Capacity Building Program on Integration of ICT in Science Education for Western Region in Context of NEP 2020

PAC-23.23

Programme Coordinators

Prof. (Capt.) Rashmi Singhai

Dr. Kalpana Maski

Regional Institute of Education, Bhopal
National Council of Educational Research and Training 2024-25

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Preface

In the ever-evolving education system, the integration of Information and Communication Technology (ICT) has emerged as a transformative force, reshaping teaching and learning methodologies to meet the dynamic demands of the 21st century. With the advent of the National Education Policy (NEP) 2020, which envisions a holistic and inclusive educational framework for the nation, the imperative to harness the potential of ICT in science education has never been more pronounced.

It is with great pleasure and anticipation that we organized the Capacity Building Programme on the Integration of ICT in Science Education, from March 19-21, 2025 at Palitana Gujarat, this programme represents a significant milestone in our collective efforts to modernize and enhance science education in alignment with the transformative goals of the National Education Policy (NEP) 2020.

This capacity-building programme on the integration of ICT in science education, contextualized within the ambit of NEP 2020, represents a concerted effort to empower educators with the knowledge, skills, and tools necessary to navigate this digital paradigm shift effectively. By leveraging ICT tools and resources, educators can create immersive and engaging learning experiences that foster critical thinking, creativity, and scientific inquiry among students.

With NEP 2020 emphasizing the importance of holistic and experiential learning, this programme seeks to engage participants in a journey of exploration and discovery, equipping them with practical strategies for integrating ICT seamlessly into science instruction. Through interactive workshops, hands-on activities, and collaborative discussions, participants will delve into innovative pedagogical approaches, explore emerging technologies, and discover best practices for leveraging ICT to enhance teaching and learning outcomes in science education.

We are deeply grateful to GCERT Gandhi Nagar & DIET Bhavnagar Gujarat for graciously hosting this programme at Palitana Gujarat and providing a conducive environment for professional development and collaboration. We extend our heartfelt appreciation to the organizing committee, facilitators, and administrative staff for their tireless efforts in conceptualizing and executing this initiative.

We extend our sincere gratitude to all the participants for their dedication to professional development and their willingness to embrace change in service of student success.

Together, let us embrace the transformative potential of ICT in science education, empowering educators to inspire curiosity, foster creativity, and cultivate a lifelong love for learning among their students.

Prof. (Capt.) Rashmi Singhai
Dr. KalpanaMaski
(Programme Coordinators)

Acknowledgement

We humbly acknowledge the grace and blessings of Almighty God, whose guidance and support have been ever-present throughout our journey. We are grateful for the strength, wisdom, and providence bestowed upon us, enabling us to undertake this endeavor with purpose and determination.

We are deeply grateful to Professor Jaydip Mandal, Principal of RIE, whose guidance and visionary leadership throughout the capacity-building program have been invaluable.

We extend our sincere gratitude to Professor Chitra Singh, Head Extension Education, for her kind support throughout the capacity-building program. Her invaluable assistance has been instrumental in ensuring the success of this endeavor.

We are particularly grateful to Dr. Santosh Kumar, Dr. Nilesh Chapaneri , Mr. Amit Majithiya and Mr Nilesh Nathani whose expertise and guidance as Resource Persons have enriched this work immeasurably.

Their invaluable contributions have enriched the learning experience and empowered educators to embrace innovative teaching methodologies. We are deeply grateful for their dedication and commitment for enhancing science education.

We extend our sincere gratitude to the administrative staff of RIE for their dedicated support and seamless coordination throughout the capacity-building program on the integration of ICT in science education. Their efficiency and professionalism have been instrumental in ensuring the smooth execution of various aspects of the program, contributing significantly to its success. We deeply appreciate their hard work and commitment to excellence.

We also extend our sincere thanks to DIET Principal Bhavnagar, Mr. Hiren Bhatt and the entire team for their unwavering support and commitment to excellence, which has been fundamental in realizing the objectives of this initiative.

Prof. (Capt.) Rashmi Singhai

Dr. Kalpana Maski

Programme Coordinators

Capacity Building Program on Integration of ICT in Science Education for Western Region in Context of NEP 2020

List of Resource Persons

1. Mr. Hiren Bhatt: DIET Principal, Bhavnagar Gujarat
2. Dr. Rajeshree Aundhiya: DIET Bhavnagar
3. Dr. Nilesh Chapaneri: DIET Principal Amreli Gujarat
4. Mr. Nilesh Nathani: Head Teacher Gundala KV School Sihor Bhavnagar
5. Mr. Amit Majithiya: Assistant Teacher Vartej KV School Bhavnagar
6. Dr. Santosh Kumar, Regional Institute of Education, NCERT Bhopal
7. Dr. Kalpana Maski, Regional Institute of Education, NCERT Bhopal
8. Prof. (Capt.) Rashmi Singhai, Regional Institute of Education, NCERT Bhopal

Introduction

In the wake of the National Education Policy (NEP) 2020's forward-looking directives, the integration of Information and Communication Technology (ICT) into education has emerged as a pivotal avenue for transforming pedagogical practices. Against this backdrop, capacity-building programs focusing on the integration of ICT in science education have garnered significant attention. These programs serve as essential platforms for educators to acquire the requisite knowledge, skills, and strategies to harness the potential of ICT in enriching the teaching and learning of science subjects. The NEP 2020, with its emphasis on fostering holistic and experiential learning experiences, underscores the importance of leveraging ICT as a catalyst for innovation and inclusivity in education. As such, capacity-building initiatives adapted to the principles of NEP 2020 play a crucial role in empowering educators to adapt to the evolving educational system and equip students with the competencies needed to thrive in the digital age.

In this connection, Regional Institute of Education, NCERT Bhopal organized three-day capacity building program on integration of ICT in Science Education in context of NEP 2020, from March 19-21 2025, at Bangalore Bhavan, Palitana, Gujarat. This program, aimed to the commitment towards enhancing science education in alignment with the visionary National Education Policy (NEP) of 2020. With a group of 56 enthusiastic participants from various districts of Gujarat, this program aimed to equip educators with innovative strategies and tools to effectively integrate ICT into science teaching practices. Through interactive workshops, hands-on sessions, and insightful discussions, participants embarked on a journey to explore the transformative potential of ICT in enriching science education experiences. Under the guidance of esteemed experts and facilitators, attendees delved into various facets of ICT integration, fostering a collaborative learning environment conducive to professional growth and development. The program at Palitana, Gujarat served as a beacon of innovation and excellence, empowering educators to embrace technology as a catalyst for nurturing critical thinking, inquiry-based learning, and scientific literacy among students. Total seventeen sessions took place during the capacity building programme. These sessions collectively provided participants with a comprehensive understanding of ICT tools and methodologies tailored for science education, empowering them to enhance their teaching practices in alignment with contemporary educational paradigms.

The detailed descriptions of the sessions are presented below in sequential order.

Day-1

March19, 2025

Time: 9.00 -9.30 am

Registration and Inaugural Session

*"**The secret of getting ahead is, getting started**"*, with this objective to facilitate the teaching learning process in order to promote critical thinking and innovations, Regional Institute of Education, NCERT Bhopal had 3 days Capacity building programme on Integration of ICT in Science Education, In the light of NEP-2020 was organized at Bangalore Bhavan, Palitana Bhavnagar, Gujarat from March 19-21, 2025. The initiative sought to equip educators with the requisite tools, methodologies, and insights necessary to leverage technology effectively in the teaching and learning of science, thereby catalyzing transformative educational practices in accordance with contemporary educational paradigms.

Commencing with the inaugural session on March 19, 2025, the capacity-building program witnessed the esteemed presence of notable dignitaries who lent their expertise and insights to the occasion. Among the distinguished figures gracing the event were Prof.(Capt.)Rashmi Singhai, renowned for her contributions in the field of ICT, Dr. Kalpana Maski, a stalwart in Science Pedagogy and Mr. Hiren Bhatt, a respected authority from DIET Bhavnagar. Their collective presence underscored the significance of the endeavor and set the tone for an enriching and productive discourse on the integration of ICT in science education within the framework of the NEP 2020.


During the inaugural session, Dr. Kalpana Maski, assumed the role of formally welcoming the esteemed gathering and introducing the significance of the capacity-building program. With eloquence and insight, Dr. Maski underscored the importance of such initiatives in fostering professional growth and development among educators. She emphasized how the program aimed not only to enhance pedagogical practices but also to empower educators with the necessary skills and competencies to effectively integrate Information and Communication Technology (ICT) into science education. Dr. Maski's remarks set the stage for an engaging and purposeful exchange, highlighting the transformative potential of the program in shaping the educational landscape in alignment with the mandates of the NEP 2020.

In her address, Prof. (Capt.) Rashmi Singhai, Head DESM, and Programme Coordinator, eloquently articulated the imperative for embracing child-centric learning methodologies in tandem with the ethos of the NEP 2020. With a keen understanding of contemporary educational paradigms, Prof. Singhai elucidated on the necessity of prioritizing the needs and interests of the learners, emphasizing their active engagement and participation in the learning process. Furthermore, she elucidated on the pivotal role of media and technology in facilitating immersive and interactive learning experiences, thereby fostering deeper understanding and retention among students. Prof. Singhai's insightful discourse underscored the crucial synergy between innovative pedagogical approaches and the overarching goals of the NEP 2020, positioning the integration of media and technology as catalysts for educational transformation. Additionally, she extended her gratitude to the Gujarat Council of Education, Research & Training (GCERT) Gujarat for their unwavering support and collaboration, acknowledging their instrumental role in facilitating the successful execution of the program.

Concluding the inaugural session, Mr. Hiren Bhatt extended heartfelt gratitude to all participants for their presence and engagement in the program. Drawing from his wealth of experience, Dr. Bhatt emphasized the paramount importance of nurturing experiential learning among students, advocating for a pedagogical approach on "learning by doing." He underscored the transformative impact of hands-on experiences in fostering deep understanding and mastery of concepts, urging educators to cultivate environments conducive to active exploration and discovery. Furthermore, Dr. Bhatt shared personal anecdotes, highlighting the power of a positive mindset in navigating challenges and transforming adversity into opportunities for growth and innovation. Encouraging all attendees to approach their roles with enthusiasm and resilience, he called for collective commitment to driving positive change in education through active participation and collaboration. Dr. Bhatt's poignant remarks resonated with the audience, inspiring a renewed sense of purpose and determination as they embarked on their journey towards empowering the next generation of learners.

Day-1

March 19 , 2025

Session-I
Time: 9.30-10.45 pm

Title: Experience Sharing on ICT in Schools of UK

Resource Person: Mr. Hiren Bhatt

The session titled "**Experience Sharing on ICT in Schools of UK**" was conducted on Day 1, March 19, 2025 (Session-I) from 9:30 AM to 10:45 AM. The resource person, Mr. Hiren Bhatt from DIET Bhavnagar, provided valuable insights into the integration of Information and Communication Technology (ICT) in schools in the United Kingdom (UK). The session focused on sharing experiences, best practices, and innovative approaches adopted by UK schools to enhance teaching and learning through digital tools and technology-driven methodologies.

Mr. Bhatt highlighted how ICT has revolutionized education in the UK by promoting interactive and student-centric learning environments. He discussed the widespread use of smart classrooms, artificial intelligence (AI)-based learning systems, digital assessments, and online collaborative platforms that have transformed traditional teaching methods. Special emphasis was given to how technology supports personalized learning, enabling students to progress at their own pace with the help of adaptive learning platforms.

The session also explored the role of teacher training and professional development in effectively integrating ICT into classrooms. Mr. Bhatt shared insights into the UK's structured approach to digital literacy, coding education, and STEM-based learning, which equips students with 21st-century skills. He elaborated on how schools leverage virtual reality (VR) and augmented reality (AR) to provide immersive learning experiences, making subjects like science and mathematics more engaging and comprehensible.

Moreover, the discussion covered government policies, infrastructure development, and

challenges faced in implementing ICT in education. Mr. Bhatt compared the UK's strategies with the Indian context, encouraging participants to reflect on how similar practices could be adapted to improve digital education in Indian schools. The session concluded with an interactive discussion where educators shared their perspectives, exchanged ideas, and explored the feasibility of implementing ICT-driven innovations in their own teaching environments. Overall, the session served as an enriching experience, inspiring participants to embrace technology for enhanced learning outcomes and a future-ready education system.

Day-1

March 19, 2025

Session-II

Time: 10.45-12.00 Noon

Title: ICT in Sc. Edu. in context of NEP 2020 & NCFSE 2023

Resource Person: Prof. (Capt.) Rashmi Singhai

The session **"ICT in Science Education in the Context of NEP 2020 & NCFSE 2023"**, held on March 19, 2025 (Session-II) from 10:45 AM to 12:00 Noon, was an insightful discussion on the transformative role of technology in science education. **Prof. Rashmi Singhai**, an esteemed expert from the Regional Institute of Education, NCERT Bhopal, led the session, emphasizing the integration of Information and Communication Technology (ICT) in teaching and learning as envisioned by the National Education Policy (NEP) 2020 and the National Curriculum Framework for School Education (NCFSE) 2023. Prof. Singhai elaborated on how ICT can be effectively utilized to enhance science education by promoting experiential and inquiry-based learning. She discussed various digital tools, interactive simulations, virtual laboratories, and AI-driven learning platforms, which can help students visualize complex scientific concepts and conduct experiments in a virtual environment. She highlighted how these technological advancements bridge the gap between theoretical knowledge and practical application, making learning more engaging, interactive, and student-centric.

Additionally, the session explored the role of ICT in personalized learning, allowing students to learn at their own pace through adaptive technologies. Prof. Singhai also addressed the significance of open educational resources (OERs) and online collaborative platforms in fostering a culture of shared learning. She stressed the importance of teacher training and capacity-building programs to ensure educators are well-equipped to integrate ICT into their teaching methodologies.

Furthermore, the discussion linked ICT integration with the core objectives of NEP 2020 and NCFSE 2023, emphasizing multidisciplinary learning, digital literacy, and 21st-century skill development. The session also touched upon ethical considerations in using technology, the digital divide, and strategies for ensuring equitable access to ICT resources for all students, including those in rural and underprivileged areas.

Overall, the session provided a comprehensive understanding of the transformative potential of ICT in science education. It encouraged educators to adopt innovative teaching practices, aligning with national policies and global trends to enhance the quality, accessibility, and effectiveness of science education in India. The session concluded with an engaging discussion, where participants shared their perspectives on challenges and best practices in implementing ICT in science classrooms.

Day-1

March 19, 2025

Session-III

Time: 12.00 – 1.15 PM

Title: Challenges and Opportunities in ICT

Resource Person: Dr. Kalpana Maski

The session "**Challenges and Opportunities in ICT**" was conducted on Day 1, March 19, 2025 (Session-III) from 12:00 PM to 1:15 PM. The resource person, Dr. Kalpana Maski from the Regional Institute of Education, NCERT Bhopal, provided an insightful discussion on the role of Information and Communication Technology (ICT) in education, highlighting both its potential benefits and the challenges associated with its implementation. She emphasized how ICT has the power to enhance teaching and learning experiences, making education more interactive, engaging, and accessible.

In her session, Dr. Kalpana took the lead with a focus on learner-centered education and the integral role of Information and Communication Technology (ICT) in facilitating flexible learning environments. Dr. Kalpana underscored the importance of shifting the educational paradigm towards a learner-centric approach, emphasizing the need for flexibility in teaching and learning processes. Moreover, Dr. Kalpana emphasized the crucial role of teachers in bridging the gap between content and learning outcomes. Through thoughtful integration of ICT tools and methodologies, educators can effectively scaffold learning experiences that cater to the diverse needs and learning styles of students. ICT makes easy to achieve the skill of creativity so that our students can compete globally. Using ICT presentation of content is more effective in classroom, also focus is on “teach less and learn more” methodology of teaching learning. The technology should be used as per the age and locality so that we can redirect and refocus ideas of students.

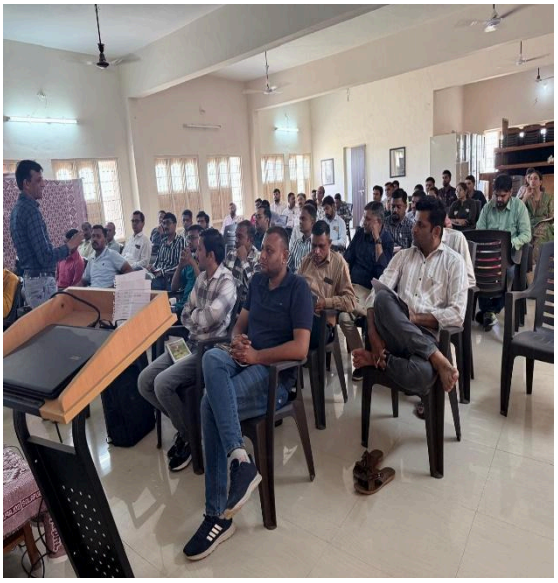
Teaching learning process should go from known to unknown concepts easy topic to tough. To plan activities one should follow PPT meaning Plan & Prepare as per time and locality. Main focus should be on plan so that execution is smooth, while explaining softwares like Netlogo which makes concept of pressure, temperature and volume easy to understand. Algodoo for physics simulations, optic concepts, friction etc. She added ICT helps learning to remain for longer period of time as it involves senses of student's increases critical thinking among students. It also focuses on skill development in learner. Teachers need to be active to make students active, they should also understand psychology of student to make the learning process to go with their pace of understanding and also should build a good relationship with them to make the entire process effective. Central to Dr. Kalpana's discourse was the notion that ICT serves as a powerful tool for visualizing abstract concepts and facilitating hands-on learning experiences. By incorporating ICT into the teaching-learning process, educators can create opportunities for students to engage with content in dynamic and interactive ways, thereby enhancing comprehension and retention. Her insights served as a catalyst for educators to reflect on their pedagogical practices and explore innovative strategies for empowering learners in the digital age.

The session concluded with an interactive discussion where participants shared their experiences, concerns, and innovative solutions for integrating ICT effectively. Dr. Maski encouraged educators to embrace technology as a tool for empowerment and to explore blended learning models, gamification, and AI-based solutions for a more effective and future-ready education system. The session provided valuable insights into how ICT can be leveraged to transform education while addressing its inherent challenges, paving the way for a digitally inclusive and innovative learning ecosystem.

Day-1
March 19, 2025
Session-IV
Time: 2.00 – 3.15 PM
Title: Use of ICT in Science Education-1
Resource Person: Dr. Neelesh Chapaneri

On 19th March 2025 (Session-III) from 12:00 PM to 1:15 PM, the session titled "**Use of ICT in Science Education-1**" was conducted by Dr. Neelesh Chapaneri, Principal of DIET Amreli, Gujarat. Dr. Chapaneri provided a comprehensive overview of the importance of

Information and Communication Technology (ICT) in science education, specifically in the context of the National Education Policy (NEP) 2020. Dr. Chapaneri provided a detailed explanation of the ICT-related aspects covered in NEP 2020, specifically referencing Chapters 23 and 24, which emphasize digital learning, technological advancements, and the role of ICT in bridging educational gaps. He highlighted how ICT can be integrated into science classrooms to facilitate experiential learning, conceptual clarity, and inquiry-based education.

In the session, Dr. Chapaneri encouraged science teachers to utilize a variety of public platforms that offer valuable resources for enhancing science education. He provided detailed information about platforms such as OLABS (Online Labs), PHET (Interactive Simulations), CIET (Central Institute of Educational Technology), and NDL (National Digital Library). He highlighted the importance of these platforms in offering interactive experiments, virtual labs, and multimedia resources that can help students better understand complex scientific concepts. By showcasing these resources, Dr. Chapaneri aimed to inspire teachers to incorporate digital tools into their classrooms, making science education more engaging, accessible, and practical. The session concluded with an interactive discussion, where educators shared their perspectives on challenges and best practices for integrating ICT into science education. Dr. Chapaneri motivated teachers to adopt digital tools and online resources to create a dynamic and student-centric learning environment. The session served as a valuable learning experience, reinforcing the significance of ICT in transforming science education and making it more accessible, innovative, and aligned with the vision of NEP

2020.

Day-1

March 19, 2025

Session-V

Time: 3.15 - 4.30 PM

Title: AI Tools in Science

Resource Person: Mr. Amit Majithiya

The session "**AI Tools in Science**" was conducted on Day 1, 19th March 2025 (Session-V) from 3:15 PM to 4:30 PM, led by Mr. Amit Majithiya, a teacher at Vartej Kanya School, Bhavnagar, Gujarat. The session focused on the integration of AI-powered applications in science education, demonstrating how advanced digital tools can help students and teachers visualize, simulate, and explore scientific concepts in an engaging and interactive manner.
Mr. Majithiya provided a detailed demonstration of various AI-driven applications available on Android and iOS, which enable real-time simulations in different branches of science. He introduced applications such as Human Atlas, Chemistry Lab, Heart Insite, and Planet AR, each offering interactive and 3D visualizations of scientific phenomena. Human Atlas provided a detailed anatomical representation of the human body, enabling students to explore organs and systems in depth. Heart Insite offered a real-time simulation of heart functions, allowing students to understand blood circulation and cardiac mechanisms through an immersive experience. Chemistry Lab acted as a virtual laboratory, where students could conduct chemical experiments safely without the need for physical lab equipment. Planet AR brought astronomical concepts to life, helping students visualize planets, their movements, and celestial events using augmented reality.

To ensure active participation, every trainee was encouraged to download these applications and engage in hands-on activities. The interactive approach made the session highly

engaging, visually appealing, and educational. Teachers and trainees explored different functions of these applications, conducted simulated experiments, and interacted with AI-generated scientific models, making the session a truly immersive learning experience.

Mr. Majithiya emphasized that AI tools are not just supplementary aids but essential resources that can revolutionize science education. He explained how AI-driven learning platforms enhance students' understanding by providing dynamic, real-time simulations that traditional textbooks and lectures cannot offer. He also discussed the importance of incorporating AI in modern classrooms to help students develop analytical thinking, problem-solving skills, and a deeper understanding of scientific concepts.

The session also addressed the practical benefits of AI in science education, such as reducing dependency on physical labs, ensuring safety in experiments, and enabling remote learning. Mr. Majithiya shared real-world applications of AI in science, including its use in medical research, space exploration, and environmental studies. He highlighted how AI-powered tools are being used to analyze climate data, predict natural disasters, and develop new medical treatments, encouraging students to think beyond textbooks and explore scientific advancements driven by AI.

Towards the end of the session, Mr. Majithiya invited participants to share their experiences and discuss how they could integrate AI tools into their own teaching practices. Many educators expressed enthusiasm about adopting these applications in their classrooms, noting that they make learning more interactive, engaging, and student-centered.

The session concluded with a discussion on future trends in AI-driven education, emphasizing that AI is not a replacement for teachers but a powerful tool to support and enhance teaching methodologies. Mr. Majithiya encouraged educators to stay updated with emerging technologies, experiment with AI-powered resources, and leverage digital tools to create a more dynamic and innovative learning environment. The session was highly insightful, inspiring, and transformative, leaving participants with practical knowledge and new perspectives on AI integration in science education.

Day-1

March 19, 2025

Session-VI

Time: 4.30 – 5.45 PM

Title: Implementation of ICT in Classrooms

Resource Person: Dr. Rajeshree Anudhiya

In this session led by Dr. Rajeshree Anudhiya from DIET Bhavnagar, the spotlight was firmly on the practical implementation of Information and Communication Technology (ICT) in science education within school settings. Dr. Anudhiya delved into how the integration of ICT can not only cultivate critical thinking and analytical skills but also create an inclusive learning environment catering to visually challenged students. The session focused on the effective integration of Information and Communication Technology (ICT) in classroom teaching, emphasizing its role in enhancing learning experiences, engaging students, and improving instructional strategies. Emphasizing the versatility of ICT tools, she explored avenues such as distance education and flipped classrooms, showcasing their potential to revolutionize traditional teaching methods.

Furthermore, she illuminated how ICT can demystify complex scientific concepts, offering examples such as simulations, animations, and virtual labs to elucidate abstract ideas. She underscored the importance of employing various teaching methods to enhance classroom engagement, citing the use of digital projectors and interactive whiteboards as effective tools in this endeavor. Dr. Anudhiya highlighted that the use of ICT tools aligns with the objectives of the National Education Policy (NEP) 2020, which encourages the adoption of digital resources to create an interactive and student-centered learning environment.

During the session, Dr. Anudhiya discussed various ICT-based teaching methodologies, including the use of multimedia presentations, digital whiteboards, online collaborative platforms, and e-learning resources. She demonstrated how teachers can incorporate educational software, virtual labs, and digital assessments to make lessons more engaging

and accessible. Special attention was given to interactive learning platforms like DIKSHA, SWAYAM, and e-Pathshala, which provide open educational resources that teachers can use to enhance their instructional delivery.

Additionally, the session explored the importance of using ICT for differentiated learning, where students can progress at their own pace using adaptive learning technologies. Dr. Anudhiya introduced tools like Google Classroom, Microsoft Teams, and AI-powered learning assistants, which facilitate personalized instruction, collaborative learning, and instant feedback. She also discussed the benefits of gamification in education, showcasing how game-based learning apps and simulations can make complex subjects more engaging and enjoyable for students.

A key focus of the session was overcoming challenges in ICT implementation, such as lack of infrastructure, teacher training, and digital literacy among students. Dr. Anudhiya emphasized the need for continuous professional development for teachers to effectively integrate technology into their teaching practices. She encouraged educators to explore free and accessible online training programs to enhance their ICT skills.

The session concluded with an interactive discussion, where participants shared their experiences, challenges, and success stories related to ICT integration in classrooms. Dr. Anudhiya provided practical solutions for overcoming barriers and encouraged educators to embrace digital transformation in education. The session was insightful and highly engaging, equipping teachers with valuable knowledge and tools to implement ICT effectively in their classrooms, thereby fostering a more dynamic, inclusive, and technology-driven learning environment.

Day-2
March 20, 2025
Session-VII
Time: 9.30 – 10.45 PM
Title: Initiatives of ICT By Gujarat State
Resource Person: Mr. Hiren Bhatt

The session "Initiatives of ICT by Gujarat State" was conducted on Day 2, 20th March 2025 (Session-VII) from 9:30 PM to 10:45 PM, led by Mr. Hiren Bhatt from DIET Bhavnagar, Gujarat. The session focused on various ICT-driven initiatives launched by the Gujarat state government to enhance digital learning, teacher training, and classroom technology

integration. Mr. Bhatt provided an in-depth overview of how Gujarat has embraced ICT to revolutionize education, ensuring that students and teachers have access to digital tools, online learning platforms, and innovative teaching methodologies.

During the session, Mr. Bhatt highlighted key initiatives such as Gyankunj, Digital Learning Centers, and the use of Virtual Classrooms, which have significantly improved teaching and learning experiences in government schools. He explained how Gyankunj has transformed traditional classrooms into smart classrooms by equipping them with interactive digital boards, projectors, and e-content. Additionally, he discussed the role of SANDHAN, Gujarat's satellite-based education program, which enables students in remote areas to access high-quality digital lessons.

Mr. Bhatt also emphasized the importance of teacher capacity-building programs, such as ICT training workshops and online certification courses, designed to enhance digital literacy and pedagogical skills among educators. He introduced platforms like DIKSHA Gujarat, which provides curriculum-based digital resources, assessment tools, and professional development modules for teachers. Moreover, he discussed the use of mobile learning applications and AI-powered educational tools that are helping students engage with science, mathematics, and languages more effectively.

He encouraged educators to adopt a blended learning approach, combining traditional teaching with digital resources to make learning more interactive, personalized, and effective.

The session concluded with an interactive discussion, where participants shared their experiences with ICT tools and suggested ways to improve digital education in Gujarat. Mr.

Bhatt encouraged teachers to actively engage with available ICT resources, experiment with e-learning platforms, and contribute to the state's vision of a technology-driven education system. The session provided valuable insights into Gujarat's ICT initiatives, inspiring educators to integrate digital innovations into their teaching practices for a more inclusive and future-ready education system.

Day-2
March 20, 2025
Session-VIII
Time: 10.45 – 12.00 Noon
Title: Online Assessment Tools for Science Evaluation
Resource Person: Mr. Neelesh Nathani

The session "**Online Assessment Tools for Science Evaluation**" was conducted on Day 2, 20th March 2025 (Session-VIII) from 10:45 AM to 12:00 Noon, led by Mr. Neelesh Nathani, Head Teacher at Galad KV School, Sihor, Bhavnagar. This session focused on the use of digital tools for assessing students' understanding of scientific concepts, with a special emphasis on interactive and engaging assessment methods.
Mr. Nathani provided a detailed demonstration of the Kahoot platform, showcasing how it can be used to create interactive quizzes, conduct real-time assessments, and enhance student engagement in science education. He guided participants through the process of designing quizzes, explaining how to onboard students, customize questions, and share assessments seamlessly. The session highlighted how game-based learning and online assessment tools can make science evaluation more engaging, dynamic, and effective.

In addition to Kahoot, Mr. Nathani discussed the importance of digital assessment tools in modern education, emphasizing how they allow for instant feedback, data-driven insights, and personalized learning experiences. He encouraged teachers to explore other AI-powered platforms and interactive tools, such as Google Forms, Quizizz, and Mentimeter, which enable adaptive learning and formative assessment.

Throughout the session, participants actively engaged in hands-on activities, experiencing firsthand how gamification and digital assessments can boost student motivation, enhance learning outcomes, and make classroom interactions more lively. The session concluded with an interactive discussion, where educators shared their thoughts on integrating online assessment tools into their teaching practices. Mr. Nathani encouraged teachers to embrace digital assessments, emphasizing that such tools help in making science education more engaging, effective, and student-centered. The session provided valuable insights into the future of online evaluation, equipping educators with practical knowledge to implement technology-driven assessment strategies in their classrooms.

Day-2
March 20, 2025
Session-IX
Time: 12.00 – 1.15 PM
Title: ICT Based Science Experiments and Virtual Labs
Resource Person: Dr. Santosh Kumar

The session "**ICT-Based Science Experiments and Virtual Labs**" was conducted on Day 2, 20th March 2025 (Session-VIII) from 10:45 AM to 12:00 Noon, led by Dr. Santosh Kumar from the Regional Institute of Education, NCERT Bhopal. The session focused on the importance of integrating virtual labs and ICT-based experiments into science education, highlighting how digital tools can make science learning more engaging, interactive, and accessible.


Dr. Santosh Kumar provided a detailed presentation on the OLAB (Online Lab) platform, showcasing its features, functionalities, and applications in conducting virtual science experiments. He explained how OLAB serves as a powerful interactive platform, allowing students to perform experiments in Physics, Chemistry, and Biology without the need for a physical laboratory. He emphasized that virtual labs are particularly beneficial for schools with limited laboratory resources, as they provide a cost-effective and scalable solution for science education.

In addition to OLAB, Dr. Kumar discussed various interactive platforms and digital tools designed to enhance scientific inquiry and experimentation in classrooms. He introduced teachers to AI-driven simulations, augmented reality (AR) applications, and online science modules, which help students visualize complex concepts, conduct experiments in real-time, and analyze results with greater accuracy. He also highlighted the role of virtual labs in promoting inquiry-based learning, encouraging students to develop scientific reasoning, critical thinking, and problem-solving skills.

Throughout the session, Dr. Kumar provided live demonstrations of ICT-based experiments, illustrating how teachers can integrate virtual lab activities into their lesson plans to make science education more engaging and interactive. He stressed the need for educators to embrace digital tools and platforms, ensuring that students receive hands-on experience in scientific experimentation, even in resource-constrained environments. And also talked about the interactive platform which is useful for making science education interesting in the classroom.

The session concluded with an interactive discussion, where participants shared their experiences and explored ways to implement virtual lab tools in their teaching practices. Dr.

Kumar encouraged teachers to explore the potential of ICT in science education, emphasizing that technology can bridge gaps in access to quality education and create a dynamic and immersive learning environment for students. The session provided valuable insights into the future of digital science education, inspiring educators to integrate virtual labs and ICT-based experiments into their classrooms for a more effective and engaging learning experience.

Day-2
March 20, 2025
Session-X
Time: 2.00 – 3.15 PM
Title: Digital Initiative in Science Education
Resource Person: Mr. Amit Majithiya

The session "**Digital Initiative in Science Education**" was conducted on Day 2, 20th March 2025 (Session-XI) from 2:00 PM to 3:15 PM, led by Mr. Amit Majithiya from KV School, Bhavnagar. This session focused on leveraging digital tools and emerging technologies to enhance science education, making it more interactive, engaging, and accessible for students and teachers alike.

Mr. Majithiya introduced various ICT-based tools that have transformed science teaching, including smart classrooms, virtual labs, augmented reality (AR), artificial intelligence (AI)-powered applications, and interactive learning platforms. A major highlight of the session was the introduction of Looker Studio (formerly Google Data Studio) and Canva, two powerful digital tools that can be utilized in science education and assessment. Mr.

Majithiya demonstrated how Looker Studio can be used by educators to analyze and visualize student performance data, helping them track learning progress through interactive dashboards and reports. He also showcased Canva, a user-friendly graphic design platform, explaining how teachers can create engaging science presentations, infographics, and educational posters to make complex topics more visually appealing and understandable for students.

Throughout the session, Mr. Majithiya emphasized the importance of blended learning approaches, where traditional teaching methods are supplemented with digital tools to create a more immersive and student-centric learning experience. He encouraged educators to explore AI-powered assessment tools, gamified learning platforms, and collaborative online resources, all of which contribute to enhanced student engagement and deeper conceptual understanding.

The session concluded with an interactive discussion, where participants shared their insights and explored strategies to effectively implement digital tools in their teaching practices. Mr. Majithiya stressed the importance of continuous professional development and encouraged educators to embrace digital transformation in science education. The session provided valuable insights into the future of education technology, equipping teachers with the knowledge and skills to leverage ICT tools for a more dynamic, effective, and engaging learning environment.

Day-2

March 20, 2025

Session-XI

Time: 3.15 – 4.30 PM

Title: Use of ICT in Science Education-2

Resource Person: Dr. Nilesh Chapaneri

The session "**Use of ICT in Science Education-2**" was conducted on Day 2, 20th March 2025 (Session-XI) from 3:15 PM to 4:30 PM, led by Dr. Nilesh Chapaneri from DIET Amreli, Gujarat. This session was a continuation of the discussion on the effective integration of ICT in science education, focusing on advanced digital tools, interactive resources, and innovative pedagogical approaches to enhance classroom teaching and student engagement.

Dr. Chapaneri began the session by emphasizing the transformative role of ICT in science education, stating that digital tools not only help in conceptual clarity but also make learning more interactive and accessible. He introduced various government initiatives and open-source platforms, including OLABS (Online Labs), PHET Interactive Simulations, CIET (Central Institute of Educational Technology) resources, and the National Digital Library (NDL). These platforms provide students with virtual hands-on experiences, helping them visualize complex scientific phenomena and conduct experiments digitally, even in resource-constrained settings.

A key highlight of the session was the demonstration of AI-based and cloud-based educational tools that are revolutionizing science teaching. Dr. Chapaneri showcased adaptive learning platforms, AI-powered assessment tools, and real-time data analysis software, allowing teachers to track student performance, identify learning gaps, and

personalize instruction accordingly. He also demonstrated the use of Google Looker Studio, explaining how educators can use data visualization and analytics to monitor student progress, attendance, and assessment results in an organized and insightful manner.

In addition, the session covered content creation tools like Canva, which enable educators to design visually appealing lesson materials, infographics, presentations, and educational posters to make complex scientific topics more understandable and engaging for students. Dr. Chapaneri emphasized how interactive content and multimedia integration enhance student interest and retention, making the learning process more immersive and impactful.

Participants actively engaged in hands-on exercises, exploring ICT tools for digital lesson planning, online assessments, and virtual science experiments. Dr. Chapaneri encouraged teachers to adopt a blended learning approach, integrating traditional teaching methods with digital platforms to create a more dynamic, student-centered classroom environment.

The session concluded with an interactive discussion, where teachers shared their experiences and discussed the challenges and best practices of implementing ICT in science education. Dr. Chapaneri stressed the importance of continuous professional development and digital literacy among educators, urging them to stay updated with emerging technologies and innovative teaching methodologies.

Overall, the session provided valuable insights into the future of science education through ICT, equipping teachers with practical skills and digital resources to enhance teaching effectiveness, student engagement, and scientific inquiry in the modern classroom.

Day-2

March 20, 2025

Session-XII

Time: 4.30 – 6.00 PM

Title: Visit to Jambodweep Science Museum and PM Shri school Jhaliya

Resource Person: Prof. Rashmi Singhai and Dr. Kalpana Maski

The educational visit to Jambodweep Science Museum, Palitana, and PM Shri School, Jhaliya, on 20th March 2025 (Session-XII) was led by Prof. (Capt.) Rashmi Singhai and Dr. Kalpana Maski from RIE, NCERT Bhopal. At the museum, educators explored various misconceptions in science and watched a small movie on about these misconceptions for eg. earth is not round it is flat etc. The visit to PM Shri KV School, Jhaliya, showcased ICT-integrated classrooms and digital teaching methodologies aligned with NEP 2020 and NCFSE 2023. All amenities and facilities were as per an inclusive classroom and according to NEP 2020. The Mid day meal area was clean and proper hygienic conditions were also seen. A good sense of responsibility and awareness regarding saving the environment was also visible. The session concluded with discussions on leveraging digital tools and experiential learning to enhance science education, emphasizing technology-driven pedagogy for engaging and effective classroom instruction.

Day-3

March 21, 2025

Session-XIII

Time: 9.30 – 10.45 AM

Title: G-Shala Plus & GROWER

Resource Person: Mr. Hiren Bhatt

The morning session kicked off with a comprehensive report reading of the previous day's

sessions, setting the stage for another day of immersive learning. On Day 3, 21st March 2025 (Session-XIII) from 9:30 AM to 10:45 AM, Mr. Hiren Bhatt from DIET Bhavnagar conducted an insightful session on **G-Shala Plus & GROWER**, two advanced digital platforms aimed at enhancing teaching and learning through technology-driven solutions. He elaborated on how G-Shala Plus, an upgraded version of Gujarat's G-Shala (Gujarat Student Holistic Adaptive Learning App), provides interactive content, AI-based personalized learning, adaptive assessments, and real-time student progress tracking, making it a valuable tool for both teachers and students.

Mr. Bhatt then introduced GROWER (Gujarat Online Resource for Education and Research), a comprehensive digital repository offering e-content, lesson plans, simulations, assessment tools, and research-based learning materials. He demonstrated how educators can access subject-specific resources, integrate digital tools into their curriculum, and enhance classroom engagement through ICT. The platform also enables teachers to collaborate, share best practices, and develop innovative pedagogical approaches for 21st-century education.

A major highlight of the session was the hands-on activity, where participants explored the functionalities of G-Shala Plus and GROWER, including creating digital lesson plans, designing interactive assessments, and utilizing AI-driven analytics to customize instruction based on student needs. Mr. Bhatt emphasized how these platforms align with NEP 2020's vision of digital education, fostering a blended learning approach that combines traditional teaching with modern technology.

He further discussed the role of data analytics and AI-based recommendations in tracking student performance, helping teachers identify learning gaps and personalize instruction effectively. Participants actively engaged in discussions, sharing their experiences and brainstorming ways to seamlessly integrate these platforms into their teaching methodologies.

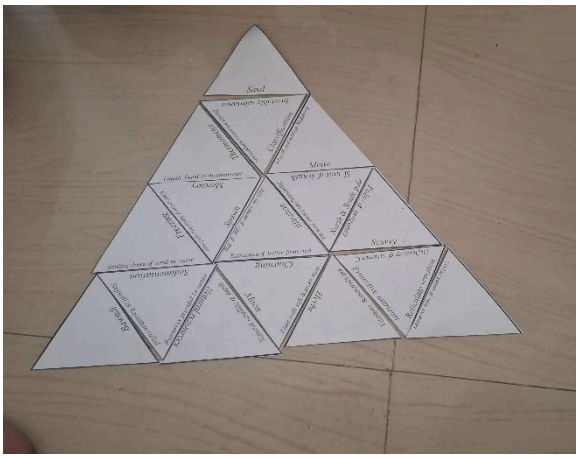
The session concluded with an interactive Q&A, where Mr. Bhatt addressed queries on the practical application of G-Shala Plus & GROWER in different educational contexts. He encouraged teachers to embrace digital tools, continuously upgrade their ICT skills, and leverage these platforms to create more engaging, efficient, and student-centered learning environments. This session served as an eye-opener, showcasing the future of digital education in Gujarat and empowering educators to become tech-savvy facilitators of knowledge.

Day-3
March 21, 2025
Session-XIV
Time: 10.45 – 12.00 Noon
Title: Flipped Classroom
Resource Person: Prof. (Capt.) Rashmi Singhai

On Day 3, March 21, 2025 (Session-XIV) from 10:45 AM to 12:00 Noon, Prof. Rashmi Singhai from the Regional Institute of Education, NCERT Bhopal, conducted an insightful session on the **Flipped Classroom approach**. She introduced participants to this innovative

student-centered pedagogy, where students learn concepts at home through digital resources and engage in interactive problem-solving activities in the classroom.

To provide a hands-on experience, Prof. Singhai divided participants into pairs and introduced them to Tarsia software, a digital tool used to create interactive learning puzzles. Using Tarsia, she designed an activity where each group received 16 triangular-shaped pieces of paper, each containing a type of chemical reaction written in words or depicted as a chemical equation. Participants were tasked with arranging the pieces to form a complete triangle by matching the correct examples or names of chemical reactions. This collaborative and engaging activity demonstrated how digital tools like Tarsia can enhance active learning, problem-solving, and critical thinking in classrooms.



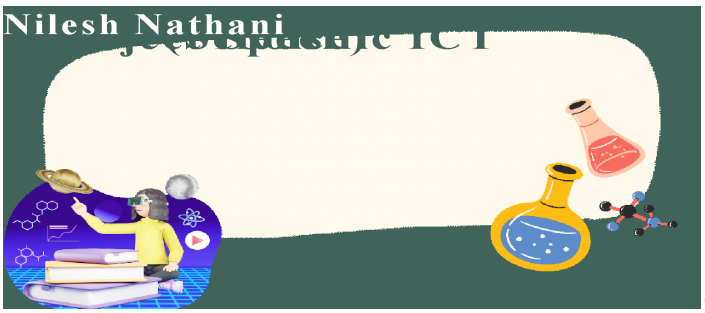
As educators worked through the interactive puzzle, they experienced the power of experiential learning, where students actively construct knowledge instead of passively receiving information. Prof. Singhai highlighted how Tarsia software can be used across subjects, allowing teachers to create customized matching exercises, sequencing activities, and revision games to make learning more engaging.

She further emphasized how the Flipped Classroom model aligns with NEP 2020, fostering student engagement, inquiry-based learning, and digital integration. The session concluded with Prof. Singhai sharing the well-known educational proverb, *"I hear, I forget. I see, I remember. I do, I understand."* This statement reinforced the idea that active participation and technology-enhanced learning lead to better retention and deeper understanding, inspiring educators to implement digital tools like Tarsia and adopt the Flipped Classroom approach for a more effective and student-centered learning experience.

Day-3
21th March 2025
Session-XV
Time: 12.00 – 1.15 PM
Title: Simulations in Science Education
Resource Person: Mr. Neelesh Nathani

On Day 3, 21st March 2025 (Session-XV) from 12:00 PM to 1:15 PM, Mr. Neelesh Nathani from Galada KV School, Sihor, Bhavnagar, conducted an engaging session on Simulations in Science Education. He emphasized the importance of digital simulations in making abstract scientific concepts more accessible and engaging for students. Mr. Nathani demonstrated various simulation-based platforms such as PHET Interactive Simulations, Stellarium, Java Lab, Cells alive, star walk, Chemix, and Quiver, showcasing how these tools can be integrated into science teaching to create virtual experiments and interactive learning experiences.

Participants explored real-time simulations of physics, chemistry, and biology experiments, allowing them to manipulate variables, observe cause-and-effect relationships, and analyze scientific phenomena in a risk-free virtual environment. He highlighted how simulations enhance conceptual understanding, develop scientific inquiry skills, and bridge the gap

between theoreti 

cal knowledge and practical application, especially in schools with limited access to physical lab resources.


The session also included a hands-on activity, where teachers experimented with PHET simulations to visualize topics such as electric circuits, chemical reactions, and force-motion relationships. Mr. Nathani guided educators on how to create inquiry-based lesson plans using simulations, making science lessons more interactive, student-centered, and aligned with NEP 2020's emphasis on digital learning and experiential education.

Concluding the session, he encouraged teachers to integrate simulation-based learning into their classrooms, emphasizing that technology-driven science education can significantly enhance student engagement, foster curiosity, and improve learning outcomes. The session provided valuable insights into the potential of simulations to transform traditional science education into an immersive and exploratory experience.

Day-3

March 21, 2025

Session-XVI

Time: 2.00 – 3.15 PM

Title: Gamification and Game Base Learning

Resource Person: Dr. Santosh Kumar

On Day 3, March 21, 2025 (Session-XVI) from 2:00 PM to 3:15 PM, an engaging session on Gamification and Game-Based Learning was conducted, emphasizing the role of interactive and competitive elements in enhancing student engagement and learning outcomes. The session highlighted the distinction between gamification—which involves integrating game-like elements such as badges, leaderboards, points, and rewards into the learning process—and game-based learning, which uses actual games to teach specific concepts.

Participants explored various digital and non-digital game-based learning strategies, including educational quizzes, simulation-based games, role-playing activities, and augmented reality (AR) applications. The session emphasized how such methods motivate

students, encourage active participation, and create a dynamic learning environment that aligns with NEP 2020's emphasis on experiential learning and student-centric pedagogy.

A hands-on activity was conducted, where teachers designed their own gamified lesson plans, incorporating points systems, challenge-based assessments, and interactive storytelling techniques. The session also explored how game-based learning fosters collaborative problem-solving, creativity, and critical thinking skills, making it an effective tool for teaching complex scientific concepts in an engaging manner.

The session concluded with a discussion on the benefits and challenges of gamification in education, including student motivation, accessibility, and the need for balanced implementation. Participants left with practical insights and strategies on integrating gamified learning experiences into their teaching practices, making education more engaging, interactive, and impactful.

Day-3
March 21, 2025
Session-XVII
Time: 3.15-4.30 PM
Title: Assessment and Evaluation in Science Education
Resource Person: Dr. Kalpana Maski

On Day 3, March 21, 2025 (Session-XVII) from 3:15 PM to 4:30 PM, a comprehensive session on Assessment and Evaluation in Science Education was conducted by Dr. Kalpana Maski, focusing on modern strategies and digital tools for effective assessment. The session emphasized the importance of formative and summative assessments in tracking student progress and ensuring conceptual clarity in science education. Various assessment models, including competency-based assessment, inquiry-driven evaluation, and project-based learning, were discussed to highlight how assessments can go beyond rote memorization to measure critical thinking, problem-solving, and practical application of scientific concepts.

Dr. Kalpana underscored the importance of tailoring teaching strategies to meet the diverse needs of students, ensuring that every child has the opportunity to excel and relate science to different aspects of life. She elucidated the key principles outlined in the National Curriculum Framework School Education (NCFSE), emphasizing the holistic development of students through thoughtful content analysis and flexible instructional approaches. Furthermore, Dr. Kalpana delved into the intricacies of assessment, highlighting the role of digital tools such as online quizzes, video recordings, and data analysis in facilitating effective evaluation practices. She emphasized the multifaceted roles of teachers as innovators, facilitators, and mentors in nurturing students' learning journey. Conducting a practical session on Algadoo, Dr. Kalpana provided participants with hands-on experience in applying assessment principles in a digital environment. As the session drew to a close, Dr. Kalpana left participants with the profound reminder that teaching is not merely a profession but a work of love, underscoring the intrinsic connection between educators and their students' growth and development.

Day-3

March 21, 2025

Session-XVII

Time: 4.30 PM

Title: Valedictory Session

On Day 3, March 21, 2025 (Session-XVIII) at 4:30 PM, the Valedictory Session marked the

conclusion of the enriching three-day program. The session served as a platform for reflection on the key learnings, experiences, and insights gained throughout the event.

Participants shared their feedback, highlighting the impact of ICT tools, gamification, digital simulations, and assessment techniques in enhancing science education.

The session emphasized the alignment of the training program with NEP 2020 and NCFSE 2023, reinforcing the importance of technology-driven, student-centric teaching methodologies. Educators discussed how they would implement the knowledge and skills acquired, particularly in interactive teaching, digital assessments, and experiential learning.

Certificates were distributed to all participants in recognition of their active involvement and successful completion of the training. The session concluded with a vote of thanks, acknowledging the resource persons, organizers, and participants for their valuable contributions in making the program a success. The event ended on a positive note, inspiring teachers to integrate ICT-based approaches in their classrooms to create engaging and effective learning environments.


Shree Bangalore Aradhana Bhavan
Capacity Building programme
on Integration of ICT in Science Education
In the light of NEP - 2020
Date : 19/03/2025 to 21/03/2025
Place : Bangalore Bhavan, Taleti Road, Palitana, Dist. : Bhavnagar
Venue - DIET - Bhavnagar
Organized by RIE NCERT Bhopal, Madhy Pradesh

Time Table

Regional Institute of Education, NCERT Bhopal

Capacity Building Programme on Integration of ICT in Science Education for Western Region in Context of NEP 2020

March 19-21, 2025

Date/time	9.00-9.30 am	9.30 -10.45 am	10.45-12.00 noon	12.00-1.15 pm	1.15-2.00 pm	2.00 -3.15 pm	3.15-4.30 pm	4.30-5.45 pm
19.03.25	**Registration and Inaugural function**	Experience Sharing on ICT in Schools of UK HB	ICT in Sc. Edu. in context of NEP 2020 & NCFSE 2023 RS	Challenges and Opportunities in ICT KM	Lunch Break	Use of ICT in Science Education-1 NC	AI Tools AM	Implementation of ICT in Classrooms RA
20.03.25	Report Presentation	Initiatives of ICT By Gujarat State HB	Online Assessment Tools for Science Evaluation NN	ICT Based Science Experiments and Virtual Labs SK		Digital Initiative in Science Education AM	Use of ICT in Science Education-2 NC	Visit to Jambudweep Science Museum And PM Shri School Jaliya
21.03.25	Report Presentation	G-Shala Plus & GROWER HB	Flipped Classroom RS	Simulations in Science Education NN		Gamification and Game Based Learning SK	Assessment and Evaluation in Science Education KM	**Valedictory function**

HB: Mr. Hiren Bhatt **RS: Prof. Rashmi Singhai** **KM: Dr. Kalpana Maski** **NN: Mr. Nilesh Nathani**

SK: Dr. Santosh Kumar **NC: Dr. Nilesh Chapaneri** **AM: Mr. Amit Majithiya** **RA: Dr. Rajeshree Aundhiya**

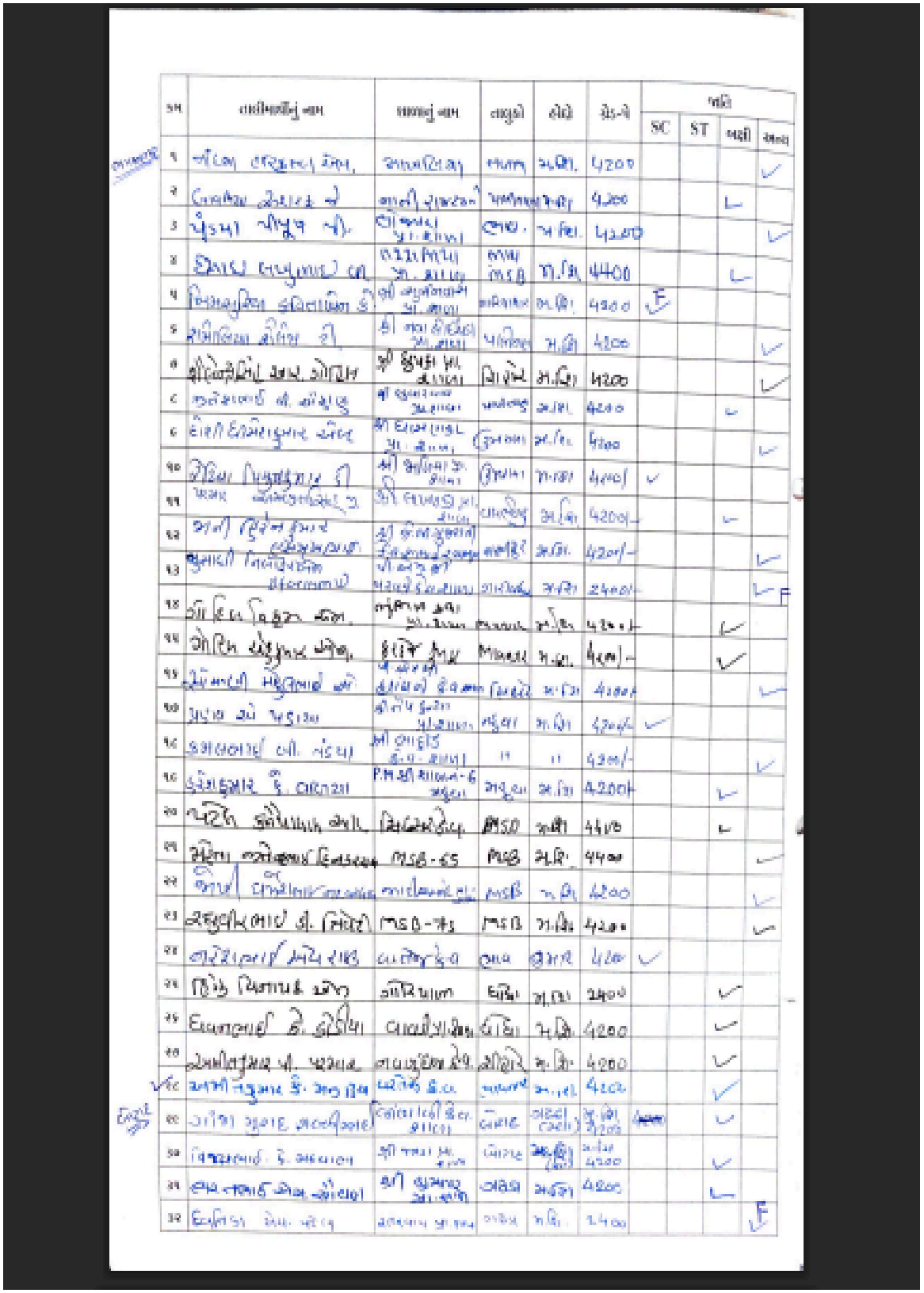
Kalpana Maski

(Programme Coordinator)

Prof. Rashmi Singhai

(Programme Coordinator)

ATTENDANCE SHEET



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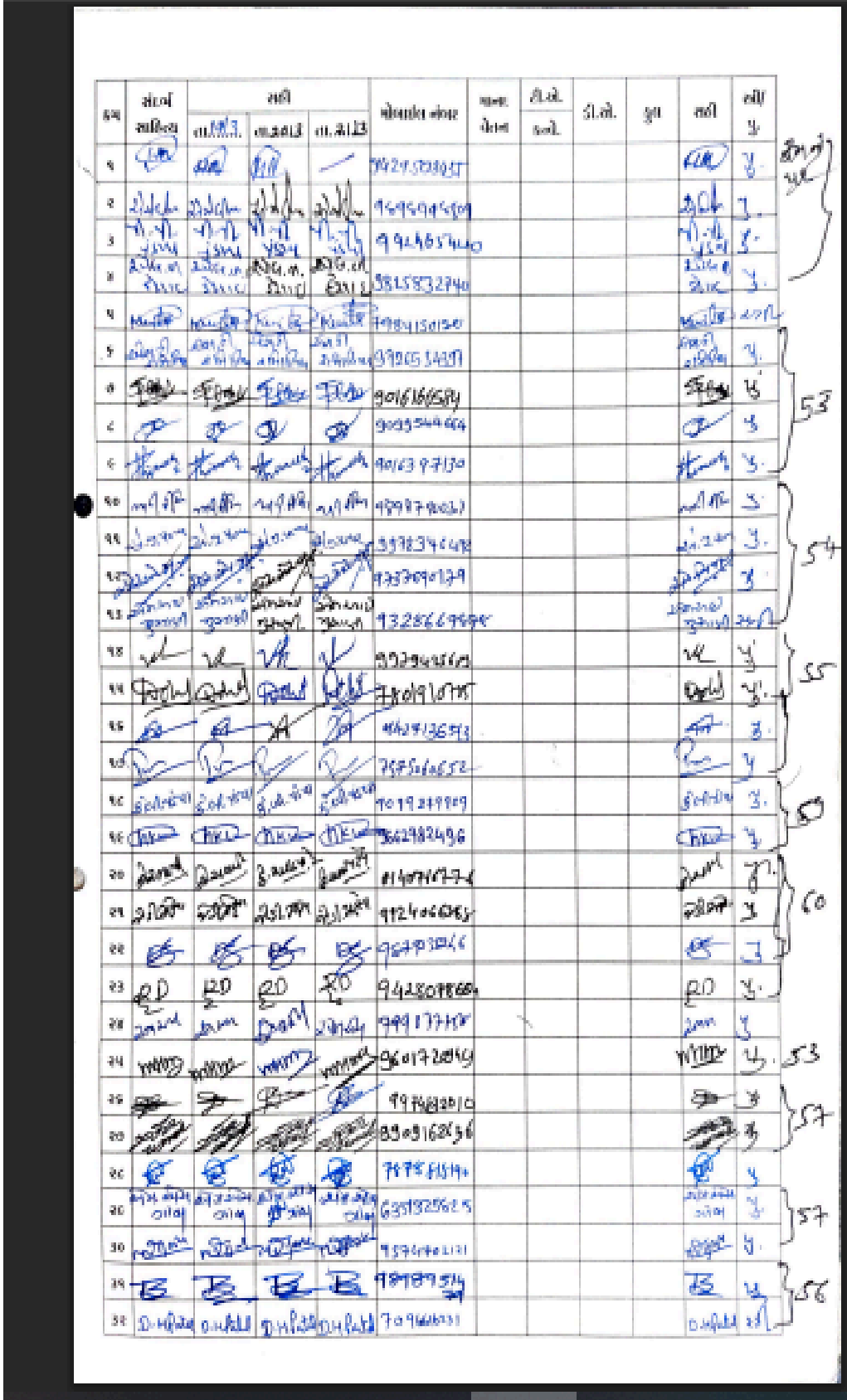
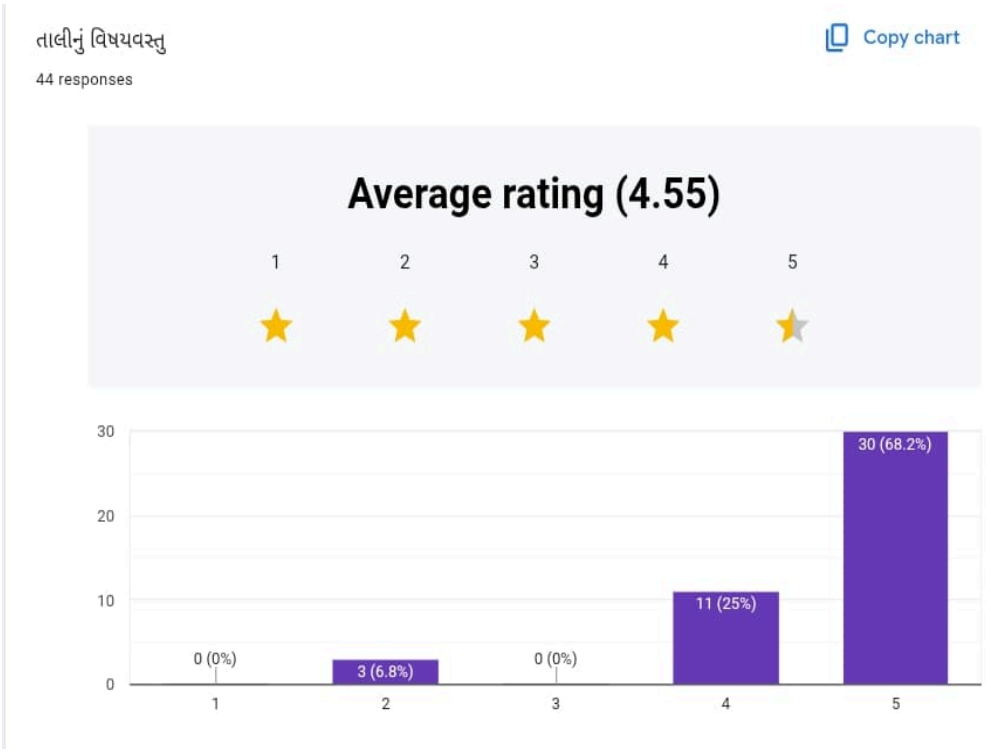
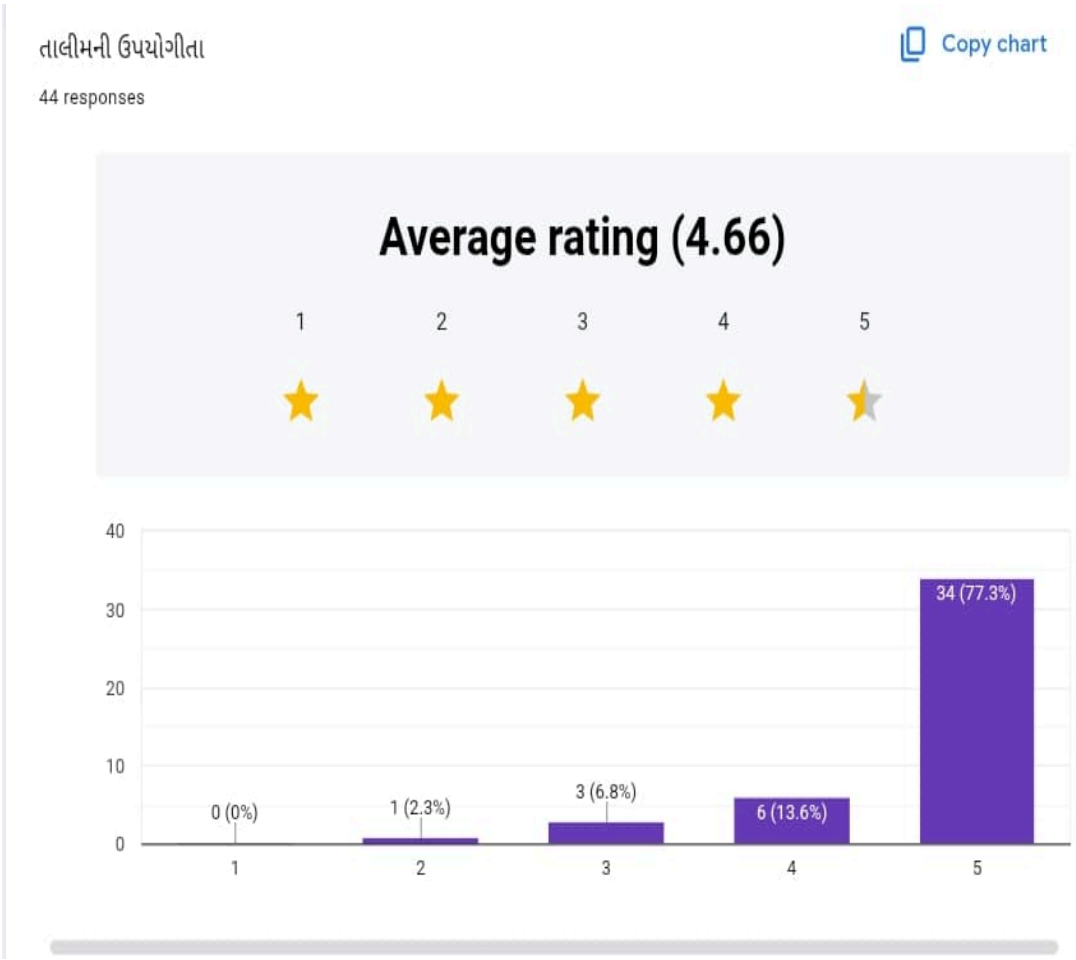


FEEDBACK OF PARTICIPANTS





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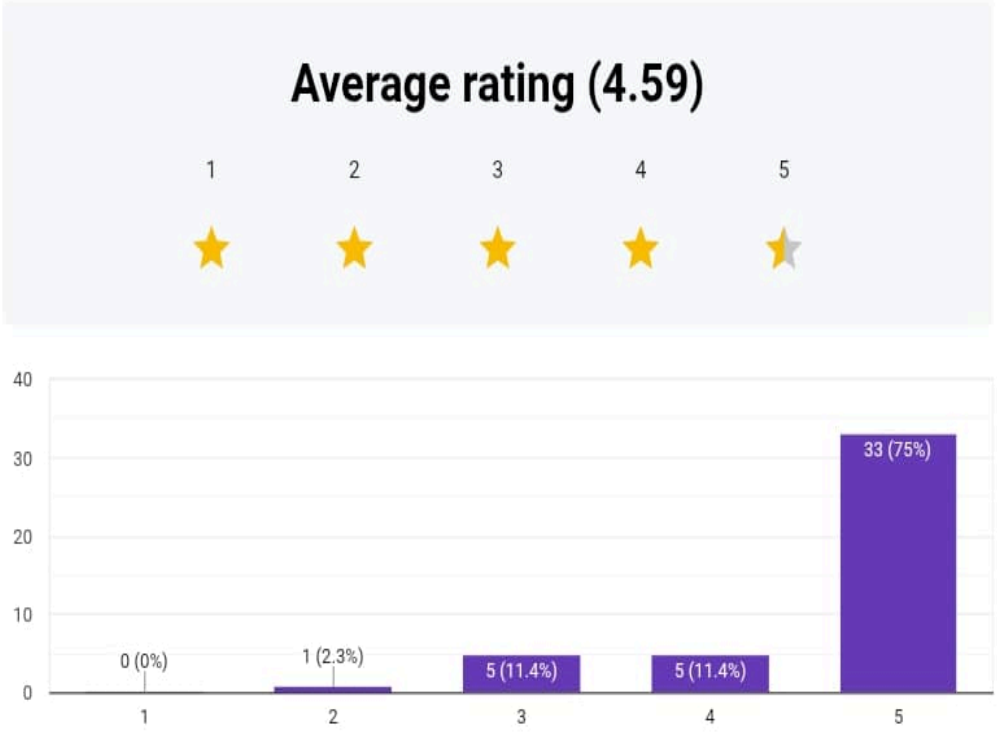

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