

Best Practices in Bio-Science Pedagogy Enrichment in Telangana Minority Residential Educational Institution Society (TGMREIS) Residential Junior Colleges in Hyderabad District

Dr. Shamshaad Begum

Assistant Professor, Department of Education and Training, Maulana Azad National Urdu University, Hyderabad

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ABSTRACT

Residential junior colleges serve as a crucial platform for holistic education, but many struggle to provide high-quality science education due to limited access to modern teaching resources, teacher shortages and turnover and geographic isolation leading to limited exposure to practical biological science. The study of Telangana Minority Residential Educational Institutions Society (TGMREIS) is significant because it provides insights into how a government initiative can address the educational needs of marginalized communities, offering a model for other regions and potentially impacting the lives of countless students. Targeted approach: TGMREIS focuses on providing quality education to minority students, particularly those from economically disadvantaged backgrounds recognizing their specific needs and challenges. The residential nature of TGMREIS schools ensures that students have access to a safe, nurturing and conducive learning environment, addressing issues of lack of education and other resources. This research paper aims at investigating the various best practices in Bio-Science pedagogy enrichment at selected residential junior colleges run by TGMREIS. This research article is an outcome of a minor project funded by UGC and conducted by MANUU. Questionnaires are provided to teachers and students to assess various parameters and data is collected for analysis. A comprehensive study is done and valuable suggestions and insights are inferred for further scope of improvement.

Project Title: A Study on Best practices in Bio-Science Pedagogy enrichment in Telangana Minority Residential Educational Institution Society (TGMREIS) Residential Junior Colleges in Hyderabad District

INTRODUCTION

TGMREIS aims to foster holistic development, encompassing academic excellence, skill development and the cultivation of good values, preparing students for future success. Impact of minority communities by providing access to quality education, TGMREIS powers minority communities, enabling them to participate fully in society and contribute to the nation's progress Model for educational reform scalability and replication the TGMREIS model can be replicated in other regions and states to address similar educational problems demonstrating the effectiveness of targeted interventions so this study deals with how far TGMRS is able to do as projected. Policy implications studying can inform educational policies and programs leading to more effective and equitable and innovative approaches to education. Research opportunities TGMREIS provides a rich context for research, allowing scholars to investigate the impact of residential schools, the challenges faced by the minority students and the effectiveness of various educational interventions. Collaboration and partnerships the collaboration between TGMREIS and institutions like Maulana Azad national Urdu university MANUU highlights the importance of partnerships in promoting educational development.

The minorities comprise of 14.2% of the state, they are educationally as well as economically backward. To uplift these communities the then Honorable Chief Minister had established 204 minorities' residential schools and all are upgraded to minorities residential junior colleges. (Telangana state residential school was first set up at Sarvail by the then State Government under the then Central Government in India.)

Specific Achievements and Initiatives

Rapid Expansion: TGMREIS has established a large network of residential schools and junior colleges in a short period demonstrating its commitment to providing access to education. Focus on quality education TGMREIS emphasizes providing high quality education ensuring that students receive the necessary skills and knowledge to succeed innovative and best methods of Teaching-Learning. TGMREIS prioritizes student welfare, providing them with nutritious food, health care and a safe and supportive environment. Empowerment of the students TGMREIS aims to empower students, enabling them to realize their full potential and become responsible and productive citizens. The main mission of TGMREIS is to provide high quality and free education to the children of most economically backward minorities communities of the state of Telangana., to enable them to avail professional educational courses and jobs in the government and public and private sectors and also to have access to the best opportunities possible.

Objectives:

- To study the pedagogical approaches adopted in Minority Residential Junior Colleges in Biological Science
- To assess best practices adopted in Minority Residential Junior Colleges in Biological Science pedagogical enrichment.
- To find out the methods of learning biological sciences of boys and girls in Minority Residential Junior Colleges.
- To investigate approaches of teaching in teachers towards biological science pedagogy in Minority Residential Junior Colleges

Introduction to TGMREIS

As a part of 'Golden Telangana Initiative': KG to PG Programme has been started to provide free education to economically backward communities including Minorities. Minorities comprise of 14% of the State population. They are educationally as well as economically backward. To uplift these communities, the honorable Chief Minister has established 204 Minorities Residential Schools and all are upgraded to Minorities Residential Junior Colleges.

This is one of the Flagship Programmes of the then Honorable Chief Minister of Telangana State, which has become so successful that other States also trying to establish similar kind of schools for the Minority children. To administer these schools, a separate society has been established in the name of Telangana Minorities Residential Educational Institutions Society (TGMREIS) in the year 2016 with its Headquarters at Hyderabad. TGMREIS In a span of 13 months presently, which reflects some exceptionally great efforts and tiresome work done day in and day out. All the students in TGMREIS come from economically deprived community. They have separate residential schools and colleges for boys and girls.

The Telangana State Model Residential Educational Institutions (TGMREIS) are a group of schools established by the Government of Telangana to provide quality education to children from marginalized sections of society, especially those belonging to the Scheduled Castes (SC), Scheduled Tribes (ST), Backward Classes (BC), and economically weaker sections (EWS). The institution's primary mission is to bridge the gap between students from rural and urban areas by offering them high-quality education, along with opportunities for personal and academic growth. These institutions focus on students' overall development, including academics, co-curricular activities, and life skills, with the aim of preparing them for competitive examinations and providing them access to professional careers.

Objectives of TGMREIS

TGMREIS was designed with several key objectives:

1. **Providing Quality Education:** The primary goal of TGMREIS is to provide a high standard of education to students from marginalized communities. The institutions aim to offer a curriculum that not only focuses on academics but also on the holistic development of students.

2. **Inclusive Education:** One of the core principles of TGMREIS is inclusivity. These schools are designed to ensure that children from SC, ST, BC, and EWS backgrounds receive the same level of education and resources that would typically be available in urban and private schools.
3. **Holistic Development:** TGMREIS schools place a strong emphasis on the overall development of students. This includes co-curricular activities such as sports, arts, music, and cultural programs, aimed at fostering creativity and leadership qualities in students.
4. **Empowerment through Knowledge:** The institution aims to empower students through education, helping them to break free from the cycle of poverty and enabling them to access opportunities for higher education and professional careers.
5. **Equal Access to Opportunities:** One of the most important goals of TGMREIS is to bridge the gap between the urban and rural education systems by providing access to opportunities for students from disadvantaged backgrounds.



Figure 1: Students from Telangana Minorities Residential Educational Institutions Society (TGMREIS) emerged victorious in various age group categories at the 6th AICF All India Open Prize Money Chess Tournament.



Figure 2: Neat and clean mess area



Figure 3: Girls in a queue at the dining hall

Best Practices:

1. Focus on Knowledge based, Skill based and Value based Education.
2. Continuous Empowerment of Students
3. Promoting Healthy and Competitive Spirit among the Students, Teachers and Schools.
4. Providing well researched, Systematic study material
5. Activity Based Learning, Interactive, Involving and Evolving Teaching.
6. Intensive and Scientific revision programme.
7. Micro analysis of tests, assignments and progress.
8. Use of Information Technology in both Academic & Administrative Activities
9. Unique Pedagogy and Personalised Academic Supervision.
10. Round the Clock (24x7) Medical Services.
11. 24x7 Surveillance through CCTV Cameras & Monitoring from Head Office TGMREIS.
12. Empowering the Girl Child by conducting regular Life Skills and Personality Development Workshops.
13. Self Defence Training Programme for Girl Students.
14. Bridge Course Programmes in all Subjects.
15. Conduct of Parent Teacher Meetings to utilize their collective wisdom and resources.
16. Conduct of Summer Camps.
17. Daily conduct of Club Activities like E+ Club, T+ Club, W+ Club etc.
18. Encouraging the Students at Younger age to adapt to the future Technology by Organising trainings in Robotics & Engineering Skills.
19. In order to promote Scientific Temper among the students, the students are exposed to Astronomy in collaboration with Astronomy Society of India.
20. All India Tour Programme (Excursions) for students.
21. Brighter Minds Alpha Programme for Students and Teachers. It is an Educational Initiative to equip every child with tools and methods to enhance cognitive functioning for achieving personal excellence and instill confidence in oneself.

LITERATURE REVIEWED FROM EMINENT SOURCES

Pasham Deepika [2] reported an article published in South First Newspaper (online article) published on May 22 2024.

The article skilfully balances praise for TMREIS students' perseverance and accomplishments with a critical look at the difficulties they endure. It highlights concerns such as inadequate hostel facilities, unsatisfactory

food quality, and financial hardships that put immense pressure on students and their families. These issues raise pertinent questions about how well government-run residential schools are equipped to support their students beyond academics.

The study "A Reflective Study on Classroom Practices in Residential Schools" by **B. Prameela** [3] explores the dynamics of teaching and learning within residential schools, particularly focusing on classroom interactions and student engagement.

The study "Residential Schools in India: Flashpoints or Bulwarks for Peace and Integral Human Development" by **Kishor Patnaik** [4] explores the role of residential schools in shaping peacebuilding and social empowerment in India. It examines how these institutions function in tribal and low-literacy areas, assessing their impact on students' development and broader societal change.

Overall, the study provides valuable insights into the strengths and limitations of residential schools in India. It calls for systematic improvements to ensure that these institutions contribute positively to both individual student growth and broader societal harmony.

M. Nishamol [5] examines the effectiveness of residential schools in improving educational outcomes for tribal students in Kerala in "Role of Model Residential Schools in the Educational Attainments of Tribal Students: An Analysis of the Performance of Tribal Residential Schools in Kerala".

The study underscores the importance of targeted educational interventions for tribal students and calls for systematic improvements in infrastructure and teaching quality to enhance learning outcomes. It serves as a valuable resource for policymakers and educators aiming to strengthen tribal education in Kerala.

Bollam Karunakar [6] explores the initiatives undertaken by the Telangana Social Welfare Residential Educational Institutions Society (TSWREIS) to enhance teacher development and improve educational outcomes for marginalized students.

A key takeaway from the study is the significant investment in teacher training, which has contributed to the success of TSWREIS in placing students in prestigious institutions like IITs, NITs, and medical colleges. The research underscores the need for continuous skill enhancement among educators to maintain high academic standards and support students from disadvantaged backgrounds.

Manav S. Geddam [7] evaluates the effectiveness of EMRS (Eklavya Model Residential Schools) in providing quality education to Scheduled Tribe (ST) students in India.

The research provides valuable insights into the strengths and shortcomings of EMRS in tribal education. It calls for systematic improvements, including better infrastructure planning and budget allocation, to enhance the effectiveness of these schools.

Prasenjit Nemo et al. [8] examines the role of Eklavya Model Residential Schools (EMRS) in improving educational access for Scheduled Tribe (ST) students in Eastern India.

The research highlights the importance of EMRS in addressing educational disparities, particularly in states like Jharkhand, West Bengal, and Tripura. It discusses how these schools provide free education, similar to Navodaya Vidyalayas, and assesses their effectiveness in preparing students for higher education and future employment.

A key finding of the study is that while EMRS institutions have a promising outlook, there is room for improvement in infrastructure and facilities. The study notes that hostel conditions vary, with some institutions offering excellent environments while others require significant upgrades. Additionally, the research emphasizes the need for better educational provisions to ensure students receive holistic development beyond academics.

The study provides valuable insights into the strengths and challenges of EMRS in Eastern India. It calls for systematic improvements to enhance the quality of education and living conditions for tribal students, ensuring that these institutions fulfill their intended purpose effectively.

A. Premkumar [9] examines the role of Eklavya Model Residential Schools (EMRS) in improving educational opportunities for Scheduled Tribe (ST) students in India.

The research highlights the importance of EMRS in bridging educational gaps, particularly in states with significant tribal populations. It discusses how these schools provide free residential education, aiming to enhance literacy rates and reduce dropout rates among ST students. The study employs multiple linear regression and ANOVA to analyze factors influencing the allocation of funds for EMRS, offering a data-driven evaluation of their effectiveness.

A key finding of the study is that states like Madhya Pradesh and Gujarat have the highest number of functional EMRS institutions, benefiting a large number of students. However, challenges such as land acquisition issues have hindered the establishment of new schools in certain states, limiting access to quality education for tribal communities. The study suggests policy interventions to resolve these issues and improve the overall implementation of the EMRS scheme.

The research paper by **Dr. Yashpal D. Netragaonkar** [10], titled "Impact of Residential Schools and Current Challenging Issues of Tribal Education in Odisha", delves into the educational challenges faced by tribal communities in Odisha. It provides a comprehensive analysis of the literacy rates among Scheduled Tribes (STs) compared to other social groups from 1961 to 2011, highlighting the persistent gaps in education.

The study emphasizes the role of residential schools as a significant intervention by the state and central governments to bridge these gaps. It discusses the effectiveness of these schools in addressing the unique challenges faced by tribal populations, such as geographical isolation, economic hardships, and cultural barriers. The paper also sheds light on the ongoing issues, including inadequate infrastructure, lack of trained teachers, and socio-economic constraints that hinder the progress of tribal education.

Amatur Rehman Maimoona's [11] article, "Telangana Minorities Residential Educational Institutions Society (TMREIS) - Providing and Maintaining Standard of Quality Education," published in the August 2023 issue of the *International Journal of Novel Research and Development*, offers a comprehensive examination of the Telangana government's initiative to enhance educational opportunities for minority communities. The Telangana Minorities Residential Educational Institutions Society (TGMREIS) was established to provide quality education to students from economically disadvantaged minority backgrounds.

It delves into the objectives, infrastructure, and impact of TMREIS. The society aims to bridge the educational gap by offering free, high-quality education to students from minority communities, particularly Muslims, who have historically been educationally disadvantaged.

Expansion and Reach: TMREIS has expanded significantly since its inception, growing from 71 schools in 2016-17 to 204 schools and junior colleges by 2022. This expansion indicates a strong commitment to increasing access to education for minority communities.

This article provides valuable insights into the efforts of TMREIS to uplift minority communities through education. While the initiative has made significant strides in expanding access and improving educational outcomes, addressing the highlighted challenges will be crucial for sustaining and enhancing its impact. Continued focus on targeted support for academically disadvantaged students and resolution of internal administrative issues will further strengthen TMREIS's role in promoting educational equity in Telangana.

METHODOLOGY

Questionnaires are prepared to conduct an exploratory survey to students and teachers of some schools of Hyderabad district on innovative best methods in TGMREIS.

To explore the perceptions, preferences, and experiences of TGMREIS and to spread education to the society especially to the remote area children, and to promote and to let know teachers regarding new and innovative methods in biology.

To identify innovative best practices that can enhance the teaching and learning of biology. The target students were currently enrolled in TGMREIS in Hyderabad district, Telangana.

Research design

A mixed methods approach was employed combining quantitative data from structured survey questions with qualitative data from open ended questions.

Development of the questionnaire

After literature review and studying the information about TGMREIS and innovative best teaching practices in biology questions were framed to identify the key relevant to best teaching learning methods in biology.

Sampling method

Sampling technique: stratified random sampling to ensure representation from junior colleges of TGMREIS and diverse student demographics.

Sample size: 220 students were selected using a statistical formula ensuring a confidence level of 95% and a margin of error of 5%. 32 Teachers data was also collected in the same manner.

Administration of the questionnaire:

A pilot test with a small group of students to identify any issues with the questionnaire before larger data collection.

Distribution method: The researcher distributed the survey questionnaire personally by visiting the TGMREIS junior colleges and schools. Paper based surveys for students and teachers was compulsory and no electronic method was used.

Instructions:

The instructions and outline for the purpose of the survey, to assure confidentiality and to provide guidance as how to complete the questionnaire were given.

Data collection process:

A timeline for data collection lasting for four months.

Monitor response rates and follow up with reminders to encourage greater participation was done.

Data Analysis

Quantitative data analysis: use of statistical methods through MS Excel to analyze closed ended questions in majority and a few open ended questions was done.

Qualitative data analysis:

Code and categorize responses for open ended questions to identify common themes and insights, that may complement quantitative findings.

Ethical considerations:

Obtained necessary permissions from Head office of TGMREIS Secretary at Anees Ul Ghurba, Nampally, Hyderabad to allow and to permit the survey through school authorities, HM and in-charge Principals and to ensure informed consent from students.

Report findings:

To create a comprehensive report detailing the findings, including

An overview of respondent's demographics

Statistical analyses and patterns observed in teaching methods of preferences.

Thematic analysis of qualitative data

Discuss implications for teachers and educational policy regarding biology best and innovative practices of innovative instruction.

Recommendations for actions:

Provide actionable recommendations based on data analysis to educators and policy makers on best practices and innovative approaches to teaching biology.

Feedback:

Share findings with participants and stakeholders to foster further discussion and insights into effective teaching strategies in the future.

By following this structured methodology, the study aims to provide innovative methods of teaching to TGMREIS students, ultimately contributing to the improvement of educational practices in Telangana.

Data Analysis and Data Interpretation

Teachers Response interpretation

Most of the teachers responded that they use interactive visuals during teaching of Biological Science Studies. They teach Biological Science through Scientific methods and very few of them use story-line method of teaching and only for historical topics of Scientists Life histories and their contributions towards Science for Human Welfare and the Society. Some teachers replied that they use opinion polls to encourage students' participation in Biological Science Classroom. Almost all the teachers responded that they relate Biology to everyday life through their teaching. They encourage experiential learning during their biological science laboratory instructions. The class is made interesting through activities in the bio-science lessons and demonstration of Experiments in the classroom. Laboratories are active in some of the institutions of TGMREIS. A few teachers were enthusiastic about their teaching of biological science of a few topics by hosting a virtual field trip, with the help of ICT while teaching bio-science.

Science News Articles are read out to the students and are the students are also inspired through this way to read Science Editorials and news in Daily News Papers, monthly, quarterly, biannual and annual Science Magazines and Journals in the Library. They are thus encouraged to update themselves regarding Science news. 95% of the teachers help the students in forming Science clubs, thus enabling them to inculcate Scientific Temper and to learn better.

Concept-mapping method is used in teaching and learning of complicated topics like Krebs's Cycle, Life-Cycle of Malarial Parasite etc. Flow-chart, Schema charts are taught for memorizing difficult topics. Team teaching, peer teaching is also encouraged. Quiz Programs are also conducted often, based on the Biological Science syllabus. Co-Curricular Activities are also conducted annually as Science Fairs and Science Exhibitions.

Therefore, all the instructional objectives of Teaching-Learning of education in a Biological-Science Classroom are achieved. In 75% schools the teachers' response regarding assignment of Project work as Practical-self-involvement was positive. Dedicated Teachers responded that "I prepare my students for Career Selection through Guidance and Counselling."

FINDINGS AND SUGGESTIONS

Essential Findings

There are numerous indications of the **importance of biology**. **Biology** is primarily concerned with studying life. In addition, it offers a thorough scientific explanation of how all living and non-living things interact with one another. It provides information about various life forms. As a field of science, biology helps us to understand the living world and the ways its many species including humans' function, evolve, and interact. Advances in medicine, agriculture, biotechnology, and many other areas of biology have brought improvement in the quality of life. One of the main objectives of teaching Biological Sciences remains to inculcate scientific attitude and scientific temper in students so that they can understand the prevailing situations, perceive the problems and work scientifically to resolve them as science remains the sole hope for solving the manifold problems of life. **One of the main objectives of the teaching of Biological Sciences remains to inculcate scientific attitude and scientific temperament in the students so that they can understand the prevailing situations, perceive the problems and work scientifically to resolve them**

Innovative Teaching Methods: Innovative teaching methods extend beyond the mere incorporation of cutting-edge teaching methods or a constant pursuit of the latest education trends. To enhance biology education, we must consider innovative methods like flipped classroom, inquiry-based learning, gamification, and blended learning, incorporating technology and real-world applications to foster deeper understanding and engagement.

CONCLUSION

Effective Monitoring and Implementation of the Vision & Mission of TGMREIS is to be done. The role of Minorities, be it in Education, Business, Marketing, Socio-Political issues is very significant. This is due to the role of knowledge driven society in the past and in the present scenario of the Indian minority population. Education is an important factor in creating knowledge base in the society, as it is the basic education that leads to the Higher Education and Higher Education leads to the Economy of a Country. In the last two and a half decades the world has become more globalized than it had been in the previous century. The Economy of the world has become directly or indirectly dependent on technology and its implementation in every field of pursuit. As a result of Globalization, Privatization and Liberalization most of the sectors of economy are privatized. As all of us know that how private sectors keep on growing, especially the corporate sectors. Even in the field of Education the corporate world has penetrated and availed access to the population. In such a condition it is the Government Sector that has to become more approachable and accessible to the common people and more so to the remote population of the States of the Country. Discovery Methods and Innovative Practices of this Technological Era have to be implemented in this vision, promptly. In such a scenario where the state's welfare role in terms of furthering higher education which is attractive and affordable to all is a must. This will enhance the constitutional commitment to undo the backwardness of minorities in the remotest area of the state.

In this context the present study was conducted with three-fold motives. Firstly, to study the phenomenon of Education for All. Secondly to have a glance at the impact of Government facilities embarked with a mission on minorities upliftment and thirdly the enrollment trends and functioning of TGMREIS in view of implementing the best and innovative practices in teaching of not only Biological Sciences and other subjects. Finally, the impact of upgrading the educational strategies in view of the present scenario of technology boom and innovation was also studied. Gender equity in terms of enrolment of minorities at secondary level and Junior College level is also observed. One thing noticed in this field was that these institutions are strictly monitored and they maintain tight security of the System and the Human Resources, of course it is well and

good but intermittent permission of study or research-based enquiry is not much allowed, may be in terms of policy leakage of the Institution.

Implications: There is a need for effective implementation of available policies and facilities for the Minorities for better participation and student enrollment without any gap of filling the seats meant for the major minority of Muslims. Awareness programs to be conducted and promoted in the rural and remote areas of the State and also in the lower economy zones in and around the metropolitan City of Hyderabad. There is a requirement to have more number of freeships and scholarships for the minority students of backward areas in the state in the promotion of general and professional education in particular. Adequate hostel facilities ensuring residence and security for the students is well provided. Proper discipline is maintained in TGMREIS schools and Junior Colleges strict routine and vigilance is maintained which must be carried on as ever since the establishment of the institutional society. Muslim and other minority girls in particular who are pursuing education away from their home town are required to have their enhanced participation from remote locations in institutions for leading towards achievement of Higher Education.

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