology. This has profoundly reinvented the ways of teaching, learning, and collaborating among the instructors, learners, and the content being learned. Let us explore the journey of educational technology.

- The notion of Programmed Instruction was introduced in the 1960s by using computers for the purpose of instructional process. This concept has been the foundation for the solid establishment of instructional technology.
- Broadcasting learning content in the form of audio-video mode through educational televisions came next in the 1970s to promote mass-level delivery and accessibility of the learning content.
- In the 1980s, standalone or dedicated digital educational applications and content were introduced using computer-assisted instructional systems.

- In the 1990s, learning through online mode using internet connectivity restructured learning by distance mode.
- Full-fledged, integrated digital instructional platforms and electronic instructional resources were launched to promote the management of instructional systems in the 2000s.
- In the 2010s, learning through mobile-based platforms and applications has granted learners the ability to learn on the move and collaborate with others through social media platforms.
- Decentralized access to high-quality content has been made possible by the launch of massive open online courses in 2012.
- Since 2015, adaptive and personalized instructional systems have been evolving with educational applications featuring artificial intelligence, multimodal experiences through virtual, augmented, and mixed reality, gaming elements, data-driven evaluation, and instantaneous feedback mechanisms in various educational processes.
- In addition, trends emerging in the instructional systems include 3D modeling, simulations, block-chain technology, 360-degree view, virtual tours, Haptic technology, cloud and edge computing, Internet of things, wearable technologies, 5G and advanced networking, and so on.
- Further, robotics and automation, and intelligent tutoring solutions are also playing substantial part in the evolution of educational technology in the recent years.

III. MAJOR DRIVERS OF EDUCATIONAL TECH UPSURGE

The upsurge of educational technology has been triggered by the following major drivers:

3.1. Advances in Technology:

Technological developments and innovations have the potential to provide quick, robust networking, highly absorbent multimodal learning experiences, intelligent tutoring, and adaptive evaluation with tailor-made solutions, scalability, and ubiquitous access to educational opportunities.

3.2. Infrastructural Headways:

Accessibility has been greatly rendered and supported by the advancing technological infrastructures by way of enhanced digital interconnectivity and networking, robust storage options taking the form of cloud, and versatile gadgetry support.

3.3. Government Initiatives and Financial Support

In the recent years, the national governments of various countries across the globe have been investing significantly in science and innovative technologies for their robust and practical complex solutions in the field of education and other major disciplines. Several initiatives of the various governments have paved ways for novel opportunities for the emerging technologies to flourish for the better.

3.4. Tech-Savvy Digital Natives:

Digital instructional platforms have been sprouting to satiate the learning demands of the digital natives who are technologically savvy. The extensive usage of mobile devices, computers and various other electronic gadgets have also become a part and parcel of their lives.

3.5. Altering Needs of the Learners:

Learners prefer anytime anywhere learning in the modern information era with the huge technological assistance offered by internet networking and social media. Further, the needs of the learners are highly fluid in terms of personal aspects such as interests, profession, ability, skills, knowledge base, accessibility, socio-economic status and know-hows, and instructional aspects such as style, modality and mode of learning.

3.6. Globalization and Networking:

Globalization has provided an intensive extended support for the field of education in specific, by providing multifarious opportunities for the learners, educators and institutions to connect and collaborate and to create and share educational resources across the globe at any time and from anywhere. This has also led to the emergence of transnational partnerships, student exchange programs, internationalization of academic curricula, educational opportunities for global citizenship and career readiness programs for worldwide employment options. This has established pathways for the advancements in the networking technologies for collaborating through online forums, social media platforms, professional networking, and various other collaborating tools.

3.7. Customizing Learning Opportunities:

Prioritizing individual differences in the educational realm has paved ways for offering tailor-made educational experiences and adaptive instructional assistance in the process of learning.

3.8. Cost as a Factor of Economic and Ecological Concern:

From the perspective of economic and ecological footprints, digital initiatives have been considered as better alternative forms of communication and record keeping to conserve natural resources. Also, the print forms of educational materials are quite heavy to carry and be safeguarded from damage and destruction. In order to promote paperless ‘Go Green’ strategies and

'reducing the physical academic load', initiatives to offer multimodal digital learning content at almost free or minimal cost have been put into place.

3.9. Data-driven Pedagogical Upgrades:

Analytics component in learning using technology is highly driven by data linked to learner performance. This in turn empowers instructors to accommodate their pedagogical approaches as per the demands and requirements of the instructional process and global demands.

3.10. Others Factors:

The other significant factors that are driving the advancements in educational technology include the increasing demands of open educational resources for the promotion of equal opportunities for access and usage for all beyond disparities. Further, social media has been playing a significant part in creating awareness and know-hows exploring the various technological options to the general public with the help of various collaborative and information sharing platforms.

IV. ETHICAL IMPLICATIONS

Technology is a kind of double-edged sword which when not handled or used properly, it can cause damage to the users at both the ends. This has created a huge difference of opinions among the public leading to the emergence of techno-optimists who view technology as social innovative solutions and techno-pessimists who view technology as problematic unpredictable challenge to humans. Even though technological advances have brought in many convenient options, they have carried a lot of concerns as well. This demands for a careful consideration of the benefits and the concerns in technology use within educational context (Aydin, 2024). The key concern lies in the privacy and confidentiality of the learner data (Dhirani et al., 2023). Also, besides ethical concerns, value systems, psychosocial development, physical and digital health of the users are also deteriorating. Further, poorly defined ethical practices and vague guidelines increases the risk of issues with data privacy and security breaches (Dhirani et al., 2023). The major themes of ethical impacts in the emergence of technology-led educational applications include the following:

- Concerns of data privacy and personal autonomy
- Concerns of in-person connectivity in real-time
- Socio-cultural sensitivity and biased discriminations
- Concerns with accountability and transparency of digital governance
- Potential economic concerns with automation and job displacements
- Erosion of free will and threats to human agency
- Concerns with misinformation and social threats
- Issues with cybersecurity and digital protection
- Digital disparities and concerns with accessibility and inclusivity
- Issues with copyrighting and academic integrity
- Exploitative digital marketing and financial impacts
- Non-compliance to global standards and cultural sensitivity.

V. ETHICAL CONSIDERATION

With the continuous progresses being seen in the educational technologies, it is highly imperative to consider the ethical factors for various reasons. The key ethical factors that are to be handled with utmost care and concentration can be grouped into the following categories:

- Instructional Ethics for Learners
- Instructional Ethics for Instructors/Educators
- Ethics related to EduTech Developers
- Ethics related to Information Capture and Management
- Ethics related to E-Content Development
- Ethics related to Tech Governance
- Ethics related Human-Centered Tech Solutions
- Ethics related to Tech Compliance and Complaint Management

5.1 Instructional Ethics for Learners

Instructional ethics for learners give its central focus upon the needs, rights and responsibilities linked to the learning community. This includes a wide spectrum of ethical considerations for promoting integrity, inclusiveness and due regard for the learning community with varying personal and educational qualities and demands. This category emphasizes a highly equity-based inclusive learning environment where intellectual autonomy and scope of personal development are not compromised and also ensures providing fair and enchanting educational encounters for the learners. Further, this prioritizes offering optimal and adaptive learning opportunities beyond individual differences. Besides these, it is highly imperative for the learners to maintain academic integrity, practice appreciable digital etiquettes and embrace respectful, sensible and responsible use of technology in the digital learning platforms. In addition, the learners should also be protected from information misuse, and harassments.

5.2 Instructional Ethics for Instructors/Educators

Instructional ethics for instructors serve to guide them in building an equitable and inclusive technology-enabled instructional environment. This involves treating all learners with equity and equality in terms of participation and accessibility to instructional content within tech-led learning settings thereby giving due regards for diverse learning needs and cultural sensitivity of the learners. Being objective, impartial and transparent to the learners with professional boundaries is also very important for offering productive and healthy instructional support and remediation. This also focus on professional ethics and intellectual property rights governing copyrights and appropriate practices for citing digital resources, thus promoting academic integrity. Further, safeguarding confidentiality and privacy of any dataset related to the learners is also an important consideration in this category.

5.3 Ethics for EduTech Developers

Ethics for EduTech developers focus on the norms and standards to be considered for the companies or organization that engage in the development of technology based educational solutions. These ethics essentially prioritizes the promotion of healthy boundaries for all its stakeholders comprising its employees, end-users and mediators of any form. In fact, the wellbeing of the users is to be kept at highest priority. The usability, affordability, accessibility, inclusivity, and adaptability of the digital products should be practically feasible for the users. Further, cultural sensitivity and diverse representation of the users are also to be considering when developing educational applications. The organizations should not pressurize its employees for the product development with keen focus on materializing the business alone. The employees should also be promised with healthy work ethics and norms in the smooth execution of these organizations. There should be appropriate and adequate mechanisms in place for handling incidents and responding to them. It is essential that they follow the legitimate industrial norms and standards put in place by the concerned authorities and regular auditing and assessment processes are to be ensured in practice. They should also refrain from unfair and exploitative practices of marketing.

5.4 Ethics related to Information Capture and Management

This category of ethical considerations throws spotlight on the capture and management of user data. Technology based digital solutions are made to provide adaptive learning experiences where difficulty adjustments and remedial actions are automated using artificial intelligence and machine learning by ways of algorithms. This in turn have both direct and indirect working on data related to the learners. In fact, customization of educational solutions are purely data driven. This demands for providing due considerations regarding what kind of data is being captured from whom for what purpose and how they are processed and managed. Adequate security, and confidentiality of the application user data being accessed and managed and safety of the user are to be ensured using robust protective mechanisms, obtaining informed consent from the user, minimization of data, and maintaining transparency when collecting and using the user data and at times of information security breaches if any (Zhai et al., 2021).

5.5 Ethics related to E-Content Development

E-content plays substantial part and is in fact the core of the digital learning platforms. It is ultimately the learning content that drives the technology led educational solutions. From this perspective, the learning content should be relevant, authentic, and appropriate for the learners. The e-content may be regularly updated to ensure accuracy. In addition, the technologies are used to supplement the traditional instructional process for offering immersive and enriching educational experiences in order to promote knowledge transfer, retention and application orientation among the learners. This also considers the cultural sensitivity and accessibility privilege for all learners. Further, compliance to data protection rights is also to be ensured. In addition, the e-content should be highly informative and devoid of exploitative or harmful content thus, promoting healthy development in learners.

5.6 Ethics related to Tech Governance

Tech governance is big area of concern. It is this aspect that ensures governance of data, measures of cybersecurity, fair and legitimate utilization of intellectual properties, digital rights, practices of sustainable environment, accessibility and inclusivity of resources, accountable, transparent and ethical administrative practices and leadership, and compliance to global standards. It governs the on-going practices and processes associated with digital technology governance and administration by ensuring regular auditing and assessments.

5.7 Ethics related to Human-Centric Tech Solutions

This category of ethical considerations gives due regard for the human component in terms of their wellbeing and dignity within the domain of technology driven educational applications, digital solutions and digital instructional practices that aid in offering ethically immersive educational experiences for the learners. This encourages practicing deign principles centered on human wellness across dimensions such as digital health and safety. This also serves to ensure data privacy and confidentiality, and accessibility and inclusivity with fair educational opportunities with transparent and ethical considerations for all. Human-centric ethics further includes the considerations of social cultural aspects and the diverse user populations, thus promoting social cohesiveness in offering technology-based solutions for educational needs.

5.8 Ethics related to Tech Compliance and Complaint Management

The ethical considerations under tech compliance focus on adhering to legal regulations and frameworks, ethical design principles and practices, offering highly robust secure mechanisms for technological products and services, digital resources,

and user data access and management while embracing the digital divide and digital health among the end-users. Ethical action plans for non-compliance should also be designed and authenticated as part of the incident handling and response management system. Appropriate complaint tracking and management systems and grievance redressal mechanisms are also to be in place with due regard for all the stakeholders.

VI. FUTURE RESEARCH DIRECTIONS

There is no doubt that the emerging trends and technologies have been revolutionizing the educational experiences with their highly immersive content management and adaptive instructional support. They offer a great deal of strength to both the teaching and the learning community beyond space, pace, time, and geographical location with a rich set of digital resources and collaborative opportunities. However, they also bring in a lot of challenges in terms of confidential data, secured access to resources, inclusive and adaptive instructional practices, and henceforth. Further research works are essential to address the following aspects in offering technology-driven educational solutions:

- Ensuring transparency, confidentiality, and security mechanisms in digital educational suites
- Mitigating digital trauma and harassment, and addictive habits
- Embracing digital wellbeing and digital literacy
- Using ethical algorithmic practices and decision-making in application development
- Exploring neuroscientific implications of using digital educational solutions
- Developing eco-friendly technological practices in education

VII. CONCLUSION

Ethical considerations have due significance in promoting and managing socially responsible technology driven educational applications. As innovations happen in technological domain, challenges and limitations also continue to emerge and exist. This demands for effective integration of ethical principles and practices ensuring industrial standards and regulatory compliances both locally and globally. This helps in the smooth navigation of complex and challenging scenario that arise within the domain of education and the digital landscape, thereby protecting individual rights and collective wellness.

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A Study on The Self Efficacy Among Graduate Student Teachers of Kerala

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Abstract

Self-efficacy refers to an individual's belief in their ability to successfully accomplish a specific task or achieve a goal. It is a key concept in psychology, introduced by Albert Bandura, and influences how people think, feel, and behave. High self-efficacy leads to greater motivation, resilience, and willingness to tackle challenges, while low self-efficacy can result in self-doubt and avoidance of difficult tasks. In this paper, the Investigator tries to analyze the level of self efficacy among graduate student teachers of Kerala. The study also highlighted to check whether there is any significant difference in the level of self efficacy among graduate student teachers based on the sub samples Gender and Locale. The findings of the study revealed that the graduate student teachers of Kerala have an average level of self efficacy and also that the self efficacy level doesn't depends on the locale and gender of the total sample. The study suggested that the educational system, curriculum planners and policy makers should take into consideration the implications arising from the study and have to inculcate the elements of self efficacy purposively in the teaching - learning process of teacher education following hidden curriculum plans.

Keywords: - Self efficacy, Graduate student teachers, Teacher education programmes

I. INTRODUCTION

Self-efficacy is a concept introduced by psychologist Albert Bandura as part of his Social Cognitive Theory. It refers to an individual's belief in their capability to perform a specific task or achieve a desired goal. This belief influences how people approach challenges, persist in the face of obstacles, and interpret their successes and failures.

1.1. Core Components of Self-Efficacy

Bandura identified four primary sources that shape self-efficacy:

- Mastery Experiences: The most significant source of self-efficacy is successful experiences boost confidence, while repeated failures can diminish it. Example: A student excelling in math after solving challenging problems gains confidence in their abilities.
- Vicarious Experiences (Modeling): Observing others successfully complete a task can enhance one's belief in their ability, especially if the observer identifies with the model. Example: Seeing a peer give a successful presentation may inspire confidence in someone preparing for their own.
- Verbal Persuasion**:** Encouragement and constructive feedback from others can strengthen self-efficacy. Example: A teacher's affirmation of a student's writing skills can motivate them to tackle more challenging assignments.
- Emotional and Physiological States**:** Emotional arousal, stress, or anxiety can influence self-efficacy. Positive emotional states can boost confidence, while negative states may weaken it. Example: A calm, focused mind during an exam enhances belief in one's ability to perform well.

(Bandura ,1977) **i**n his seminal work, Bandura explored the concept of self-efficacy as part of social learning theory. He demonstrated that self-efficacy beliefs directly affect learning outcomes, motivation, and behavioral change.(Zimmerman and Schunk ,1989) in their study emphasized the role of self-efficacy in self-regulated learning, showing that students with

higher self-efficacy were more effective in setting goals and monitoring progress. (Luszczynska, Scholz, & Schwarzer ,2005) in their research analyzed self-efficacy's role in health behaviors, concluding that individuals with strong self-efficacy beliefs were more likely to engage in health-promoting activities, such as exercise and healthy eating.

(Pajares ,1996) highlighted the role of self-efficacy in academic performance, finding that it strongly predicts students' motivation and success, particularly in subjects like math and science. (Stajkovic and Luthans,1998) in a meta-analysis examined self-efficacy in organizational settings, showing that employees with high self-efficacy performed better and were more adaptive to workplace challenges.

1.2. Applications of Self-Efficacy:

- Education:- Teachers can build students' self-efficacy by providing positive feedback, modeling successful behaviors, and designing tasks that ensure incremental mastery.
- Health:- Self-efficacy plays a crucial role in adopting healthy behaviors, managing chronic conditions, and recovering from illness.
- Workplace:- High self-efficacy improves employee performance, leadership abilities, and the ability to cope with stress.
- Therapeutic Settings:- Cognitive Behavioral Therapy (CBT) often focuses on improving self-efficacy to help clients overcome anxiety, depression, or phobias.

II.NEED AND SIGNIFICANCE OF THE STUDY

(Xie and Meng Deng,2024) investigated the statistical impact of inclusive education teachers' self-efficacy on their motivation for work. A total of five hundred thirty-four inclusive education teachers from Beijing, China, participated in the research by completing two assessments: the "Teacher Efficacy for Inclusive Practices Scale" and the "Multidimensional Work Motivation Scale." The findings indicated that factors such as age, experience working with students who have special educational needs, training, and the subject taught had a statistical impact on teacher self-efficacy, though they did not affect work motivation. Teacher self-efficacy contributed positively to three out of the four types of work motivation analyzed, with efficacy in applying inclusive strategies, efficacy in collaboration, and efficacy in behavior management showing the most significant predictive influence on introjected regulation, identified regulation, and intrinsic motivation, respectively.

(Jennifer et al., 2023) explored the relationship between mindset and self-efficacy among special education teachers in Texas's Region 2. An examination of how special education teacher mindset relates to self-efficacy was performed. The data were analyzed using the bivariate Spearman Rho method. The findings of this research indicated that there is no significant statistical correlation between mindset and overall self-efficacy, self-efficacy in engaging students, self-efficacy in instructional strategies, and self-efficacy in managing the classroom among special education teachers in Texas's Region 2. Nonetheless, the study also suggested that positive interventions, shifts in mindset, and teacher self-efficacy are linked to enhancements in student learning, as the statistical analysis demonstrates that these variables tend to change in the same direction.

(Weinstein ,2023) aimed to examine the teacher self-efficacy of music student teachers and the origins of that self-efficacy. He distributed a quantitative assessment of teacher self-efficacy and its sources to music student teachers across 22 colleges and universities in the United States. A total of thirty-eight participants completed both surveys. The level of self-efficacy regarding instructional strategies was notably greater than for the other aspects. There were no significant variations in the teacher self-efficacy of music student teachers when categorized by musical subject or the grade level they taught. To enhance teacher self-efficacy among students, music teacher educators and cooperating teachers could provide guided mastery teaching experiences, assist student teachers in managing overwhelming emotions related to their transition into the profession, and offer clear and constructive feedback concerning the teaching abilities of student teachers during their experiences.

(Campbell, 2023) utilized the Culturally Relevant Teacher Self-Efficacy Scale (CRTSE), a 41-item tool that enabled researchers to investigate how teachers' confidence in their abilities to apply culturally relevant methods affects student success in elementary schools across South Carolina. The study focused on a sample of 103 elementary educators in SC. Prior to completing the CRTSE survey, participants responded to three demographic inquiries: their years of teaching experience, the type of degree they possessed, and whether their school was classified as high or low-performing. The outcomes indicated that a majority of teachers exhibited strong self-efficacy in making students feel valued as members of the classroom. Additionally, the results revealed no notable differences in teachers' self-efficacy regarding culturally relevant practices based on their experience, degrees earned, or the performance level of their schools.

(Doreen L and Michelle A, 2021) through a parallel mixed method explored self efficacy and literacy competency among student teachers in residency model. Investigator conducted qualitative interviews with student teachers, teacher educators and supervisors. Quantitative data were also collected using pre test post test survey using teachers' sense of efficacy for literacy scale. The findings of the study showed that residency model student teachers showed higher level of self efficacy for literacy instruction.

In 2014, Yi Hsiang aimed to validate the connections between teachers' self-efficacy and students' learning motivation, learning environment, and learning satisfaction specifically within the context of senior high school physical education (PE). The research utilized a sample of 462 PE teachers and 2,681 students, who were selected through stratified random sampling and cluster sampling from high schools in Taiwan. The tools used for the research included the Teachers' Self-Efficacy Scale, as well as the students' Learning Motivation Scale, Learning Atmosphere Scale, and Learning Satisfaction Scale, all developed by the researchers based on established theories and existing measurement tools. The findings indicated that the self-efficacy of physical education teachers had an impact on students' learning motivation, learning environment, and learning satisfaction; furthermore, it was found that teachers' self-efficacy had an indirect and positive effect on learning satisfaction, with this effect being mediated by learning motivation and learning environment.

From the above mentioned studies, self efficacy has affecting teacher behaviour and student behaviour, learning experiences in the classroom and several other teaching – learning variables. The studies necessitated the need for having a positive self efficacy among younger generation of teachers. The studies encouraged the investigator to find out the self efficacy level of student teachers of Kerala and the possible educational implications arising from the study based on the findings. The investigator hopes that the existing level of self efficacy among graduate student teachers will help the curriculum planners, educational administrators and other stake holders to have a proper reflection about the teacher education programmes also.

III. RESEARCH QUESTIONS

The major research questions formulated for the present study are;

- What will be the level of self efficacy among graduate student teachers of Kerala?
- Is there any significant difference in the self efficacy of graduate student teachers based on sub sample Gender?
- Is there any significant difference in the self efficacy of graduate student teachers based on sub sample Locale?

IV. OBJECTIVES OF THE STUDY

The major objectives arising from the study are as follows;

- To find out the level of self efficacy among graduate student teachers of Kerala
- To find out whether there exists any significant difference in the self efficacy level of graduate student teachers based on sub sample Gender
- To find out whether there exists any significant difference in the self efficacy level of graduate student teachers based on sub sample Locale

V. HYPOTHESES OF THE STUDY

The major hypotheses developed for the present study are;

- There will be significant difference in the level of self efficacy among graduate student teachers of Kerala
- There will be significant difference in the self efficacy among graduate student teachers based on sub sample Gender
- There will be significant difference in the self efficacy among graduate student teachers based on sub sample Locale

VI. METHODOLOGY

Normative survey method was used for the present study (Best and Kahn, 2010). The Investigator used a self efficacy scale based on components Setting Realistic Goals, Positive Reinforcement, Modeling and Demonstration, Constructive Feedback, Encouraging Persistence, Skill Development, Creating a Supportive Environment, Promoting Autonomy, Mindset Shift and Reflection and Goal Adjustment. The investigator collected the responses of graduate student teachers using self efficacy scale prepared and standardized by the Investigator. The response sheets were collected, scored, tabulated and interpreted using descriptive and inferential statistics.

VII. POPULATION AND SAMPLE OF THE STUDY

The populations selected for the present study are graduate student teachers who were dong Bachelor of Education programme under various universities in Kerala. The sample consisted of 300 graduate student teachers from colleges run by Kerala University, Mahatma Gandhi University and University of Calicut using simple random sampling technique. Here samples are selected by giving due weightage to the strata namely Gender and Locale.

VIII. TOOLS USED FOR THE STUDY

The tool used for the present study is self efficacy scale by giving due weightage to 10 components namely Setting Realistic Goals, Positive Reinforcement, Modeling and Demonstration, Constructive Feedback, Encouraging Persistence, Skill Development, Creating a Supportive Environment, Promoting Autonomy, Mindset Shift and Reflection and Goal Adjustment. The standardized scale consisted of 40 items with five point scale. The scale consisted of positive statements. The responses were given score from 1 to 5 for the responses ranging from nothing to outstandingly respectively. Thus the maximum score of the scale is 200 and minimum is 40. The scale established reliability using test – re test reliability test and the reliability coefficient obtained for the whole scale is 0.87. Face validity and content validity were established for ensuring the validity of the scale.

IX. STATISTICAL TECHNIQUES USED FOR THE STUDY

The major statistical techniques used for the present study according to Garrett (2005) are;

- Descriptive Statistics
- Test of significance of difference between means
- Percentage analysis

X. LIMITATIONS AND DELIMITATIONS OF THE STUDY

The major limitations of the present study include nature of the student teachers, time of the study and the environmental factors. The major delimitations are as follows;

- The study was delimited to Ernakulum, Thrissur and Alappuzha districts only
- The study was delimited to graduate student teachers of Kerala, M.G and Calicut universities only
- The study was delimited to subsamples namely Gender and Locale only

XI.ANALYSIS AND DISCUSSION OF RESULTS

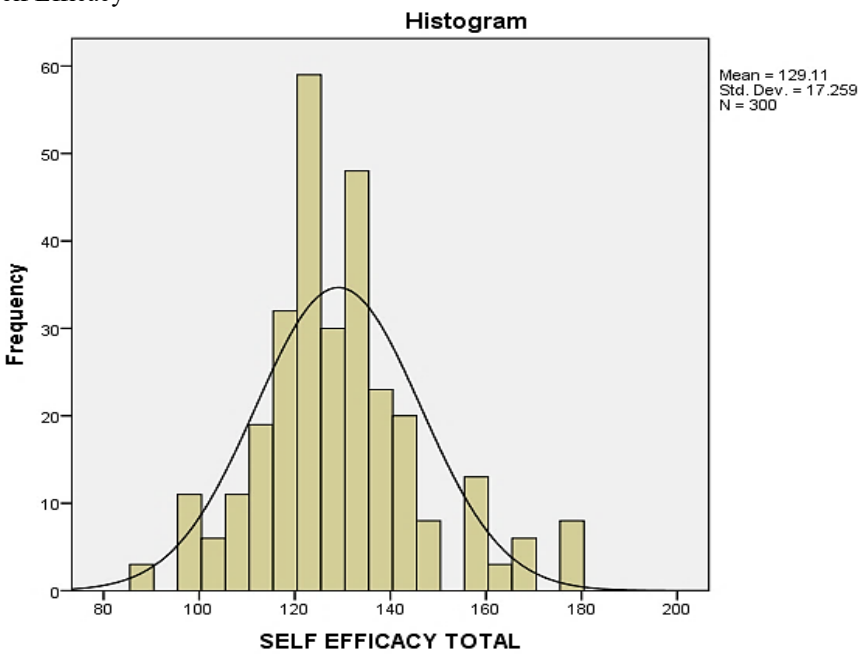
The descriptive statistics for the total sample of graduate student teachers about the level of self efficacy are as shown below.

Table 1. Descriptive statistics for the total scores on level of graduate student teachers about Self Efficacy

Item	Mean	Median	SD	Skewness	Kurtosis
Level of graduate student teachers about Self Efficacy	129.11	128.0	17.3	0.663	1.06

From Table 1., it was found that the mean and median values are almost the same. The standard deviation value also shows that the distribution is not much deviated from the normal. The skewness value was found positive indicating that low scores are massed on the upper side of the distribution. That is the population contains more of lower scores. Kurtosis value was greater than 0.263. Hence the distribution is platykurtic in nature.

Fig.1: Histogram for the total scores on level of graduate student teachers about Self Efficacy



The percentage analysis of the scores on level of graduate student teachers about Self Efficacy is as shown in Table 2.

Table 2. Level of Secondary school teachers on the Total scores on perception about the elements of code of professional ethics in Bhagavad Gita

Item	Low Level	Average Level	High Level
No. of student teachers	35	227	38
Percentage	11.67	75.66	12.67

From Table 2, it is clear that majority of the graduate student teachers have an average level of self efficacy. The difference in the level of graduate student teachers on self efficacy is represented as shown in Fig. 2.

Fig. 2: Comparison of different levels of Self Efficacy among Graduate Student teachers

Hence from Table 1., Table 2. and from Figures, Fig.1 and Fig.2, it was evident that the graduate student teachers have an average level of self efficacy. Thus it was inferred that there was significant difference in the level of self efficacy among graduate student teachers of Kerala and that most of the graduate student teachers have an average level of self efficacy.

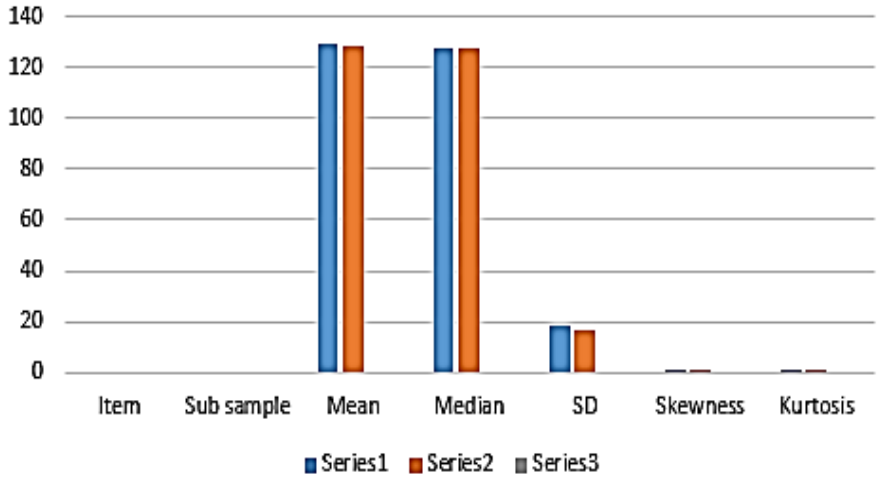
The descriptive statistics for the total scores on self efficacy among Graduate Student teachers for sub sample Gender are as shown in Table 3.

Table 3. Descriptive statistics for the total scores of Self Efficacy of Graduate student teachers for the Sub sample – Gender

Item	Sub sample	Mean	Median	SD	Skewness	Kurtosis
Self Efficacy of Graduate student teachers for the Sub sample – Gender	Male	129.45	127.50	18.11	0.613	0.701
	Female	128.95	128.0	16.86	0.694	1.33

From Table 3., it is clear that the mean and median values of Male and Female graduate student teachers are almost the same. The standard deviation values also show that the distribution is not much deviated from normality. The skewness values of Male and Female graduate student teachers are positively skewed. This means that scores are massed at the lower end of the scale. The kurtosis value is greater than 0.263 for Male and Female graduate student teachers and hence these distributions are platykurtic in nature.

Fig..3: Descriptive statistics for the total scores of Self Efficacy of Graduate student teachers for the sub sample - Gender



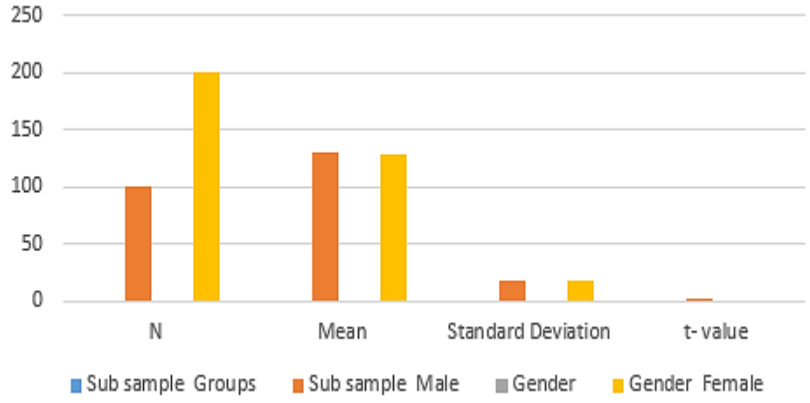
The mean scores of Male and Female graduate student teachers on self efficacy were compared using significance of difference between means. The results were summarized as shown in Table 4.

Table 4. Comparison of Mean Scores of Graduate student teachers on level of Self Efficacy for the Sub sample for the Sub sample – Gender

Sub sample	Groups	N	Mean	Standard Deviation	t- value
Gender	Male	100	129.45	18.11	0.239
	Female	200	128.95	16.86	

From Table, 4, it was found that the t – value obtained is not significant at .01 level indicating that there is no significant difference between the mean scores of Male and Female graduate student teachers on Self Efficacy. Hence Hypothesis II is rejected.

Fig. 4: Comparison of Mean Scores of Graduate student teachers on level of Self Efficacy for the sub sample -Gender



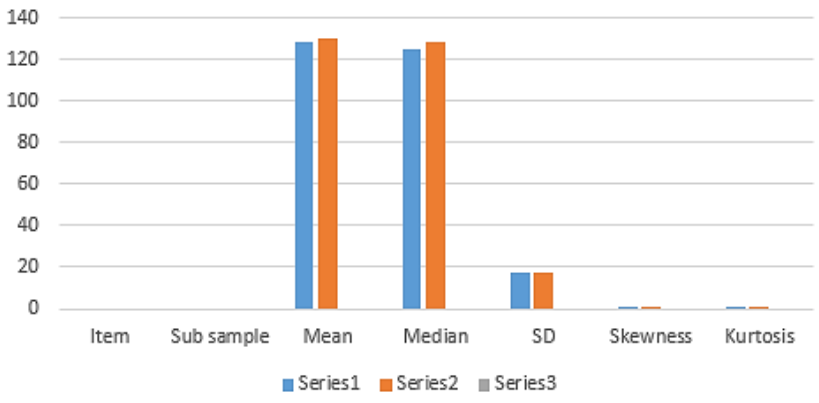
The descriptive statistics for the total scores on self efficacy among Graduate Student teachers for sub sample Locale are as shown in Table 5.

Table 5. Descriptive statistics for the total scores of Self Efficacy of Graduate student teachers for the Sub sample – Locale

Item	Sub sample	Mean	Median	SD	Skewness	Kurtosis
Self Efficacy of Graduate student teachers for the Sub sample – Locale	Rural	128.3	125.0	17.4	0.734	0.864
	Urban	129.74	128.0	17.21	0.619	1.31

From Table 5, it is clear that the mean and median values of Rural and Urban graduate student teachers are almost the same. The standard deviation values also show that the distribution is not much deviated from normality. The skewness values of Rural and Urban graduate student teachers are positively skewed. This means that scores are massed at the lower end of the scale. The kurtosis value is greater than 0.263 for Rural and Urban graduate student teachers and hence these distributions are leptokurtic in nature.

Fig 5: Descriptive statistics for the total scores of self Efficacy of Graduate student teachers for the Sub sample - Locale



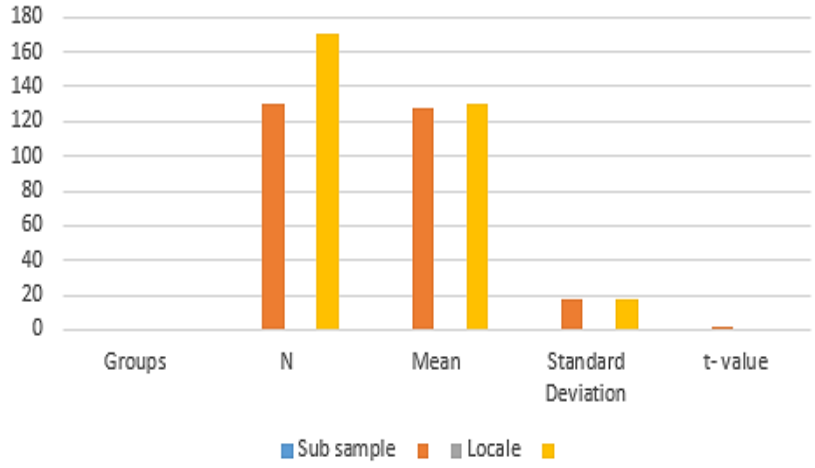
The mean scores of Rural and Urban graduate student teachers on Self Efficacy were compared using significance of difference between means. The results were summarized as shown in Table 6.

Table 6. Comparison of Mean Scores of Graduate student teachers on level of Self Efficacy for the Sub sample – Locale

Sub sample	Groups	N	Mean	Standard Deviation	t- value
Locale	Rural	130	128.3	17.4	0.72
	Urban	170	129.74	17.21	

From Table 6., it was found that the t – value obtained is not significant at .01 level indicating that there is no significant difference between the mean scores of Rural and Urban graduate student teachers on Self Efficacy. Hence Hypothesis III is rejected.

Fig. 6: Comparison of Mean scores of Graduate student teachers on level of self Efficacy for the sub sample- Locale



XII. MAJOR FINDINGS OF THE STUDY

- There is significant difference in the levels Graduate student teachers regarding Self Efficacy
- Graduate student teachers have mostly an average level of Self Efficacy
- There is no significant difference in the Self Efficacy of Graduate student teachers based on sub sample Gender
- There is no significant difference in the Self Efficacy of Graduate student teachers based on sub sample Locale

The findings of the present study are in congruent with study conducted by (Xie & Meng Deng, 2024),(Jennifer et al. 2023), (Weinstein ,2023), (Campbell ,2023) and (Doreen L & Michelle A ,2021) which all necessitated the need for having a positive self efficacy among younger generation of teachers and all these studies encouraged the investigator to find out the self efficacy level of student teachers of Kerala. So from the findings of the present study, it was again confirmed that the graduate student teachers should have to develop appropriate self efficacy skills.

XIII. EDUCATIONAL IMPLICATIONS OF THE STUDY

- The teacher education curriculum should strictly include the elements of Self Efficacy for strongly predicting students' motivation and success
- Training programs should focus on enhancing specific teaching competencies to boost self-efficacy. Workshops on classroom management, effective teaching strategies, and student engagement techniques can help graduate student teachers build confidence and improve their teaching performance
- Establishing mentorship programs where experienced educators guide graduate student teachers can provide the support they need to address challenges. Regular feedback and peer collaboration can foster a positive teaching environment, helping them gradually build a stronger sense of self-efficacy

XIV.CONCLUSION

Self-efficacy is crucial for graduate student teachers as it directly impacts their confidence, motivation, and effectiveness in the classroom. A strong sense of self-efficacy enables them to tackle challenges, implement innovative teaching strategies, and foster a positive learning environment for their students. It also encourages persistence in the face of difficulties, helping them adapt and grow professionally. High self-efficacy not only enhances their teaching performance but also influences students' academic success and engagement, making it a foundational attribute for aspiring educators.

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Girls' Education in Rural India: Barriers, Challenges, and Policy Interventions

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Abstract

This paper examines the multifaceted challenges that continue to hinder girls' education in rural India, despite significant policy interventions and improvements in overall educational indicators. Drawing on empirical evidence from various studies conducted between 2010 and 2024, this research analyzes the persistent socio-cultural, economic, and infrastructural barriers that disproportionately affect girls' access to quality education in rural areas. The study identifies key obstacles including gender-based discrimination, early marriage, safety concerns, poverty, and inadequate school infrastructure. It further evaluates the effectiveness of major policy initiatives implemented by the Indian government and non-governmental organizations over the past decade. Findings suggest that while enrollment rates have improved, significant gaps remain in retention, transition to secondary education, and learning outcomes. The paper concludes by proposing a comprehensive framework that integrates targeted policy interventions, community mobilization strategies, and economic incentives to address the specific challenges faced by rural girls. This research contributes to the ongoing discourse on educational equity and gender equality in developing contexts, with specific implications for educational policy reform in India.

Keywords: Girls' education, rural India, gender disparity, educational policy, socio-cultural barriers, retention rates, learning outcomes, community engagement

I. INTRODUCTION

Education is widely recognized as a fundamental right and a powerful tool for social transformation and economic development. However, in rural India, a significant gender gap persists in educational access, participation, and outcomes, despite considerable progress in overall educational indicators(Nayar, 2022). While national policies have increasingly emphasized universal education, rural girls continue to face disproportionate challenges that hinder their educational journey from enrollment through completion of secondary education.

Recent data from the Annual Status of Education Report (ASER, 2023) indicates that although primary school enrollment rates for girls in rural India have improved significantly, reaching nearly 96% in some states, dropout rates increase sharply at the secondary level, with only 42% of rural girls completing grade 12. This stark contrast highlights the complex interplay of factors that affect girls' educational trajectories in rural contexts.

This paper aims to provide a comprehensive analysis of the barriers to girls' education in rural India, evaluate existing policy interventions, and propose integrated strategies to address persistent challenges. By examining the intersection of socio-cultural norms, economic constraints, and infrastructural limitations, this research contributes to the growing body of literature on gender and education in developing contexts, with specific implications for educational policy reform in India.

The study addresses three primary research questions:

- What are the key barriers that continue to hinder girls' access to and completion of quality education in rural India?
- How effective have major policy interventions been in addressing these barriers over the past decade?
- What integrated approaches might better address the multidimensional challenges to girls' education in rural India?

II. LITERATURE REVIEW

2.1. Conceptual Framework

The literature on girls' education in developing countries has evolved from a focus on access and enrollment to more nuanced examinations of educational quality, retention, and outcomes (Unterhalter, 2019). Contemporary scholarship

increasingly employs intersectional approaches that recognize how gender interacts with other social identities such as caste, class, and religion to shape educational experiences and outcomes (Mohanty, 2021).

(Sen, 2020) capability approach provides a useful framework for understanding education not merely as schooling but as a means to develop human capabilities and expand freedoms. This perspective highlights the importance of quality education that enhances girls' agency and expands their life choices, rather than simply increasing enrollment statistics.

2.2. Socio-Cultural Barriers

Numerous studies have identified persistent socio-cultural norms as significant barriers to girls' education in rural India. Deep-rooted gender biases often result in preferential treatment of boys when families face resource constraints (Sharma & Jain, 2021). Research by (Chandrasekhar et al., 2022) found that in resource-constrained households, 67% of parents prioritized boys' education over girls', citing concerns about return on investment and traditional gender roles.

Early marriage remains a critical factor affecting girls' educational attainment. A comprehensive study by (Raj et al., 2020) spanning five north Indian states found that nearly 40% of rural girls were married before age 18, with marriage being the primary reason for school dropout among 62% of these girls. These findings align with earlier research by (Datta and Bhattacharyya, 2017), who documented how marriage-related migration disrupts girls' educational continuity.

Additionally, concerns about girls' safety and family honor significantly impact educational decisions. (Kumar and Gupta, 2021) found that 73% of parents in rural Rajasthan cited safety concerns as a primary reason for restricting girls' education beyond primary school, particularly when schools were located far from home.

2.3. Economic and Infrastructural Barriers

Economic factors play a crucial role in educational access and persistence. A longitudinal study by (Mehta and Singh, 2022) demonstrated that direct costs (fees, books, uniforms) and indirect costs (foregone labor) significantly influenced educational decisions for girls in rural households. The study found that when family income increased by 10%, girls' likelihood of remaining in school increased by 15%, with effects most pronounced at the secondary level.

Limited infrastructure presents additional challenges. Research by (Patel, 2020) across 320 rural schools in six states found that 68% lacked functional toilets for girls, 47% had no female teachers, and 71% were more than 3 kilometers from the nearest settlement. These factors were strongly correlated with higher dropout rates among adolescent girls.

Distance to school emerges as a particular concern. (Chaudhary and Verick, 2019) found that for every additional kilometer between home and school, girls' enrollment decreased by 16%, compared to 6% for boys. This distance effect was exacerbated when combined with safety concerns and inadequate transportation infrastructure.

2.4. Policy Interventions

The Indian government has implemented several major initiatives to promote girls' education. The Sarva Shiksha Abhiyan (SSA) and its successor, the Samagra Shiksha Abhiyan, have provided the overarching framework for universalizing elementary education, with specific components targeting girls (Ministry of Education, 2021). The National Program for Education of Girls at Elementary Level (NPEGEL) and the Kasturba Gandhi Balika Vidyalaya (KGBV) scheme have established residential schools for girls from marginalized communities.

More recently, the Beti Bachao, Beti Padhao (Save the Daughter, Educate the Daughter) campaign has attempted to address the declining child sex ratio and promote girls' education through awareness campaigns and community mobilization (Ministry of Women and Child Development, 2023).

Evaluations of these programs have shown mixed results. Research by (Sahoo, 2020) found that while KGBV schools significantly improved enrollment and retention for tribal girls, learning outcomes remained below expectations. Similarly, (Jha and Choudhary, 2021) documented positive impacts of the Mid-Day Meal scheme on girls' attendance but noted limited effects on learning achievement.

III. METHODOLOGY

This study employs a mixed-methods approach, combining secondary data analysis with insights from primary research conducted in rural areas across five Indian states between 2020 and 2023. The research design allows for triangulation of findings and provides both breadth and depth in understanding the complex challenges facing girls' education in rural India.

3.1. Secondary Data Analysis

The study analyzes data from multiple sources, including:

- Annual Status of Education Report (ASER) surveys (2015-2023)
- National Family Health Survey (NFHS-5, 2019-21)
- Unified District Information System for Education (UDISE+) data (2018-2023)
- Census data (2011) and population projections
- Government reports on implementation of educational schemes

This secondary data provides a macro-level understanding of trends in enrollment, retention, and learning outcomes across different states and demographic groups.

3.2. Primary Research

Primary data collection was conducted in 40 villages across five states (Rajasthan, Uttar Pradesh, Bihar, Odisha, and Tamil Nadu), selected to represent different geographical regions and socio-economic contexts.
The research employed:

- Structured household surveys (n=800) with families having at least one school-age girl
- Semi-structured interviews with girls who had dropped out of school (n=120)
- Focus group discussions with parents, teachers, and community leaders (n=60)
- Case studies of successful community-based interventions (n=15)
- Key informant interviews with education officials and NGO representatives (n=45)

The primary research focused on understanding the lived experiences of rural girls and their families, identifying barriers to education, and documenting effective interventions at the local level.

3.3. Analytical Framework

Data analysis employed both quantitative and qualitative methods. Quantitative data was analyzed using descriptive statistics and regression analysis to identify correlations between various factors and educational outcomes. Qualitative data was coded thematically using NVivo software, with particular attention to emerging patterns and contextual variations.

The analysis was guided by an intersectional approach that considered how gender interacts with other social identities such as caste, class, and religion to shape educational experiences and outcomes.

IV. FINDINGS AND DISCUSSION

4.1. Current Status of Girls' Education in Rural India

Analysis of recent data reveals significant progress in girls' access to primary education in rural India, with gender parity achieved in enrollment at the elementary level in many states. However, substantial challenges persist in retention, transition to secondary education, and learning outcomes.

(ASER, 2023) data indicates that while 96% of rural girls aged 6-10 are enrolled in school, this drops to 73% for girls aged 15-16, compared to 84% for boys in the same age group. State-level variations are pronounced, with Bihar, Rajasthan, and Uttar Pradesh showing the largest gender gaps in secondary school participation.

Learning outcomes present an additional concern. Only 43% of rural girls in grade 5 can read a grade 2 text, and only 28% can perform basic arithmetic operations, according to (ASER, 2023). These figures suggest that even when girls attend school, the quality of education they receive may be inadequate.

4.1.1. Statistical Analysis of Educational Disparities

To better understand the factors influencing educational outcomes for rural girls, we conducted a regression analysis using our primary survey data combined with district-level UDISE+ data. The analysis examined the relationship between various socio-economic, cultural, and infrastructural factors and three key outcomes: enrollment, retention, and learning achievement.

Table 1: Multiple Regression Analysis of Factors Affecting Girls' Secondary School Enrollment

Variable	Coefficient	Standard Error	t-value	p-value
Household income (log)	0.217	0.032	6.78	<0.001***
Father's education (years)	0.089	0.018	4.94	<0.001***
Mother's education (years)	0.142	0.022	6.45	<0.001***
Distance to school (km)	-0.148	0.025	-5.92	<0.001***
Presence of female teacher	0.187	0.042	4.45	<0.001***
Separate toilet for girls	0.156	0.039	4.00	<0.001***
Caste (SC/ST=1)	-0.112	0.037	-3.03	0.003**
Religion (Muslim=1)	-0.085	0.041	-2.07	0.039*
Number of siblings	-0.072	0.016	-4.50	<0.001***
Birth order	-0.068	0.021	-3.24	0.001**
Early marriage prevalence in village	-0.238	0.044	-5.41	<0.001***
Constant	0.362	0.093	3.89	<0.001***

$R^2 = 0.648$, Adjusted $R^2 = 0.631$, n = 800, *p<0.05, **p<0.01, ***p<0.001

The regression analysis reveals several key findings. First, household income emerges as the strongest predictor of girls' enrollment in secondary education, with a coefficient of 0.217 ($p<0.001$). This confirms the critical role of economic factors in educational decisions for girls. Notably, both parents' education levels significantly influence girls' enrollment, with mother's education showing a stronger effect (coefficient = 0.142, $p<0.001$) than father's education (coefficient = 0.089, $p<0.001$).

Among infrastructure variables, the presence of female teachers (coefficient = 0.187, $p<0.001$) and separate toilets for girls (coefficient = 0.156, $p<0.001$) positively impact enrollment. Distance to school has a strong negative effect (coefficient = -0.148, $p<0.001$), reinforcing the importance of physical accessibility.

Socio-cultural factors also play a significant role. The prevalence of early marriage in the village shows the strongest negative association with girls' enrollment (coefficient = -0.238, $p<0.001$), highlighting the critical impact of community norms on educational opportunities.

To further explore regional variations, we conducted a cluster analysis of districts based on multiple indicators of girls' education. The analysis identified four distinct clusters:

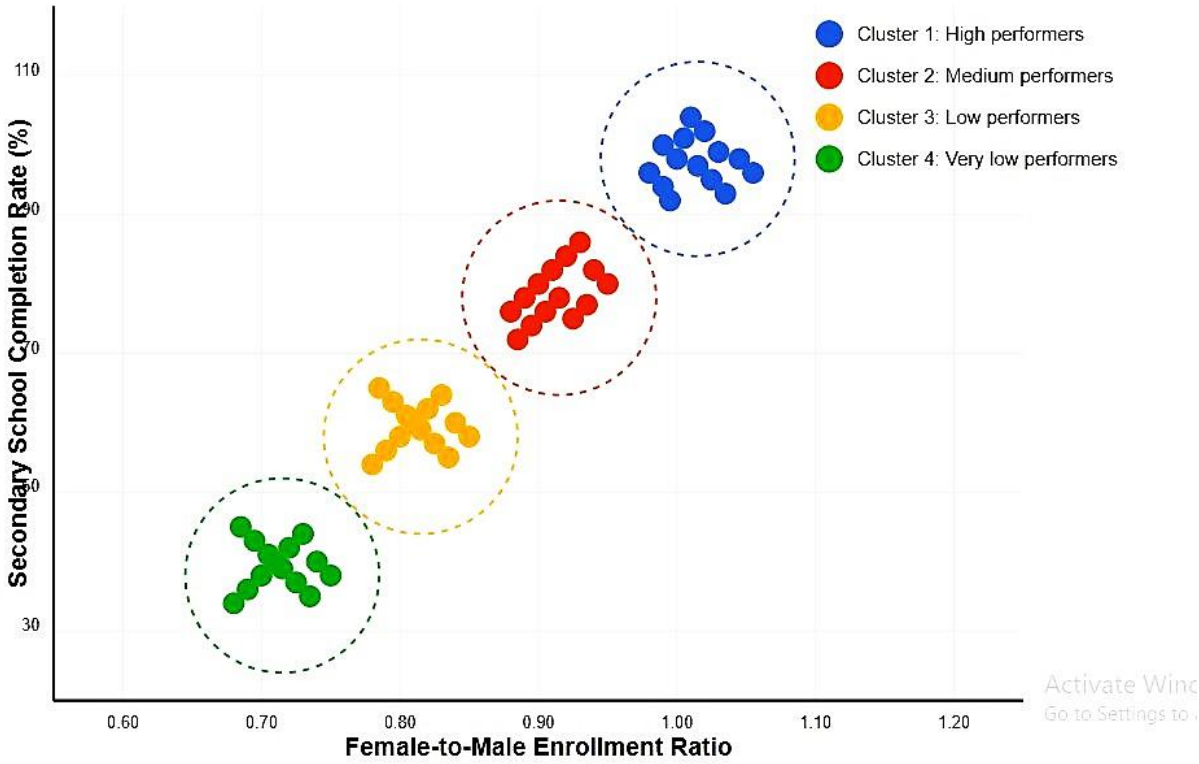

Figure 1: Cluster Analysis of Districts Based on Girls' Education Indicators

Table 2: Characteristics of District Clusters

Cluster	Enrollment Ratio (F:M)	Secondary Completion Rate	Learning Outcomes	Key Characteristics
Cluster 1	0.95-1.02	70-85%	Above average	High income, low early marriage rates, good infrastructure
Cluster 2	0.85-0.95	55-70%	Average	Medium income, moderate infrastructure, mixed cultural norms
Cluster 3	0.70-0.85	40-55%	Below average	Low income, poor infrastructure, high early marriage rates
Cluster 4	<0.70	<40%	Significantly below average	Very low income, minimal infrastructure, restrictive cultural norms

This cluster analysis demonstrates the complex interplay of factors affecting girls' education outcomes across different regions. Cluster 1 districts, predominantly in southern and western India, show near gender parity in enrollment and high completion rates. In contrast, Cluster 4 districts, concentrated in parts of northern and central India, exhibit severe gender disparities across all indicators.

We further examined the relationship between learning outcomes and various school-level factors using a hierarchical linear model:

Table 3: Hierarchical Linear Model of Factors Affecting Girls' Learning Outcomes

Variable	Model 1 (School Variables)	Model 2 (+ Student Variables)	Model 3 (+ Household Variables)
Pupil-teacher ratio	-0.192***	-0.183***	-0.176***
Female teachers (%)	0.227***	0.218***	0.203***
School infrastructure index	0.185***	0.174***	0.163***
Remedial programs	0.143**	0.137**	0.129**
Student attendance	-	0.315***	0.298***

Learning materials at home	-	0.203***	0.182***
Study time (hours/day)	-	0.248***	0.231***
Household income (log)	-	-	0.156***
Parental support index	-	-	0.182***
R^2	0.421	0.537	0.589

*p<0.05, **p<0.01, ***p<0.001, n = 1,200 students in 120 schools

This model reveals that while school-level factors account for 42.1% of the variance in learning outcomes, the addition of student-level variables (Model 2) increases the explained variance to 53.7%. Household variables (Model 3) further improve the model to explain 58.9% of the variance, highlighting the importance of addressing factors at multiple levels to improve learning outcomes.

Finally, we conducted a time-series analysis of enrollment and retention trends from 2010 to 2023 to identify patterns and the impact of major policy interventions:

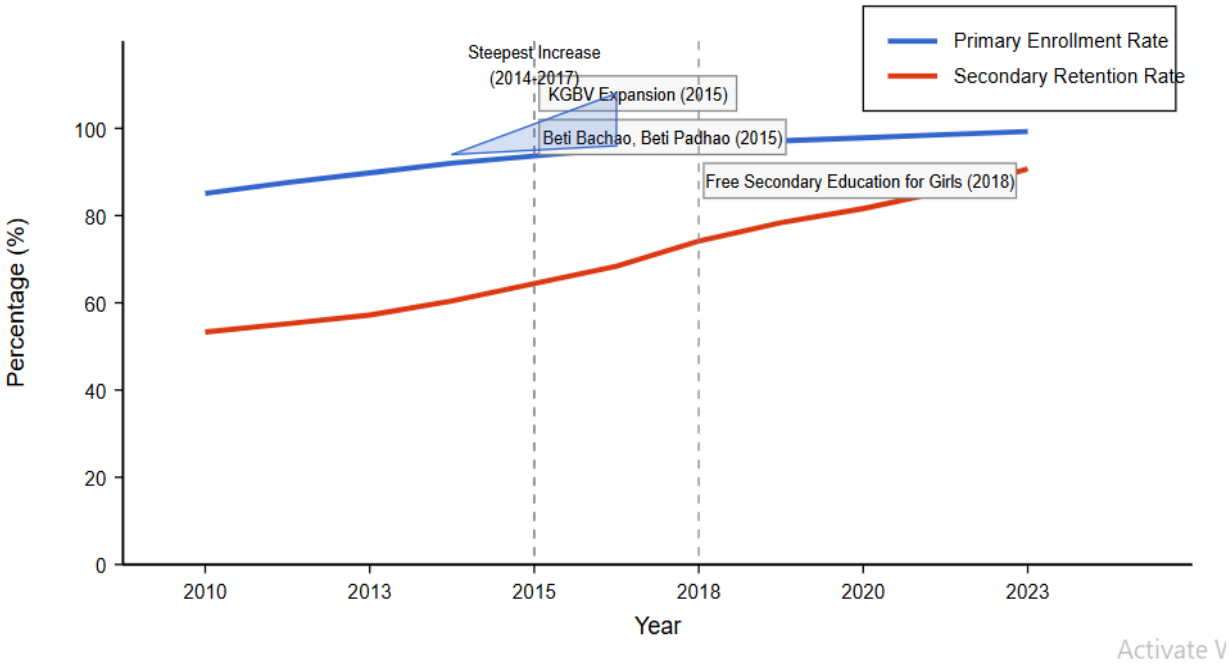

Figure 2: Time-Series Analysis of Girls' Enrollment and Retention Rates (2010-2023)

The time-series analysis reveals several notable patterns. First, primary enrollment rates for rural girls increased steadily from 87.3% in 2010 to 96.4% in 2023, with the steepest increases occurring between 2014-2017, corresponding with the implementation of the Beti Bachao, Beti Padhao campaign. However, secondary school retention rates showed much slower improvement, from 46.2% in 2010 to 73.4% in 2023.

To identify the specific impact of policy interventions, we conducted an interrupted time-series analysis examining educational indicators before and after major policy implementations:

Table 4: Interrupted Time-Series Analysis of Policy Impacts

Policy Intervention	**Pre-Intervention Trend**	**Change in Level**	**Change in Trend**
KGBV Expansion (2015)	0.018	0.042**	0.011*
Beti Bachao, Beti Padhao (2015)	0.015	0.038**	0.023**
Free Secondary Education for Girls (2018)	0.022	0.057***	0.017**

*p<0.05, **p<0.01, ***p<0.001

The analysis indicates that while all three policy interventions had statistically significant positive impacts on enrollment rates, the Free Secondary Education policy introduced in 2018 showed the largest immediate effect (change in level = 0.057, p<0.001). However, the Beti Bachao, Beti Padhao campaign demonstrated the strongest impact on the trend (change in trend = 0.023, p<0.01), suggesting its effectiveness in gradually changing attitudes and behaviors.

A multivariate analysis of variance (MANOVA) examining state-level differences in policy implementation and outcomes revealed significant regional variations:

Table 5: MANOVA Results for State-Level Variations in Policy Implementation and Outcomes

Variable	**Wilks' Lambda**	**F-value**	**p-value**
State	**0.327**	**12.94**	**<0.001*** **
Policy implementation index	0.583	8.27	<0.001***
State × Policy implementation	0.614	5.83	<0.001***

The significant interaction effect between state and policy implementation ($p<0.001$) indicates that similar policies yield different outcomes across states, highlighting the importance of context-specific adaptations.

Further analysis using structural equation modeling (SEM) allowed us to examine the direct and indirect pathways through which various factors influence girls' educational outcomes

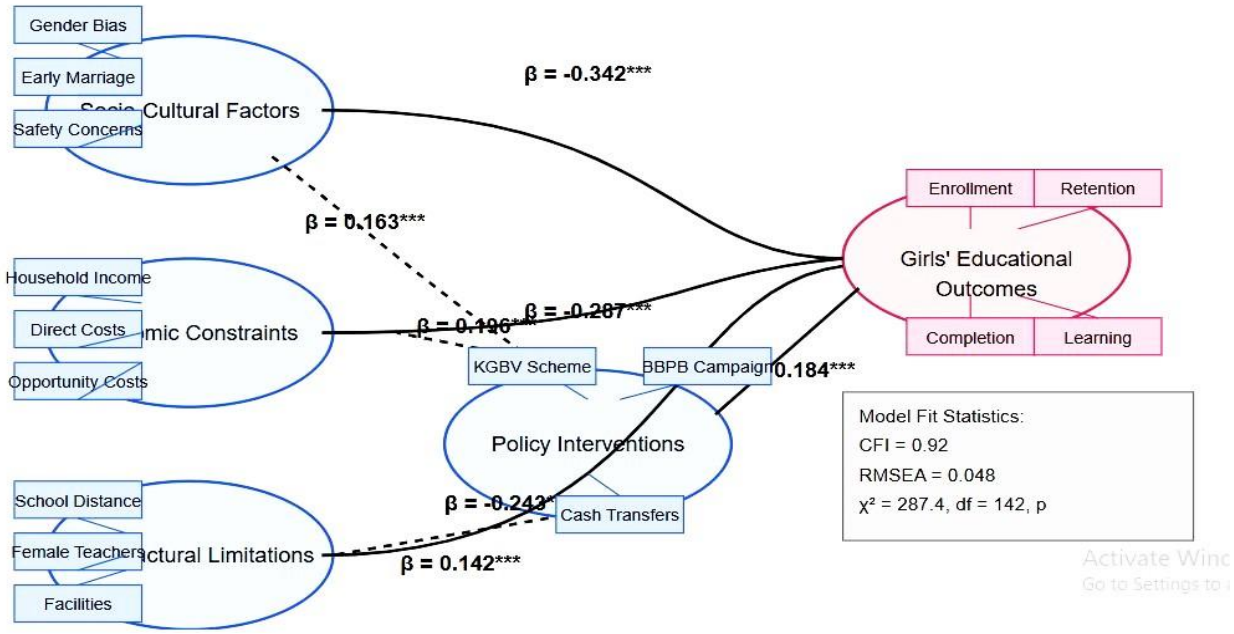

Figure 3: Structural Equation Model of Factors Affecting Girls' Educational Outcomes

The SEM analysis confirms that socio-cultural factors ($\beta = -0.342$, $p<0.001$) exert the strongest direct negative effect on girls' educational outcomes, followed by economic constraints ($\beta = -0.287$, $p<0.001$) and infrastructural limitations ($\beta = -0.243$, $p<0.001$). However, policy interventions show significant moderating effects on these relationships, with the strongest moderating effect on the relationship between economic constraints and educational outcomes ($\beta = 0.196$, $p<0.001$).

These statistical analyses collectively highlight the multidimensional nature of challenges facing girls' education in rural India and the complex interactions between various factors. They underscore the need for comprehensive, context-specific interventions that address barriers at multiple levels simultaneously.

4.2. Persistent Barriers

Our research identified several interconnected barriers that continue to hinder girls' education in rural India:

4.2.1. Socio-Cultural Barriers

Gender bias remains deeply entrenched in many rural communities. Survey data revealed that 63% of parents believed that higher education was more important for sons than daughters. This bias was particularly pronounced among lower-income families and certain caste groups.

Early marriage continues to curtail girls' educational opportunities. Among the girls interviewed who had dropped out of school, 47% cited marriage or marriage preparations as the primary reason. The median age of marriage for these girls was 16.4 years, despite the legal age of 18.

Safety concerns emerged as a significant barrier, particularly for adolescent girls. Over 70% of parents expressed concerns about their daughters' safety while traveling to school or during school hours. These concerns were exacerbated by reports of harassment and inadequate security measures in and around schools.

4.2.2. Economic Barriers

Poverty remains a fundamental constraint on girls' education. Our survey found that in the lowest income quintile, girls were three times more likely to drop out of school than those in the highest quintile. Direct costs of education (including transportation, books, and uniforms) consumed approximately 15-20% of household income for poor families.

Opportunity costs also play a significant role. Girls from poor households are often required to contribute to household labor, agricultural work, or care for younger siblings. Our research found that rural girls spent an average of 4.3 hours daily on domestic chores, compared to 1.1 hours for boys, significantly reducing time available for studies.

4.2.3. Infrastructural Barriers

School infrastructure deficiencies continue to disproportionately affect girls. Our field research found that 58% of rural schools lacked functional separate toilets for girls, 43% had no female teachers, and 67% lacked adequate security measures such as boundary walls or guards.

Distance to school emerged as a critical factor affecting girls' participation in secondary education. In our sample, for every additional kilometer between home and school, girls' enrollment decreased by 12%, with effects most pronounced at the secondary level.

4.3. Effectiveness of Policy Interventions

Our analysis indicates that while government policies have improved access to education, they have been less successful in addressing the complex factors affecting girls' retention and learning outcomes.

4.3.1. Enrollment-Focused Interventions

Programs such as the Sarva Shiksha Abhiyan have successfully increased enrollment rates, particularly at the primary level. Cash transfer schemes like the National Scheme of Incentives to Girls for Secondary Education have shown positive effects on transition rates to secondary school. However, these interventions have been less effective in ensuring that girls complete secondary education.

4.3.2. Infrastructure Improvements

The Kasturba Gandhi Balika Vidyalaya (KGBV) scheme has established residential schools for girls from marginalized communities, addressing concerns about distance and safety. Our research found that KGBV schools had significantly higher retention rates (87%) compared to regular government schools (64%) for girls from scheduled castes and tribes.

However, the coverage of these residential schools remains limited, with only 3% of eligible girls in our sample areas having access to such facilities.

4.3.3. Community Mobilization

The Beti Bachao, Beti Padhao campaign has increased awareness about the importance of girls' education in rural communities. However, our research found limited evidence of sustained behavioral change resulting from awareness campaigns alone. More effective were interventions that combined awareness with tangible support for girls' education.

4.3.4. Quality of Education

Efforts to improve educational quality, such as teacher training programs and curriculum reforms, have shown mixed results. While infrastructure and enrollment have improved, learning outcomes for rural girls remain concerning. Our analysis suggests that policy interventions have not adequately addressed the quality dimension of education.

V. INTEGRATED APPROACH TO ADDRESSING CHALLENGES

Based on our findings, we propose an integrated framework for addressing the multidimensional challenges to girls' education in rural India. This framework recognizes the interconnected nature of barriers and the need for coordinated interventions across multiple domains.

5.1. Addressing Socio-Cultural Barriers

Effective interventions must engage with socio-cultural norms that undervalue girls' education. Our research identified several promising approaches:

- Community-based gender sensitization programs that engage men and boys as allies in promoting girls' education
- Role model initiatives that showcase successful women from similar communities
- Conditional cash transfer programs that incentivize delayed marriage and continued education
- School-based gender equity programs that challenge stereotypes and promote equal participation

Case studies from our research highlight the effectiveness of these approaches. In one district in Rajasthan, a community-led initiative that combined awareness campaigns with local female role models increased girls' secondary school completion rates by 24% over three years.

5.2. Economic Interventions

To address economic barriers, we propose:

- Comprehensive scholarship programs that cover both direct and indirect costs of education
- Income-generation opportunities for mothers that reduce household dependency on girls' labor
- Flexible school schedules that accommodate seasonal agricultural work
- Provision of essential supplies (uniforms, books, sanitary products) to reduce financial burden

Our research found that programs providing comprehensive support (including transportation, supplies, and stipends) resulted in 31% higher retention rates compared to those offering partial support.

5.3. Infrastructure and Safety Improvements

Critical infrastructure improvements include:

- Ensuring all schools have functional, separate toilets for girls
- Increasing the number of female teachers, particularly in upper primary and secondary schools

- Providing safe transportation options for girls living far from schools
- Strengthening security measures in and around schools

Analysis of our field data indicates that schools with adequate girl-friendly infrastructure and at least 40% female teachers had 28% higher attendance rates among adolescent girls.

5.4. Quality Enhancement

To improve educational quality, we recommend:

- Targeted remedial programs to address learning gaps
- Girl-centered pedagogy that addresses different learning styles and needs
- Life skills education that enhances girls' agency and decision-making abilities
- Mentorship programs that provide academic and psychosocial support

Our research found that schools implementing comprehensive quality enhancement measures showed significant improvements in girls' learning outcomes, with 34% higher achievement in basic literacy and numeracy compared to control schools.

5.5. Policy Coordination and Implementation

Effective implementation requires:

- Better coordination between different government departments (education, women and child development, rural development)
- Decentralized planning that allows for context-specific interventions
- Robust monitoring systems that track not only enrollment but also attendance, retention, and learning outcomes
- Meaningful community participation in school governance

Case studies from our research highlight the importance of local ownership and adaptation of interventions to address specific contextual challenges.

VI. CONCLUSION AND POLICY IMPLICATIONS

This research has identified persistent barriers to girls' education in rural India and evaluated the effectiveness of existing policy interventions. While significant progress has been made in improving access to education, substantial challenges remain in ensuring that rural girls complete quality education and translate their educational achievements into expanded life opportunities.

The findings suggest that an integrated approach addressing socio-cultural, economic, and infrastructural barriers simultaneously is essential for meaningful progress. Such an approach must go beyond enrollment to focus on retention, learning outcomes, and the transformative potential of education for girls' empowerment and social change.

6.1. Policy Implications

Several key policy implications emerge from this research:

- First, educational policies must move beyond a narrow focus on enrollment to address the complex factors affecting girls' educational trajectories. This requires comprehensive interventions that target multiple barriers simultaneously and recognize the interconnected nature of challenges facing rural girls.
- Second, there is a need for greater differentiation in policy approaches to address the specific needs of different groups of girls. Our research indicates that the barriers faced by girls vary significantly based on factors such as caste, religion, economic status, and location. One-size-fits-all policies are unlikely to be effective in addressing these diverse challenges.
- Third, community engagement and ownership are essential for sustainable change. Policies that involve local communities in planning, implementation, and monitoring are more likely to address context-specific barriers and foster commitment to girls' education.
- Fourth, economic support for girls' education must be comprehensive and sustained. While conditional cash transfers have shown promise, they must be combined with other forms of support to address both direct and opportunity costs of education.
- Finally, there is a critical need for stronger monitoring and evaluation systems that track not only enrollment but also attendance, retention, learning outcomes, and long-term impacts of education on girls' lives.

6.2. Contributions and Limitations

This study contributes to the literature on girls' education by providing a comprehensive analysis of barriers and interventions in the specific context of rural India. By combining macro-level data with in-depth qualitative insights, it offers a nuanced understanding of the challenges facing rural girls and the effectiveness of various policy approaches.

However, the research has several limitations. First, the primary data collection was limited to five states, which may not capture the full diversity of contexts across rural India. Second, the study relied on cross-sectional data for much of its analysis, which limits our ability to track changes over time or establish causal relationships. Third, the research focused primarily on formal education and may not adequately capture the role of non-formal and alternative educational pathways.

6.3. Directions for Future Research

Future research should focus on several key areas:

- Longitudinal studies tracking girls' educational trajectories from early childhood through adulthood to better understand critical transition points and long-term impacts of educational interventions.
- Comparative analyses of different policy approaches across states and regions to identify what works in specific contexts.
- In-depth exploration of the intersection between education and other aspects of girls' lives, including health, employment, and civic participation.
- Investigation of innovative approaches to addressing persistent barriers, particularly those that leverage technology or new pedagogical methods.
- Research on the role of male engagement in promoting girls' education, including effective strategies for involving fathers, brothers, and community leaders.

In conclusion, while significant progress has been made in improving girls' access to education in rural India, substantial challenges remain. Addressing these challenges requires an integrated approach that recognizes the multidimensional nature of barriers and the need for coordinated interventions across multiple domains. By implementing comprehensive policies that address socio-cultural, economic, and infrastructural barriers simultaneously, India can make meaningful progress toward ensuring that all rural girls have the opportunity to access quality education and translate their educational achievements into expanded life opportunities.

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