GRACE - NAAEE 2024 GLOBAL E-STEM INNOVATION AWARD PROJECT

POST-PROJECT SURVEY FINDINGS SUMMARY REPORT

Skardu, Pakistan
November 2025

PRATT & WHITNEY
E-STEM
AWARDS

naaee
North American Association for Environmental Educaiton

GRACE ASSOCIATION PAKISTAN

Contents

List of Abbreviations

E-STEAM	Environment, Science, Technology, Engineering, Arts, Mathematics
NAAEE	North American Association for Environmental Education
GRACE	Grassroots Association for Community Empowerment
NPO	Non-profit Organization
TMCS	The Management Consultancy Services
GPSC	GRACE Public School & College
PBL	Project Based Learning
GB	Gilgit-Baltistan

Partners

Executive Summary

The GRACE E-STEAM Initiative (Environment, Science, Technology, Engineering, Arts, and Mathematics), implemented during January 2024 to November 2025 under the Global E-STEM Innovation Award, introduced an innovative and context-responsive learning model for rural mountain communities in Skardu.

The project sought to empower teachers, engage students in inquiry-based and environmentally conscious learning, and strengthen family and community participation across GRACE Public School & College and The STEM School Skardu. By integrating climate education, STEM inquiry, digital literacy, creativity, and hands-on learning, the initiative created transformative shifts in both teaching quality and student outcomes.

Post-project surveys from 30 teachers, 569 students, and 350 parents reveal substantial improvements across key learning and teaching indicators. Teachers demonstrated stronger competencies in E-STEAM-integrated instruction, with 75% reporting improved ability to apply E-STEAM concepts and 80% adopting digital tools such as PhET, Canva, and GIS and other cellphone applications. Classroom practices reflected notable growth, including increased use of project-based learning, environmental themes, and low-cost hands-on activities that enhanced student engagement and curiosity.

Students showed equally remarkable progress. Understanding of E-STEAM concepts rose to 88%, with 69% completing STEM mini-projects such as solar energy, pre-warning system for natural

disasters, filtration systems, and recycling innovations. Environmental responsibility increased significantly, with 92% adopting eco-friendly behaviors. Digital skills improved sharply, and girls' STEM confidence and leadership participation rose to 78% and 86%, demonstrating meaningful gender transformation.

Parents also reported positive change, with 74% observing increased curiosity and 80% noting improved communication and confidence in their children. The project's establishment of a low-cost Makerspace, structured lesson plans, and monitoring tools ensured sustainability and long-term integration within school systems.

Challenges such as limited STEM materials, connectivity issues, and varied parental literacy persist, yet the project's successes affirm that high-impact, inclusive STEM education is achievable in low-resource settings. Overall, the GRACE E-STEAM model has proven scalable, sustainable, and aligned with SDGs 4, 5, and 13—offering a powerful blueprint for climate-responsive education in Pakistan's mountainous regions.

Introduction

The GRACE E-STEAM Initiative—implemented with support from the Global E-STEM Innovation Grant—was designed to empower teachers, students, parents, and community members across GRACE Public School & College and STEM School Skardu in the mountainous region of Gilgit-Baltistan, northern Pakistan.

Rooted in the principles of Environmental Education, STEM learning, digital literacy, entrepreneurship, and community engagement, the project sought to cultivate 21st-century skills and climate awareness among learners in underserved communities. Through hands-on activities, Makerspace innovation and inquiry-based teaching, students explored practical solutions to local environmental challenges while strengthening scientific and technological confidence, especially among girls.

To assess the overall effectiveness of the initiative, post-project surveys were conducted with teachers, students, parents, and key community stakeholders. The following report presents a consolidated summary of the project's impact, highlighting improvements in knowledge, skills, behaviors, and community participation, as well as areas identified for future enhancement.

Participants Profile

1. Survey Participants

1.1 Teachers Demographics (n=30)

S. #	Category	Sub-category	Numbers	% fo Lady Teachers
1	**Gender**	Female	22	73%
		Male	12	40%
2	**Age Group**	18 - 24	6	20%
		25 - 30	18	60%
		31-40	4	13%
		40+	2	7%
3	**Qualification**	Intermediate	5	17%
		Bechelors	5	17%
		Masters / M. Ed	19	63%
		Other / MS	1	3%
4	**School**	GRACE Public School & College	22	73%
		The STEM School	8	27%

1.2 Students Demographics (n=569)

S. #	Category	Sub-category	Numbers	% of Girls
1	**Gender**	Girls	312	55%
		Boys	255	45%
2	**Grade**	1 to 5	267	47%
		6 to 8	200	35%
		9 to 10	102	18%
4	**School**	GRACE Public School & College	535	94%
		The STEM School	34	6%

1.3 Parents Demographics (n=350)

S. #	Category	Sub-category	Numbers	% fo Lady Teachers
1	**Gender**	Mothers	245	70%
		Fathers	105	30%
2	**Education**	College/University	21	6%
		Secondary	65	19%
		Primary	40	11%
		No formal education	224	64%
3	**Occupation**	Household works / Farming	208	59%
		Self-employed	32	9%
		Govt/Private Jobs	59	17%
		Daily Wage Labor	51	15%
4	**School**	GRACE Public School & College	329	94%
		The STEM School	21	6%

Methodology

The post-project survey for the GRACE E-STEAM Initiative was conducted using a mixed-methods approach, combining both quantitative and qualitative data collection techniques to ensure a comprehensive and reliable assessment of project outcomes. The methodology followed established guidelines for educational program evaluation and was designed to ensure validity, reliability, and alignment with the project's objectives and expected results.

The pre-project survey questionnaire served as the primary model for designing the post-project tools, allowing for direct comparison of baseline and endline data. This ensured consistency in indicators, measurement scales, and thematic areas such as learning interest, environmental behavior, digital literacy, teacher competencies, and community engagement. The post-project questions were refined to make them accessible and understandable for all stakeholders, including teachers, students, parents, and community representatives.

GRACE used Microsoft Office Forms to administer the survey digitally, complemented by in-person data collection where internet access was limited. The GRACE Association engaged The Management Consultancy Services, a consultancy group in Skardu under supervision of GRACE senior management.They jointly coordinated the data collection process. A detailed orientation meeting was conducted with theTMCS team to clarify survey objectives, tools, ethical considerations, and protocols for accurate recording of responses.

Data were collected from 400 students, 30 teachers, and 350 parents, supplemented by qualitative interviews. Enumerators recorded open-ended feedback and observed behavioral indicators during school visits. This approach ensured deeper insights into project effectiveness, gaps, and participant experiences.

Overall, the methodology provided a robust foundation for assessing project achievements, identifying changes from baseline, and documenting the impact of the Global E-STEAM Award initiative in the target communities.

Key Survey Findings

2.1 Teacher Level Findings

2.1.1 Improvement in Teaching Skills (n=30)

S. #	Descriptions	Before (%)	After (%)	% of Improvement / Change
1	# of teachers reported improved confidence in integrating E-STEAM concepts into regular lessons.	48%	92%	**44%**
2	# of teachers use at least three digital tools introduced during the training (e.g., ChatGPT and other ai Apps, Canva, Kahoot, educational videos, Microsoft Office, Google forms).	16%	69%	**53%**
3	# teachers integrating environmental themes (climate change, recycling, biodiversity) into weekly teaching plans.	34%	78%	**44%**

2.1.2 Classroom Practice Change (n=30)

S. #	Descriptions	Before (%)	After (%)	% of Improvement / Change
1	# of teachers implementing project-based learning (PBL) at least twice during the project.	34%	60%	**26%**
2	# of teachers developing and used E-STEAM lesson plans as per school templates.	0%	70%	**70%**
3	# teachers conducting student experiments or hands-on activities in school at least once a week.	55%	77%	**22%**

2.1.3 Behavior & Mindsets Shift (n=30)

S. #	Descriptions	Before (%)	After (%)	% of Improvement / Change
1	# of teachers demonstrating stronger Environmental responsibility.	21%	94%	**73%**
2	# of teachers demonstrating stronger Confidence in facilitating inquiry-based learning	30%	82%	**52%**
3	# of teachers demonstrate stronger Belief in girls' participation in STEM	80%	100%	**20%**

2.2 Student Level Findings

2.2.1 Knowledge Gains (n=400)

S. #	Descriptions	Before (%)	After (%)	% of Improvement / Change	% Girl Students Improveed
1	# of students understood core E-STEAM/STEM/Basic Science/ Computer concepts better than before (e.g., renewable energy, climate change, robotics basics, biodiversity)	35%	75%	**40%**	**60%**
2	# students able to explain how science connects to daily life and environmental issues.	15%	64%	**49%**	**70%**
3	# of students able to design or participate in a mini-project (solar car, water filtration, composting bins, weather station, recycling art).	25%	92%	**67%**	**64%**

2.2 2 Change in Attitude (n=400)

S. #	Descriptions	Before (%)	After (%)	% of Improvement / Change	% Girl Students Improveed
1	Positive environmental behaviors increased significantly, such as: **# of students have the sense/behavior for Tree care and plantation.**	0%	92%	**92%**	**80%**
2	Positive environmental behaviors increased significantly, such: **# of students having the sense/behavior of Reduced plastic use**	45%	60%	**15%**	**70%**
3	Positive environmental behaviors increased significantly, such as: **# of students having the sense/behavior in Water conservation**	55%	95%	**40%**	**90%**

2.2.3 Digital Skills Confidence (n=400)

S. #	Descriptions	Before (%)	After (%)	% of Improvement / Change	% Girl Students Improveed
1	# of students reported improved comfort using digital tools (tablets, mobile apps, computer lab, E-STEM Kit resources).	0%	60%	**60%**	**62%**
2	# of students using at least one or two digital tools independently (Kahoot, Gmail, MS Office, Canva, Google Earth etc.).	20%	80%	**60%**	**40%**

2.2 Student Level Findings

2.2.4 Girls Empowerment Indicators (n=312)

S. #	Descriptions	Before (%)	After (%)	% of Improvement / Change
1	# of girl students reported improved confidence in learning science and technology.	32%	78%	**46%**
2	# of girl students who felt E-STEAM activities helped them express creativity and leadership.	0%	86%	**86%**

2.3 Parents Level Findings

2.3.1 Awareness & Involvement (n=350)

S. #	Descriptions	Before* (%)	After (%)	% of Improvement / Change
1	# of parents reported improved confidence in learning science and computer, entrepreneurship, and other science subjects	0%	74%	**74%**
2	# of parents agreed the E-STEAM/STEM program improved their children's curiosity and learning habits of their children.	0%	80%	**80%**
3	# of parents who noticed their children discussing in any one or all of the topics: - environmental challenges - recycling - climate-related issues - home energy-saving practices	0%	62%	**62%**

2.3.2 Perceived Behavioral Change (n=350)

S. #	Descriptions	Before* (%)	After (%)	% of Improvement / Change
1	# of parents reported that their children were: More confident than before	0%	70%	**70%**
2	# of parents reported that their children were: More responsible at home	0%	72%	**72%**
3	# of parents reported that their children were: More interested in science & technology	0%	80%	**80%**

*Parents data didn't collect in the baseline

Major Outcomes Achieved

Outcome 1: Teachers Gained Skills in E-STEM Pedagogy

- 30 teachers trained (target: 20)
- Strong adoption of E-STEAM lesson plans
- Increased female teachers' leadership in STEM activities
- Use of online resources and artificial intelligence in lesson planning

Outcome 2: Students Gain 21st-Century Skills

- 569 students benefitted (target: 300)
- High engagement in project-based learning (PBL)
- Strong environmental awareness indicators
- Girls' confidence increased significantly

Outcome 3: Community & Parental Engagement*

- 1500+ community members reached (target: 1000)
- 350 parents (70%) mothers participated in the E-STEAM project related different meetings during the year.
- High engagement in project-based learning (PBL)
- Strong environmental awareness indicators
- Girls' confidence increased significantly

Outcome 4: Schools Adopt Sustainable E-STEM Model

Sustainability model adopted

- **Makerspace** established and introduced low-cost model
- Digital tools embedded in MER systems
- Teachers ready for continued implementation with minimal additional resources

* School records data

Challenges

Category	Challenges Identified
Resources	Lack of STEM kits
Teachers Capacity	Need for regular coaching, observation, and refresher training for teachers
Digital Access	Internet issues, limited devices
Curriculum & Time	Heavy workload, insufficient time for Project Based Learning
Parental Engagement	Fathers participation need improve
Inclusion	An elevator needs observed for students with physical disability for upper floor classes.
Scalability	Multi-school projects and resources required for scalability
Documentation	Need digital M&E and LMS
Showcasing Opportunities	Students demanded more competition and exhibition opportunities
Financial Sustainability	Need for local partnerships & long-term funding

Recommendations

For Sustainability

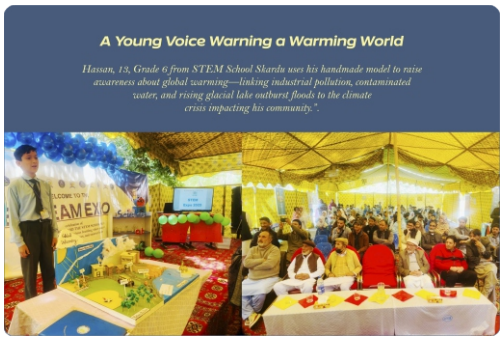
1. Monthly E-STEAM Coaching Circles for teachers
2. Quarterly E-STEAM Section Meeting with parents
3. Expand Makerspace with:

    - More tool kits
    - Low-cost robotics
    - Recycled-material-based science kits

4. StrengthenTechnology Access & Digital Learning
5. Integrate E-STEAM indicators into annual teacher performance evaluation
6. Work with donors and local government and partners to scale model in surrounding villages

For Scalability

- Develop a 12-Month E-STEAM Implementation Calendar
- Strengthen Some Teachers Capacity as E-STEAM Master Trainers
- Create a more and more “Low-Cost/No-Cost STEM Kits Bank in Makespace
- Strengthen GRACE School Monitoring, Evaluation and Learning (MEL) Systems
- Encourage teachers develop Student Portfolio System compiling their mini-projects, photos/videos, learning reflections making them easier to track learning as project expands to more and more schools.
- Build partnerships for scaling up building collaborations with local, national and international organizations.



STEM School Girls showcasing their created models in STEM Expo, Sep 2025

Parents Teachers Meeting, GRACE Public School Skardu, September 2025

Summary and Conclusion

The survey findings strongly reaffirm the transformative impact of the GRACE E-STEAM Program and offer a clear roadmap for deepening its reach across rural and marginalized communities. Feedback from students, teachers, and parents demonstrates a consistent and powerful shift in learning attitudes, environmental awareness, and confidence among children. A significant 80% of teachers report heightened curiosity among students; 74% of parents now understand the E-STEAM concept; 80% observe increased interest in STEM-related discussions at home; and 72% note improved responsibility and confidence in their children. These insights confirm that the program is effectively nurturing environmentally conscious, creative, and confident young thinkers, particularly girls and underserved rural youth.

Teacher feedback highlights strong motivation and readiness for professional growth, while also signaling the need for structured training, resource-rich classrooms, and more hands-on, project-based learning activities. Students express strong enthusiasm for environmental protection, climate action, and experiential learning. Parents report a growing culture of inquiry at home, with children increasingly initiating conversations about pollution, climate change, and sustainability, an encouraging sign of community-level behavioral change.

These insights collectively provide a solid baseline for strengthening teacher capacity, tracking progress, and measuring long-term outcomes. They further establish the GRACE E-STEAM model as a credible, inclusive, and context-responsive approach to environmental and STEM education in mountain regions.

To amplify project success and community awareness, local print and electronic media were engaged throughout implementation. Coverage in Skardu, Gilgit-Baltistan, significantly boosted visibility, with Skardu TV's outreach alone reaching 181,000 viewers, generating 6,400 positive reactions, and hundreds of encouraging comments.

The evidence is compelling: with support from the Pratt & Whitney Global E-STEAM Innovation Award, the GRACE E-STEAM Program has set a strong precedent for scalable, high-impact learning. Continued partnerships will enable expansion to thousands more children who lack quality STEM opportunities, empowering rural teachers and equipping the next generation—especially girls—to lead sustainable change across Pakistan and beyond.

Annexure

ANNEX 1: SUCCESS STORIES

1.1 Teacher Stories

Igniting Creativity: Hajira Maryam's Journey into E-STEM

Hajira Maryam, an Early Childhood Development teacher at GRACE Public School & College Skardu, entered the E-STEAM with curiosity but limited exposure to STEM-based teaching. Over three days, and after the E-STEM teachers' training her perspective transformed completely. She learned how the 4Cs—creativity, critical thinking, communication, and collaboration—could be nurtured through simple, low-cost DIY projects made from recycled materials. The training introduced her to entrepreneurship for early-grade learners, emphasizing resilience, self-reliance, and growth mindset. She also explored videos, smart worksheets, games, and interactive tools to deepen student engagement.

Another breakthrough for Hajira was understanding environmental sustainability—recycling, energy saving, water protection—and the role teachers play in shaping responsible young citizens. The GIS session opened a new world of spatial learning, encouraging her to integrate maps and digital tools in everyday teaching. After the workshop, Hajira redesigned her classroom environment, adding STEM corners, recycling baskets, and experimental stations. Her young students now participate eagerly, create models, and express ideas confidently.

For Hajira, E-STEM has become more than training—it has become a philosophy of teaching. She now leads with innovation, environmental responsibility, and child-centered learning, inspiring her students to imagine a brighter, sustainable future.

1.2 Teacher Stories

From Knowledge to Practice: Syeda Zarina's Classroom Transformation

Syeda Zarina, a science teacher at GRACE Public School Skardu, experienced a major shift in teaching philosophy after participating in the E-STEM program activities. The workshop and several other events introduced her to STEM-based critical thinking, entrepreneurship, GIS applications, and environmental responsibility. She discovered how combining digital tools with hands-on activities could turn ordinary lessons into interactive experiences that spark curiosity.

Inspired by these insights, Zarina redesigned her teaching methods. Using the classroom LED screen, she now shows short documentaries on marine life, wildlife, and environmental ecosystems, followed by student-led discussions and creative projects. Her students build models, create posters, and conduct mini experiments, reinforcing concepts through visual and practical engagement.

Through this program activities and training also helped her recognize the importance of linking lessons with real-world challenges. Recycling, plantation, conservation, and eco-friendly habits became recurring themes in her sessions. Students now understand not only scientific facts but also their environmental responsibilities.

Zarina's classroom has evolved into a space where learning is exciting, purposeful, and creativity-driven. Her students have become active participants, asking questions, presenting their ideas, and collaborating on group tasks. Through E-STEM, she has cultivated a generation of learners who think critically and act responsibly.

1.3 Teacher Stories

From Training to Field Action: Waseem's Student Empowerment Initiative

E-STEM program for Muhammad Waseem, science teacher GPSC became catalyst for bringing learning beyond classroom walls. The program focused on modern teaching methods, STEM integration, environmental literacy, and the use of digital tools to connect concepts with real-life challenges. Inspired by these, Waseem designed an experiential learning activity to reinforce environmental education.

He led a study tour of several grade students to Katpana Lake to strengthen their understanding of climate change, pollution, and conservation. At the site, students analyzed environmental conditions, discussed human impacts on local ecosystems, and initiated a voluntary clean-up activity. Their enthusiasm was remarkable—students cleaned a portion of the lake area and delivered heartfelt messages about protecting natural heritage.

The field activity transformed classroom theory into personal responsibility. Students returned with a deeper understanding of environmental stewardship, proudly sharing reflections on their role as responsible citizens.

Waseem's initiative showcases the power of E-STEM: learning that inspires action. His approach strengthened students' connection to nature and highlighted the importance of caring for community assets. He continues to integrate hands-on learning and environmental awareness in his science classes.

1.4 Teacher Stories

Environmental Science in Action: Gulshan's Learning Revolution

Gulshan, an energetic teacher at the STEM School Skardu, has been teaching science through textbooks—climate change, pollution, conservation—but sensed that students lacked emotional connection to their environment. After E-STEAM program training sessions, she transformed her entire approach. Instead of teaching about the environment, she began teaching through the environment.

Her classroom shifted into an exploratory lab. Students tested water quality from nearby sources, measured temperature differences around the school to study urban heat, and calculated their own carbon footprints. Suddenly, environmental science became personal. Students who once memorized definitions now investigated real issues affecting their families and community.

A breakthrough moment came when a quiet student designed a simple rooftop rainwater collection model, explaining how it could reduce tanker dependency. This idea reflected not only understanding but empowered thinking—precisely what E-STEAM aims to cultivate.

Gulshan's students now take initiative: planting trees, reducing waste, and proposing practical solutions. They no longer ask, "What is climate change?" but "What can we do to help?" Her journey shows how experiential learning can transform young minds into environmental guardians.

ANNEX 2: STUDENTS SUCCESS STORIES

2.1 Students Stories

Building a Sustainable World from Recyclables: By Shahzaib, Grade 3, GRACE School Skardu

Through the GRACE E-STEAM program, I built an eco-friendly ecosystem model using only recyclable materials such as matchsticks and empty cooking-oil cartons from home. I wanted to show how everyday waste can be transformed into something meaningful with creativity and care. As I worked on my prototype, I realized how small actions—like recycling and reusing—can protect our environment. This project changed the way I look at household waste and taught me the importance of responsible resource use. What began as a simple class activity became a lesson in sustainability, innovation, and hope. Today, I proudly share my model with my classmates, encouraging them to think creatively and reduce waste in their daily lives.

2.2 Students Stories

Becoming a Voice for Climate Awareness: By Wajiha Bano, Grade 7, GRACE School Skardu

My E-STEAM journey empowered me to raise awareness about climate change in my community. I created a presentation highlighting how rising temperatures, deforestation, and water pollution impact life in Gilgit-Baltistan.To reach more students, I designed posters with simple messages on saving water, planting trees, and reducing plastic use. When I presented my work, many classmates felt inspired and started discussing environmental issues for the first time. This experience taught me that knowledge is powerful—and that even a student can influence positive change. I now feel confident speaking up for the environment and motivating others to act responsibly.Through E-STEAM, I found my voice, and I plan to keep using it for the planet.

2.3 Students Stories

Leading My School Toward Zero-Waste: By Madiha Zahra, Grade 7, GRACE School Skardu

E-STEAM inspired me to start a zero-waste movement in my school. With a small group of friends, I encouraged students to avoid single-use plastics and switch to reusable bottles and lunch containers. We planted trees on the school grounds and even reused old plastic bottles as pots for small plants. I conducted a classroom talk on sustainable habits, and I was amazed to see younger students adopting the ideas quickly. Leading this project helped me gain confidence, responsibility, and leadership skills. It also made me realize that real change begins with simple daily choices. I am proud that our campaign is reducing waste in our school and motivating others to protect our environment—I urge to take one step at a time.

2.4 Students Stories

Lighting Homes with Sunlight in a Jar: By Mujtaba Ali, Grade 6, STEM School Skardu

The E-STEAM program helped me understand the power of renewable energy in a way I never imagined. After a winter power outage left my house in darkness, I wanted to find a solution. With guidance from my teacher, I learned to build a solar lantern using a glass jar, a small solar panel, and a recycled LED light. My team gathered old jars, assembled the parts, and after several attempts, our solar jar finally lit up—powered entirely by sunlight. I took it home, and my parents were amazed. Soon, neighbors began asking for help in making their own. Now, I assist families in our village to create solar jars for emergencies. This project taught me that even young students can innovate practical solutions for their communities. I love science.

2.5 Students Stories

Flood Detector to Project Community: By Madiha, Grade 8 – GRACE School Skardu

Living in a region repeatedly struck by Glacial Lake Outburst Floods (GLOFs), Madiha had seen fear, loss, and destruction far too close during the last few years. Homes were washed away, roads disappeared, and families struggled to rebuild after every unexpected flood. What troubled us most was the absence of any early warning system that could alert the community before disaster struck. Mouth whistling is the only warning system in our community. Motivated by this gap, I teamed up with her classmates through the GRACE E-STEAM Program to design an innovative Flood Detector, a simple, low-cost device that detects flooding and triggers an alarm.

Our project will become a symbol of local innovations by students. I am thankful to our teachers, classmates, and community elders for appreciating our skills in science, creativity, and compassion used to solve a real local problem. Madiha's innovation shows how empowered girls can transform challenges into solutions—protecting lives and inspiring others to think boldly for their communities.

3. Parents & Community Feedbacks

Feedbacks Summary

During the GRACE and STEM Schools' Parents–Teachers Meetings, the E-STEAM section, STEM Expo, and DIY learning initiatives received overwhelmingly positive appreciation from parents and community members. Many parents shared that the introduction of E-STEAM has brought a visible change in their children's learning habits. They expressed that students now show more curiosity, talk about scientific ideas at home, and take greater interest in practical activities rather than relying only on memorization. Parents from Astana, Brolmo, Kharmang, and Bagardu mentioned that their children discuss STEM kits, DIY projects, and school experiments with excitement, which shows how learning has become more meaningful and enjoyable.

Several parents highlighted that the STEM Expo helped families understand the creativity and confidence of children. They appreciated that students, even from early grades, were able to present their projects with clarity. According to them, the Expo was an eye-opening experience, displaying the hard work of teachers and the talent of students. Many parents said that such events help build children's confidence and strengthen the connection between school and community.

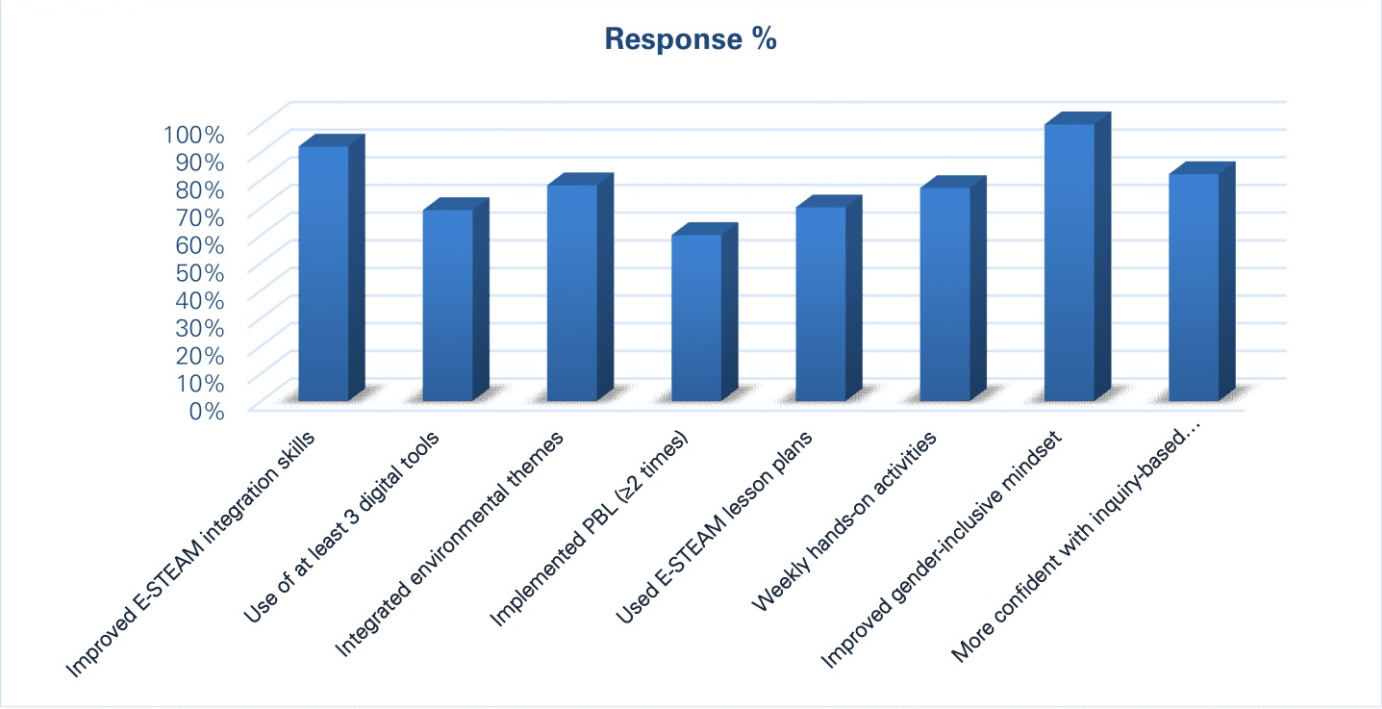
Parents also praised the E-STEM learning materials, especially STEM Kits, videos and worksheets, saying these helped children continue learning during sick days or at home. They considered the digital and DIY resources very supportive for revision. They also noted that PTMs were helpful and well-structured, enabling teachers to explain progress clearly and listen to parents' concerns with respect.

Along with appreciation, parents offered constructive suggestions. Many recommended organizing more weekend learning activities, science competitions, and math-based STEM sessions. Others requested more field trips, parent workshops, and opportunities for younger children to engage in hands-on learning. A few parents also suggested that regular feedback should continue so that families can better support their children at home.
Overall, parents expressed deep satisfaction with the school's efforts, describing GRACE and STEM Schools as progressive institutions that are nurturing creativity, confidence, and practical skills among children across Baltistan.

Overall Response Charts

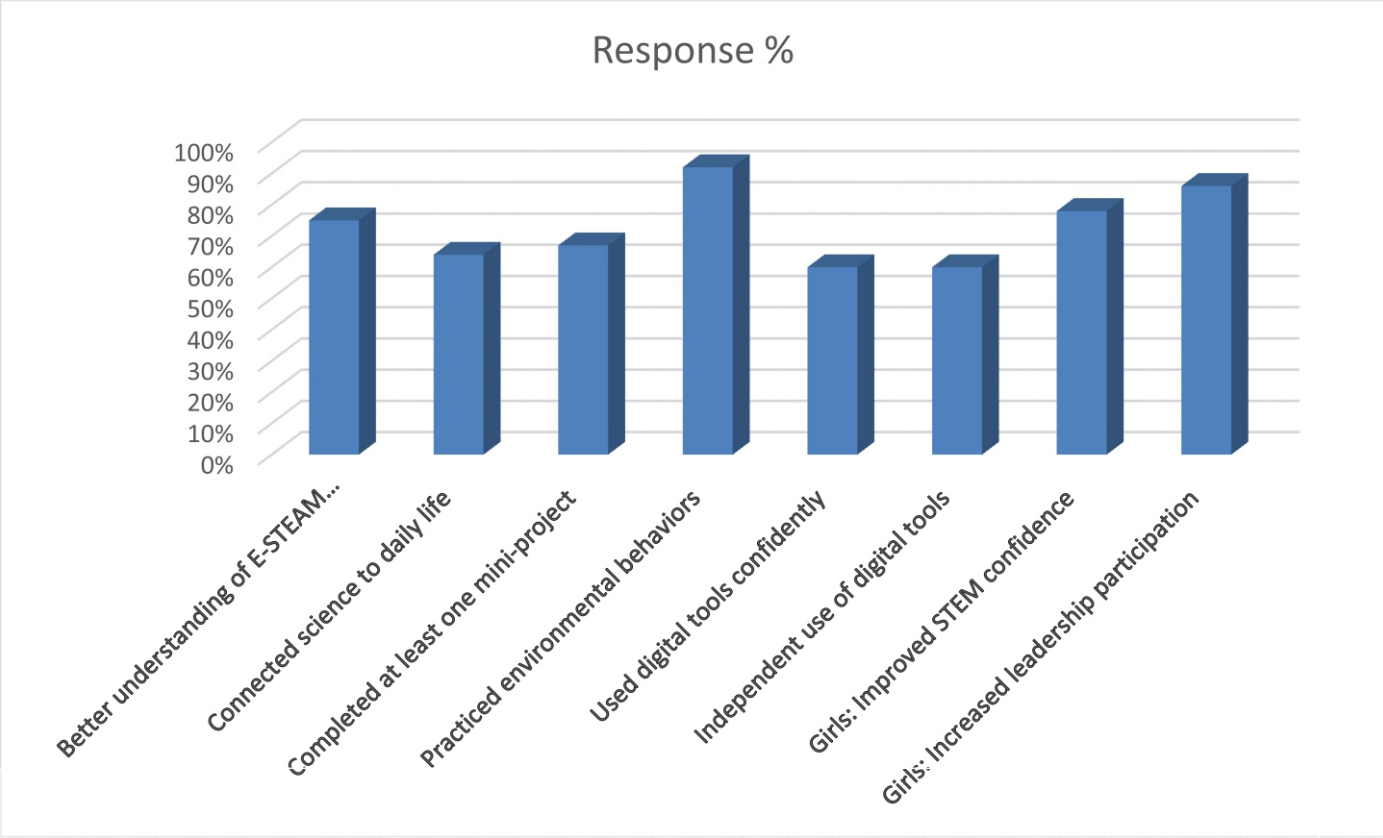
3. E-STEM Overall Response Percentage (%) Charts

3.1 Teachers E-STEM Pedagogical Skills (n=30)



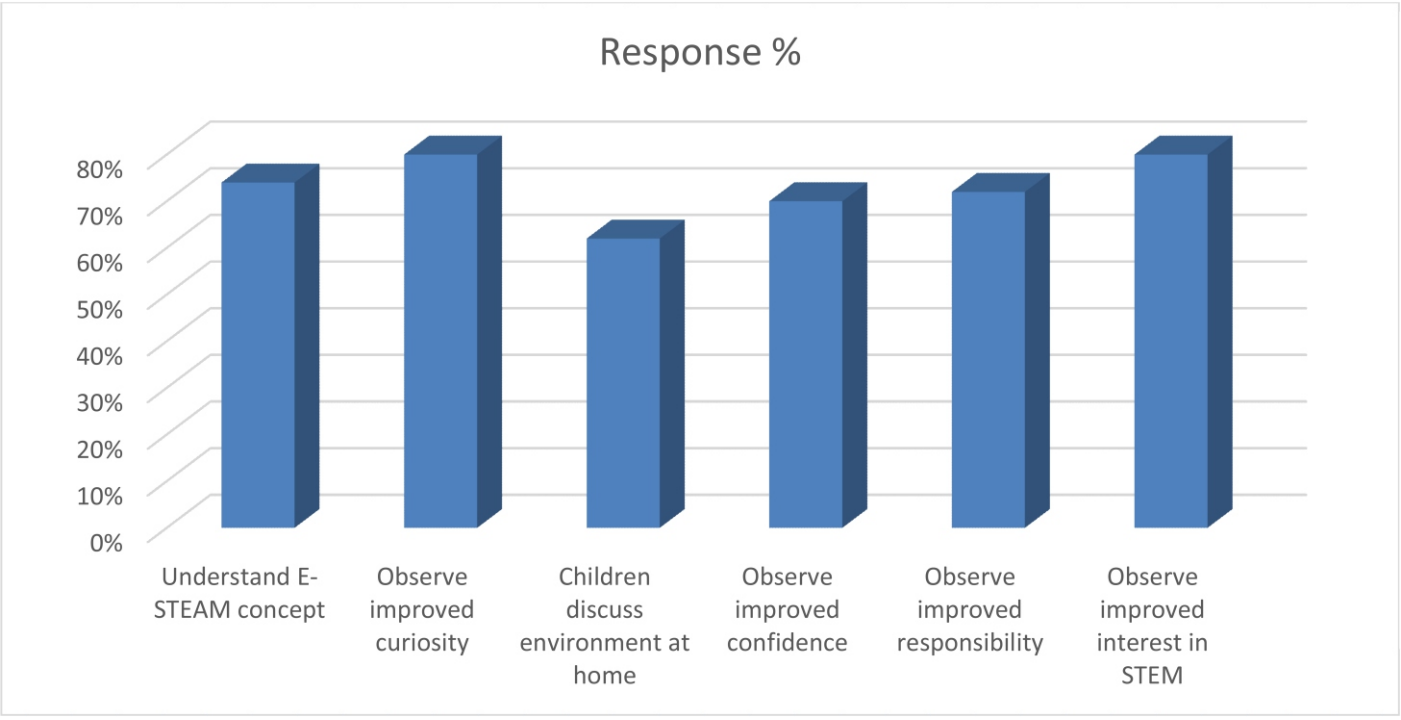
The survey results reflect strong pedagogical growth among teachers. A remarkable 92% report improved E-STEAM integration, supported by increased use of digital tools (69%) and structured lesson plans (70%). Environmental themes (78%) and weekly hands-on activities (77%) show that experiential, real-world learning has become routine. Although 60% implemented project-based learning twice or more, this remains an area for deeper reinforcement. Notably, gender-inclusive mindsets reached 100%, indicating powerful attitudinal transformation. Overall, teachers demonstrate strengthened inquiry-based, technology-supported, and inclusive E-STEAM pedagogy—laying a solid foundation for innovative, student-centered learning across GRACE and STEM schools.

3.2 Students E-STEM Pedagogical Skills (n=569)



The data shows strong early outcomes of the GRACE E-STEAM Project. Students demonstrate solid conceptual understanding of E-STEAM (75%) and are beginning to apply scientific thinking to real life (64%). Hands-on learning is taking root, with 67% completing at least one mini-project. Environmental awareness is exceptionally high (92%), indicating a major behavioral shift. Digital literacy remains moderate (60%), suggesting an area for further support, especially for independent use. Notably, girls show significant growth, with 78% reporting increased STEM confidence and 86% stepping into leadership roles—highlighting the project's impact on gender empowerment and inclusive participation.

3.3 Parents Involvement & Observations (n=350)



Parents' feedback shows strong positive outcomes of the GRACE E-STEAM Initiative. Most parents (74%) now understand the E-STEAM concept, indicating effective awareness-building. They observe notable improvements in their children's curiosity (80%), confidence (70%), sense of responsibility (72%), and interest in STEM subjects (80%). Importantly, 62% report that children are increasingly discussing environmental issues at home, reflecting meaningful knowledge transfer beyond the classroom. Overall, these results highlight strengthened parental engagement and significant growth in students' attitudes, behaviours, and awareness—demonstrating that the E-STEAM approach is fostering holistic learning both in school and at home.

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