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ARTICLE

Teacher Motivation and Mentoring Dynamics in the National Children's Science Congress (NCSC)

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ABSTRACT

The National Children's Science Congress (NCSC), a flagship initiative of the National Council for Science and Technology Communication under the Department of Science and Technology, Government of India, seeks to promote scientific temper among students aged 10-17 through decentralised, research-based participation. While the program's scale and student impact have been widely documented, limited research has examined the motivations and experiences of Guide Teachers (GTs), who play a central mentoring role in student projects. This study adopts a mixed-method design, combining quantitative survey data (n = 251) with qualitative insights from open-ended responses and interviews, to explore teacher motivations, mentoring practices, institutional support, and challenges. Findings indicate that intrinsic motivation-particularly professional satisfaction- drives teacher participation, despite limited formal research training and inadequate institutional support. The study identifies structural gaps in training, recognition, and resource allocation and proposes specific policy-level interventions to strengthen teacher capacity within the NCSC ecosystem.

KEYWORDS: Student-scientist; Guide teacher; Scientific method; Mentoring; Teacher motivation

1 Introduction

India's National Children's Science Congress (NCSC) is one of India's largest science outreach platforms, engaging approximately 8-9 lakhs of students nationwide annually in experiential scientific inquiry through a decentralised and inclusive program. Since its

inception in 1993 followed by its integration in the National Council for Science and Technology Communication (NCSTC), Department of Science and Technology, Government of India (NCSTC, 2023), in 2014, the NCSC has evolved into a unique model inculcating interest in and initiating students in the process and rigour of scientific method, unlike other traditional science fairs, exhibitions and outreach programmes (NCSC, 2010).

The Congress has a multi-tiered process spanning district, state, and national levels, where, though the research is student-led, it is initiated and guided under the mentorship of a guide teacher (GT). Every year, approximately 5 lakh teachers associate with the NCSC as mentors playing multiple roles of facilitators, co-researchers, emotional supporters, and logistical coordinators. For school students without prior training in scientific inquiry, methods, and research skills, it is the GTs' guidance that is an important determinant of the quality of the final outcome of a research project.

However, despite the scale and longevity of the Congress and the indispensability of GTs, research attention has largely focused on student participation and program logistics. Little is known about the motivations, mentoring practices, and professional challenges of Guide Teachers (GTs), the educators who are pivotal in shaping students' research competencies. An in-depth understanding of this dimension can inform NCSC frameworks and policy decisions to achieve tangible, effective outcomes. Given the emphasis on experiential learning and teacher empowerment in policy frameworks such as the National Education Policy, 2020, understanding GT engagement is both timely and necessary. This study addresses the following gaps:

i. What is the profile of the teachers who are volunteering as GTs
ii. How do teachers with limited research training navigate project supervision?
iii. What institutional mechanisms support or constrain their engagement?
iv. What motivates teachers to voluntarily invest time and effort in NCSC mentoring?

2. Literature Review

Early exposure to research skills- such as systematic observation, problem identification, literature review, experimentation, documentation, data analysis, interpretation, and presentation- has been shown to enhance students' conceptual understanding and cultivate a scientific temper. Such training not only strengthens students' grasp of scientific principles but also equips them with methodological tools necessary for inquiry-based learning and fosters sustained interest in science-related careers (Abernathy & Vineyard, 2001). Science competitions and project-based platforms further extend this engagement by promoting critical thinking and problem-solving skills directed toward real-world societal challenges (Lachebo et al., 2024). These initiatives serve as structured entry points into authentic, hands-on research experiences for school students.

Within this framework, the role of teachers is pivotal. Teachers facilitate the identification of feasible and innovative project ideas, guide methodological design, and support students in preparing written and oral presentations for competitions (Dionne *et al*., 2012; Mbowane et al., 2017). They function as primary academic mentors, nurturing students' competencies and sustaining their interest in scientific inquiry, particularly in the context of science fairs and competitive forums (Abernathy & Vineyard, 2001). However, while teachers often demonstrate strong motivation to mentor students, research indicates that many feel inadequately prepared to coordinate and guide students effectively for science project competitions (Raharti & Mustaphi, 2020). Similarly, Meydan (2017) observed that pedagogical approaches adopted during competition coaching were frequently insufficient to support high-quality project development.

Effective mentoring in science competitions requires teachers to possess robust content knowledge, pedagogical expertise, and technological proficiency, particularly to foster higher-order thinking skills (Demissie et al., 2022). Nonetheless, multiple contextual constraints impede this process. Teachers, especially in rural settings, face challenges such as limited access to information, insufficient funding, inadequate technical support, and scarcity of laboratory equipment and materials. Administrative barriers- including delayed announcements and restricted timelines for

project completion- further constrain meaningful mentoring engagement (Raharti & Mustaphi, 2020). Despite these challenges, the success of science competitions across cluster, zonal, regional, national, and international levels is significantly influenced by teachers' commitment, interest, and competencies in scientific inquiry (Lachebo et al., 2024). A nuanced understanding of teachers' dilemmas and contextual constraints is therefore essential for aligning professional development initiatives with the competencies required to prepare students for global scientific engagement.

To examine the factors motivating teachers to voluntarily assume mentoring roles- often requiring substantial investment of time and energy- the present review draws upon motivational theory, particularly Self-Determination Theory (Deci & Ryan, 2000). Self-Determination Theory (SDT) distinguishes between intrinsic and extrinsic forms of motivation, positing that intrinsic motivation-engagement driven by inherent interest or enjoyment-supports sustained commitment, whereas extrinsic motivation, driven by external rewards or recognition, may foster shorter-term participation. SDT further emphasises the psychological needs of autonomy, competence, and relatedness as foundational to enduring engagement. In the context of volunteerism in education, altruistic motivation-defined as the desire to support students' growth and contribute to societal development- has been identified as a central driver among teachers (Watt et al., 2017).

Self-oriented motivations encompass both intrinsic satisfaction derived from the activity itself and extrinsic benefits associated with participation (Ryan & Deci, 2017). Empirical studies indicate that altruistic and intrinsic motivations are positively associated with sustained voluntary engagement, whereas predominantly extrinsic motivations correlate with short-term involvement (Han & Yin, 2016). Teachers participating in co-curricular science initiatives often report professional fulfilment and identity affirmation as primary motivators, rather than financial incentives (Richardson & Watt, 2014). Furthermore, engagement in mentoring activities contributes to professional growth, enhanced teamwork capabilities, and strengthened instructional competencies (Day & Gu, 2007; Hudson, 2013).

Teachers' readiness and perceived efficacy in mentoring are critical determinants of successful student participation in science projects (Lakin et al., 2021). Consequently, a comprehensive understanding of the motivational factors underpinning teachers' voluntary engagement in science competitions is essential for strengthening such programs. In the Indian context, empirical research examining teacher motivation in science outreach and competition-based initiatives remains limited. Integrating motivational theory with evidence derived from mentors involved in the NCSC can contribute significantly to science education discourse by illuminating the factors that sustain teacher engagement and, in turn, enhance the effectiveness of science competitions in promoting inquiry-based learning.

3. Objectives

The objectives of this study are:

1. To document the profile of GTs and the roles and responsibilities undertaken by themin student research
2. To understand mentor-student dynamics
3. To examine the challenges and institutional support mechanisms
4. To investigate motivational factors of GTs

4. Methodology

A mixed-method approach was adopted, combining quantitative survey data with qualitative insights from open-ended responses, to gain in-depth insights into the experiences and motivational factors of GTs . This approach enabled the researchers to capture both statistical profiling and interpretative understanding of mentoring dynamics, contextual challenges, and the emotional and intellectual commitment involved in the mentoring process. The quantitative approach allowed data collection from a large population where a smaller representative sample is drawn while the qualitative approach provided an in-depth insight into the issue being studied (Creswell & Plano Clark 2010).Secondary data were obtained through an extensive review of official NCSC reports, published literature on science education, and case studies on mentorship practices.

Sample

Data were collected from 251 GTs across 22 states using purposive sampling. While geographically diverse, the sample distribution was uneven, with Bihar overrepresented, limiting generalizability. This limitation is acknowledged. Ethical protocols were followed, informed consent was obtained from all participants, anonymity was maintained, and confidentiality was assured.

Data Collection and Analysis

A 40-item digital questionnaire used in the study included 15 demographic items and 25 items on mentoring practices, motivation, support, and challenges. The demographic section aimed to profile the GTs and covered teachers' academic qualifications, subject expertise, professional experience, and the extent of NCSC involvement. While the main section elicited responses on mentoring practices, strategies, project development support, institutional support and training received, personal motivations, perceived impacts, logistical and systemic challenges.

Quantitative data were analysed using descriptive statistics. Qualitative responses were analysed using thematic analysis, in which responses were coded manually to identify recurring patterns related to motivation, institutional constraints, mentoring practices, and research preparedness.

5. Results and Discussion

Demographic Profile of Teacher-Mentors

The demographic data revealed that teacher-mentors in this study had a balanced gender distribution, with 50.6% males and 49.4% females (Figure 1). More than 80% teachers were either employed as Post-Graduate Teachers (PGTs-39.8%) or trained graduate teachers (TGTs- 43%) (Figure 2). The maximum number of teacher-mentors had educational qualifications up to post-graduate level (61%) followed by graduation level (26.7%), while 11.6% had PhD degrees (Figure 3). 90% of the teachers had some professional degree-B.Ed., M.Ed. or other (Figure 4).

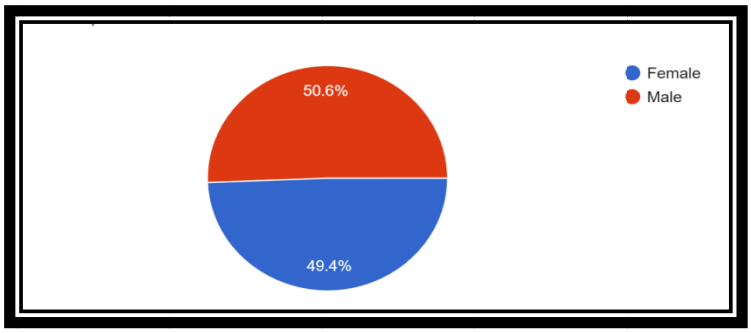

Fig. 1 Gender distribution of Guide Teachers, NCSC.

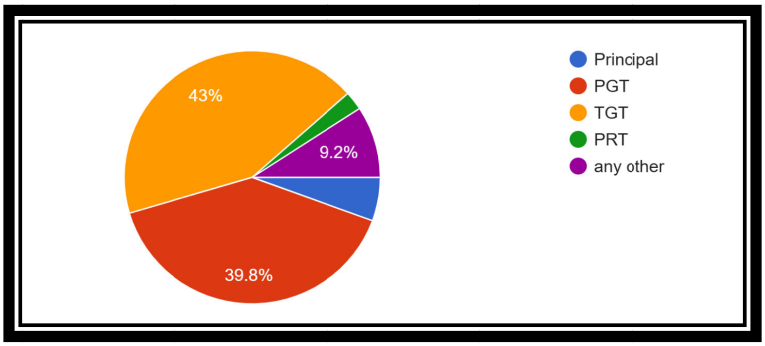

Fig. 2 Designations of Guide Teachers, NCSC.

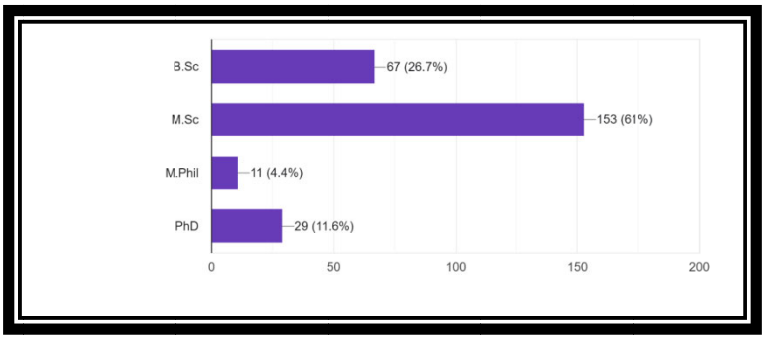

Fig. 3 Educational Qualifications of Guide Teachers, NCSC.

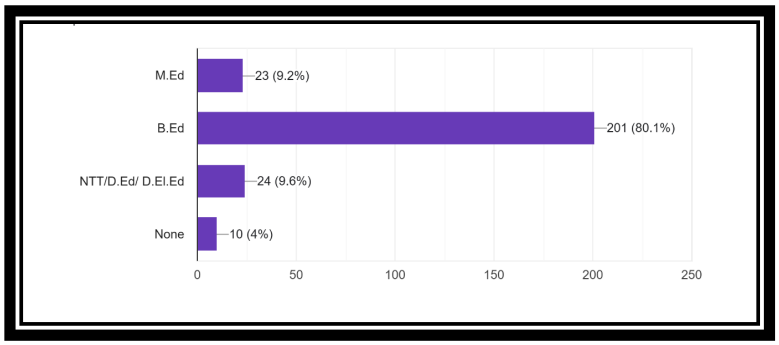

Fig. 4 Professional Qualifications of Guide Teachers, NCSC.

In terms of subject specialisation, biology teachers were the most frequent mentors, followed by chemistry and physics specialists, with math teachers being the least involved among the basic science subjects (Figure 5). This distribution reflects the nature of student projects in the NCSC, where biological research tends to dominate. In a few cases, teachers teaching non-Science subjects also acted as mentors for the student-scientists (Figure 6), and teachers in administrative roles, such as Vice-principals, also became GTs. 11.2% Mathematics teachers have been involved as GTs.

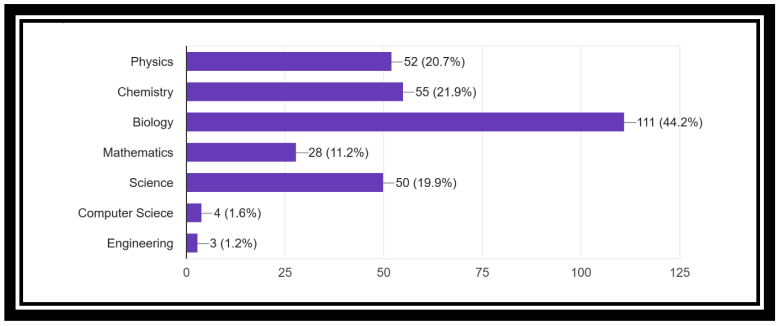

Fig. 5 Subject Specialization of Guide Teachers, NCSC.

At the national level presentations, no projects related to Maths have been noted. It may be due to the difficulty of translating abstract mathematical ideas into a research project. To balance this lopsided approach, NCSC can initiate special sections on Maths and data analysis.

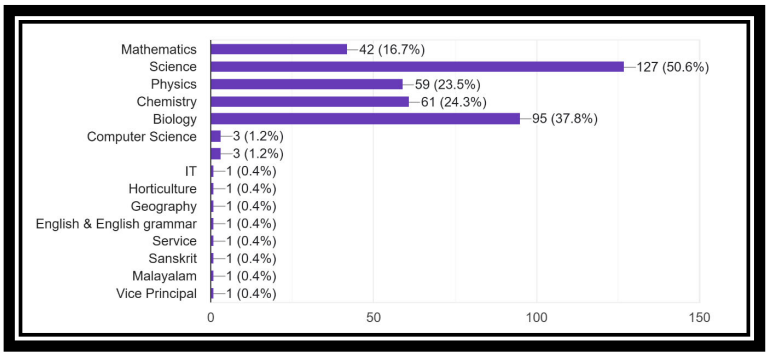

Fig. 6 Subjects taught by the Guide Teachers, NCSC.

The respondent GTs belonged to 22 states, with maximum GTs from Bihar (80) followed by Kerala (43), Tripura (23), Jammu & Kashmir (21) and Maharashtra (12). This makes the survey a pan-India survey, though the representation from the states is lopsided (Figure 7), as already acknowledged, posing problems for generalisations.

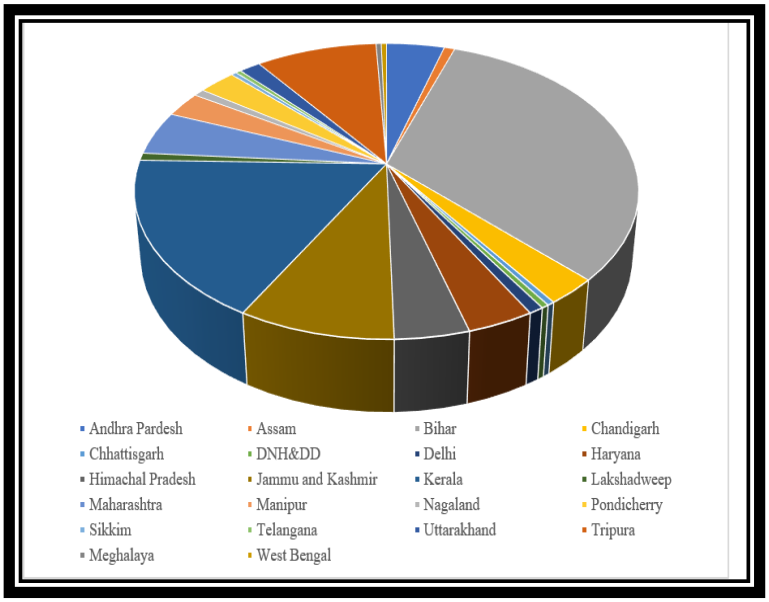

Fig. 7 Guide Teachers, NCSC representing different States of India.

Mentoring Practices: Mentoring Experience and Engagement

The 66.9% of teacher-mentors had more than 10 years of teaching experience (Figure 8), which may suggest a high level of expertise in guiding students; however, 62.9% of the teacher-mentors had no experience of research, and only 33% teachers have either undergone research during a PhD or master's degree (Figure 9). Despite their lack of formal research experience, 55.8% of the teachers had mentored more than five student-scientist projects (Figure 10). Though these figures highlight the commitment and adaptability of these teachers in stepping into the role of mentor despite not having a research-oriented background, they also point out a gap which can be bridged to achieve better outcomes for the Congress. In the absence of any research training or experience, the GTs are unable to appreciate the salience of aspects such as originality of ideas, plagiarism issues, rigour of scientific method and meticulous keeping of the logbook etc., required for instructing the student-scientists regarding the same. This leads to gaps in the training of the scientific method of the student-scientists, thus lowering the bar for quality of the research project at the Congress.

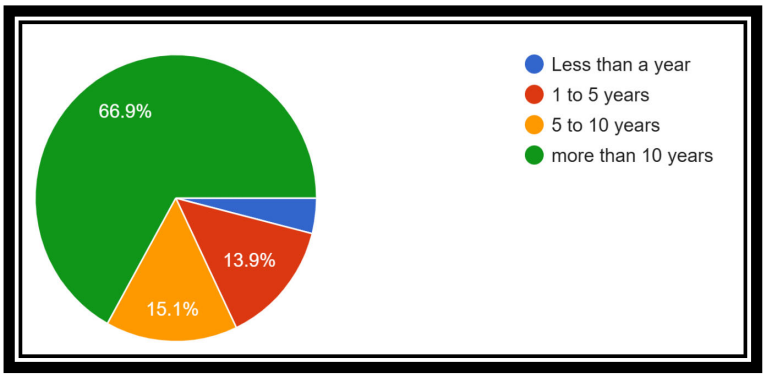

Fig. 8 Science Teaching Experience of Guide Teachers, NCSC inience.

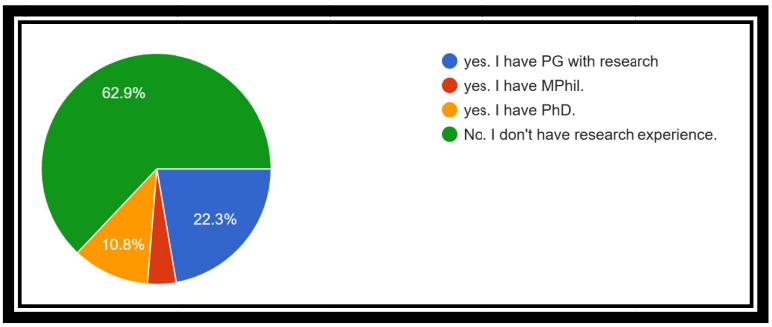

Fig. 9 Research Experience of Guide Teachers, NCSC

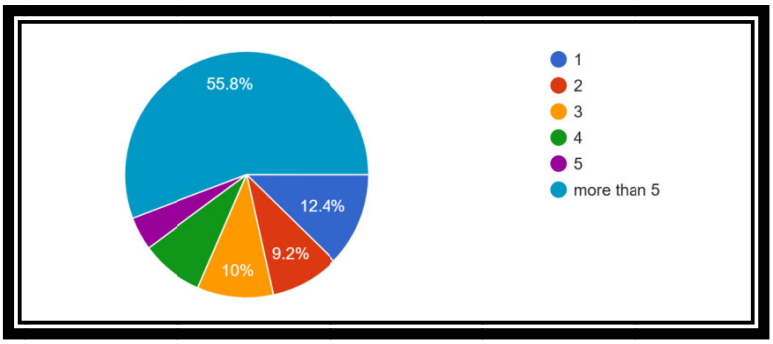

Fig. 10 Number of Projects guided by the Guide Teachers, NCSC.

It was found that more than 51.8% teachers volunteered to mentor the student-scientist, while in 46.2% cases it was assigned to the teacher by their respective schools. Only in 17.9% cases the student themselves approach the teacher (Figure 11). Many of these mentors or GTs were involved in other science popularisation initiatives too, such as Science Olympiads, Innovation in Science Pursuit for Inspired Research- INSPIRE scheme and other government-sponsored science schemes and were active on the science outreach circuit (Figure 12). This multifaceted involvement indicates a strong interest in fostering scientific curiosity beyond the NCSC and also the fact that once a teacher develops an interest and experience in such activities, they are frequently sought after. While this system works smoothly for the student-scientists, new teachers also need to be brought into

the circuit, through a well-planned system, where handholding of the new GTs can be done, and he/she can become familiar with the workings of the system, before the senior teachers leave the scene. A provision for having two GTs, with one as the principal GT and the other as the co-GT, can be suggested.

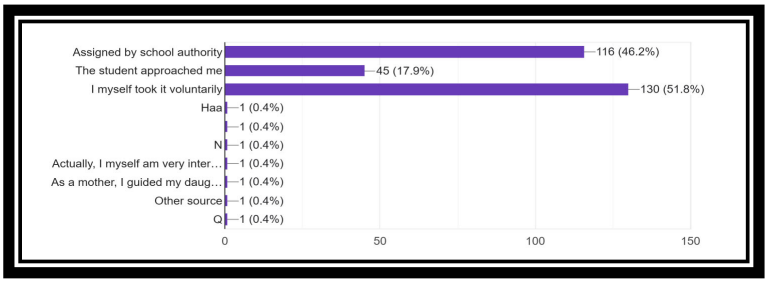

Fig. 11 Methods of engagement of the Guide Teachers, NCSC.

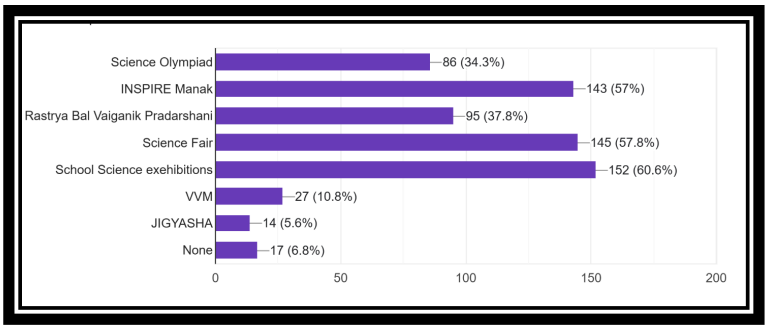

Fig. 12 Association of Guide Teachers, NCSC with different science popularisation schemes other than NCSC.

17.9% of the students who approach the GTs themselves point towards such cases where schools are participating in the NCSC for the first time and do not already have a pool of experienced GTs. This mostly happens through word of mouth or networking among acquaintances, and there is no mechanism for the students to find a suitable GT whose expertise matches the domain in which the students wish to work.

A repository of the contacts of GTs can be created, showing their 'Expression of Interest' by registering on a portal along with their qualifications, experience, subject of expertise and their preferred geographic location where they will be available to guide the students. This can facilitate the students and make the

GT-student-scientist pairing more transparent, easy, professional and less cumbersome.

Methods of Mentoring

In terms of mentoring methods, teacher-mentors predominantly employed discussions (78.1%) as a key strategy for guiding their mentees. Other commonly used methods included accompanying students for surveys (65.3%) and conducting experiments (57.8%). The variety of methods employed suggests that teacher-mentors adapt their strategies depending on the needs of the student and the nature of the project (Figure 13).

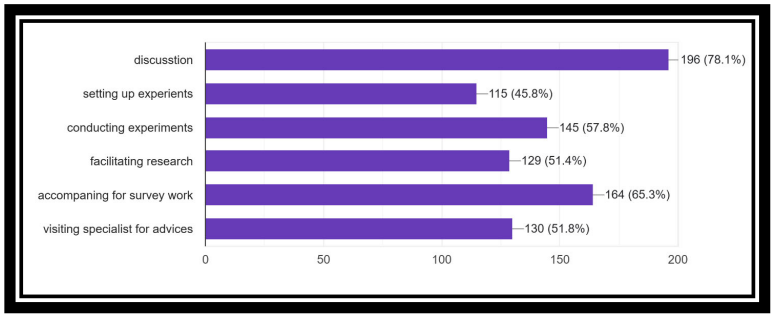

Fig. 13 Different methods of guidance of mentees by the Guide Teachers, NCSC.

A crucial aspect of mentoring is helping the student to explore the domain and zero-in on the idea for the project. In research, new ideas are generated through methods like brainstorming, visualisation, mind mapping, idea combination etc. In this study, it was found that in most cases (77.7%) ideas for research were generated through discussions between the teacher and the student. Contrary to the spirit of the Congress 13.5% of teachers themselves selected the project theme where the participation of the student was negligible and 3% resorted to internet searches for ideas. This finding suggests that teacher-mentors close collaboration with their mentees, open communication and discussion which fosters a sense of ownership in the students' research need to be strengthened (Figure 14). In the NCSC national level, it has been observed that students often bring identical projects. This can happen only when ideas are plagiarised, and the desired propriety has not been followed at

the first step which thwarts the very purpose of the Congress. Hence, idea generation for research project should be an important step in the whole process and some directions and guidelines to ensure the originality of the research work need to be formulated for achievement of objectives. A short write up on how the idea has been generated in the project submission can curb the practice of copying and not giving due diligence to the originality of the idea.

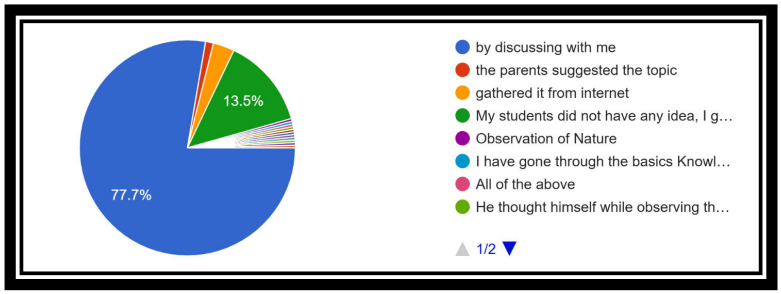

Fig. 14 Method of project identification for NCSC by the mentees.

Time Commitment and Support for Mentoring

The amount of time spent on mentoring varied, with 41.4% of GTs devoting 1-5 hours per week and 30.7% spending 5-10 hours. A significant portion (23.9%) reported spending over 10 hours per week, indicating the substantial effort required in mentoring (Figure 15). For the duration of the mentorship, 41.8% teachers needed 1-3 months, 20.7% spent 3-6 months and 24.7% more than 6 months on mentoring the student-scientists (Figure 16).

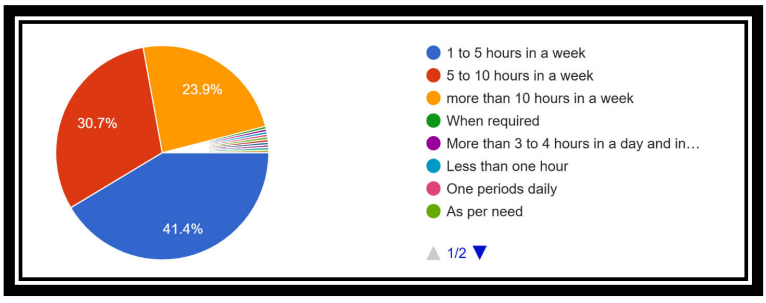

Fig. 15: Average time invested for guiding the students by the Guide Teachers, NCSC.

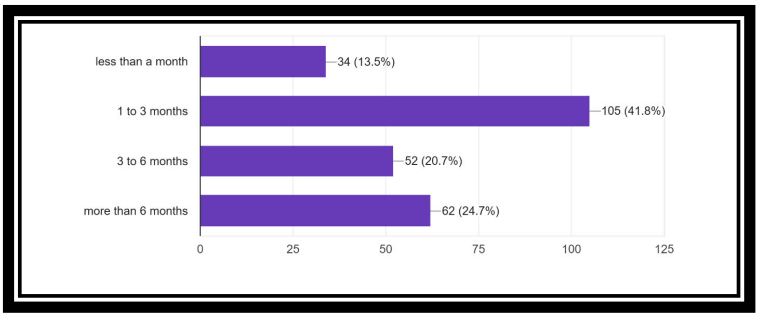

Fig. 16 Duration of involvement of the Guide Teachers with the students for the recent project done in the NCSC.

Along with idea generation GTs also helped the students in setting up the experiment and train them in logbook keeping. 70.9% mentors agreed that, the log book serves as a valuable tool for documenting daily progress and actions, helping to arrive at well-informed and insightful conclusions by the end of the project (Figure 17). However, this action further needed time and effort. According to survey results, 58.6% of GTs used their personal networks to get approvals for the students to conduct experiments in collaboration with external research laboratories or higher education institutes (Figure 18). Some teachers from schools in far-flung areas facing resource crunch divulged that they have paid for equipment, devices, test fees or sundry articles needed in the research from their own pockets, which amount was never reimbursed to them. Role complexity was also observed as GTs undertook multifaceted roles- ranging from research supervisors, fieldwork coordinators to logistical managers and even accompanying the student-scientists to the state or national level events.

This investment of personal time, effort and occasionally money in the student project by the volunteer GT is extremely crucial because it would determine the quality of training of the student-scientist as well as the practice of the scientific method and a deeper understanding of the research ecosystem. Though for all these years the Congress has functioned on the voluntary contribution of the GT of their time, energy, and effort, it is understandable that in the presence of such ad-hoc arrangements, rigorous restrictions on low-quality work cannot be

implemented. Taking the GTs contribution for granted will not bring serious results, and such a loose arrangement also brings a casual approach in the student-scientist. Hence, some plan needs to be embedded in the structure and function of the Congress via which volunteer GTs can guide and advise in a well-structured timeline within or outside the school system. The challenge is not to encumber the process of supervision and mentoring with unnecessary red tape but to make the GT empowered enough to take the assignment in a serious and professional way.

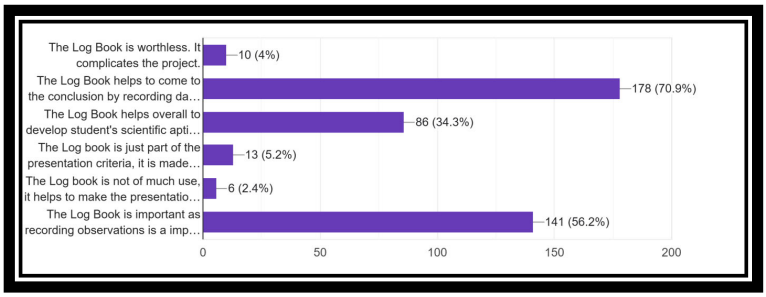

Fig. 17 Opinion of the Guide Teachers about the significance of Log book in student's research project.

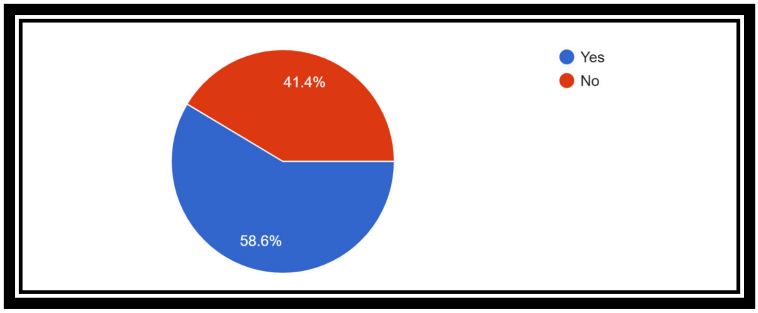

Fig. 18 Collaboration with the external labs or higher education institutes by Guide Teachers, NCSC for conducting experiments.

Despite the substantial time commitment, GTs reported limited formal support from their schools. Only 17.8% received teaching load reduction, and 21.5% received financial assistance for project-related expenses. A larger proportion (38.5%) acknowledged some form of school facilitation, but overall, the support received was minimal (Figure 19).

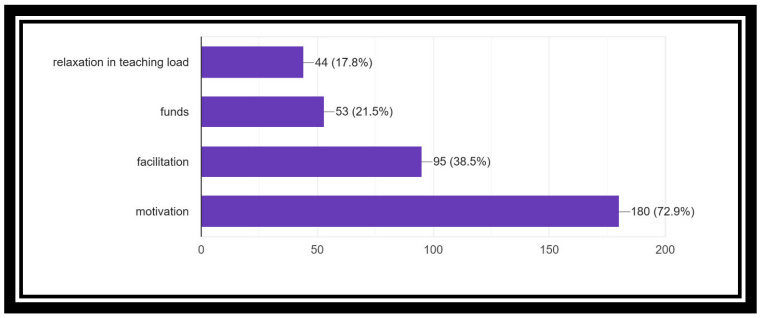

Fig. 19 Types of support received by the Guide Teachers from their respective schools during the period of projects for NCSC.

While some teachers received workshops and training, others highlighted a need for more consistent support mechanisms, mentorship resources, and recognition systems. In some states training programs are being conducted for the GTs by different non-governmental agencies under NCSC programmes, and 61.8% of GTs had attended such training programs (Figure 20), however, only 53% found the training adequate (Figure 21). The majority (96%) believed that further training in research methodology would enhance their mentoring capabilities (Figure 22). This suggests a need for more structured professional development opportunities to build the capacity of GTs. A strong, collaborative mentor-student relationship emerged as central to project success. The design of NCSC is based on the handholding of the students from the preliminary to the ultimate step of scientific research, which presupposes the presence of a learned guide. The GT taking up this role can be prepared for better performance by providing opportunities for quality training on the basics of scientific research methods and on effective mentoring. Short handbooks, mentoring toolkits, and peer learning forums for the GTs will also help everyone to be on the same page. Though information addressed to the students is available on the NCSC website, the availability of such material for GTs can ensure accessibility to all GTs and also position them as important participants in the student transformation journey.

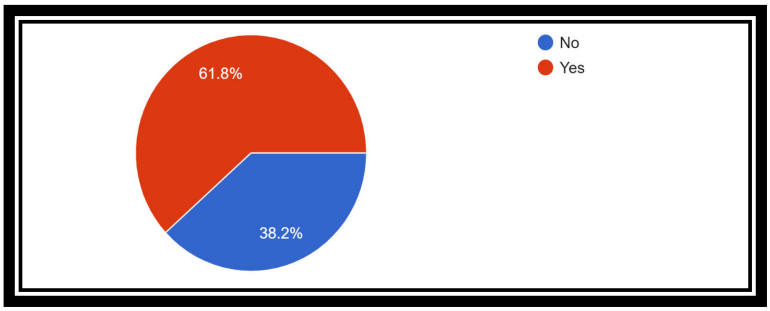

Fig. 20 Percentage of attendance in training programmes by Guide Teachers, NCSC.

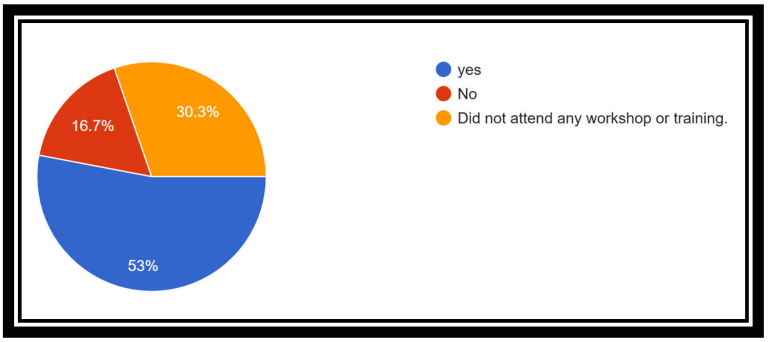

Fig. 21 Opinion of Guide Teachers, NCSC about the adequacy of the training programmes.

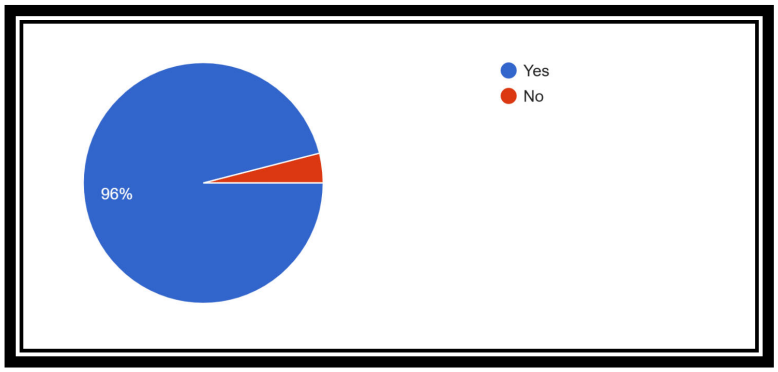

Fig. 22 Opinion of Guide Teachers, NCSC about their training in research methodology

Sources of Motivation

Keeping with the findings in literature, it was found that teacher-mentors were primarily motivated by intrinsic factors, with 77.7% indicating self-satisfaction and academic joy as their main drivers for mentoring. A smaller proportion cited recognition and respect (31.9%), while only 14.3% reported being motivated by institutional requirements. Teachers cited passion for science, commitment to student development, and the opportunity to contribute to national scientific goals as primary motivators. Many mentors experienced a sense of personal fulfilment through their students' success. Interestingly, very few teachers mentioned the desire to enrich students' lives or promote scientific thinking as their primary motivation (Figure 23), suggesting that the personal rewards and recognition may outweigh the educational objectives in many cases.This shift is an important one in order to make the NCSC project a game-changer in today's educational scenario. Consultations and training of the GTs can bring these ideas into the mental horizon of the GTs and make them look at their role as a scientific temper warrior pursuing the transformation of their students as scientists, actively, rather than passively be a GT.

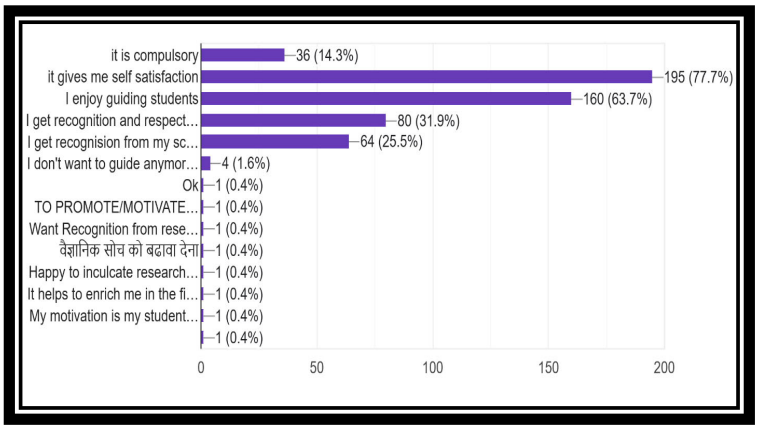

Fig. 23 Reasons inspiring Guide Teachers for NCSC.

Despite the lack of monetary incentives, 86.5% of the teachers expressed a willingness to continue mentoring, reflecting the intrinsic rewards they derive from the process. Notably, none of

the respondents expressed a desire to stop mentoring, indicating a high level of personal commitment to the NCSC program (Figure 24). Key challenges included lack of institutional support, time constraints, digital infrastructure gaps (especially in rural areas) inspite of which, teachers often relied on personal networks and self-initiative to sustain mentorship. The predominance of intrinsic motivation (77.7%) aligns with Self-Determination Theory, suggesting that autonomy and internal satisfaction are strong drivers of teacher engagement. The study shows that teachers who work without any direction from institutions select mentoring programs based on their personal preferences. Research results demonstrate that intrinsic motivation maintains engagement while institutional recognition promotes enduring dedication to tasks.

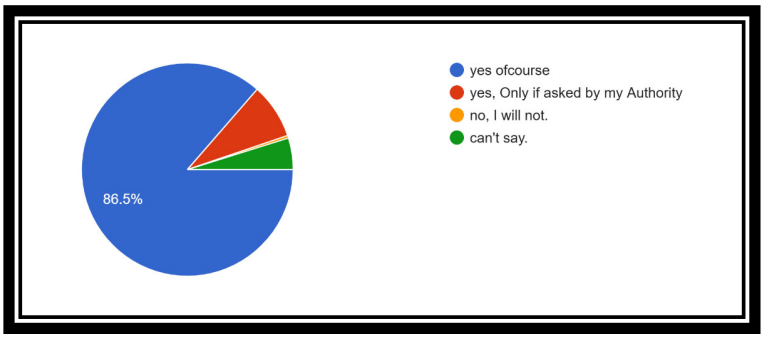

Fig. 24 Willingness of Guide Teachers for working for NCSC in future.

This inclination of the GTs to contribute to the larger cause can be further extended to prepare an army of GTs who are well versed in scientific methods themselves and are trained professionally to train the students in turn. Fair and evidence based systems for public recognition and rewards for outstanding GTs can be put in place. Collaboration between schools, district coordinators, state science departments and national bodies can further strengthen the whole NCSC structure to be in seamless integration for alignment of all forces towards the achievement of the goal of giving an early exposure of scientific research method to the students.

6. Recommendations

1. There are Guide teachers (GTs) who have been guiding for several years and are active in the NCSC circuit. While this system works smoothly, new teachers also need to be brought into the circuit, through a well-planned system, where handholding of the new GT can be done, and he/she can become familiar with the workings of the system before the senior teachers leave the scene. A provision for having two GTs (one chief GT and another co-GT) can be suggested.
2. Reflective documentation of mentoring experiences for future improvement should be incorporated into the GTs role, which can further help to generate important insights into the process.
3. Projects on Mathematics are very rare. To balance this lopsided approach, NCSC can initiate special sections on Maths and data analysis.
4. A repository of the contacts of GTs can be created, who show their 'Expression of Interest' by registering on a portal along with their qualifications, experience, subject of expertise and their preferred geographic location where they will be available to guide the students. This can facilitate the students and make the GT-student-scientist pairing more transparent, easier, and professional and less cumbersome.
5. Idea generation for a research project is the most important step in the whole process, and some directions and guidelines to ensure the originality of the research work need to be formulated for the achievement of objectives. A short write-up on how the idea has been generated in the project submission can curb the practice of copying and not giving due diligence to the originality of the idea.
6. The design of NCSC is based on the handholding of the students from the preliminary to the ultimate step of scientific research, which presupposes the presence of a learned guide. The GT taking up this role can be prepared for better performance by providing opportunities for quality training on the basics of scientific research methods and on effective mentoring. Short handbooks, mentoring toolkits,

and peer learning forums for the GTs will also help everyone to be on the same page. Availability of such material for GTs can ensure accessibility to all GTs and also position them as important participants in the student transformation journey.

7. Very few teachers mentioned the desire to enrich students' lives or promote scientific thinking as their primary motivation, suggesting that the personal rewards and recognition may outweigh the educational objectives in many cases. This shift is an important one in order to make the NCSC project a game-changer in today's educational scenario. Consultations and training of the GTs can bring these ideas into the mental horizon of the GTs and make them look at their role as a scientific temper warrior pursuing the transformation of their students as scientists, actively, rather than passively being a GT.
8. The inclination of the GTs to contribute to the larger cause can be further exploited to prepare an army of GTs who are well-versed in scientific methods themselves and are trained professionally to train the students in turn. Fair and evidence-based systems for public recognition and rewards for outstanding GTs can be put in place.
9. Collaboration between schools, district coordinators, state science departments and national bodies can further strengthen the whole NCSC structure to be in seamless integration for alignment of all forces towards the achievement of the goal of giving an early exposure to scientific research methods to the students.
10. In spite of the NCSC going on for more than three decades, it is hard to find studies or discussions or feedback related to such an important and path-breaking science outreach programme. Reflective documentation of mentoring experiences for future improvements should be incorporated within the GTs role, which can further help in getting important insights in the process.

7. Conclusions

In spite of the NCSC going on for more than three decades, it is hard to find studies or discussions or feedback related to such an important and path-breaking science outreach programme.

The study affirms that GTs are the foundational pillars of the NCSC ecosystem. Their intrinsic motivation, dedication, and proactive mentoring efforts significantly shape student experiences and the overall success of the Congress. The findings underline the need for stronger institutional frameworks, equitable access to resources, and policy interventions that acknowledge and incentivise teacher participation. Recommendations for more effective role performance of the GTs in NCSC based on this study can be adopted in the policy. By recognising and addressing the experiences of these educators, the NCSC can further enrich its impact and inclusivity.

References

Abernathy, T., & Vineyard, R. (2001). Academic competitions in science: What are the rewards for students? *The Clearing House, 74*(5), 269–276.

Creswell, J.W. Plano Clark, V.L. (2010) Designing and Conducting Mixed Methods Research. 2nd Edition, SAGE Publications, Inc., Washington DC.

Day, C., & Gu, Q. (2007). Variations in the conditions for teachers' professional learning and development: Sustaining commitment and effectiveness over a career. *Oxford Review of Education, 33*(4), 423–443.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and self-determination of behavior. *Psychological Inquiry, 11*(4), 227–268.

Demissie, E. B., Labiso, T. O., & Thuo, M. W. (2022). Teachers' digital competencies and technology integration in education: Insights from secondary schools in Wolaita Zone, Ethiopia. *Social Sciences & Humanities Open, 6*(1).

Dionne, L., Reis, G., Trudel, L., Guillet, G., Kleine, L., & Hancianu, C. (2012). Students' sources of motivation for participating in science fairs: An exploratory study within the Canada-wide science fair 2008. *International Journal of Science and Mathematics Education, 10*, 669–693. https://doi.org/10.1007/s10763-011-9318-8

Han, J., & Yin, H. (2016). Teacher motivation: Definition, research, and implications for teachers. *Cogent Education, 3*.https://doi.org/10.1080/2331186X.2016.1217819

Hudson, P. (2013). Mentoring as professional development: "Growth for both" mentor and mentee. *Professional Development in Education, 39*(5), 771–783.

Lachebo, G. C., Thuo, M. W., Demissie, E. B., & Labiso, T. O. (2024). Teachers' engagement in students' science competitions: Views from secondary schools in Southern Ethiopia. *Social Sciences & Humanities Open, 10*.

Lakin, J. M., Ewald, M. L., Hardy, E. E., Cobine, P. A., Marino, J. G., Landers, A. L., et al. (2021). Getting everyone to the fair: Supporting teachers in broadening participation in science and engineering fairs. *Journal of Science Education and Technology, 30*, 658–677. https://doi.org/10.1007/s10956-021-09910-7

Mbowane, C. K., de Villiers, J. J. R., & Braun, M. W. H. (2017). Teacher participation in science fairs as professional development in South Africa. *South African Journal of Science, 113*(7/8), 1–7. https://doi.org/10.17159/sajs.2017/20160364

Meydan, A. (2017). The contribution of scientific project competitions upon high school students' acquiring a scientific viewpoint (Geography lesson case).*Journal of Education and Learning, 6*(2), 294–304. https://doi.org/10.5539/jel.v6n2p294

National Council for Science and Technology Communication. (2023). *Official guidelines of NCSC*.Department of Science and Technology, Government of India.

NCSC.(2010). *Brief of NCSC*. Department of Science and Technology. https://dst.gov.in/sites/default/files/18th_national_children.pdf

Raharti, M., & Mustapha, R. (2020).The role of mentoring to win science project competition in Indonesia.*Journal of Asian Vocational Education and Training, 13*, 34–44.

Richardson, P. W., Watt, H. M. G., & Karabenick, S. A. (2014). Teacher motivation matters: An introduction. In P. W. Richardson, S. A. Karabenick, & H. M. G. Watt (Eds.), *Teacher motivation: Theory and practice* (pp. xiii–xxii). Routledge.

Ryan, R. M., &Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Press. https://doi.org/10.1521/978.14625/28806

Watt, H. M. G., Richardson, P. W., & Smith, K. (Eds.). (2017). *Global perspectives on teacher motivation*.Cambridge University Press.