VASCSC Activity Outreach 2020-21

- Students: ~160000
- Teachers: ~8000
- Schools: ~7000
- States covered: 17
The Joy of Science
Innovative Programmes and Material for Science Education

Annual Report
2020-21
Chairman's Message

I am happy to know that Vikram A Sarabhai Community Science Centre has continued the efforts to make quality science learning accessible for children with full fervour, even in the midst of COVID-19 pandemic. The Centre has adapted itself in today’s context and remodeled its programme methodology; providing innovative STEM learning online and reaching out to students and teachers all over the country.

The Centre has successfully sustained its programmes through innovative measures despite the lockdown. Online sessions supported with material sent to the child’s location, ensured that they did not miss out on hands-on learning experience. It is good to note that programmes such as School Science Forum, Mobile Science Laboratory, VASCSC Science School and teachers training workshops conducted in such manner, were well-received by the participants.

In light of the National Education Policy 2020, VASCSC can play a crucial part in facilitation of nation-wide implementation of the Policy recommendations. Since its beginning, the Centre's activities have been designed around providing hands-on experiential learning opportunity to children; thereby stimulating their interest and developing understanding of fundamentals of science. The NEP 2020 highlights the importance of experiential learning and VASCSC can contribute greatly towards making high quality STEM education accessible to all.

The ever-growing advancements in science and technology will create many STEM-related jobs in the coming years. Thus, a strong foundation in STEM is essential for the students to become future-ready. STEM education encourages children to think outside the box and apply their knowledge to develop creative solutions for real world problems. It helps build core skills like critical thinking, collaboration, experimentation, problem solving and independent learning. Over the past few years, VASCSC has made a shift towards promoting emerging technologies such as Artificial Intelligence, Machine Learning, Internet of Things, Smart Automation, App Development, Coding, 3D Designing & Printing. The Centre has proved itself as a leading organization to promote STEM education and innovation.

The teachers training workshops for government school teachers were a good endeavor for their professional development, while making effective use of their time when schools were closed due to pandemic. The Centre also worked intensively on development of Teaching Learning Material. A number of low-cost and easy to use teaching aids were created, which could be used by students at home or by teachers during online classes. This is an innovative solution for continuing learning. The closure of schools for a long time during the pandemic has created learning gaps among children. This loss of learning can be compensated by engaging them in interactive activities, to rekindle their interest and develop their understanding.

The Govt. and CSR supported projects implemented by VASCSC had successful outcomes in terms of both reach and participation. The continuity of such collaborations is important for sustaining the innovative and successful programmes. The outcome of the programmes should be documented and this learning be utilized for replication and scaling up of the activities. Possibilities of new partnerships and further collaborations should be explored to put VASCSC’s rich experience to greater use, especially at national level.

I would like to compliment the Director and the team for their zeal and outstanding work. I thank all the board members, project partners, students, teachers and well-wishers for their consistent support to the Centre and faith in its potential. The coming time will be challenging but also present opportunities for innovative and groundbreaking work in science education. I am confident that VASCSC will persevere in its efforts with the same focus and enthusiasm. My best wishes.

Dr. K. Kasturirangan
Chairman
Board of Governors, VASCSC
From the Director’s Desk

It gives me pleasure to present Vikram Sarabhai Community Science Centre’s Annual Report for 2020-21. The COVID-19 pandemic brought us many challenges in all spheres. We tried our best to bridge the learning gaps of students during the pandemic, by adapting our programmes to today’s scenario. The activities in the current year focused on reaching out, innovation and continuing of learning. The pandemic compelled students to learn from home. We had to remodel our program strategy and shift to online mode for most of our programmes. We put in our best efforts to provide opportunity for experiential learning to the students, even in the online mode; by strengthening the online sessions with hands-on activity ‘learning packs’ sent to the students at their location. We are happy that our efforts were appreciated by the students and teachers alike.

VASCSC made inroads into online STEM education with implementation of new programmes for children and teachers. This was a chance to widen our reach. VASCSC Science School, Interactive STEM Learning Modules, and Winter Programme were launched. We directed our attention towards increasing social media presence, and developing digital content such as STEM videos, during the lockdown period. We also undertook the task of creating awareness about the science of COVID-19 through social media. Posters were included with Vignan Drashiti to reach out to Gujarati speaking students. With support from NCSTC, DST, GoI we initiated project to develop resource material and conduct outreach programme in schools on science of COVID-19.

VASCSC received support from several partners for activities on innovation. The focus of Innovation Hub, supported by NCSM, Govt. of India, was on developing emerging technology skills. The partnership with IBM focused on strengthening the Atal Tinkering Labs (ATL) ecosystem through workshops on innovation and Artificial Intelligence. The partnership with Oracle was aimed at promoting innovation in science and mathematics education. The projects could continue successfully through online mode. We are thankful to HCL Foundation for supporting teachers training workshops across Gujarat. The pandemic timing was opportune as the school teachers could devote time for their professional development. The workshops were conducted in in-person mode, following the COVID-19 protocols. I extend my thanks to all the District Primary Education Officers for their appreciation and support towards successful implementation of the workshops, by way of granting permissions for in-person training, deputing the teachers, providing venue, amongst others.

The pandemic created a need to develop TLM which are low-cost, easy to use and convenient to transport; meant for use by for students for home learning, by teachers for online teaching and also by Centre’s team for use in own programmes. VASCSC developed many such templates for DIY science model-making. These have been in great demand since.

The restrictions of educational activities in in-person mode prompted a setback as School Visits, school practicals and projects could not be conducted. Summer Programme also had to be cancelled. However, the year-long School Science Forum (SSF) continued in online mode. SSF was all the more appreciated as it was possibly the only source of hands-on engagement for the students in the given circumstances. We are thankful to all the students and parents for their constant faith in us and continuing their learning at VASCSC.

I would like to extend my heartfelt gratitude to Dr. K. Kasturirangan, Chairman of VASCSC Board and all the Board Members for their invaluable support and continued guidance. I laud the efforts of the VASCSC team in continuing the Centre’s programmes and projects despite the various challenges posed by the pandemic. Most of all I am thankful to all our well-wishers, donors, project partners, teachers and students for encouraging us with their participation in our activities.

Dilip Surkar
Executive Director, VASCSC
Introduction

Vikram A Sarabhai Community Science Centre (VASCSC) is a pioneering Community Science Centre, founded in 1966 by India's renowned scientist, Dr. Vikram Sarabhai, to encourage scientific thinking and innovative science teaching.

VASCSC started as a facility where people concerned about quality of science education could come together to try out new ideas and methods for teaching Science. It originated as 'Group for Improvement of Science Education (GISE)' in 1963 from Physical Research Laboratory, Ahmedabad. It was initially called as 'Community Science Centre' but after Dr. Sarabhai's demise in 1971, it was renamed as 'Vikram A Sarabhai Community Science Centre', to associate its name with its Founder.

VASCSC’s mandate is to promote among students, teachers and public an understanding of fundamental concepts involved in science education; acquisition of scientific knowledge, insights as far as possible by the process of inquiry through experiment, audio-visual media and other means; the ability to solve problems; to stimulate interest in the principles of science and scientific method among students, by giving them the encouragement and exposure; to be concerned with the role of education and ways of improving science education, in relation to the individual and the community as a whole; and to help make clear the social implications of science and technology.

The core of its philosophy is to take school and college students out of the rigid framework of textbooks and encourage them to think, explore and create. Over the years, the Centre has combined formal and non-formal techniques of education to formulate many innovative methods to give students a better understanding of science and mathematics and make the process of learning enjoyable and long-lasting. VASCSC has pioneered several concepts including an interactive exhibition space, open laboratories, Mathematics Laboratory, Science Playground, active use of computers in science education and developing interactive educational programmes. Most of these are part of mainstream today.

The Centre’s focus on spreading the joy of science by reaching out to different segments of the community is well-illustrated by its logo. The five arrowheads in the logo represent groups namely teachers, students, research workers, administrators and the community while VASCSC is represented by ‘Delta’, the mathematical symbol for change. VASCSC aims to bring about change by providing a common platform to all these groups.

The Centre houses well-equipped laboratories in Biology, Chemistry, Physics, Electronics, Model Rocketry, Astronomy Mathematics & Computer; Innovation Hub; Science Playground; Library; Workshop and Science Shop. The Centre’s efforts for improving the quality of science education and popularization have been recognized through awards, including:

- National Award for ‘Outstanding Efforts in Science & Technology Communication’ given by Dept. of Science & Technology, Govt. of India (2008)

COVID-19 pandemic presented an unprecedented challenge to education sector. The lockdown, followed by restrictions on in-person educational activities, adversely affected VASCSC’s activities. Popular programmes like School Visits, Lab Projects & Practicals, and Summer Programme could not be conducted while School Science Forum had to be shifted to online mode. However, this was also an opportunity to widen the reach to more students and teachers across India by offering online programmes. The USP was sending the activity material to participants beforehand, followed by online sessions; which was instrumental in providing them with hands-on learning experience. The efforts made by VASCSC to mitigate the setback in education sector and create new learning opportunities in science, are presented in this Annual Report.
VASCSC School Science Forum (SSF) is a syllabus oriented, year-long programme for students of Std. 5-9. The objective of this programme is to strengthen the understanding of basic science and mathematics concepts by providing the students an opportunity to perform hands-on experiments and activities. Starting in 2011, this programme has received overwhelming response from the participants, and has become one of the most sought-after programmes of VASCSC.

Std. 5-9 are formative years which determine a student's life-long interest and aptitude for science; and are also a motivating factor for taking up higher studies and careers in the field. This programme was initiated as an intervention to nurture their curiosity and provide them with hands-on experience for developing understanding of science & mathematics.

The programme duration was from July 2020 to March 2021. Due to the pandemic, different changes were brought in the programme format. Sessions were held online, to ensure the safety of participants. Individual kits containing the material for each hands-on session were prepared for the participants and distributed to them. As some of the activities required adult supervision, sessions were conducted on Saturdays and Sundays. For each standard, 30 sessions, each of two hours duration, were conducted every week.

With the implementation of the National Education Policy 2020 that emphasizes on the importance of hands-on learning as an integral part of school level education, SSF focused on conceptual understanding where each topic was explored in depth and the science behind it was explained. Interdisciplinary approach was taken to provide holistic knowledge, that fascinated the students and helped to develop their critical thinking and problem-solving ability.

"I loved the sessions on Electronics & Maths - STEM activities. This practical knowledge is increasing my confidence specially during my school's Maths & science classes. The materials were given in organised manner during online sessions. The resources persons are knowledgeable on the topic. Awaiting next year's SSF program."

- Sakshi Bhatt
Student, Std. 7

To strengthen the understanding of basic concepts, topics from Biology, Chemistry, Computers, Physics, Mathematics, Electronics, Astronomy, Model Rocketry etc. were included. To familiarize the participants with different emerging technologies, topics like Artificial Intelligence, Coding etc. were also included. The activities were designed in such a way that it helped them to understand the topics clearly.

Due to the huge popularity that SSF has gained over the years, even in the existing challenging time, parents & participants trusted the programme quality. Around 800 participants from different schools of Ahmedabad enrolled for 2020-21 academic session.
With support from Oracle, VASCSC has been working on the project ‘Innovation in Science and Mathematics Education’ since 2016. Over this period, the project has directly benefitted 355044 students and 12309 teachers from 7258 schools across Gujarat. The indirect reach of the project has been much more.

The project was once again implemented successfully in 2020-21. The objective was to cultivate innovative approach and scientific temper and to provide an opportunity for them to understand basic science concepts through hands-on experiential learning.

Due to COVID-19 pandemic and resulting restrictions, some of the project activities were undertaken in online mode while for some activities blended learning methodology was used. The Project components are given as below:

**Hands-on Activities for Students**
Due to COVID 19 pandemic lockdown, it was not possible to conduct this activity in offline mode. Some changes were made in the implementation strategy. This component ‘Innovative Science & Mathematics Hands-on Activities for School Students’ consisted of three aspects: Learning Pack for each student, online workshops for teachers, and hands-on activities in school by the teachers. 80 schools were selected, from which 8003 students, 264 teachers participated.

Expression of interest for participation was invited from schools of Gujarat, from which 80 schools were selected. The target group were students of standard 6 to 8. Science and mathematics learning packs were especially designed for giving to each student for performing hands-on activities. This learning pack contained material for conducting hands-on activities including Make model of \((a+b)(c+d)\)/, \(a^2-b^2\)/, \((a+b+c)\)/ Fraction strips, Make a Periscope, Make 3D Glasses, Make a Sun Dial Model, Make Angle Sum Property Model, Make a 3D Shape, Periodic Table Chart and Vignan Drashti. The kits were sent to schools. Since the schools were closed for students, the teachers took the responsibility of distributing it to each student. Resource material was provided to the schools.

This was followed by four online guidance workshops for the teachers of participating schools. The workshop dates were 12 Feb 2021, 5 Mar 2021 (2 workshops) and 23 Mar 2021. The teachers were oriented on hands-on methodology of teaching science and mathematics and how to conduct hands-on activities with their students, using the Learning Pack. After the orientation workshop, the teachers conducted the activity with their students.

**Teachers Training Workshops**
To build the capacity of science and mathematics teachers on hands-on approaches of teaching science and mathematics, and to orient them towards innovative approaches, four training workshops were conducted in online mode. These workshops titled ‘Innovative Approaches in Science and Mathematics’

<table>
<thead>
<tr>
<th>Date</th>
<th>Location of Teachers</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 - 11 Sep 2020</td>
<td>Mehsana, Gandhinagar, Surat Banaskantha, Ahmedabad</td>
<td>56</td>
</tr>
<tr>
<td>22 - 25 Sep 2020</td>
<td>Gandhinagar, Vadodara, Chhota Udepur, Bhavnagar</td>
<td>48</td>
</tr>
<tr>
<td>22 - 25 Sep 2020</td>
<td>Vadodara, Chhota Udepur, Bhavnagar</td>
<td>43</td>
</tr>
<tr>
<td>3 - 6 Nov 2020</td>
<td>Surat, Tapi</td>
<td>53</td>
</tr>
</tbody>
</table>

“Thanks to VASCSC, we have been able to reach a child residing in a humble hut too.”
- Ashok Parmar
  Teacher, Hiten Dholakiya Vidhyalay, Bhuj
Education’ received 198 participants from 155 schools. The training included STEM activities which focused on learning by doing. The teachers could not attend the training in person due to the pandemic situation. However, the workshop methodology remained same. Activity material was sent in advance to each teacher and they attended the training online. The duration of each workshop was 4 half days. Standard specific activities were conducted. Useful resource material was provided to the participating teachers based on their medium of instruction (English/Gujarati).

"Difficult points of science were explained in a simple manner through activities ... The kit provided was useful to learn model making. The information provided by subject experts was useful to enrich our knowledge ... we will take the learning to our classroom to our students and will try to simplify our difficult work."

- Mukeshbhai L. Patel
  Teacher, Chhapi Pay Centre School, Ta. Vadgam

**Computer Teachers Training**

To update and equip teachers with skills and knowledge to teach computers more effectively, workshops titled 'Training of Teachers in Computer Education' were conducted. Four online training workshops were conducted in which 140 teachers from 59 schools participated. The target group was teachers from std. 6-8 level. Softwares in computer education like Computer Tux Paint, Turtle Art, Spread Sheet and Micro:bit were included in the sessions.

<table>
<thead>
<tr>
<th>Date</th>
<th>Location of Teachers</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 - 16 Oct 2020</td>
<td>Banaskantha, Gandhinagar, Ahmedabad</td>
<td>32</td>
</tr>
<tr>
<td>8 - 11 Dec 2020</td>
<td>Anand district</td>
<td>50</td>
</tr>
<tr>
<td>5 - 8 Jan 2021</td>
<td>Gandhinagar, Surat, Vadodara</td>
<td>28</td>
</tr>
<tr>
<td>9 - 12 Feb 2021</td>
<td>Dholka, Daskroi &amp; Sanand taluka of Ahmedabad</td>
<td>30</td>
</tr>
</tbody>
</table>

Useful resource material and certificates were given to the participants. A pen drive containing useful e-material and certificates were also sent to them.

**Mathematics Labs in Schools**

Maths Lab is a school-level resource which aims to provide hands-on, experiential learning opportunity to students for understanding difficult concepts and their real-life applications. It is a dedicated space for nurturing innovative ideas, and a learning facility for future skills like critical thinking, problem-solving, etc. VASCSC set up 20 Mathematics Labs in 20 selected schools in various districts of Gujarat, providing them with necessary hand-holding support. 7897 students and 67 teachers benefited from this activity.

For selection, expression of interest was received from schools. Those with limited access; or located in remote, rural areas, aspirational districts and those catering to underprivileged children were selected. The necessary resources required to set up Maths Lab was given to the school. These resources included teaching aids, kits for performing curricular and co-curricular activities, viz. Maths Lab Primary package (set of 31 models), teaching aids, interactive exhibits, kits for demonstrations & activities, puzzles, charts, DIY model templates, publications, etc. and an Activity Planner. The schools allotted a dedicated space for the Maths Lab in their premises.
An online orientation workshop was conducted for the Maths Lab coordinators and teachers on 25 Mar 2021.

**Space Education Clubs**
Since 2018-19, 35 Space Education Clubs have been set up by VASCSC in 35 different schools in Gujarat. In the reporting year, 25 more Space Clubs were set up. VASCSC provided the necessary handholding & technical support, some basic resource material and orientation to all these Space Clubs. 5500 students and 145 teachers from 25 schools where the Space Clubs were set up, benefited from this initiative.

This programme provided a platform to learn the basics of space science including Model Rocketry, Astronomy, Aeronautics and Satellites. Potential club activities included sport-flying launches, various contests, R & D projects and workshops, aerospace films, guest speakers, educational activities, special presentations, demonstrations and exhibits. Relevant resource material containing space science publications, model rocket launcher, inclinometer, pen drive containing an e-library was given to each school. A special planner was designed and given to each member Club to plan their activities.

Two orientation workshops were conducted to guide the teachers in using the given Space club material and carrying out the activities in their schools. The first workshop was conducted during 15-16 Oct 2020 and the second workshop was conducted on 10 Mar 2021.

"The Space Club is running in my school since two years. We have received a lot of help from VASCSC and Oracle. The content of the Space Club App is informative and very detailed. We are realizing that knowledge has no limits."
- Viralbhai Desai
  Campus Director, Aryam Educational Academy, Kim

**Model Rocketry Workshops**
15 Model Rocketry workshops were conducted targeted at std. 6-8 and std. 9-12 levels. 750 students from 15 schools participated. They fabricated water booster model rockets from simple and easily available materials and launched them. In the process, they learnt the scientific concepts of aerodynamics, inertia, gravity, air resistance, work and energy, impulse, momentum and Newton's Laws of Motion, and determining altitude and speed.

The workshops were conducted in physical or online mode depending upon the COVID-19 pandemic situation. When conducted in online mode, activity material for each student and resource material for school was sent prior to the workshop. Once the material was received, an online workshop for teachers and students of the school was conducted and then the teachers took responsibility of launching the rockets at their school. When conducted in physical mode, VASCSC resource persons visited the schools and conducted workshop, guiding them about fabrication of rocket and the scientific principles related to it. Each school was given a set of resource material containing useful publications and launcher, so that they could independently conduct such programmes in future.

"I have always been fond of space and universe. When I came to know that I am getting this golden opportunity to be a part of Astronomy workshop, I was very happy. On seeing the kit I was excited. After attending this workshop my love for space and universe achieved next level. I really enjoyed making the extraordinary and creative projects. Would love to be a part of more such activities. Thank you to all the staff and team."
- Dhyey Joshi
  Student, Holy Child School, Kalol
Astronomy Workshops
15 Astronomy workshops were conducted for students of 15 different schools. The workshops were conducted in physical or online mode depending upon the pandemic situation at that time. To make the sessions more interactive, many new TLM and hands-on activities were designed. These helped in explaining the concepts of astronomy easily to the students along with minimal intervention, as was necessary in online mode of teaching. All the materials were simple, low cost and child friendly.

When conducted in online mode, activity material for each student and resource material for school was sent to them prior to the workshop. Once the material was received, an online workshop for students and teachers of the school was conducted. When conducted in physical mode, VASCSC resource persons visited the schools and conducted workshop for students and teachers. In these workshops, the topics covered included basics of astronomy like planets, satellites, star systems, galactic systems, stellar evolution, constellations, understanding navigation using night sky, use of software and its applications, and hands-on activities in astronomy.

Vignan Drashti Subscription for Schools
Vignan Drashti is a Gujarati bimonthly science magazine published by VASCSC since last 20 years. Under this project, annual subscription of Vignan Drashti was provided to 2000 rural and remote schools of Gujarat. Expression of Interest was sought from schools. The response was overwhelming from which the 2000 schools were selected. E-version of Vignan Drashti was also prepared and made available online, for wider reach.

Science Wall Planner for Schools
The Science Wall Planner is a unique theme-based annual publication of VASCSC. Under this project, the Science Wall Planner 2021 was sent to 5083 schools of Gujarat.
VASCSC’s partnership with IBM India started in 2014. Under this collaboration, VASCSC has conducted hands-on teachers training workshops which directly benefited over 4200 govt. primary school teachers of Gujarat. Since 2018, new capacity building initiatives focusing on Innovation and AI were introduced for both teachers and students, in keeping up with the latest trends and emerging technologies.

In 2020-21, the project with IBM India consisted of four components, viz. ATL Teachers Training Workshops, ATL Student Workshops, AI Workshops for Teachers and AI Workshop for Students. Due to COVID-19 pandemic, all trainings were conducted in online mode with pan-India participation. Activity material required for the training was sent to each participant beforehand, followed by online sessions. This enabled providing hands-on experience to the participants even when they could not attend the training in physical mode.

“Thank you very much to all VASCSC trainer for giving us guidance, training was really interesting and knowledgeable, we all enjoyed the training and assignment. Once again, thank you to all team.”
- Tushar P. Sakale
Teacher

The team has conducted the sessions very well. We could learn many new topics. I am thankful to the resource persons for taking the training in the right direction and guiding us.
- Sarwade Deepak P.
Teacher, Beed, Maharashtra

ATL Teachers Training Workshops
During 2020-21, six training workshops titled ‘Unbox Tinkering’ were conducted for teachers of Atal Tinkering Lab (ATL) initiative of Govt. of India in order to give a boost to the innovation culture in the country. 228 teachers from 220 schools across India participated in these workshops. The objective of the workshops was to understand the importance and key working principles of ATL. The workshops were designed to learn innovation skills, shape up their ideas, work and learn in a flexible and creative environment. It provided an opportunity to work with the 21st century skills of critical thinking, design thinking, computational thinking, leadership and more. It also provided a systematic help to the ATL In-charge teachers to nurture innovation amongst the young innovators to solve India’s unique problems and help them mentor the students in more effective manner. The workshops were aimed to equip participants with skills and knowledge needed to teach design thinking and setting challenging experiments more effectively, using learner-centered innovative approaches. Teachers used instruments provided in their ATL and also other resources like 3D Printer, Arduino, various mechatronic kits and relevant softwares to create customized teaching aids. They interacted with technology experts and mentors and took part in hands-on activities. The following are details of the workshops:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Date</th>
<th>No. of teachers</th>
<th>No. of schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20 Jul - 1 Aug 2020</td>
<td>42</td>
<td>37</td>
</tr>
<tr>
<td>2</td>
<td>23 Sep - 7 Oct 2020</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>3</td>
<td>12 - 23 Oct 2020</td>
<td>41</td>
<td>39</td>
</tr>
<tr>
<td>4</td>
<td>26 Oct - 6 Nov 2020</td>
<td>27</td>
<td>25</td>
</tr>
<tr>
<td>5</td>
<td>18 - 29 Jan 2021</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>6</td>
<td>8 - 19 Feb 2021</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>228</strong></td>
<td><strong>220</strong></td>
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</tr>
</tbody>
</table>
**ATL Student Workshops**

Four ‘Tinkering Workshops’ were organized for students of std. 6-12 from ATL schools of Gujarat. The 4-day workshops were conducted in online mode. The focus was on making the students future-ready, by developing new age skill sets such as critical thinking, design thinking, understanding of microcontrollers, 3D designing and process involved in ideation to innovation. These workshops would provide the young minds a platform to give shape to their ideas through hands-on and do-it-yourself mode, & learn innovation skills. The training material was provided to the participating students beforehand.

197 students and 10 teachers from 8 schools participated in the workshops. The workshop details are given in the following table:

<table>
<thead>
<tr>
<th>Date</th>
<th>Name of Schools</th>
<th>Students</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 - 22 Jan 2021</td>
<td>Podar Intl. School, A'bad</td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Best High School, A'bad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27 - 30 Jan 2021</td>
<td>Kendriya Vidyalaya, Junagadh</td>
<td>48</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>KV-ONGC, Baroda</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 - 5 Feb 2021</td>
<td>Navrachana Vidyalash, Baroda</td>
<td>50</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>New Era School, Baroda</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 - 12 Feb 2021</td>
<td>Rajasthan School, A'bad</td>
<td>49</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Kendriya Vidyalaya, G'Niagar</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>197</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

**Workshops on AI for Teachers**

The objective of the workshops was to help teachers understand the importance and key working principles of Artificial Intelligence (AI) and Machine Learning. During the workshop, the teachers interacted with technology experts and mentors and took part in online hands-on activities. The workshops were designed for teachers to learn basic programming skills and implement AI projects in day-to-day life.

The workshops were conducted in online mode. The first workshop was conducted during 3 - 9 Nov 2020 in which 41 teachers from 24 schools participated. The second workshop was conducted during 15 - 18 Dec 2020 in which 30 teachers from 30 schools participated.

**Workshop on AI for Students**

The objective of the workshop was to develop awareness about Artificial Intelligence (AI) and Machine Learning among students. The workshops were designed for students to learn basic programming skills and make use of AI projects in daily life. A workshop was conducted during 3 - 9 Nov 2020 in online mode in which 41 students from 37 schools participated.
VASCSC, as Innovation Hub, aims to foster creativity and spirit of enquiry in children as a strategy to promote innovative way of thinking. This project is partially supported by the National Council of Science Museums (NCSM), Ministry of Culture, Govt. of India. Since its inception, the Centre has been carrying out innovative activities to improve the quality of Science education and also to promote innovation and creativity. Under the project, extension of these activities and their scale-up was done.

**Educational Video Series**
Many students are not able to study Autodesk Fusion 360 software for 3D design in online mode due to language barrier, as almost all online tutorials are available in English. To address this, VASCSC Innovation Hub developed 3D designing with Fusion 360 software tutorials in Hindi and Gujarati language. These online tutorials were uploaded on YouTube channel of Innovation Hub of VASCSC. Total 11 course videos were made available for students. The content covered topics starting from installation of software, basic designing to advance designing, learning CAD designing and to 3D print those designs.

**COVID-19 Idea Challenge**
A COVID-19 Idea Challenge on the theme Artificial Intelligence and Robotics was announced, to bring out fresh and innovative ideas on application of AI & Robotics to mitigate the hardships being faced in current situation and prepare our society for a post-COVID life. Three categories were announced. Students across India sent their innovative and creative ideas to initiate a change. 75 entries were received. The winning entries were awarded prizes and certificates.

**AI & TinkerCAD Workshops**
Online courses were conducted on latest technological tools including Machine Learning, Artificial Intelligence (AI) and TinkerCAD. Along with sessions, necessary assignments were provided for self-practice. Two batches of Machine Learning and AI, and two batches of TinkerCAD workshops were conducted during 16-20 Jun 2020. In AI workshops, students learnt about basics of Artificial Intelligence, how mathematics behind machine learning works and how a basic machine learning algorithm can be made in Google Colab. They got an idea about data training, image recognition and explored amazing AI projects to play with. In TinkerCAD workshops, participants learnt about the basics of electronics, sensors and microcontrollers; and programming an Arduino without owning one - as the Arduino and various other circuits are simulated virtually using the TinkerCAD platform.

**Experimental Design Course**
This course was conducted during 11 - 14 Aug 2020 in which different aspects of designing a science experiment were covered, which is essential for robust research and to make students learn about the method of science and how scientists work. 22 students participated in this course.

**Makers Fortnight**
This online workshop was conducted during 25 Aug - 5 Sep 2020. It covered basics of design thinking, problem solving and prototyping. Students learnt about their real life application through creative designing and prototype development. Challenges were given to ideate, to design and to develop a solution. 17 students from across India participated in the workshop.

**Webinar on Emerging Technologies**
A webinar on Fundamentals of ‘3D Designing and Digital Fabrication’ was conducted on 23 Aug 2020. Students developed an understanding of product design including various technical aspects of engineering. They learnt about the latest fabrication technologies which can be useful in their academic projects and research work. 480 undergraduate and postgraduate students registered for the webinar.

**Science of Toys Workshop**
'Science of Toys - Make and Learn' workshop was conducted during 6 - 9 Oct 2020, in which 52 students participated. During this online hands-on workshop, students were introduced to science behind toys. They understood how toys behave in space and gravity. They prepared their own toys like Spinning
Tops, Glider, Balancing Bird, Spinning Wheels, Yo-Yo and Thaumotrope using simple material. Through these toys, students learnt various science principles like Friction, Gravity, Force, Persistence of Vision, Angular momentum, Mechanism of Flight, Centre of Gravity, Surface Area, etc.

Smart Home Workshop
Smart Home - Internet of Things (IoT) Workshop was conducted during 24 - 28 Nov 2020. During this online workshop, students were introduced to the concept of the Internet of Things (IoT). They designed & developed a smart home using CNC laser cut wooden parts, and 3D printed parts. They learnt about sensors, actuators and microcontrollers and their application. The understanding of IoT was developed among students by exercises like how to connect and monitor different devices through internet, mechanical assembly, circuitry and programming, etc.

Artificial Intelligence Workshops
Innovation Hub team designed and conducted hands-on workshops for both teachers and students, as part of project supported by IBM India. The workshop content included understanding the importance and key working principles of Artificial Intelligence (AI) and Machine Learning. During the 4-day online hands-on workshop, the teachers and students interacted with technology experts and mentors. The workshops were designed to learn basic programming skills and implementing AI projects & AI experiments in day-to-day life. Machine Learning, Robotics, Computer Vision, various types of machine learning techniques like Google Assistant, Facebook face-tagging system, and Amazon Alexa were discussed with the teachers. They learned the concept of pixels, colour values and different operations that needed to be done on an image before giving it to the machine.

Workshops for ATL
- Teachers Training Workshops were conducted by Innovation Hub team for teachers involved with Atal Tinkering Labs (ATL). Teachers were familiarized with the process of innovation through activities incorporating physical design and fabrication, electronics and coding, problem definition, solution ideation, digital fabrication, prototype demonstration, and using online resources effectively. They were given orientation on sensors and actuators, computational thinking, design thinking, and 3D designing and printing.

- Hands-on training workshops were conducted for students of std. 6-12 from ATL schools. The aim was to introduce them to various tools and equipment of the ATL. Content included basics of electronics, Arduino, sensors, as well as 3D designing & printing. Hands-on activities like paper circuit, coding, LDR, IR, velcro-based resistance were conducted. Demonstrations & interactions were conducted on topics like Internet of Things, 3D printer and CNC machine.

Sessions in School Science Forum
The Innovation Hub team conducted hands-on sessions focusing on innovation as part of the School Science Forum (SSF) programme. Topics such as Gears - wind up mechanism, Jumping LED, Soil Science, STEM Challenge, Science in Everyday Life, Energy - Thermal Insulation and Insulators, Design your own experiment, Innovation and IPR, Electronic Circuit Designing and Troubleshooting were covered for different standards.

Sessions in VASCSC Science School
3D printed Mechanism session was conducted in the VASCSC Science School programme.

National Science Day
The National Science Day was celebrated on 28 Feb 2021. The activities were designed and developed on theme of 'Future of STI: Impact on Education, Skills & Work.' An open online lecture was arranged on topic 'Light and Scattering Phenomenon'. Quiz and hands-on activities were conducted for std. 5 students. 120 students participated in the event.
VI
Capacity Building of Teachers in Gujarat

VASCSC’s project - Capacity building of teachers of Gujarat through workshops on ‘Hands-on approaches in science & mathematics education’, was supported by HCL Foundation under HCL Grants 2020. As part of this project, 12 teachers training workshops were planned for govt. school teachers teaching in std. 6-8. The project was aimed at orienting teachers towards hands-on and experiential learning; thereby building their capacity and equipping them with skills for effective science and mathematics teaching.

Out of these, 9 workshops were conducted in different districts of Gujarat during the reporting year, with participation of 461 teachers. The workshops were organized in in-person mode, after the COVID-19 lockdown was lifted and restrictions were eased. All the necessary guidelines and safety protocols were followed. Masks were distributed to each participant. The following are details of the workshops conducted:

<table>
<thead>
<tr>
<th>Date</th>
<th>Location &amp; District</th>
<th>No. of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 - 21 Jan 2021</td>
<td>Modasa, Aravalli</td>
<td>53</td>
</tr>
<tr>
<td>22 - 23 Jan 2021</td>
<td>Anand</td>
<td>51</td>
</tr>
<tr>
<td>2 - 3 Feb 2021</td>
<td>Himmatnagar, Sabarkantha</td>
<td>51</td>
</tr>
<tr>
<td>11 - 12 Feb 2021</td>
<td>Dahod</td>
<td>52</td>
</tr>
<tr>
<td>25 - 26 Feb 2021</td>
<td>Deesa, Banaskantha</td>
<td>57</td>
</tr>
<tr>
<td>9 - 10 Mar 2021</td>
<td>Godhra, Panchmahal</td>
<td>45</td>
</tr>
<tr>
<td>12 - 13 Mar 2021</td>
<td>Rozkuva, Chhota Udepur</td>
<td>51</td>
</tr>
<tr>
<td>24 - 25 Mar 2021</td>
<td>Lunawada, Mahisagar</td>
<td>51</td>
</tr>
<tr>
<td>26 - 27 Mar 2021</td>
<td>Botad</td>
<td>50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>461</strong></td>
</tr>
</tbody>
</table>

Science and mathematics can be made more exciting, engaging, interactive and meaningful with the introduction of hands-on approaches in its teaching. This experiential learning can be instrumental in inculcating students’ interest in science and mathematics as well as developing rational thinking and scientific temper among them. Interest in these subjects is key to encouraging students to pursue higher studies and research in pure sciences; thereby adding to the human resource pool and ultimately scientific advancement of our country.

Taking this into consideration, the two-day teachers training workshops were based on practical learning of science and mathematics. Modules included use of activities which could be easily carried out by the teachers in their classroom. The major thrust was on hands-on approaches for teaching these subjects in a simple and fun-filled manner. The workshop methodology included hands-on sessions in which teachers were engaged in activities like model-making and performing experiments; demonstration of innovative science and mathematics activities developed by VASCSC; preparing innovative, low-cost teaching aids using local resources; and using innovative TLM effectively in teaching.

A set of relevant and quality TLM in Gujarati was given to each participant, for extending the learning benefits of the training workshops. It would serve as useful reference and reading material, providing the teachers with new strategies, activities and ideas that could be applied to their teaching.

"After completing the workshop when I went to school, I exhibited the models and resource material received during the workshop and explained it. Students of std. 6 to 8 were able to understand it and enjoyed a lot. If students get education through activity-based learning, they enjoy and develop interest in concepts. I learnt many things through this two-day workshop and I am very thankful to you all."
- Patel Hiteshkumar B.
  Gogadhani Anupam Primary School, Deesa
The activities were designed so as to build understanding as well as to reinforce science and mathematics concepts, and building real-world connections to simple concepts. It was also conveyed to the participants that even simple everyday material can be effective in preparing activities to demonstrate science and mathematics concepts.

Several difficult topics from school science and mathematics curriculum were included in the sessions to illustrate the hands-on methodology. Various branches of science and mathematics, viz. biology, physics, chemistry, electronics, astronomy, model rocketry and mathematics were included. Such topics from std. 6-8 were covered which could be easily replicated by the teachers in their classrooms. These included microscopy, ecological concepts, human body systems, introduction to electric circuit, electronics in daily life, chemistry around us, soil science, light, electrolysis of water, design your experiment, astronomy, science through games, area formulae, algebraic identities, 3D shapes, Pythagoras theorem, multiplication, model rocketry, etc.

Support was received from the district education authorities. Even in the COVID-19 pandemic situation, the district education authorities welcomed this initiative and deputed the teachers for the training. Senior officials, viz. Dist. Development Officer (DDO), Dist. Primary Education Officer (DPEO), took interest in the training and visited the Inauguration and Valediction events. They interacted with participants and encouraged them. Some of the special visits are mentioned as follows:

- Shri Anil Dhameliya IAS, DDO, Aravalli; Ms. Smitaben Patel, DPEO, Aravalli; and Shri Samir Patel, Dy. DPEO, Aravalli visited the inauguration on 20 Jan and valediction of the workshop on 21 Jan 2021 at Modasa.
- Shri Indrajit V Patel, Chairman, Nagar Primary Education Committee, Anand Nagar Pallika visited the workshop at Anand on 23 Jan 2021.
- Shri H. H. Chaudhari, DPEO, Sabarkantha visited the inauguration on 2 Feb and valediction of the workshop on 3 Feb 2021 at Himmatnagar.
- Dr. Rajshakha, DPEO, Dahod visited during the inauguration on 11 Feb and valediction of the workshop on 12 Feb 2021 at Dahod.
- Shri H. B. Patel, DPEO, Mahisagar and Shri Kirit Patel, Dy. DPEO, Mahisagar visited the workshop at Lunawada on 25 Mar 2021.

“
You have done an amazing work by helping teachers perform curriculum-based activities themselves. Your team work was excellent and worth imbibing. Each teacher enjoyed learning. They learnt some new things as well. In my view, the 2-day workshop was successful. Your teaching method is very good. Each team member had a good temperament... their work was praise-worthy... Our heartiest congratulations!

- Jagdishkumar Malwana, Chhota Udepur
Mobile Science Lab

‘Joy of Science - Mobile Science Lab and Exploratory’ (MSL) is a unique lab-on-wheels which takes science laboratory experience to underprivileged children in their schools. Through this Mobile Lab, students get exposure to hands-on learning and science practicals, which is helpful for understanding of difficult curriculum-based concepts with fun and ease. With support from NCSTC, Dept. of Science & Technology, the Centre initiated Mobile Lab in 2018 for schools in Gujarat. This lab is being taken to schools where there is shortage of laboratory facilities.

In the second year of its implementation during 2020-21, the Mobile Science Lab experience reached 100 schools. These included schools from aspirational district (Narmada) as well as rural, remotely located schools, catering to underprivileged children. Other districts covered were Aravalli, Sabarkantha, Anand, Mehsana, Surendranagar and Ahmedabad.

The project was successful with participation of 16166 students and 547 teachers from upper primary and secondary schools. The vehicle used for the Mobile Lab was procured from grant by KHS Machinery.

The Mobile Science Lab had a good start and it was taken to 15 schools during January 2020. However, the COVID-19 pandemic resulted in nation-wide lockdown during March-May 2020. Schools remained closed for a long time affecting the project activities.

After a long hiatus, the project activities restarted in December 2020 with a new implementation strategy. The schools had started classes in online mode but only teachers were coming to school. Keeping in mind the COVID-19 protocols, individual Learning Packs were prepared for students, which contained all the hands-on activity material required for the sessions.

VASCSC team visited the schools and gave in-person orientation to the teachers on how to conduct the hands-on activities with the students. The Learning Packs were also given to schools whereas the teachers took the responsibility of sending these to each student.

This was followed by online sessions conducted by VASCSC team. Sessions included demonstrations, hands-on activities and experiments. Students used the material provided in the Learning Packs to perform the hands-on activities. Even with the given restrictions, students could get an experience of hands-on learning through the project.
Science Education in COVID-19 Pandemic

VASCSC Science School
The COVID-19 pandemic shifted the method of teaching from offline to online mode. Although online teaching provided classroom experience to students to some extent, access to laboratory experience was still lacking. The joy of performing experiments in a laboratory was is missing.

To give students hands-on and laboratory experience at home, VASCSC Science School programme was launched in 2020-21. This interactive programme focused on conceptual understanding of science and mathematics through hands-on learning. This certificate programme was aimed at students of std. 5-8, with separate sessions for each standard. An interdisciplinary approach was adopted, covering concepts in Physics, Chemistry, Mathematics, Biology, Astronomy and emerging technologies. The first batch conducted during 29 Sep - 20 Oct 2020 received 125 participants while the second batch conducted during 24 Nov - 11 Dec 2020 received 105 participants. Students from across India participated.

VASCSC team used the opportunity to introduce an interactive STEM learning programme. The modules therein were fun-filled and useful for children to build their confidence. This programme intended to ensure that science education was less affected due to closure of schools. These modules were of short duration, and included activities that could be conducted using simple material, easily available in the participants’ homes.

These interactive modules were primarily designed to create interest of students in STEM. These modules were targeted at age group of 12 years and above. Around 950 students form across India and even other countries, participated. The workshops conducted for interactive, hands-on learning for students at home are mentioned in the following table:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of Module</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fundamentals of Aeromodelling</td>
<td>21-22 Jul 2020</td>
</tr>
<tr>
<td>2</td>
<td>Resolving Puzzles</td>
<td>23-24 Jul 2020</td>
</tr>
<tr>
<td>3</td>
<td>Experimental Design</td>
<td>28-29 Jul 2020</td>
</tr>
<tr>
<td>4</td>
<td>Mathematics in Nature</td>
<td>30-31 Jul 2020</td>
</tr>
<tr>
<td>5</td>
<td>Understanding Wave Properties</td>
<td>4-5 Aug 2020</td>
</tr>
<tr>
<td>6</td>
<td>Theory of Evolution</td>
<td>6-7 Aug 2020</td>
</tr>
<tr>
<td>7</td>
<td>Introduction to Astronomy</td>
<td>25-26 Aug 2020</td>
</tr>
<tr>
<td>8</td>
<td>Joy of Mathematics</td>
<td>25-26 Aug 2020</td>
</tr>
<tr>
<td>10</td>
<td>Physics in Nature</td>
<td>27-28 Aug 2020</td>
</tr>
<tr>
<td>11</td>
<td>Aspects of Photography</td>
<td>1-2 Sep 2020</td>
</tr>
<tr>
<td>12</td>
<td>Test your Taste</td>
<td>1-2 Sep 2020</td>
</tr>
<tr>
<td>13</td>
<td>Play with Light and Shadow</td>
<td>3-4 Sep 2020</td>
</tr>
<tr>
<td>14</td>
<td>Design Thinking</td>
<td>3-4 Sep 2020</td>
</tr>
<tr>
<td>15</td>
<td>Mendel's Inheritance</td>
<td>8-9 Sep 2020</td>
</tr>
<tr>
<td>16</td>
<td>Our Atmosphere</td>
<td>8-9 Sep 2020</td>
</tr>
<tr>
<td>17</td>
<td>Cartography (Science of Map making)</td>
<td>10-11 Sep 2020</td>
</tr>
<tr>
<td>18</td>
<td>Lighting a Bulb</td>
<td>10-11 Sep 2020</td>
</tr>
<tr>
<td>19</td>
<td>How to Choose your First Telescope?</td>
<td>8 Oct 2020</td>
</tr>
<tr>
<td>20</td>
<td>Astronomy 101</td>
<td>13-16 Oct 2020</td>
</tr>
<tr>
<td>21</td>
<td>Asteroid, Meteors and Comets</td>
<td>16 Oct 2020</td>
</tr>
<tr>
<td>22</td>
<td>Photography 101</td>
<td>20-23 Oct 2020</td>
</tr>
<tr>
<td>23</td>
<td>Curves in Science &amp; Mathematics</td>
<td>3-5 Nov 2020</td>
</tr>
<tr>
<td>24</td>
<td>Molecular Genetics</td>
<td>3-5 Nov 2020</td>
</tr>
<tr>
<td>25</td>
<td>Know Our Universe</td>
<td>24-27 Nov 2020</td>
</tr>
</tbody>
</table>

The sessions included curriculum-based experiments and activities in science and mathematics to compliment online schooling. Standard-specific learning packs containing material and tools for experiments and activities were developed, one for each session. The learning packs and informative reading material was shipped to the participants beforehand. This was followed by 12 guidance sessions conducted online by subject experts from VASCSC. The programme was highly appreciated by students as well as their parents from across India.

Interactive STEM Learning Online Modules
After COVID-19 lockdown was lifted, there were restrictions on in-person activities for students.
Teachers Training Workshops
- Two workshops were conducted for school teachers from Kheroj in Gujarat in online mode. These workshops were supported by CII. A blended learning approach was used in which the activity material was sent to the participants beforehand, followed by online sessions. The workshops are:
  - A science workshop titled ‘Hands-on Approaches in Science Education’ was conducted during 7 - 10 Oct 2020 in which 12 teachers participated.
  - A workshop titled ‘Hands-on Approaches in Mathematics Education’ was conducted during 20 - 23 Oct 2020 in which 23 teachers participated.
  - Two online workshops titled ‘Capacity Building Workshop on Mathematics for DIET Faculty Members of UP’ were conducted by VASCSCC with support from CARE India, Lucknow and SCERT-UP. The first workshop was conducted during 17 - 19 Feb 2021 & second workshop was conducted during 23 - 25 Feb 2021. The activity material was sent to the participants beforehand. Total 56 DIET faculty participated.

Activities during COVID-19 Lockdown
During the COVID-19 lockdown, VASCSCC team developed resource material for continuing science education. These were uploaded on social media including YouTube channel, Facebook, Twitter, etc. The following material was developed:
  - Scientific information on COVID-19 was compiled in form of a set of posters. These posters were developed in both Gujarati and English and published online on VASCSCC social media.
  - A number of puzzles, science challenges, astronomical event updates and exciting information was published daily on social media.

Radio Programme
A 52-episode radio series in Gujarati titled ‘Smart India 21’ was developed based on the theme of Artificial Intelligence, with support of All India Radio and Vigyan Prasar. The series started on 8 May 2020. It was broadcast from Akashvani’s Ahmedabad, Vadodara, Rajkot, Bhuj and Godhra stations every Monday during 9:30 - 10:00 pm (846 KHz MWAM).

Winter Programme 2020
Due to the pandemic situation, this programme was offered in online mode for students across India. Exciting modules, with interactive sessions were designed to enable hands-on, experiential learning of the participants at their homes. Resource material was sent to the participants beforehand. The online sessions were conducted by VASCSCC experts.

<table>
<thead>
<tr>
<th>Name of Module</th>
<th>Std.</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science Kids Zone</td>
<td>2 - 3</td>
<td>24 - 27 Nov 2020</td>
</tr>
<tr>
<td>Model Rocketry</td>
<td>5 - 6</td>
<td>24 - 27 Nov 2020 / 1 - 4 Dec 2020</td>
</tr>
<tr>
<td>Aeromodelling - Jr.</td>
<td>5 - 6</td>
<td>24 - 27 Nov 2020 / 1 - 4 Dec 2020</td>
</tr>
<tr>
<td>Aeromodelling - Sr.</td>
<td>7 - 8</td>
<td>8 - 11 Dec 2020</td>
</tr>
<tr>
<td>Know our Universe</td>
<td>6 - 8</td>
<td>24 - 27 Nov 2020 / 1 - 4 Dec 2020</td>
</tr>
<tr>
<td>Smart Home - Internet of Things (IoT)</td>
<td>6 - 12</td>
<td>24 - 28 Nov 2020 / 8 - 12 Dec 2020</td>
</tr>
<tr>
<td>Android App Development for Beginners</td>
<td>6 - 7</td>
<td>24 - 27 Nov 2020</td>
</tr>
</tbody>
</table>
Teaching Learning Material (TLM) development is a major activity of VASCSC. This material is developed with the objective of making teaching learning process of science and mathematics lasting and easy for teachers and students. This TLM is suitable for primary and secondary school level, for both classroom and individual use. Kits, books, charts, models, exhibits, puzzles etc. have been developed and available for distribution at VASCSC Science Shop. Manuals and books have been developed in English, Gujarati and Hindi. This material is in demand from all across India.

Due to the COVID-19 pandemic, online teaching became the norm. This led to demand of TLM for various new topics and in new formats, so that children did not lose access to hands-on learning even with online classes. To cater to this requirement, VASCSC developed a wide range of DIY templates which were low-cost, and easy to transport, targeting the individual learner. The demand specially arose from VASCSC’s annual programme.

In 2020-21, several existing publications were reprinted in large numbers due to their increasing demand. The following new material was developed:

**Science Wall Planner**
The Science Wall Planner is a unique theme-based publication in English, containing useful scientific information. VASCSC’s Science Wall Planner for 2021 was based on the theme ‘International Year of Fruits & Vegetables (IYFV)’. It planner contained information on the theme such as important role of fruits and vegetables in human nutrition, food security & health, and in achieving Sustainable Development Goals (SDGs). Other content included national and international days observed to mark important scientific events, birth anniversaries of eminent scientists and astronomical events. Teachers, students and individuals, used the information provided in it for planning events, talks, activities, etc. 5000 copies were printed and widely distributed across the country.

**Vigyan Drashti**
Vigyan Drashti is a Gujarati science publication in 8 page newspaper format. It contains articles, activities, experiments, latest information, puzzles, amazing facts, crosswords, science toons, etc. It serves as an effective science learning resource, subscribed by teachers, students and schools. Six volumes were brought out during the year. Four volumes also contained 12 supplements developed for awareness on the science of COVID-19. These were in poster format which could be displayed on the school notice boards. 3500 copies were printed and distributed, of which 2000 copies were sponsored by Oracle and 1000 copies were sponsored by KHS Machinery.

**Place Value Arrow Cards**
This kit is a visual learning aid to understand the concept of place value. The learning of place value is helpful to understand the concepts like addition, subtraction, multiplication, division, etc. This TLM can be used for age 7+ years, in classroom or by an individual. It will help to make the learning process comprehensive, engaging and joyful for children.
Pentominoes Puzzle
A new colourful version of this interesting and recreational puzzle was brought out. In this puzzle, 12 pentominoes are provided which can be arranged to form different shapes. Silhouettes of some of the interesting shapes have been given as puzzles.

Hundreds Chart
This is a useful tool to strengthen early mathematical concepts and skills related to numbers, arithmetic operations on numbers and other number properties. These concepts include counting, skip counting, ascending order, descending order, addition and subtraction, rounding to nearest tens, multiplication tables 1 to 10, odd number, even number, prime and composite number, factors & multiples, HCF & LCM.

Napier’s Strips
A smaller and low-cost version of the Napier’s Strips was developed to reach out to more individual users. A larger version was already available for use in schools. This model is used for quick multiplication of numbers and can also be said to be a simple mechanical calculator for easy multi-digit multiplication.

Number Shift
A low-cost version of the model already available with the Centre was developed. This is a mathematical game which appears magical to the common person. This game involves a performer and a volunteer. By using simple arithmetic, the performer can correctly guess the number chosen by the volunteer.

‘Do It Yourself’ Templates
This year, a number of Do It Yourself (DIY) templates were developed from which science or mathematics models could be prepared. These were low-cost, requiring very little or no additional material for fabrication and could be given to each child for conducting hands-on activity in their homes. These were used widely, especially in VASCSC’s projects and programmes. The details of the DIY models are given as follows:

Fraction Strips: This mathematical model is used to understand the concept of fractions. This includes identification of fractions, comparison of fractions, equivalent fractions and the basic operations like addition and subtraction of fractions.

Two Congruent Right Triangles: This geometric puzzle contains two congruent right triangular pieces and a sheet with different shapes on it. The two pieces have to be arranged in each of the given shapes. This puzzle can help to develop the concept of congruent angles and sides.

Pythagoras Theorem: This template can be used to prepare a model to verify the Pythagoras Theorem: ‘In a right-angled triangle, the square of the hypotenuse is equal to the sum of squares of the other two sides’.

Area Formulas: These models are used to verify the formulas for area of basic plane shapes. 5 templates to prepare mathematical models have been developed- one each to verify the formulas of area of a triangle, parallelogram, trapezium, rhombus & circle.

Algebraic Identities: These templates are helpful for students in std. 6-8 to strengthen the basic concepts in algebra through activity. Six templates were developed in all, one each for understanding of the algebraic identities - \((a+b)(c+d)\), \((a+b)^2\), \((a-b)^2\), \((a+b)^2 - (a-b)^2\), \((a+b)^2 + (a-b)^2\), \(a^3 + b^3\). These models can be used for demonstration and verification of the mathematical results.

Volume of Cone and Cylinder: These templates were designed to provide students with experiential learning of mathematics in a fun-filled, creative, collaborative and exploratory way. The template is useful to verify and understand about the correlation between volume of cone and cylinder through activity.
Area Sum Property of Triangle and Quadrilateral: These templates are useful to understand geometry & area through activity. Area sum property of a triangle and quadrilateral can be verified through the models prepared form these templates. They can be used by individuals, in classroom or in Mathematics lab.

Soil Biodiversity Pyramid: This model is helpful for understanding the diversity of the living organisms residing in soil. These organisms regulate the nutrient cycle, decomposition of organic matter, soil fertility, etc.

GI Chart: Geographical Indication (GI) is a sign used on products that have a specific origin and possess qualities due to that origin. This chart-based activity helps students understand about importance of IPR and learn about some of the GI tags in India.

Phases of Moon: The different Moon phases and why they occur can be understood using this template. The different positions of the Moon in its orbit around Earth can be visualized.

Horizontal Sundial: The horizontal sundial is used for measuring time using Sun's shadow from a given location on Earth. This is a simple astronomy model which students can use to understand about Earth's rotation and various methods of time measurement.

Circumpolar Constellation Dial: Using this template, a model can be prepared using which the visible circumpolar constellations and Pole Star can be found out during any given month and time.

Communication Satellite: This template is used to prepare a 3-dimensional model of a communication satellite and helps in understanding about its various components and parts and their use.

3D Glasses: Simple 3D eye glasses can be made using this template and the accompanying red and blue filters. The glasses create or enhance the illusion of depth in an image. One can see 2D pictures appear as 3D images on wearing these glasses.

Structure of Dicotyledonous Leaf: This is a cube shaped model, showing cross section of a dicotyledonous leaf. Various cells & tissues found in leaf can be easily imagined and understood using this 3D model.

Science Shop

The Science Shop makes the material developed by the Centre, available to general public. A brochure-cum-price list was brought out for wider publicity. This material was popular and received demand from schools, students and teachers across the country. For wider reach, Science Shop products were made available online through www.scienceshop.vascsc.org. Products were also listed on e-commerce website Amazon.in.

As per the requirement of the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013, VASCSC has an Internal Committee which has been constituted in accordance with the provisions of section 4 of the said Act, to provide protection against sexual harassment of women at workplace and for the prevention and redressal of complaints of sexual harassment and for matters connected therewith and incidental thereto. During this year no complaint of Sexual Harassment was reported at VASCSC. VASCSC has included the brief introduction of the provisions of the above Act as part of its orientation programme for the new joinees. The Anti Sexual Harassment Policy is in place.
VASCSC is thankful to all its funding and project partners which include the following:

**Funding Partners**
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