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Exploring the effectiveness of Co-curricular activities in Developing Students' Soft Skills at University Level

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Abstract

This qualitative research investigates the effectiveness of co-curricular activities in developing student soft skills in science teacher courses in promoting science to the community. This study aims to uncover the perceptions, practices, and challenges associated with integrating and promoting science in the community via in-depth interviews, focus groups, and participant statements applying pre-service science teachers, teacher educators, and curriculum developers. The findings reveal that while there is a strong recognition of the importance of environmental awareness, various barriers, such as insufficient curriculum content, lack of practical training opportunities, and limited institutional support, hinder effective implementation. This study explores the efficacy of counseling interventions in enhancing these skills in science students. Using a qualitative - methods approach, we conducted in-depth interviews and focus groups with science students and faculty members. The public university of Punjab province teachers and students was selected as a sample. Almost 25 teachers and 25 students were selected for the interview. The data were collected from teachers and students of university. It was required the personal efforts for gathering data from

selected sample, so the investigator of the study decided to assemble data and visited the university personally. Moreover, the study highlights educators' innovative strategies to overcome these obstacles, emphasizing experiential learning, interdisciplinary approaches, and community engagement. The results underscore the need for a comprehensive re-evaluation of science teacher education curricula to better equip coming teachers with the knowledge, skills, and attitudes necessary to advocate for and teach sustainability. This research contributes to the ongoing discourse on education in teacher preparation, offering insights and recommendations for policymakers, educators, and institutions committed to promoting sustainability through science education.

Keywords: Community participation, Curricular activities, Co-curricular activities, Academic performance

Introduction and Context of the Study

As education continues to evolve, understanding the nuanced relationship between co-curricular activities and the soft skills development of science students becomes increasingly imperative. The findings of this study intention not only donate to the existing body of understanding but also provide valuable insights for educators, curriculum designers, and policymakers striving to enhance the holistic evolution of science students (Beauchamp et al., 2015) . Pursuing science education traditionally strongly emphasizes theoretical knowledge and technical proficiency. However, the modern workforce's dynamic nature demands more than subject-specific expertise. Soft skills, frequently called "people skills" or "interpersonal skills," are crucial for science students to navigate a rapidly evolving global landscape. Integrating co-curricular activities, such as companies, workshops, and collaborative projects, provides a platform for students to develop these vital skills outside the traditional classroom setting (Nyaga *et al.*, 2021).

This research aims to go beyond mere observation of participation and outcomes, delving into the specific types of co-curricular activities that prove most

beneficial for soft skills development in science students; by identifying effective strategies and practices, the study endeavors to provide actionable suggestions that can be implemented in educational institutions to better prepare science students for the multifaceted challenges of the contemporary professional landscape (Oloruntegbe, 2011). As researchers have noted, soft skills contribute significantly to an individual's employability and success in the workplace. The demand for well-rounded professionals who can effectively communicate, collaborate, and adapt to diverse environments has prompted educators to explore innovative approaches to skill development (Moon, 2013) . With their experiential nature, co-curricular   activities offer a valuable avenue for science students to hone these skills while engaging in activities beyond their academic curriculum. The positive impact of co-curricular activities on student development, including communication skills, teamwork, and leadership qualities. However, limited research explicitly investigates the correlation between participation in co-curricular activities and soft skills development among science students.

Lavonen (2018) suggested that the co-curricular activities aim to provide students with broad knowledge and experiences to expand their interests, talents, mentality, physical, spiritual, and positive aesthetic and social values. Participation in these actions will provide the actual skills and foster a healthy lifestyle. Acknowledging the need to equip students with a diverse skill set, educational institutions increasingly emphasize integrating co-curricular activities into their programs. Soft skills, encompassing interpersonal, communication, and leadership abilities, have gained prominence as essential attributes for success in the professional realm.

This study focuses on exploring the Effectiveness of co-curricular activities in enhancing the soft skills of science students (Moller & Crick, 2018). The critical role of soft skills in personal and professional development must be balanced. These skills, which include communication, teamwork, problem-solving, and

adaptability, are essential for success in the 21st-century workforce. As work evolves with technological advancements and globalization, working collaboratively, communicating effectively, and adapting to changing circumstances becomes increasingly essential (Dyer et al., 2004) . Employers consistently highlight the value of soft skills, often placing them on par with technical skills in terms of importance. The significance of soft skills in personal and professional growth cannot be overstated. As the modern workforce continues to evolve, driven by technological innovations and globalization, the ability to collaborate, communicate, and adapt has become indispensable. Employers increasingly recognize the equal importance of soft skills alongside technical skills, as they enable individuals to navigate complex work environments, build strong relationships, and drive collective success. Effective communication, for instance, facilitates clear expression of ideas, active listening, and conflict resolution.

Teamwork enables diverse perspectives, shared responsibilities, and a cohesive approach to problem-solving. Adaptability allows individuals to pivot in response to changing circumstances, priorities, and technologies. Moreover, problem-solving skills empower individuals to analyze challenges, think critically, and develop innovative solutions. By balancing the development of soft skills with technical expertise, individuals can enhance their versatility, creativity, and leadership potential. As the work landscape continues to shift, prioritizing soft skills will enable professionals to thrive in an era of rapid change, fostering a culture of collaboration, resilience, and continuous growth. By recognizing the value of soft skills, we can cultivate a more dynamic, effective, and successful workforce (Whitty, 2014).

The development of soft skills is particularly crucial in the context of science education. Science professionals frequently work in interdisciplinary teams, requiring strong communication and collaboration skills. Additionally, thinking critically and solving complex problems is fundamental to scientific

inquiry and innovation (Xu, 2009) . However, traditional science education programs often focus heavily on content knowledge and technical skills, sometimes at the expense of soft skills development. This study seeks to address this imbalance by exploring how co-curricular activities can be leveraged to enhance science students' soft skills.

Co-curricular activities offer a unique and valuable opportunity for soft skills development. Unlike traditional classroom instruction, which is often structured and content-driven, co-curricular activities are typically more flexible and experiential (Sohaib *et al.*, 2022). This permits students to contend in hands-on, practical experiences that promote the development of soft skills. For example, participating in a science club or competition can help students develop teamwork and leadership skills, as they must work together to achieve common goals and take on leadership roles within their teams. Similarly, involvement in community service projects or internships can enhance communication and problem-solving skills as students interact with diverse groups and navigate real-world challenges (Don & Ibrahim, 2019).

Also, co-curricular activities are intended to concentrate on the development of specific soft skills. It is excellent to develop and enhance these skills outside the traditional classroom. For instance, a workshop on public speaking can help students improve their communication skills, while a collaborative research project can foster teamwork and critical thinking (Fang & Ngee, 2013) . By carefully designing co-curricular activities with explicit learning outcomes related to soft skills, educators can create chances for students to practice and refine these skills in meaningful contexts, which is essential. Reflective practices play a crucial role in the Effectiveness of co-curricular Activities for soft skills development. Reflection allows students to critically examine their experiences, identify areas for improvement and set future development goals. Their learning journeys promote a sense of ownership and

responsibility, co-curricular activities, and a remarkable ability to transfer learned skills to real-world contexts. Ultimately, reflective practices support the development of well-rounded individuals who are better equipped for the challenges of their academic and professional lives (Jackson & Bridgstock, 2021) .

Statement of the Problems

In today's dynamic world, university science students must master both technical knowledge and essential soft skills such as communication, teamwork, problem-solving, and adaptability. These skills are critical for professional success, yet traditional science education often prioritizes academic and technical competencies, neglecting soft skills development. Co-curricular activities, including clubs, workshops, internships, and collaborative projects, offer valuable opportunities for experiential learning that can address this gap. However, their effectiveness in developing soft skills still needs to be explored and utilized. Additionally, there needs to be more evidence on which specific types of co-curricular activities best promote these skills, leaving educators and policymakers without clear guidance for effective implementation. This gap impacts students' preparedness for the workforce and their ability to thrive in diverse collaborative environments. This study aims to provide actionable insights and recommendations to help universities enhance their science education programs. By systematically examining the impact of various co-curricular activities on soft skills development, we hope to guide educators in designing initiatives that offer a more holistic educational experience, equipping science students with the skills needed for future success.

Objectives of the Study

The objectives of this study encompass a comprehensive exploration of the development of soft skills in science students through co-curricular activities.

1)	To explore the effectiveness of co-curricular activities on soft skills development.

2)   To explore what co-curricular activities, help students enhancing particular soft skills in science teachers.

3)   To explore the difficulties with co-curricular activities in developing soft skills

Research Questions of the Study

The research questions of this study form the exploration of the dynamics of soft skills development among science students through co-curricular activities.

1)   What are the co-curricular activities students participate at university level

2)   What are the co-curricular activities help students enhancing particular soft skills in science teachers?

3)   What are the difficulties with co-curricular activities in developing soft skills?

Significance of the Study

This study holds considerable significance within science education and broader educational discourse. Firstly, it addresses a critical gap in the existing literature by explicitly focusing on the impact of co-curricular   activities on developing soft skills among science students (Wang et al., 2008). The findings of this research have the potential to provide educators, administrators, and policymakers with actionable insights to tailor educational strategies that enhance the holistic development of science students. The study's emphasis on evaluating the current state of soft skills among science students serves as a foundational step toward understanding the unique needs of this teacher's demographic. The study offers practical guidance for educators in designing targeted interventions within science education programs by identifying the co-curricular   activities that most significantly contribute to soft skills enhancement.

Review of the Related Literature

In the intricate landscape of science teacher education, soft skills development is a life and a cornerstone for effective pedagogy and teachers' engagement. Soft skills

encompass a spectrum of non-technical abilities essential for fostering robust communication, empathy, and adaptability in educational settings. These skills are indispensable for educators, enabling them to navigate the complexities of classroom dynamics, address diverse learning needs, and establish rapport with students (Kamaruddin, 2012). The co-curricular activities, ranging from sports to volunteering to arts, offer fertile ground for cultivating these vital soft skills. Individuals hone their interpersonal skills, leadership capabilities, and emotional intelligence through active participation in such activities. For instance, team sports foster collaboration, communication, and conflict resolution, while community service cultivates empathy, social awareness, and civic responsibility (Goldsmith & MacGeorge, 2000) . Moreover, the arts provide a creative outlet for self-expression, fostering innovation, critical thinking, and problem-solving skills. By immersing themselves in artistic endeavors, students develop resilience, decisiveness, and a growth perspective, which are invaluable for navigating the complexities of academic and professional(Shah, 2009).

In the context of science teacher education, integrating co-curricular activities into the curriculum is paramount. Not only do these activities complement academic learning by offering practical, real-world applications of theoretical concepts, but they also provide a holistic approach to education, addressing students' socio-emotional needs (Barker et al., 2009). By incorporating soft skills development through co-curricular activities, science teacher education programs can better prepare future educators to create inclusive, engaging learning environments that foster meaningful connections and promote teacher success.

Integrating co-curricular activities into science teacher education programs in contemporary education catalyzes transformative learning experiences and holistic teachers' development. By embracing a multidimensional approach to education, educators can create dynamic learning environments that nurture

students' growth in cognitive, affective, and psychomotor domains(Awang et *al.*, 2013) . Co-curricular   activities supplement traditional classroom instruction and qualify students to apply academic wisdom in real-world contexts, promoting a deeper understanding of scientific ideas and principles. Through hands-on experiences, such as conducting experiments, participating in field trips, or engaging in STEM projects, students develop critical thinking, problem-solving, and scientific inquiry skills (Shah, 2009) .

Co-curricular   activities promote the acquisition of 21st-century skills, which are essential for success in the rapidly evolving global landscape. By collaborating with peers, communicating findings, and presenting projects, students hone their teamwork, communication, and presentation skills—highly valued in academic and professional settings. Additionally, co-curricular activities foster resilience, perseverance, and self-efficacy as students navigate challenges, setbacks, and successes (Oades *et al.*, 2014). These experiences contribute to developing a growth mindset, empowering students to approach learning with curiosity, adaptability, and a willingness to embrace new opportunities.

Co-curricular   activities promote social-emotional learning and nurture students' well-being. Through interactions with peers, mentors, and community members, students develop empathy, cultural competence, and a sense of belonging. Engaging in collaborative projects, extracurricular clubs, or service-learning initiatives allows students to explore their interests, passions, and identities, fostering a sense of purpose and fulfillment. Moreover, Co-curricular activities provide a supportive environment for pupils to develop coping techniques, stress management techniques, and emotional resilience, equipping them with essential life skills for navigating challenges and adversity (Blašková *et al.*, 2014).

Integrating co-curricular activities into science teacher education programs offers students, educators, and educational institutions myriad benefits. By providing opportunities for hands-on learning, skill development, and personal growth, co-curricular activities enrich the educational experience, preparing students to thrive in an ever-changing world. As educators continue to recognize the value of holistic education, incorporating co-curricular activities will remain instrumental in fostering lifelong learners who are academically proficient, socially aware, emotionally resilient, and intellectually curious individuals ready to make meaningful contributions to society (Noori *et al.*, 2020).

In the realm of science teacher education, the incorporation of co-curricular activities yields profound impacts on both aspiring educators and the educational landscape at large. These activities serve as dynamic platforms for enriching pedagogy, enhancing student engagement, and fostering the holistic development of future science students. First and foremost, co-curricular activities provide aspiring science educators with invaluable opportunities to apply theoretical knowledge in practical, real-world contexts. Through hands-on experiences such as conducting experiments, leading field trips, or organizing STEM clubs, prospective students gain firsthand exposure to innovative teaching methodologies and instructional strategies. This experiential learning deepens their understanding of scientific concepts (Savage *et al.*, 2011) . It equips them with the skills and confidence needed to effectively translate complex subject matter into engaging learning experiences for their future students.

Moreover, participation in co-curricular activities fosters the development of essential soft skills critical for success in the teaching profession. Through interactions with peers, mentors, and community stakeholders, aspiring science students hone their communication, collaboration, and leadership abilities. Whether leading student-led research projects, coordinating science fairs, or mentoring youth in extracurricular science clubs, these experiences cultivate the

interpersonal competencies and relational aptitudes necessary to build rapport with students, foster inclusive learning environments, and effectively manage classroom dynamics (Shahmohammadi, 2014) .

Furthermore, the co-curricular activities are pivotal in nurturing aspiring students' passion, enthusiasm, and lifelong commitment to science education. Engaging in hands-on science experiences, participating in professional development workshops, and collaborating with experienced educators inspire a sense of purpose and belonging within the science education community (Brooks & Young, 2015). By promoting a culture of interest, exploration, and innovation, co-curricular activities empower future science students to cultivate a love for learning and instill a sense of wonder and inquiry in their students.

In addition to benefiting individual educators, integrating co-curricular activities into science teacher education programs enhances science education's overall quality and effectiveness (Asikainen *et al.*, 2018). By supplementing traditional classroom instruction with experiential learning opportunities, educational institutions can cultivate a new generation of science educators who are knowledgeable, skilled, passionate, empathetic, and culturally competent. This holistic approach to teacher preparation promotes student-centered pedagogy, fosters interdisciplinary collaboration, and equips educators with the tools and resources to address their students' diverse needs and interests.

The impact of co-curricular activities on science teacher education is multifaceted and far-reaching. From enhancing pedagogical practices to nurturing aspiring educators' personal and professional growth, these activities play an essential role in shaping the destiny of science education (Richardson *et al.*, 2012). By embracing a holistic approach that integrates theory with practice, science teacher education programs can empower aspiring educators to become transformative agents of change who inspire curiosity, foster inquiry, and cultivate a lifelong love for science in their students.

Effective Strategies for Implementing Co-curricular Activities in Science Teacher Education

Collaboration between Faculty and co-curricular coordinators collaboration between academic faculty and co-curricular coordinators facilitates seamless integration of soft skill development initiatives into the curriculum. Tailoring activities to specific soft skill development goals designing co-curricular activities with explicit learning outcomes related to targeted soft skills enhances their effect. Implementing Co-curricular activities in science teacher education requires strategic planning and collaboration between faculty members and co-curricular coordinators. By working closely, academic faculty and co-curricular coordinators can ensure that these activities align with the curriculum and complement the educational learning objectives (Tamannaifar & Gandomi, 2011) .

One key strategy for effective implementation is establishing regular communication channels between faculty members and Co-curricular coordinators. Allows ongoing dialogue about co-curricular activities' goals, objectives, and outcomes, ensuring they are integrated seamlessly into the educational experience. Faculty fellows can provide valuable insights into the soft skills essential for success in science education. At the same time, Co-curricular coordinators can offer expertise in designing engaging and meaningful activities to develop these skills (Pirmohamed *et al.*, 2017). Another essential strategy is to tailor co-curricular activities to specific soft skill development goals. By clearly defining each activity's desired outcomes and learning objectives, educators can ensure that students can identify and reflect on their progress in developing these skills. For example, the goal is to enhance students' communication skills. In that case, activities such as science presentations, debates, or collaborative projects can provide opportunities for practice and feedback.

Furthermore, incorporating reflective practices into co-curricular activities can enhance their effectiveness in promoting soft skill development. By encouraging

students to reflect on their experiences, identify areas for growth, and set goals for improvement, educators can help them develop metacognitive awareness and self-regulation skills (Beşoluk *et al.*, 2011) . This reflective process involves dairy writing, group discussions, or one-on-one mentoring sessions with faculty members or co-curricular advisors. Implementing co-curricular activities in science teacher education requires planning, collaboration, and reflection. By aligning activities with specific soft skill development goals, providing opportunities for practice and feedback, and encouraging a culture of thinking and continuous improvement, educators can create enriching learning experiences that prepare students for success in both their educational and experienced lives liveness in fostering holistic teachers' development.

Lack of Resources Limited funding and resources pose challenges in offering diverse co-curricular opportunities, particularly in underprivileged educational settings. Time constraints balancing academic curriculum requirements with co-curricular commitments can be demanding, necessitating careful planning and prioritization. Incorporating co-curricular activities into science teacher education programs comes with challenges and constraints, ensuring effective implementation and equitable access for all students. One significant challenge is the need for more resources, particularly in underprivileged educational settings (Asikainen et al., 2020). Limited funding and resources can restrict the range and quality of Co-curricular opportunities available to students. With adequate financial support, universities can offer diverse activities such as field trips, hands-on experiments, or specialized workshops, depriving students of valuable learning experiences outside the classroom. Additionally, disparities in resource allocation can exacerbate existing inequalities, widening the gap between students from different socioeconomic backgrounds (Pirmohamed et al., 2017).

Another challenge is time constraints, as balancing academic curriculum requirements with co-curricular   commitments can be demanding for students and educators. With limited instructional time, educators must carefully prioritize and integrate co-curricular   activities into the curriculum without compromising academic rigor. strategic planning, collaboration, and flexibility are required to ensure that co-curricular activities complement rather than compete with core academic content. Moreover, students may face challenges managing their academic workload alongside extracurricular responsibilities, leading to increased stress and burnout.

In addressing these challenges, it is essential for educational institutions to prioritize equity and accessibility, ensuring that all students have equal chances to participate in co-curricular   activities regardless of their background or circumstances. may involve seeking external funding sources, partnering with community organizations, or leveraging technology to offer virtual or hybrid learning experiences (Tamannaifar & Gandomi, 2011) . Additionally, educators can adopt innovative approaches to time management and curriculum design, such as integrating co-curricular activities into existing courses or offering flexible scheduling options to accommodate diverse teacher's needs.

By accepting and handling the challenges and limitations associated with co-curricular   activities, educators can create more inclusive, engaging, and enriching learning experiences that empower students to thrive academically, socially, and emotionally. Through strategic planning, teamwork, and a dedication to equity, universities can overcome resource constraints and time limitations, ensuring that all students have access to the transformative benefits of co-curricular education.

Alignment between co-curricular activities Ensures academic objectives requires intentional design and coordination, which may pose logistical challenges. Integrating co-curricular activities with the academic curriculum is essential for

maximizing their educational impact. We successfully resolved logistical issues so that the ball could roll (Matovu, 2012). One key challenge is ensuring alignment between co-curricular activities and academic objectives. Intentional design and coordination are necessary to ensure that these activities complement and reinforce the concepts and skills taught in the classroom.

However, achieving this alignment requires collaboration between faculty members, co-curricular coordinators, and other stakeholders, which may pose logistical challenges due to differences in schedules, priorities, and perspectives. Another challenge is managing the logistics of implementing co-curricular activities within the constraints of the academic calendar and curriculum requirements. Universities must balance the need for flexibility and creativity in designing activities with the need to adhere to established standards and benchmarks. may require careful planning, scheduling, and resource allocation to ensure that co-curricular activities are consistent with academic instruction (Marcela, 2015).

Research Methods

Research methods are systematically gathering and analyzing information to acquire new knowledge. Researchers select methods based on their specific inquiries, desired data type, and overarching study objectives. Qualitative research employs interviews, focus groups, and case studies to delve into detailed perspectives and narratives. In constructing the interview, it's essential to acknowledge that while interviews are often considered valuable tools for gathering information in qualitative studies, they also come with risks, such as a potentially low response rate. I personally administered the interview to address this concern, resulting in a significantly high response rate. The rationale behind this approach was to encourage participants to seek clarification if they encountered difficulties responding to the items. After careful consideration of these factors, the study primarily used the interview as its instrument. The

researcher meticulously deliberated and crafted the interview, paying close attention to wording and ensuring clarity in translation. The questions were structured to facilitate quick and easy responses from the participants. These include the perceived effectiveness of co-curricular activities on students' communication, collaboration, critical thinking, and problem-solving skills. Additionally, the presentation will delve into the challenges and opportunities associated with integrating co-curricular activities into science teacher education programs. The data collected facilitated the acquisition of valuable feedback, with participants responding positively and yielding encouraging results. Their responses and feedback to the

Reliability and Validity of Qualitative Data

The level of consistency exhibited by a tool or method of collecting data is known as reliability. On the other side, the quality of the data collection method that enables it to assess what it purports to measure is referred to as validity. Validity in this study is guaranteed by assuring congruence between the explanations provided for the occurrences and truthful responses by the respondents, as participants have more freedom to expound than survey respondents do. Validity and reliability in qualitative research are more closely related to internal validity, truthfulness, and trustworthiness than they are to survey reliability (Reid, 2006).

By using certain interviewing techniques, such as the requirement for reflective thinking to define my function as a researcher, I attempted to ensure reliability and integrity in this research. For example, the length of time allotted and the rapport between the interviewer and the interviewee affect the validity of the research's data collection (Rodrigues, 2010). Moreover, it is challenging to achieve reliability because every interview is unique (Conway *et al.*, 2009). The reserachers therefore prepared all of the interview questions in advance and practiced with a small group of professors and my classmates before the interviews. One-to-one semi-structured interviews were found to have the best level of

reliability (Conway *et al.*, 2009); for this reason, a one-to-one interview was chosen to maintain high reliability.

Sample and Location

Data collection was conducted personally by researchers throughout the university, ensuring a hands-on approach that guaranteed the accuracy and reliability of the gathered information. The process began with researchers identifying suitable participants, which included approximately 25 teachers and 25 students from a public university in the Punjab province. This selection ensured a diverse and representative sample, crucial for the study's validity. Participants must complete an informed consent form indicating their willingness to participate. This step includes their role, potential risks, and measures to protect their confidentiality. By signing the consent form, participants affirmed their voluntary participation and understanding of the study's scope. The data collection process, which lasted six weeks, involved multiple stages of interaction with the participants. Researchers conducted interviews, administered surveys, and facilitated focus group discussions as needed. I contacted the participants and informed them about my research. I contacted the participants and provided detailed information about the study, ensuring they fully understood its purpose and procedures. We mutually agreed on convenient times for our meetings to respect their schedules. During these meetings, each participant signed an informed consent form indicating their voluntary participation and understanding of the study. Participants said their data would remain confidential, not anyone outside the research team. This commitment to privacy helped build trust and encouraged candid responses. With their explicit permission, I recorded the interviews to ensure accuracy in data collection. Executed to uphold ethical standards, respect participants' rights, and ensure the integrity and reliability of the collected data. This approach underscored the importance of ethical conduct in research and the value placed on participants' privacy and consent.

Analysis of Qualitative Data

List of Themes and Sub Themes

SR. No	Main Theme	Sub Theme
Theme No. 1	Development of Soft Skills Through co-curricular Activities	• Enhancement of Communication Skills • Leadership and Teamwork
Theme No. 2	Co-curricular Activities Help Build Soft Skills	• Personal Development and Self-Discovery • Leadership and Collaboration
Theme No. 3	Evidence of co-curricular Activities Enhancing Soft Skills	• Empirical Studies on Skill Development • Comparative Analysis with Other Educational Methods
Theme No. 4	The Role of Co-curricular Activities in Education	• Enhancing Academic Learning • Promoting Personal Development
Theme No. 5	Examples of co-curricular Activities That Develop Soft Skills	• Communication and Presentation • Problem-Solving and Critical Thinking

Theme one: Development of Soft Skills Through Co-Curricular   Activities

Subtheme one: Enhancement of Communication Skills

Most participants agree that Co-curricular   activities enhance communication skills, including verbal and non-verbal communication, public speaking, and interpersonal talents, which are necessary for personal and experienced success. They have enough knowledge about co-curricular activities in developing student soft skills.

For example, one of the participants:

"I think that co-curricular activities have a profound impact on enhancing students' soft skills. These activities provide opportunities for students to develop communication, teamwork, supervision, problem-solving, and critical thinking skills, essential for their holistic growth and success in academic and professional spheres" (T1).

Few percipients stated that.

"I feel that co-curricular activities help students develop essential soft skills like communication, teamwork, and problem-solving, which are crucial for success in any field. These skills are beneficial not only in the academic sphere but also in the professional world and personal relationships." (T3)

It's clear from our research that the majority of participants agree that Co-curricular activities are most beneficial in enhancing communication skills, including verbal and non-verbal communication, public speaking, and interpersonal skills, which are essential for personal and professional success. By engaging in diverse activities outside the traditional classroom setting, students can significantly improve their ability to communicate effectively, thereby preparing them for various life challenges and opportunities.

One participant from the focus group stated that

"According to my idea co-curricular activities have been a game-changer for us in terms of developing our soft skills. We've learned so much more than just the technical skills from our courses" (FG3/15)

Subtheme two: Leadership and Teamwork

This analysis highlights the significant impact of Co-curricular activities on students' soft skills, particularly leadership and teamwork. It highlights how participation in sports teams, student government, clubs, and community service enhance their abilities.

For example, one of the participants:

"I feel that co-curricular activities help the students highlight their remarkable activities. They enhance the teamwork experience and foster the students' confidence". (T2)

This response indicates that co-curricular activities enhance communication skills and provide practical and engaging platforms for students to develop essential soft skills. Compared to traditional classroom instruction, online learning, and workshops, Co-curricular activities offer continuous, interactive, and real-world opportunities for students to practice and improve their communication abilities. These activities complement academic learning and prepare students for personal and professional success by fostering critical soft skills.

Another participant stated that:

"According to my idea co-curricular activities help students develop soft skills like teamwork, communication, and problem-solving. These skills are crucial for success in both academics and professional lives." (T5)

This *response* indicates that co-curricular activities are vital in helping students develop essential soft skills such as teamwork, communication, and problem-solving. These activities extend learning beyond the traditional classroom, providing practical experiences that foster interpersonal and cognitive abilities. For example, experience in team sports or group projects teaches students the importance of collaboration, mutual support, and collective effort, which are fundamental aspects of teamwork. Similarly, engaging in debate clubs, drama, or public speaking events enhances students' verbal and non-verbal contact skills, enabling them to articulate their opinions clearly and confidently. These soft skills are essential for academic success, where collaboration and effective communication can lead to better task results and a deeper understanding of the subject matter. Still, they are also indispensable in professional life.

There is one response from the focus group.

"My view is that co-curricular activities have helped me develop my time management skills, prioritizing tasks and balancing academic responsibilities with extracurricular commitments." (FG5/25).

This response indicates that the student compares co-curricular activities, which have enhanced my time management skills by teaching me to prioritize tasks and balance academic responsibilities with extracurricular activities. Involves careful planning and scheduling, ensuring academic performance isn't compromised. It has improved my organization, discipline, stress handling, and work-life balance, making it essential in educational and professional settings. Another participant from the focus group stated:

"I think that as a student, leading a team in our university club taught me effective communication, delegation, and problem-solving skills, essential for success in any profession" (FG4/17).

Theme Two: Co-curricular Activities Help Build Soft Skills

The data indicates that co-curricular activities enhance students' soft skills by involving them in additional duties, such as clubs, sports teams, and resident service. These experiences develop essential skills like communication, teamwork, leadership, and time management, preparing students for future academic and professional endeavors.

Subtheme one: Personal Development and Self-Discovery

"According to me co-curricular dupes provide an outlet for trainees to develop their emotional intelligence, empathy, and conflict-resolution skills, making them more well-rounded individuals" (T1).

Co-curricular activities help students develop emotional intelligence, empathy, and conflict-resolution skills, making them more well-rounded. Engaging in community service, peer mentoring, and group projects fosters empathy and helps students appreciate different perspectives. Team-based activities help students navigate conflicts, improving relationships and

communication. These activities enhance academic and professional competencies and equip students with emotional and social skills.

Another participant stated that:

"I think that co-curricular activities, students learn important soft skills like critical thinking, creativity, and collaboration, which prepare them for the workforce and life beyond academics". (T5)

This response indicates that Co-curricular activities teach students critical thinking, creativity, and collaboration, preparing them for the workforce and life beyond academics. Activities like debate clubs, arts and crafts, science fairs, and team sports encourage innovative problem-solving and teamwork. These skills improve communication and collaboration, preparing students for the modern workforce and various life situations.

Participants from the focus group stated that

"It seems to me that planning curriculum, delivering lessons, managing student, behavior assessing, learning outcomes and championing each child's academic and personal growth" (FG1/11)

Subtheme Two: Leadership and Collaboration

The collected data showed that most participants think that Co-curricular activities help build soft skills by involving students in various additional duties that contribute to the academic community and ensure the smooth functioning of the institution. These activities provide practical experiences where students can develop essential communication, teamwork, leadership, and time management skills.

For example, one of the participants stated:

"I think that involvement in sports teams, group projects, and student organizations fosters teamwork, teaching students to work collaboratively towards common goals". (T6)

Hence, This response indicates that Participation in sports teams, group projects, and student organizations fosters teamwork and collaboration. These activities teach students the value of cooperation, mutual support, and communication. They also encourage creativity and innovation through collective brainstorming and problem-solving. Student organizations provide platforms for planning events, managing resources, and executing initiatives as a team. These experiences prepare students for real-world scenarios where teamwork is critical, building strong interpersonal relationships and a sense of community.

My point of view co-curricular activities allows individuals to express themselves and develop verbal and non-verbal communication skills. Many Co-curricular activities offer leadership roles, helping individuals develop leadership mastery, such as decision-making and problem-solving. (T7)

This response indicates that Co-curricular activities offer students opportunities to express themselves, develop verbal and non-verbal communication skills, and develop leadership skills. Activities like debate clubs, drama, and public speaking events help students express their thoughts and ideas effectively. Creative arts and music clubs also help students' express emotions and ideas without words. Leadership roles like team captain, club president, and event coordinator sharpen decision-making and problem-solving abilities, allowing students to evaluate situations, consider different perspectives, and build cohesive teams.

Participants from the focus group stated that:

"I think that many co-curricular activities involve presenting ideas or performing in front of an audience, developing public speaking and presentation skills.". (FG5/24)

Many Co-curricular activities require students to present their ideas or perform in front of an audience, fostering the development of public speaking and presentation skills. These experiences help students gain confidence, learn to

articulate their thoughts clearly and engage effectively with their audience. For instance, participating in debate clubs, drama productions, or science fairs involves significant preparation and presentation practice, which enhances verbal and non-verbal communication skills. Moreover, these activities often include feedback from peers and mentors, allowing students to refine their techniques and build resilience. Such skills are invaluable for academic success and future professional endeavors.

Theme Three: Evidence of Co-Curricular Activities Enhancing Soft Skills

The collected information highlighted the significant role that co-curricular activities play in enhancing soft skills. By providing practical, hands-on experiences, these activities prepare students for academic success and professional excellence, contributing to their overall personal development.

Subtheme one: Empirical Studies on Skill Development

The collected information appeared that most members think that comparative analysis explores the impact of co-curricular activities on soft skills development, particularly communication, teamwork, and leadership, compared to traditional educational methods like classroom instruction and online learning.

For example, one of the participants stated:

"*Many studies have delivered evidence of the significance of co-curricular activities in enhancing students' soft skills. Research findings consistently demonstrate positive correlations between participation in Co-curricular activities and improved communication abilities, leadership qualities, teamwork skills, and overall personal development.*" (T1)

This response indicates that the positive correlations between participation in Co-curricular activities and improvements in soft skills are well-documented and widely recognized. By offering practical, hands-on experiences that complement academic learning, Co-curricular   activities play a crucial role in

shaping well-rounded individuals with the essential skills needed for success in both personal and professional realms. Another participant stated that:

"Research findings consistently demonstrate positive correlations between participation in Co-curricular activities and improved communication abilities, leadership qualities, teamwork skills, and overall personal development". (T6)

This response indicates that co-curricular activities play a significant role in developing leadership and collaboration skills. These activities provide a dynamic environment where students can practice and refine these essential skills, preparing them for future challenges and opportunities in their academic and professional lives. Participants from the focus group stated that:

Researchers have indicated a strong relationship between Co-curricular activities and skills development. The more a person finds or observes, the more he learns. (FG5/25)

This response indicates that participation in co-curricular activities significantly contributes to developing essential skills like communication, leadership, teamwork, and problem-solving. These hands-on learning experiences enhance understanding and capabilities. Participation in sports, clubs, and student organizations enhances personal and professional growth, preparing students for future career challenges and making them well-rounded and adaptable individuals. Another participant stated that:

According to *co-curricular activities, such as project competitions and hackathons, help students develop technical and soft skills like problem-solving, communication, and teamwork. These skills are essential for engineers to succeed in industry. (T10)*

Co-curricular activities like project competitions and hackathons challenge participants to address real-world problems, fostering advanced problem-solving skills and innovative thinking. Additionally, they provide opportunities to work collaboratively in teams, which hone teamwork and communication skills.

Presenting their projects and solutions requires clear articulation and effective public speaking, further enhancing their communication prowess. Such experiences are precious for engineering students, as these skills are essential for success in the industry, where technical expertise must work well with others and convey ideas effectively.

Subtheme Two: Comparative Analysis with Other Educational Methods

The collected information showed that most members think that co-curricular activities offer distinct benefits for developing soft skills compared to traditional classroom instruction, online learning, and workshops/seminars, offering distinct advantages in enhancing these skills. For example, one of the participants stated:

"I think that the evidence suggests that co-curricular activities are a valuable component of a well-rounded education, providing students with essential soft skills that complement their academic learning and prepare them for future careers." (T5)

This response indicates that co-curricular activities, such as clubs, sports, arts, and volunteer work, are essential for a well-rounded education, providing students with practical experiences not typically covered in traditional academic settings.

Another participant stated that:

"I get any task relevant to my studies, and many things increase my knowledge. Apart from this, the person is also active, so in this sense, additional duty is perfect and adds to the experience" (T9).

This response indicates that engaging in study-related tasks has broadened my knowledge and academic experience. These tasks provide practical insights, real-world applications, and problem-solving, enhancing skills and expertise. Active involvement reinforces knowledge, contributes to personal growth, and provides hands-on experience, ultimately benefiting academic and professional development.

Theme Four: The Role of Co-Curricular Activities in Education

The collected information showed that most members think there are many difficulties during Co-curricular Activities in Education; some teachers and students believe that students' Co-curricular activities relax the mental level if the teacher cares about their health and hard duty can occur between family time.

Subtheme One: Enhancing Academic Learning

The collected data showed that most participants stated that Co-curricular activities enhance academic learning by providing practical experiences that complement and extend classroom instruction.

For example, one of the participants stated:

"My view is that as curricular activities in all aspects of life, they also positively impact the spirit of teamwork. It fosters time management in students, one of their most valuable educational skills. It also develops patience, spirit, and determination in a student." (T3)

This response indicates that Co-curricular activities are beneficial in various aspects of life and have a notable positive impact on students' education. These activities significantly enhance teamwork as students collaborate on projects, sports teams, and organizational roles, learning to work effectively with others towards common goals. This collaborative experience improves their ability to function as part of a team and fosters a sense of camaraderie and mutual support.

A participant stated that:

"I think that co-curricular movements allow students to explore their curiosities and passions, leading to a more fulfilling university experience." (T4)

This response indicates that Co-curricular activities provide students valuable opportunities to explore their interests and passions, significantly enriching their university experience. These activities, which range from sports and arts to student organizations and volunteer work, allow students to delve into areas

outside their core academic subjects. By hiring in activities they are interested in, students can discover new interests, invent talents, and produce a sense of purpose. Participants from the focus group stated that:

"Co-curricular activities foster creativity, innovation, and entrepreneurship, preparing students for a rapidly changing world." (FG1/14)

Co-curricular activities foster creativity, innovation, and entrepreneurship, preparing students for a rapidly changing world. These activities encourage students to consider beyond the box, research new ideas, and develop the skills to turn concepts into fact. Students gain practical experience in solving problems, collaborating with others, and navigating challenges by participating in various clubs, competitions, and hands-on projects. It enhances their educational learning and equips them with the adaptability and resilience needed to thrive in dynamic and fast-evolving industries. Consequently, students emerge better prepared to meet the demands of a constantly shifting global landscape.

Theme Five: Examples of Co-curricular Activities That Develop Soft Skills

The collected data showed that most participants said we can enhance our communication, critical thinking, and persuasion. Engaging in debates and public speaking requires students to articulate their ideas clearly, think on their feet, and present arguments convincingly. It improves their verbal communication skills and boosts their confidence in public speaking.

Subtheme One: Communication and Presentation

The collected data showed that many participants stated that co-curricular activities offer diverse opportunities for students to develop essential soft skills.

One of the participants stated:

"Co-curricular activities in science teacher education can encompass various initiatives, including organizing science fairs, conducting hands-on experiments, and leading environmental conservation projects with industry partners on

research projects. Each activity provides a unique platform for students to develop critical soft skills while deepening their understanding of scientific concepts." (T4)

This response indicates that science teacher education incorporates co-curricular activities to develop essential soft skills and enhance students' understanding of scientific concepts. These activities include organizing science fairs, conducting hands-on experiments, and leading environmental conservation projects. These activities deepen students' knowledge of scientific principles and equip them with critical soft skills for future roles as educators and professionals in science.

Participants from the focus group stated that:

"Examples of Co-curricular Activities That Develop Soft Skills are hackathons, which develop problem-solving, critical thinking, and collaboration skills." (FG1/11)

This response indicates that co-curricular activities foster essential soft skills like problem-solving, critical thinking, and collaboration. Participants work intensively to tackle complex challenges, often in teams. This immersive environment encourages critical thinking, creative strategies, and decision-making. Hackathons also enable effective communication, idea sharing, and problem-solving, preparing students for real-world scenarios requiring teamwork, critical analysis, and creative problem-solving.

Another participant stated that:

"Participation in academic clubs allows students to explore their interests deeply, work on group projects, and develop research and analytical skills through hands-on experiments and problem-solving activities". (T8)

Participation in academic clubs allows students to delve deeply into their interests, work on group projects, and develop research and analytical skills through hands-on experiments and problem-solving activities. These clubs provide an environment where students can collaborate with like-minded peers,

engage in stimulating discussions, and tackle challenging questions. Through practical experience and experimentation, they enhance their understanding of theoretical concepts, improve their critical thinking, and refine their ability to analyze data and draw conclusions. This immersive learning process enriches their academic knowledge and designs them for future educational and professional objectives. The enhancement of communication skills the data reveals that co-curricular activities, such as public speaking and interpersonal engagements, significantly improve communication skills, providing essential verbal and non-verbal practice.

Discussions

The findings of this study reveal a profound and multi-dimensional impact of co-curricular activities on the development of soft skills among science teacher education students at the university level. co-curricular activities are critical in complementing academic instruction and enhancing soft skills essential for professional success and personal growth. The data consistently underscores the Effectiveness of co-curricular activities in refining communication skills. Activities such as public speaking engagements, debate clubs, and interpersonal interactions in student organizations provide students with invaluable verbal and non-verbal communication practice. This practical experience is crucial as it allows students to develop proficiency in articulating ideas clearly and engaging effectively with diverse audiences. Participants' responses highlight that these experiences are instrumental in preparing students for professional and academic communication complexities, boosting their confidence and competence in conveying ideas. As researchers have noted, soft skills contribute significantly to an individual's employability and success in the workplace (Dacre *et al.*, 2007; Robles, 2012)

Co-curricular   activities are also pivotal in fostering leadership and teamwork skills. Engagements in sports teams, student government, and community service projects create opportunities for students to practice collaboration, leadership, and

time management. These activities offer a platform for students to assume leadership roles, manage group dynamics, and work towards common goals. The real-world scenarios presented through these activities contribute to developing essential leadership qualities and the ability to function effectively within teams. Participants' feedback indicates that these experiences are instrumental in preparing students for future professional roles, where teamwork and leadership are crucial (Astin, 1999). The study highlights that co-curricular activities contribute significantly to personal development and emotional intelligence. Activities such as community service and peer mentoring provide opportunities for students to engage in self-discovery, empathy, and conflict resolution. These experiences help students develop a well-rounded character and enhance their ability to navigate interpersonal relationships. Participants' observations point to the role of these activities in fostering emotional resilience and social skills, which are vital for both personal and professional interactions (Pascarella & Teenzine, 1991).

The data reveals a strong consensus that Co-curricular activities significantly enhance communication skills. Participants noted that public speaking and interpersonal engagements are crucial for success in both personal and professional realms. These activities offer students essential practice in both verbal and non-verbal communication, preparing them to tackle diverse life challenges effectively. Focus group discussions further highlighted the transformative impact of co-curricular activities on students' communication abilities and confidence. Additionally, co-curricular activities foster leadership and teamwork skills. Participation in sports teams, student government, and community service improves students' teamwork, leadership, and confidence. These activities create practical platforms where students can develop and refine their abilities to collaborate and lead. Using these activities, students gain helpful experience managing group dynamics and working towards shared goals, which

are crucial for educational achievement and professional success. co-curricular activities enhance communication and build essential leadership and teamwork skills, contributing to well-rounded personal and professional development.

Co-curricular   activities are vital in personal development, emotional intelligence, and conflict resolution. Activities like community service and peer mentoring provide students with opportunities for self-discovery and foster empathy. These experiences help students understand and navigate interpersonal conflicts, leading to a more well-rounded character. Participants in the study highlighted how such activities contribute to developing emotional intelligence, which is crucial for building meaningful relationships and resolving conflicts effectively.

Furthermore, the data indicates that co-curricular activities enhance leadership and collaboration skills. Involvement in various roles within sports teams, student organizations, and project groups helps students cultivate essential skills such as teamwork, leadership, and time management. These activities offer practical experiences where students can learn to work collaboratively towards shared goals and improve their problem-solving capabilities. By participating in diverse roles, students gain valuable insights into managing group dynamics and leading effectively; co-curricular   activities are instrumental in developing well-rounded individuals with the skills necessary for effective leadership and collaboration.

Empirical evidence supports the positive impact of co-curricular activities on soft skills development. Research consistently shows that participation in these activities correlates with communication, leadership, and teamwork improvements. The data reveals that co-curricular   activities offer distinct advantages over traditional educational methods, such as classroom instruction and online learning. These activities provide practical, hands-on experiences not typically covered in traditional settings, complementing academic learning and

preparing students for real-world challenges (Hattie *et al.*, 1997). The findings also indicate that co-curricular activities enhance academic learning by providing practical experiences that extend classroom instruction. Participants noted that these activities improve teamwork, time management, and determination. By exploring their interests and engaging in creative initiatives, students gain a deeper understanding of their academic subjects and develop a sense of purpose. This enrichment of the educational experience highlights the value of integrating co-curricular activities into the academic curriculum. The University can implement strategies such as establishing clear learning objectives for co-curricular activities, providing professional development and training for faculty and staff involved in their design and implementation, and integrating assessment and reflection into the activity design process (Smith & Brown, 2022).

The study identifies specific co-curricular activities, such as organizing science fairs, conducting experiments, and leading conservation projects, as effective in developing critical soft skills while deepening scientific understanding. Hackathons and academic clubs enhance problem-solving, critical thinking, and collaboration. These examples illustrate how co-curricular engagements provide practical experiences that complement and enrich academic learning, preparing students for future academic and professional challenges. Employers consistently highlight the value of soft skills, often placing them on par with technical skills in terms of importance.

The findings highlight the significant effectiveness of co-curricular activities in developing soft skills among science teacher education students. These activities offer practical, hands-on experiences that enhance communication, leadership, teamwork, emotional intelligence, and academic learning, thereby contributing to students' holistic development and preparing them for success in their future careers.

Conclusions and Recommendations

The findings of this qualitative research reveal a compelling truth co-curricular activity are not just supplementary to science education but fundamental to nurturing essential soft skills among students. These activities serve as a dynamic extension of the academic experience, offering invaluable opportunities for experiential learning that textbooks alone cannot provide. By engaging in diverse activities such as scientific clubs, research projects, and community service, students gain hands-on experience that enriches their academic knowledge. This practical involvement hones their abilities in teamwork, leadership, and effective communication skills that are indispensable in any professional setting. Unlike traditional classroom learning, these activities immerse students in real-world scenarios, challenging them to apply their knowledge in innovative ways and collaborate with peers from various disciplines.

For science students, who often focus intensively on technical subjects, co-curricular activities provide a well-rounded educational experience. By fostering these activities, educational institutions can ensure that their graduates are not only knowledgeable scientists but also effective communicators, collaborative team members, and innovative problem solvers. Majority of the participants agreed that universities can enhance the effectiveness of co-curricular activities in developing student soft skills. It will prepare students for future roles as science teachers and contribute to their overall

In essence, co-curricular activities are a vital ingredient in crafting well-rounded individuals who are prepared to face the multifaceted challenges of the modern professional world. They enhance the educational experience, preparing students to excel in both their technical fields and their interactions with others. Embracing and integrating these activities into science programs is not just beneficial but essential for cultivating the next generation of capable, versatile professionals. The following recommendations aim to optimize the effectiveness of

co-curricular activities of co-curricular activities on student engagement and learning and should developing a framework for effective implementation of co-curricular activities.

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