



Sindh Education Foundation
Government of Sindh

Empowering through Education

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Effectiveness of Introducing Smart Teaching and Learning (INSTAL) Project in Foundation Assisted Schools (FAS)



Launching ceremony of INSTAL Project by the Hon'ble Chief Minister, Syed Murad Ali Shah

Developed by
Research and Publication Unit (RPU)

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ACRONYMS

AALTP	Adolescent & Adult Learning and Training Program
AASP	Adopt A School Program
AV Room	Audio Visual Room
BoGs	Board of Governors
ESSP	Existing Schools Support Program
FAS	Foundation Assisted Schools
ICT	Information & Communication Technology
INSTAL	Introducing Smart Teaching and Learning
IT	Information Technology
KG	Kindergarten
MOU	Memorandum of Understanding
NFE	Non-Formal Education
OUP	Oxford University Press
PC-I	Project Cycle One
PCK	Pedagogical Content Knowledge
PPP	Public-Private Partnership
PPRS	Promoting Private Schooling in Rural Sindh
PSP	Peoples School Program
RPU	Research and Publication Unit
SAS	SEF Assisted School
SEF	Sindh Education Foundation
SMHSP	SEF Middle & High School Program
SSESP	Sindh School Education Scholarship Program
STBB	Sindh Text Book Board
TNA	Training Need Assessment

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ACRONYMS

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MESSAGE

Sindh Education Foundation (SEF) has long been advocating and emphasizing the need for technology-aided learning at schools. In this pursuit, the Foundation has been innovating with various partners through different interventions before rolling out the project 'Introducing Smart Teaching And Learning (INSTAL) at Foundation Assisted Schools in 2016. This was an ADP Scheme launched with the support of the School Education & Literacy Department, Govt. of Sindh, through which dedicated Audio-Visual rooms were established in 600 Foundation Assisted Schools by the SEF's Partners where the Foundation provided financial support for LED TVs, Solar Power Units and provided 30 Tablets to each school which had a customized android application pre-installed that had interactive content for grades Katchi to Grade V in Urdu, Sindhi, and English languages. The content was also developed under the INSTAL project and, at that time, it was the first of its kind in Pakistan.

The idea was to supplement students' learning in these AV rooms where students used the Tablets to reinforce their concepts of Science, Maths and Language with an aim to improve student learning outcomes. The customized content developed by SEF was also uploaded on SEF's official YouTube channel which was widely utilized during the pandemic, and the demand for more resources, particularly for teachers, has been increasing. The Foundation also developed the capacity of teachers enabling them to innovate with technology and using it with modern teaching techniques. Since the project's closure, various scholars and experts have conducted several studies highlighting the positive impact of introducing technology at schools, especially in remote and challenging areas in Sindh where not only the learning outcomes showed improvement but the AV Rooms and the interactive media attracted out-of-school children and lowered drop-outs.

Subsequent to the success of INSTAL, the Foundation has forged strategic partnerships with notable organizations such as Microsoft Pakistan, Noon Academy, and Edkasa. These partnerships enable us to provide our teachers and students with free access to educational products and services. By leveraging these collaborations and building upon our experiences from INSTAL, the Foundation is committed to continued innovation and evolution. Our goal is to leverage technology and the expertise of education and technology specialists to enhance learning gains and empower our students for a brighter future. The technology evolved through INSTAL, also greatly helped the Foundation during the pandemic when the digital content developed by SEF was widely used and appreciated by the public at large.

I would reiterate here that the Government of Sindh remains committed to improving the state of education in the province and hence, the Foundation remains consistent in this pursuit with the honorable Chief Minister Sindh (Chairman of the SEF Board) sharing his vision to integrate and leverage technology with education and skill programs to secure a better future of the youth of the province. In this context, the project INSTAL has proved to be a success story for the Foundation, and due credit goes to the SEF's project team that steered this movement.

I am confident that, by exploring avenues of development and creating synergies for improved teaching-learning, SEF will continue to push the boundaries of innovation, ensuring that the children in Sindh receive the quality education they deserve.

Abdul Kabir Kazi

Managing Director ,
Sindh Education Foundation

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I would like to thank all those who have contributed towards the completion of this report. A special thanks is due to MD,SEF, Mr Abdul Kabir Kazi, for his valuable feedback which helped in improving the report.

Furthermore, I would also like to acknowledge the INSTAL team for providing all the necessary documents of the project.

Last but not least, many thanks go to the research participants, i.e. school partners, teachers and students, who participated voluntarily in this research.

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Hon'ble Chief Minister Syed Murad Ali Shah, accompanied with Hon'ble Minister for Education & Literacy Mr. Jam Mehtab Dahar and Managing Director, SEF Ms. Naheed S. Durrani, launching the "Introducing Smart Teaching and Learning (INSTAL) Project".







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Executive Summary

Sindh Education Foundation (SEF) launched a project titled 'Introducing Smart Teaching and Learning' (INSTAL) to introduce modern and technology-aided teaching and learning methods in the Foundation Assisted Schools (FAS). Under the project, a relevant interactive e-learning application consisting of digitized content of Science, Mathematics, and English subjects for KG to grade V was developed and deployed in 600 Foundation Assisted Schools (FAS) along with 30 Tablets with an installed digital resource pack and a smart LED TV. The project was completed in 2019 with a defined responsibility that the partner will ensure the use of equipment to improve the overall teaching-learning standards of the school. It was the time when the education sector was interrupted due to the covid-19 lockdown.

In 2022, an in-house research study was conducted in 111 INSTAL intervened schools to measure the effectiveness of the INSTAL project. The study employed exploratory sequential mixed methods and data was gathered from school partners, teachers and students.

The study's findings revealed that the INSTAL project positively achieved technology-aided teaching-learning outcomes by employing subject-specific teachers in marginalized communities. The introduction of technology, the unique learning software application and the usage of Tablets enabled teachers and students to cope with 21st-century skills. The data depicted that INSTAL classes were running in AV rooms setup in 86% of schools.

The reflection from teachers reported that the introduction of INSTAL projects in Foundation Assisted Schools transformed their teaching practices and increased interest and made teaching easier with the help of a digital resource pack. It also enhanced the confidence, content knowledge, pedagogical, language, and presentation skills. Likewise, the students reported that INSTAL improved their content knowledge of Science, Mathematics, and English subjects. They preferred to learn through technology-aided techniques as it enhanced their language, and presentation skills.

The study also focused on the challenges faced by the Partners, teachers and students. The Partners suggested that the financial grant needs to be raised in order to meet the standard requirements and their installation. Likewise, the completion of the warranty period of issued Tablets and the closure of customer service centers across the country hampers the timely maintenance of technical issues in Tablets. They also requested the upgradation of the content of the resource pack in line with the approved curriculum. By and large, they appreciated the efforts of SEF staff who guided and facilitated them with software issues and re-installation of the resource pack even after the completion of the project.

In view of above, it is concluded that the INSTAL project has been appreciated by the partners, teachers, and students. Partners have managed to sustain the project significantly. They requested to upscale the blended learning approach to the elementary level. In order to have everlasting effectiveness it is suggested to deploy a designated focal person and team members on a regional/district basis for mentoring sessions and on-ground pedagogical support and follow-up mechanism. Furthermore, due to higher maintenance costs, it is suggested to allocate additional budget to schools having thin enrolment or situated in hard areas. The quality Tablets with insurance and maintenance policy may be provided with additional quantity as it has equipped the students with 21st-century learning tools and skills.



I. Introduction

a) Sindh Education Foundation (SEF) Vision-Portfolio- Intervention

The Sindh Education Foundation (SEF), government of Sindh, is an autonomous organization, established in 1992 to empower marginalized communities of Sindh province by creating and facilitating new approaches to learning and education. To pursue its strategic vision, the Foundation works on a diverse portfolio of programs by promoting Public- Private Partnership (PPP). It seeks to address the goals of Education for All and quality education targets and creates greater ownership and sustainability of the educational interventions.

Previously, the Foundation was running schools under different programs, including SEF Assisted Schools (SAS), Promoting Private Schooling in Rural Sindh (PPRS), Existing School Support Program (ESSP), and SEF Middle and High School Program (SMHSP). These programs have recently been merged and renamed "Foundation Assisted Schools" (FAS). Besides this, a few other interventions of the Foundation are; Adopt a School Program (AASP), Adolescent and Adult Learning and Training Program (AALTP), Sindh School Education Scholarship Program (SSESP), and Peoples School Program (PSP). The Foundation's portfolio has outstretched to 2640 schools with 840,000 students and 21000 teachers, and 107 Non-Formal Education (NFE) centers with 11000 learners. These schools and NFE centers operate under per-child subsidy model.

The dynamics of education in Sindh imply problems of access to quality institutions, capacity of teachers, lack of use of technology, language barriers, energy crisis, lack of motivation and incentives at the grass-roots to strive for improvement to play a positive role for the development of the region. However, Sindh Education Foundation is bridging the gap to improve the access to free of cost quality education in Foundation Assisted Schools (FAS) by providing financial vis a vis quality input that mainly includes professional development of service providers, designing of the scheme of studies, provision of textbooks, and other supporting learning materials. Recognizing the importance and effective use of Information and Communication Technologies (ICTs) based digital learning, the Foundation launched Introducing Smart Teaching and Learning (INSTAL) project in the Foundation Assisted Schools.

b) Overview of Introducing Smart Teaching and Learning (INSTAL) Project

Introducing Smart Teaching and Learning (INSTAL), one of the Foundation's most innovative project, was initiated in October, 2016 under its PPP modality. The project

aimed to introduce technology- integrated teaching and learning in the Foundation Assisted Schools (FAS) in order to provide competitive advantage to the children of less privileged areas across the Sindh province where access to education is limited.

Clause A (i & ii) of the 'Memorandum of Understanding' (MoU) signed between the Foundation and the school partners, which pertains to the acquisition, deployment, operation, and maintenance of equipment, stated that:

- i. The School Operator will bear the expenses (if any) that may be incurred as part of the damage(s) to the equipment not covered in vendor maintenance once the equipment has been installed/ deployed.
- ii. That the School Operator will ensure the use of equipment to improve the overall teaching-learning standards of the school.

i. Key Objectives of the INSTAL Project

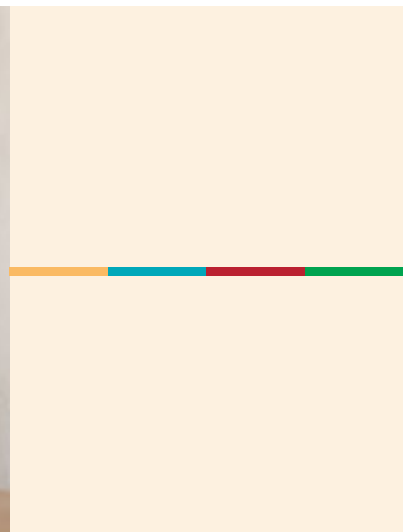
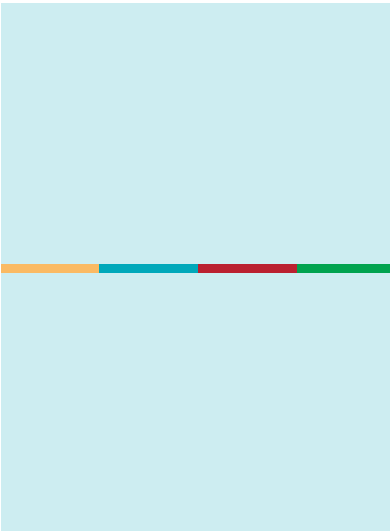
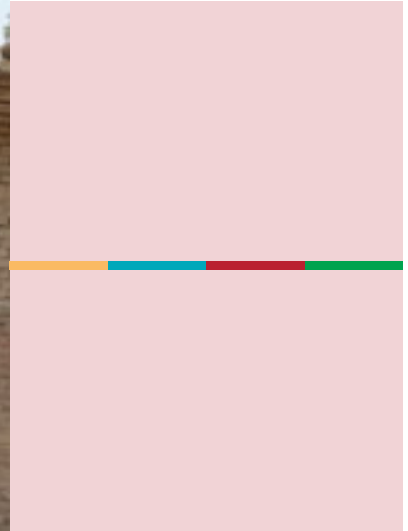
The key objectives of the project (as outlined in the PC- 1) were to:

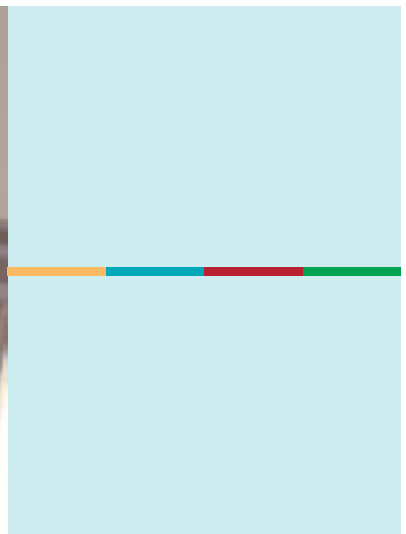
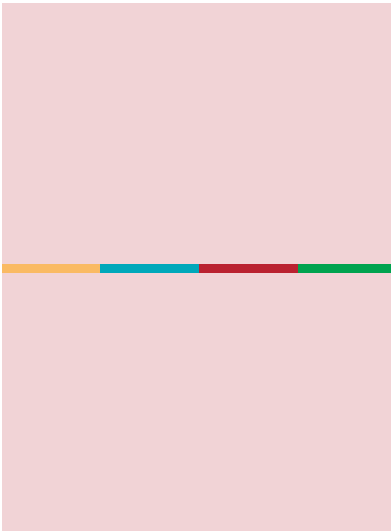
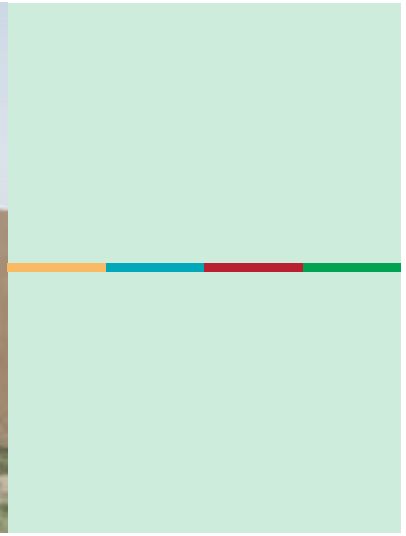
- ◆ Introduce E-Learning strategies in SEF Supported Schools to provide access to technology to children of marginalized communities.
- ◆ Introduce modern, technology-aided teaching methods at SEF Supported Schools for improved knowledge delivery.
- ◆ Introduce a unique learning software application that can be used across the schools of Sindh and across Pakistan to support teaching-learning processes, especially in the context of less privileged communities.
- ◆ Build the capacity of teachers in the area of Information and Communication Technology (ICT).
- ◆ Encourage the concept of green and renewable energy resources to power schools with problems of electricity supply and affordability.
- ◆ Strengthen the Public-Private Partnership between SEF and School Operators of Foundation Assisted Schools (SEF) by supporting the operators to invest in the schools.
- ◆ Create employment opportunities in far-flung areas and develop human resources in teaching.

ii. Key Achievements of the INSTAL Project

The project, during its four-year span of time, achieved the core objectives delineated in PC-1. The outline of the key achievements of the project is given below:

- ◆ Culturally relevant interactive e-learning application of Science, Mathematics, and English subjects for KG to grade V was developed and deployed in 600 Foundation Assisted Schools (FAS).
- ◆ Audio-Visual rooms were established in 600 schools and powered with solar energy. The AV rooms were equipped with Tablets and smart LED TVs.
- ◆ The 4,500 teachers of Science, Mathematics, and English subjects, along with IT teachers, were trained on INSTAL.





The project incorporated designing, developing, and implementing a customized e-learning application of Science, Mathematics, and English subjects of KG to Grade V students and improved learning outcomes. INSTAL e-learning application consists of story-based animated video content, flipbooks, and interactive exercises used for formative assessment of students. The e-learning application is contextually relevant and aligned with National Curriculum 2006 and with Sindh Text Book Board (STBB), and Oxford University Press (OUP) books. The schools selected under the project were provided Tablet, PCs and the matching grant for developing the necessary infrastructure of Audio-Visual rooms and procurement of smart LED TVs. The grant was also used for solar panels for alternate energy so that the learning could not be interrupted by the perpetual electricity crisis.

iii. INSTAL Digital Resource Pack – Highlights & Features

- INSTAL lessons in the Digital Resource Pack are curriculum aligned and used with any books that follow the Pakistan National Curriculum 2006.
- INSTAL Lessons incorporate blended learning, an educational approach combining digital media with traditional teaching.
- INSTAL Digital Resource Pack comes complete with in-depth lesson plans in Sindhi, Urdu, and English. The Teacher Guides also include detailed teaching strategies, multiple in-class activities, and practice exercises to enhance teaching and strengthen teacher performance.
- The animated & engaging lessons are created to ensure that they appeal to students and educate them in a way that is both fun and easy to understand. The lessons feature loveable characters that help students along in their learning journey and feature in all INSTAL digital resources.
- INSTAL Digital Resource Pack includes interactive exercises following a student-centered learning approach. These short formative tests provide immediate feedback to students and enable them to get personalized feedback on their mistakes in real time without waiting for teacher feedback.
- Many students struggle when learning mathematics subject. The INSTAL Digital Resource Pack uses the subject through stories approach to support students through this. By using real-world examples, compelling characters, and an easy-to-understand format.
- Contextualized Science lessons allow students and teachers using the INSTAL Digital Resource Pack to learn essential science concepts using the environment and the world they know.
- The INSTAL Digital Resource Pack includes an English Accelerator to ensure that all students become English fluently during their primary education. The English Accelerator includes:
 - **Starter Packs** – To jumpstart students’ English fluency.
 - **Read With Me English Stories** – To ensure understanding and pronunciation correctly, these stories allow students to interact with their Tablets and get word definitions, visual clues, and reinforcement!
 - **Student Readers** – Simple readers allow students to scaffold their reading skills from beginner to advanced levels

iv. INSTAL Soft Launch

The Foundation's android-based e-learning application was launched by Chief Minister Sindh, Syed Murad Ali Shah on the auspicious occasion of the Silver Jubilee of Sindh Education Foundation, Government of Sindh, on January 06, 2018.

v. Professional Development of INSTAL Teachers

The Foundation extended continuous support to the schools in the shape of training and mentoring to the teachers of Science, Mathematics, and English subjects, along with IT teachers recruited by the schools to deliver the INSTAL project. Teaching with Tablets and LED TVs in Audio-Visual Rooms with a unique android-based e-learning application necessitated teacher's training. Capitalizing on it, the Foundation provided training on smart teaching and learning to 4500 teachers of 600 schools. However, there were discrepancies in the number of trainings and days of teachers and the training days imparted to the teachers during the project.

The post-training lesson observation and mentoring of teachers under Introducing Smart Teaching and Learning (INSTAL) Project was one of the essential parts of Teachers' Professional Development for technology integration. During the course of mentoring, technology-aided lessons of English, Science, and Mathematics from KG to Grade V were observed by Training and Deployment Officers to assess teachers' instructional strategies and use of digital technology gadgets in Audio-Visual rooms leading to constructive feedback on the lessons. The mentoring activity aimed to identify and overcome the challenges faced by teachers in smart teaching and learning by providing them with instructional support and guidance.

II. Literature Review

i. Effectiveness of ICT Integration

Information and Communication Technology (ICT) integration is the use of technology to facilitate teaching and learning. Technology use is said to impact teaching and to learn at all levels positively; therefore, ubiquitous technologies have been used in formal educational settings. ICT integration in education has been acknowledged as a vital force in achieving the goal of educational transformation (Aydin, 2016), improving instructional quality (Cetinkaya, 2017), and overcoming various educational problems of the 21st century (Seraji, 2017). A significant shift in teaching and learning has been observed due to technology integration in education. According to Beauchamp (2010), effective use of technology can result in learner-centered teaching and collaborative and interactive classrooms. ICTs have brought a considerable change in the teaching and learning processes by shifting the traditional classroom, where a student is a passive learner, to an interactive and collaborative classroom, where a student is an active participant (Kapoor, 2019).

Nevertheless, the successful integration of ICTs into teaching and learning is a complex, inclusive process that involves not only technology but also curriculum and pedagogy, institutional motivation, teacher proficiencies, and ongoing financing (Higgins, 2012). According to Davis's Technology Acceptance Model (TAM) (1989), the most crucial concepts for using technology are Perceived Ease

of Use and Perceived Usefulness, which influence the intention to use technology. Celik and keskin (2009) maintain that effective technology integration in the classroom depends on teachers' positive perceptions. Smeets, Gennip, and Rens (2009) highlighted that when technology was not available, emphasis was merely on information transmission, but due to technology integration, emphasis has transferred to the construction of knowledge.

Tezci (2010) claims that the proper use of technology can increase students' participation and interactivity and shift teaching and learning to students from teachers. He considers technology as a substitute for teacher-centered classrooms. He admits that technology has not only changed the way learners learn but has also changed the way teachers teach. Haddad (2003) corroborates the same finding and states that research reveals that teaching with technology promotes collaboration, developsthinkingskills, and results in student-centered teaching. Bilwani and Zehra (2016) substantiate the same findings and state that technology integration increases students' engagement, interest, excitement, and collaboration. Students actively participate in learning activities and learn better when technology is integrated with teaching and learning. The use of technology is very effective for teaching as it doesn't only improve teaching and learning but also makes teaching easier. Discussion of another research study (Le Thi, 2020) authenticates the findings of this research, which state that ICT integration encourages students to communicate more with their classmates and increases their confidence to participate actively in class. It also supports teachers in changing their teaching from teacher-centred to sstudent-centred allowing students to participate actively in learning. Another author (Oguzor, 2011) agreed that most students like using creative ways to learn, but only a few prefer traditional teaching styles.

ii. Challenges to ICT Integration

As cited in the literature review by Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, and Sendurur (2012) two kinds of challenges influence ICT integration in the classroom, first-order: lack of training, inadequate resources, technical problems in digital equipment and lack of administrative support. The second-order challenges are teachers' confidence, beliefs, perceptions, and value of technology integration in the classroom. This study found that most of the teachers faced first-order barriers. Most of the teachers were ready and confident; exhibited a positive attitude towards technology integration. Their ability to use technology was encouraging. The intensity of first-order barriers, such as lacking technical and financial resources to support ICT integration, appears to be more in under-developing countries like Pakistan (Bilwani & Zehra, 2016). Teachers' skills, lack of infrastructure, electricity outages, and opportunities for professional development and leadership are the significant challenges that influence the process of ICT integration in the present case (Balanskat, 2006).



III. Research Framework

i. Context of the Study

As per the project design, the INSTAL launched by the Foundation, successfully completed project's life in the year 2019. As per MOU, school partners continued its implementation in their respective schools. The research team of the Foundation designed to analyze the effectiveness of INSTAL project and execute it through the notion of students, teachers, and school partners of INSTAL. The study also explored the challenges while implementing INSTAL in the schools. The finding of the study will be a reference point for future strategy and effective decision-making in upcoming endeavors.

ii. Objectives of the Study

The objective of the present study was:

“To analyze the effectiveness of INSTAL intervention in Foundation Assisted Schools”

The study also explored the challenges experienced by teachers, students, and school partners in implementing the INSTAL project. Based on the findings, the study also proposes recommendations for the effective implementation of INSTAL in Foundation Assisted Schools.

iii. Research Design

The study employed exploratory sequential mixed methods (ESMM) design for data collection and analysis. This study aimed to evaluate the effectiveness of the INSTAL project in intervened Foundation Assisted Schools (FAS). A survey method was conducted to collect the data from students, teachers and partners of the INSTAL intervened schools. Three tools i.e. school partner, teachers, students were developed; consisting the profiles, status of INSTAL setup, availability and usage of resources, professional development, teaching & learning outcomes and challenges were observed. The study explored the effects of the INSTAL project on students' learning attitudes and outcomes and teachers' Pedagogical Content Knowledge (PCK), language skills, interest in teaching, and motivation to teach. The study also investigated the factors affecting the effective implementation of INSTAL in Foundation Assisted Schools (FAS).

iv. Sample

A random sampling method was employed to select sample schools for data collection. 20% of INSTAL intervened schools which makes 111 schools of 24 districts across the province, were selected. The sample schools were further classified in phases 1, 2, and 3 of the intervention and randomly selected. From the sample schools, data were gathered from the school Partner, 2 teachers (senior most subject-specific teacher), and 5 students (from the highest grade

who had a chance to attend the INSTAL class before COVID-19). The study participants were 553 students, 220 teachers, and 111 school partners.

v. Data Collectors

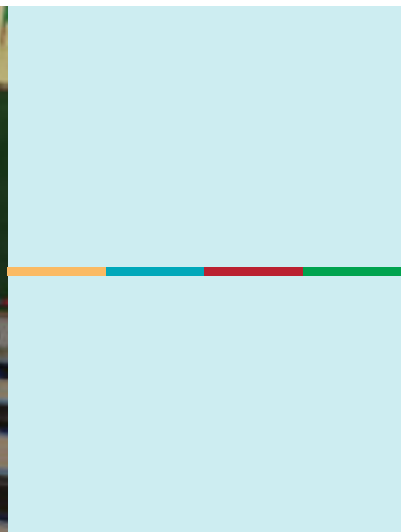
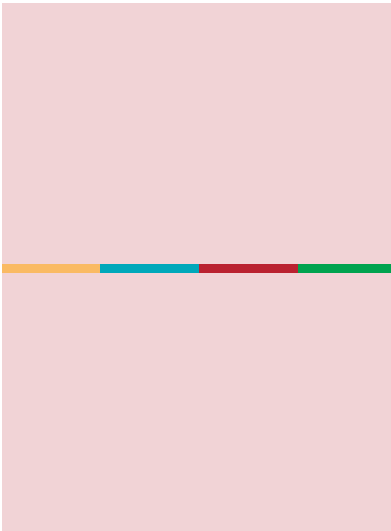
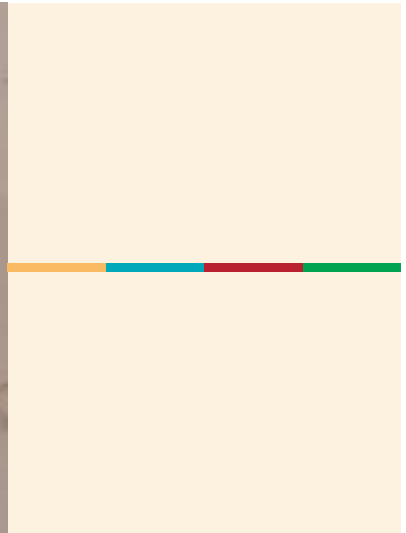
Ten team members from the Research and Publication Unit (RPU) and Monitoring and Evaluation (M&E) Cell of the Sindh Education Foundation (SEF) were oriented extensively for two days on the project's aims and objectives and the data collection tools and process. A mock activity of tools was conducted in three FAS schools of Karachi region. Later on, the team members were divided into four clusters to collect data from their assigned districts.

vi. Data Collection

The data was collected on the designed questionnaire from all the stakeholders i.e. students, teachers, and school partners in accordance to the scheduled sampled schools. The collected data was reviewed and entered in the data entry template for further processing. The consolidated data was steered into data analysis. Pictorial data was also gathered to compliment the data.

vii. Data Analysis

The data gathered through survey were consolidated and analyzed through Microsoft Excel. The survey also included a few open-ended questions requiring respondents' comments. The responses collected through open-ended questions were analyzed in descriptive form and added in both sections of effectiveness and challenges affecting the effectiveness of INSTAL. The survey data collected from the school partners were added in the students' and teachers' sections on the effectiveness of INSTAL and on challenges affecting the effectiveness of INSTAL in implementation.





IV. Findings and Results

The findings and results of the data collected through the survey are presented here. This section is further divided into 4 sub-sections. The first section presents the overall status of the INSTAL setup in the observed schools and availability and usage of resources. The second section depicts the students' and teachers' perceptions of the effectiveness of INSTAL on student learning. The third section presents teachers' perspectives on the effectiveness of INSTAL on their teaching processes and outcomes. The last section presents the findings on challenges experienced by students, teachers, and school partners in implementing INSTAL. These sections further included the reflections of students, teachers, and school partners shared in the form of responses to open-ended questions during data collection process. Data for each section are analyzed under the following headings:

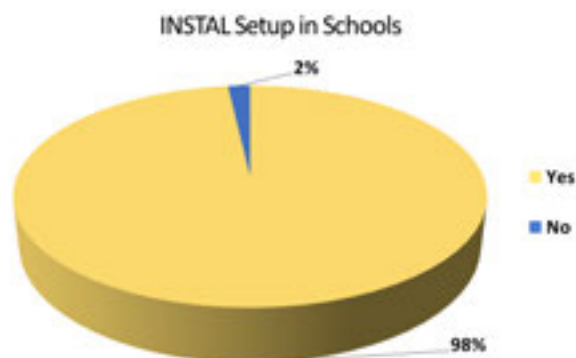
i. Effectiveness of Introducing Smart Teaching and Learning (INSTAL) Project

The first section presents the overall status of INSTAL setup, availability and usage of resources in the observed schools, reported by the data collectors.

The data reported that 97% schools have INSTAL intervention since the beginning. The project was initiated within 6 months of signing MOU with the potential partners. All the partners received the grants and used them to construct AV Room and purchase furniture and other equipment and material. All the schools received 30 Tablets with the installed resource pack.

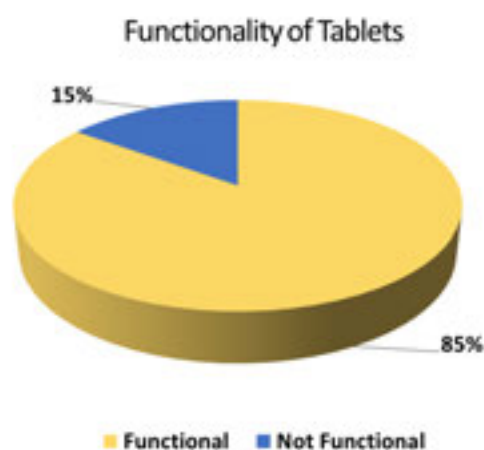
a) Availability of INSTAL Setup

The data reported that 98% of sampled schools have INSTAL setup in proper AV rooms with adequate furniture. However, two schools did not maintain AV rooms in their schools; perhaps there was some community conflict in the school and a shortage of space required to set up the AV room.



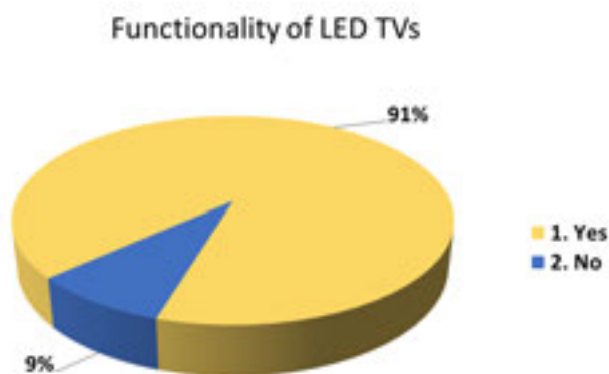
b) Availability of Functional Tablets

The results showed that Tablets were available in 98% schools with installed e-learning application. Out of the total availability, 78% Tablets were found functional during the visit. However, 23% of Tablets were out of order. The key features of the INSTAL digital resource pack, like flipbooks, interactive exercises, and student readers, are part of the e-learning application, which can be operated on Tablets.



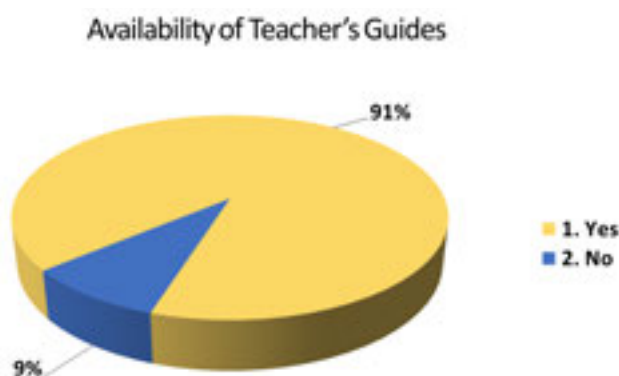
c). Availability of Functional LED TV

All the schools selected under the INSTAL project were guided to procure LED TVs through the grants. The findings showed that LED TVs were available in working conditions in 88% of the sampled schools. However, the data reported that LED TVs were unavailable in 12% of the sampled schools. The reasons for the unavailability of LED TVs in schools were technical error/faults in LED TVs.



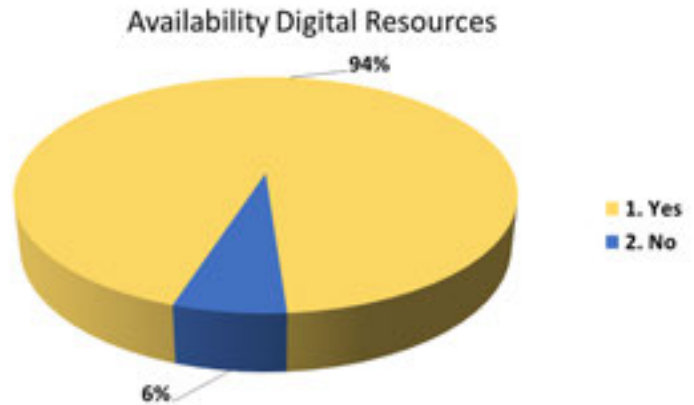
d) Availability of Teacher's Guide

To help teachers implement INSTAL lessons effectively, teachers were provided INSTAL Teacher Guides during the INSTAL training. In addition, to INSTAL Training, the Deployment team provided Teacher Guides to the schools as per need. However, the study's findings revealed that in 91% of the schools, Teacher Guides were available.



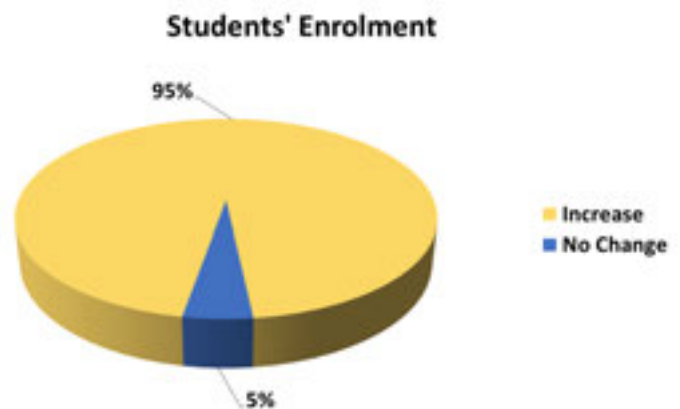
e). Availability of Digital Resources

This study identified that INSTAL Digital Resource Pack were available in 91% of the schools taken in sample. One of the most essential parts of the digital resource pack is videos of Science, Mathematics, and English subjects. The survey findings revealed that 6% of the schools did not have video content in sample schools. The respondents also acknowledged the support and facilitation by SEF staff who to deal with software issues and re-installation of the digital resource pack even after the completion of the project.



f). Impact on Students' Enrolment

INSTAL digital resource pack consists of Student Readers, mainly used to improve students' reading proficiency. When asked about the effects of INSTAL on their reading skills, 79% of students opined that it improved their reading skills; 14% said that it improved their reading skills to some extent. In contrast, 11% of students were unsure about the effects of INSTAL on their reading skills. Only 3% of students shared that it did not affect their reading skills.



ii. Effectiveness of (INSTAL) Project for Students Learning

This section presents the findings from students' and teachers' responses about the effectiveness of INSTAL on students learning. The key indicators were measured/analyzed for the effectiveness of INSTAL on students learning. It is worth mentioning that the students were selected on random basis to respond the questionnaire of the survey. They had a long gap in learning due to Covid-19 lockdowns. However, they were confident

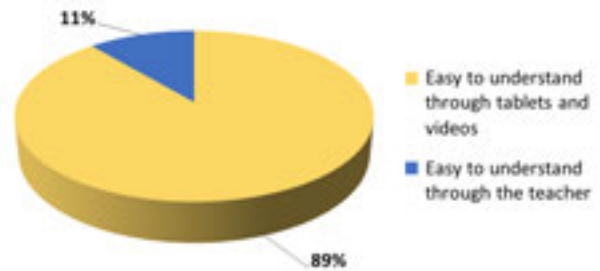
recalling their learning experiences with INSTAL. Thus, the findings presented here are purely based on their views.

RESPONSES OF STUDENTS

a) Students' Preference of Learning

During the survey students were asked about their preference for learning, whether they wanted to learn through the INSTAL digital resource pack, i.e., videos and Tablets, or through conventional method of learning. The results revealed that most students i.e. 89% preferred to learn through the INSTAL digital resource pack. As videos and Tablets make it easy to understand. At the same time, 11% of students responded to learn through conventional method by teachers.

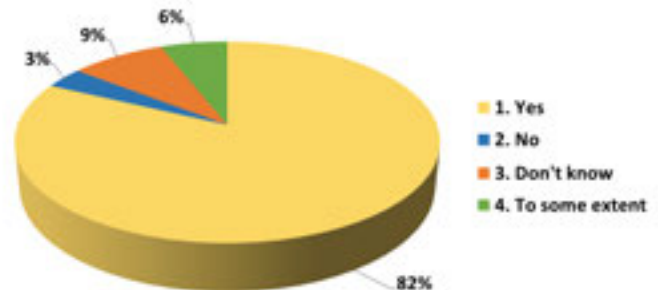
Tablets vs. Teachers



b) Students' Confidence

One of the interesting findings was related to the effects of INSTAL on students' confidence. During the survey, 82% of students reported that INSTAL enhanced their confidence level; only 6% shared that INSTAL has improved their confidence to some extent. Whereas 3% of students reported that INSTAL did not affect their confidence, and 9% of the total respondents were uncertain if INSTAL had any effect on their confidence.

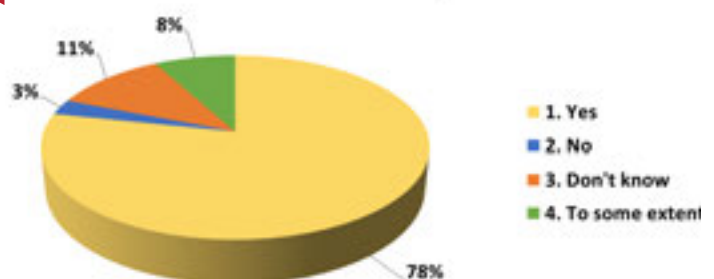
Enhanced Confidence



c) Students' Class Participation

Another important finding of the study was the effect of INSTAL on students' class participation. When students were asked about the effects of INSTAL on their class participation, 78% of the students shared that it increased their class participation. While 8% of students reported INSTAL

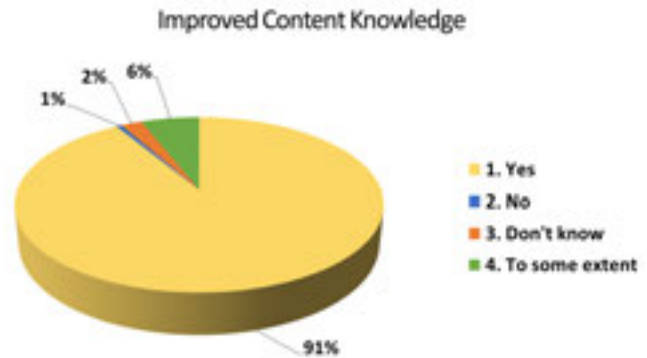
Increased Class Participation



increased their class participation to some extent. Whereas 11% of students were uncertain about the effects of INSTAL on their class participation, and 3% of students shared that INSTAL has had no effect on their class participation.

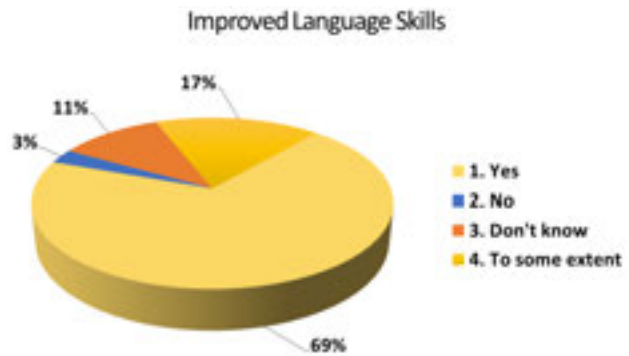
d) Students' Content Knowledge

One reason for introducing smart teaching and learning in the Foundation Assisted Schools (FAS) was to improve student's learning outcomes. In this study, when students were asked about the effects of INSTAL on their content knowledge, 91% of students shared that INSTAL has improved their content knowledge, and 6% of students stated that INSTAL had improved their content knowledge to some extent. In contrast, 2% of the students were uncertain whether INSTAL had any effect on their content knowledge or not. Only 1% of students responded that INSTAL did not enhance their content knowledge.



e) Students' Language Skills

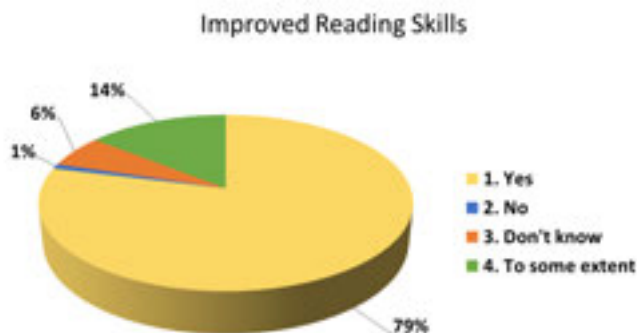
To determine the effects of INSTAL on students' language skills, students were also asked about the effects of INSTAL digitized content on their language skills. 69% of the students reported that INSTAL had improved their language skills to some extent; 17% maintained that it had improved their language skills to some extent. Whereas 11% of students showed uncertainty, only 3% shared that INSTAL had not affected their language skills.



The indicator of language skill was further classified into four strands, i.e., reading, comprehension, writing, and speaking skills

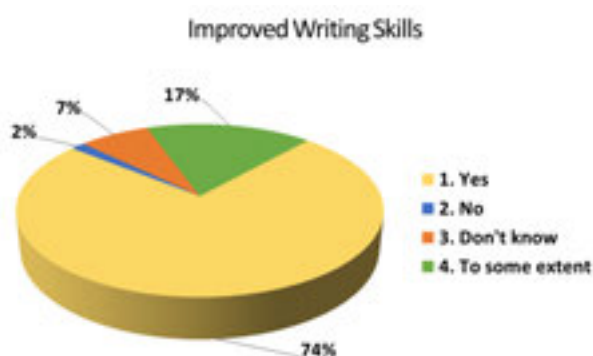
f) Students' Reading Skills

INSTAL digital resource pack consists of Student Readers, mainly used to improve students' reading proficiency. When asked about the effects of INSTAL on their reading skills, 79% of students opined that it improved their reading skills; 14% said that it improved their reading skills to some extent. In contrast, 11% of students were unsure about the effects of INSTAL on their reading skills. Only 3% of students shared that it did not affect their reading skills.



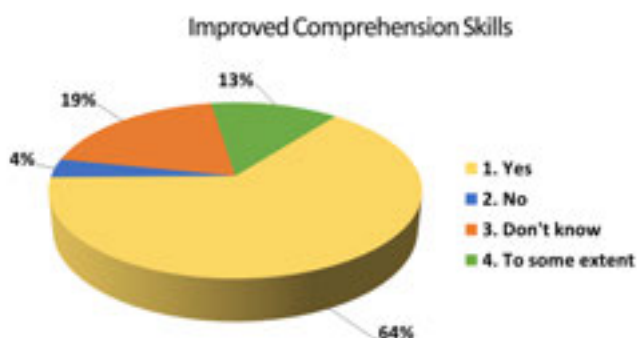
g) Students' Writing Skills

The survey findings showed that 74% of students believe INSTAL has improved their writing skills; 17% of students believe that INSTAL has improved their writing skills to some extent. While 7% of students were unsure if INSTAL has improved their writing skills or not. Only 2% of students reported INSTAL had not improved their writing skills.



h) Students' Comprehension Skills

Students were also asked if INSTAL improved their comprehension skills. In responding to the question, 64% of students shared that INSTAL improved their comprehension skills; 13% reported that INSTAL improved their comprehension skills to some extent. While 19% of students showed uncertainty if INSTAL improved their comprehension skills or not, only 4% of students opined that INSTAL had not improved their comprehension skills.



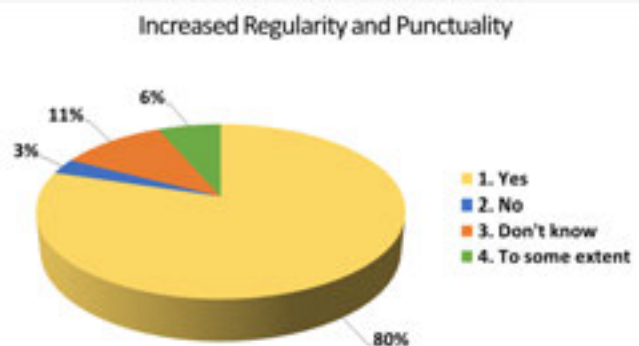
i) Students' Speaking Skills

One of the important questions related to the effects of INSTAL on students' speaking skills also showed interesting findings wherein 69% of students shared that INSTAL improved their speaking skills. 17% of students reported that INSTAL improved their speaking skills to some extent. The 12% students showed uncertainty, and only 2% of students shared that INSTAL has not improved their speaking skills.



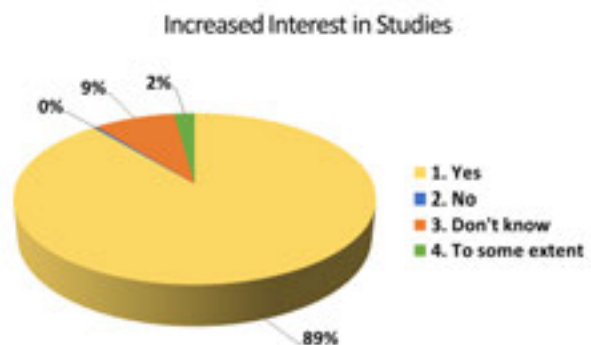
j) Students' Regularity & Punctuality

The findings indicated that the 80% of students expressed that the effects of the INSTAL project improved the students' regularity and punctuality; 6% of students shared that it improved their regularity and punctuality to some extent. Whereas 11% of students were uncertain, and 3% opined it had not affected their regularity and punctuality.



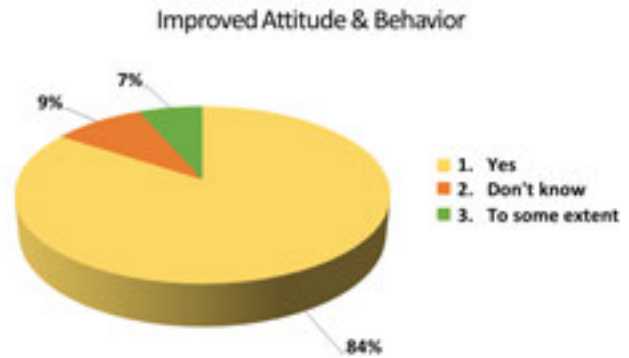
k) Students' Interest in Studies

The survey also attempted to determine if the digital learning introduced through INSTAL projects affected students' interest in studies. The findings revealed that 89% of students maintained that INSTAL improved their interest in studies; 2% of students opined that INSTAL, increased their interest in studies to some extent. 9% of students showed uncertainty about the effects of INSTAL on their interest in studies. None of the students disagreed with the statement that INSTAL has improved their interest in studies.



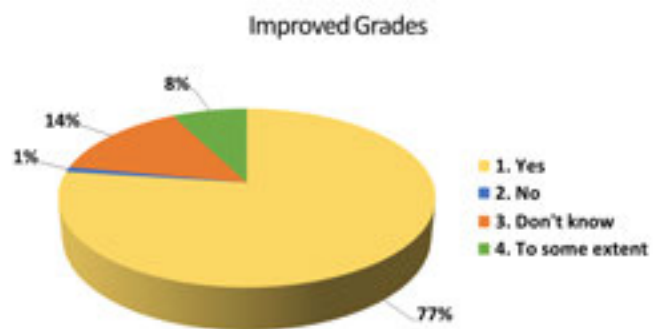
l) Students' Attitude and Behavior

One of the most exciting findings of the study was about the effects of the INSTAL project on students' attitudes and behavior. 84% of the students said INSTAL improved their attitudes and behavior towards learning in the classroom. 7% of students opined that INSTAL improved their attitude and behavior to some extent. In contrast, 9% of students showed uncertainty about the effects of INSTAL on their attitude and behavior. None of the students disagreed with statement.



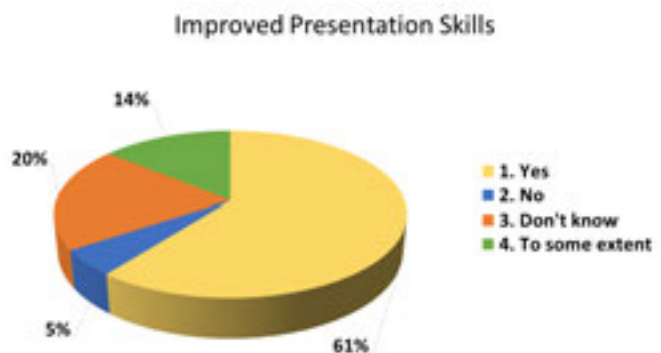
m) Students' Grades

During the survey, teachers were also asked if INSTAL enables the students to use Tablets without the teacher's assistance; 80% of teachers agreed to the statement and said yes. While 10% said to some extent, and the remaining 10% of teachers disagreed with the statement and said no. This shows that most students learned to operate Tablets without teachers' assistance.



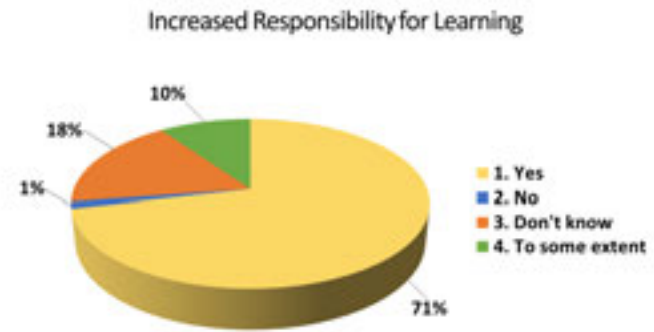
n) Presentation Skills

INSTAL digital resource pack includes numerous pedagogical practices which shift teaching from teacher-centered to student-centered. It includes project-based learning methods, discussions, think pair share, group discussions, and presentations. Thus, the survey also attempted to determine if INSTAL has affected students' presentation skills; 61% of students responded that INSTAL improved their presentation skills, and 14% of students maintained that INSTAL improved their presentation skills to some extent. While 20% of students showed indecision, and 5% of students opined that INSTAL had not improved their presentation skills.



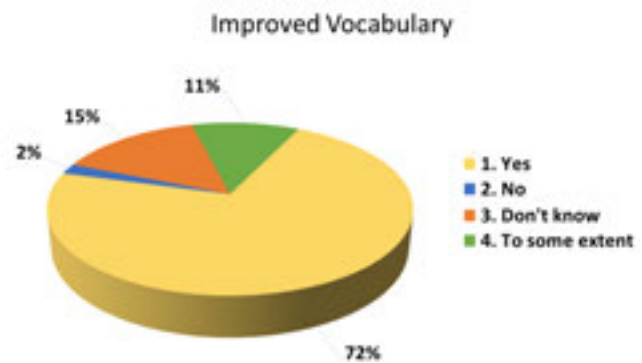
o) Students' Responsibility for Learning

The study's findings showed that the effects of INSTAL were not limited to improved grades, it also make them responsible towards learning; 71% of students shared that INSTAL increased their responsibility for learning; 10% reported that it increased their responsibility for learning to some extent. Whereas 18% of students were uncertain, and 1% of students negated the effects of INSTAL on improving their sense of responsibility for learning.



p) Students' Vocabulary

INSTAL digital resource pack also includes Read with Me English Stories – to ensure correct pronunciation and understanding, these stories allow students to interact with their Tablets and get word definitions, visual clues, and word reinforcement. It also includes Student Readers, which allow students to scaffold their reading skills from beginner to advanced levels. Students were asked if the INSTAL digital resource pack improved their vocabulary; 72% of students shared that it improved their vocabulary; 11% of students held that it had improved their vocabulary to some extent. Whereas 15% of students were uncertain about the effects of INSTAL on their vocabulary, and 2% shared that INSTAL had not improved their vocabulary.



RESPONSES OF TEACHERS

This sub-section presents the findings from teachers' survey responses on the effects of INSTAL on students learning.

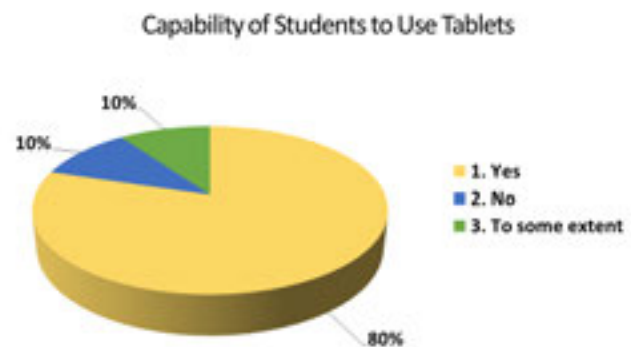
a) INSTAL contributes to give an equal opportunity for learning to every student in class

Responding to the statement that INSTAL contributes to equal learning opportunities for every student in class, 94% of the teachers agreed to it and said yes. Whereas 5% of teachers said to some extent and only 1% negated that INSTAL contributes to equal learning opportunities to every student in the class.



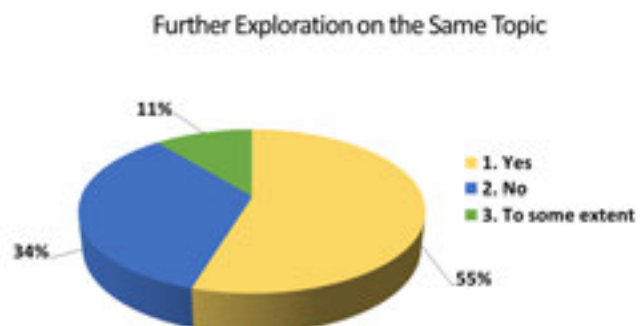
b) INSTAL enables the students to use Tablets without Teacher's Assistance

During the survey, teachers were also asked if INSTAL enables the students to use Tablets without the teacher's assistance; 80% of teachers agreed to the statement and said yes. While 10% said to some extent, and the remaining 10% of teachers disagreed with the statement and said no. This shows that most students learned to operate Tablets without teachers' assistance.



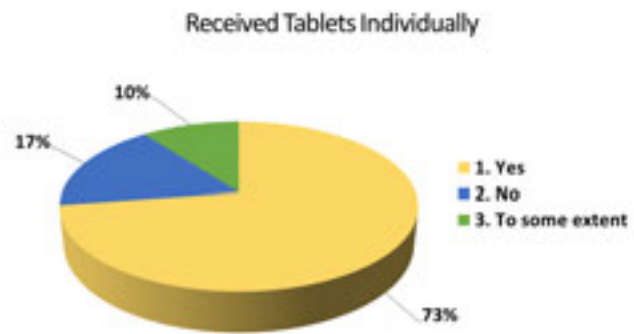
c) INSTAL Allows Students to Search More on the Same Topic Taught by the Teacher

Teachers were also asked if INSTAL allows students to search more on the same topic taught by teachers; 55% of the teachers agreed to the statement and said yes. At the same time, 11% of teachers reported that INSTAL allows students to search more on the same topic taught by the teacher to some extent. In comparison, 34% of teachers who did not agree with the statement and said no.



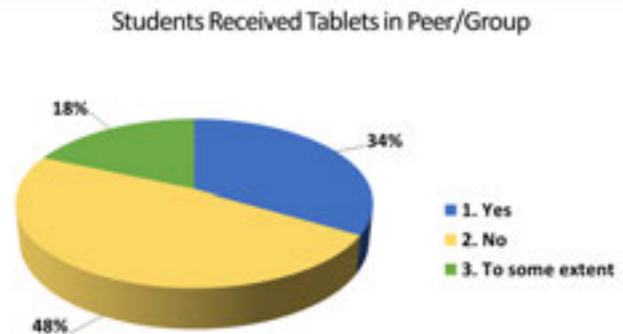
d) Students Received Tablets Individually During Class

During the survey, teachers were asked if students received Tablets individually during class; 73% of the teachers agreed to the statement and said yes, while 17% of teachers said to some extent. Whereas 10% of teachers disagreed with the statement and said no. These findings do not corroborate with their response on technical issues in Tablets, in which it was reported that only in 15% of schools all Tablets (30 Tablets) were functional. Whereas in 85% of the schools, 5-7 Tablets on average were dysfunctional.



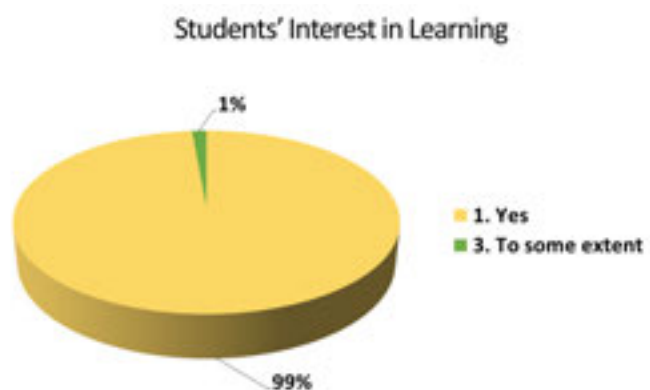
e) Students received Tablets in Peer/Group During Class

Responding to the statement that students received Tablets in peer groups during class, 34% of teachers agreed to the statement and said yes. While 18% of teachers partially agreed and said that students received Tablets in peer/groups during class to some extent. Whereas 48% of the teachers didn't agree with the statement that students received Tablets in peer groups during class. It is worth mentioning that students received Tablets in peer group only where technical issues were found in Tablets.



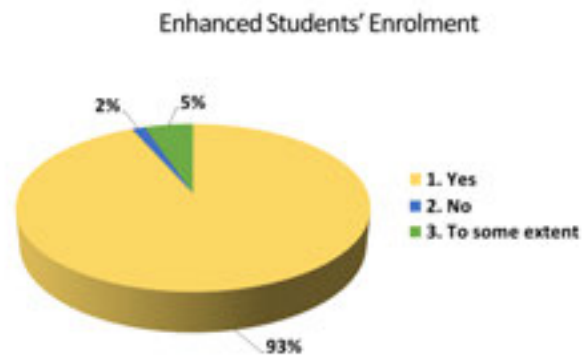
f) INSTAL Enhanced Students' Interest in Learning

When teachers were asked if the introduction of INSTAL enhances students' interest in learning, 99% of the teachers reported that INSTAL enhances students' interest in learning. Whereas 1% of teachers shared that INSTAL enhances students' interest in learning to some extent. This finding corroborates students' responses as they reported 89% enhancement on students' interest in studies due to INSTAL. The same finding was validated by the teachers as well.



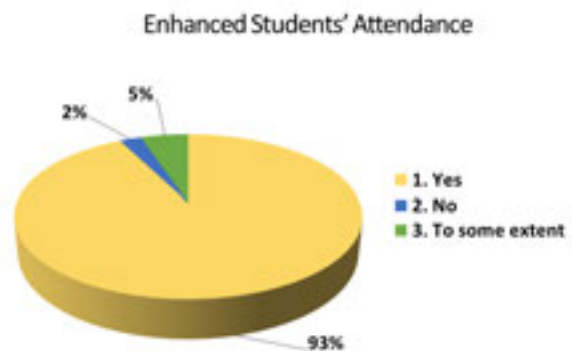
g) Introduction of INSTAL Enhanced the Enrolment of students

One of the study's essential findings was the effect of INSTAL on students' enrolment. When teachers were asked if the introduction of INSTAL enhanced the enrolment of students, 93% of teachers agreed to the statement. They said yes, and 5% of teachers reported that the introduction of INSTAL enhanced the enrolment of students to some extent. While only 2% of teachers disagreed with the statement that the introduction of INSTAL enhanced the enrolment of students. This finding is also reported in one of the research studies cited in the literature review.



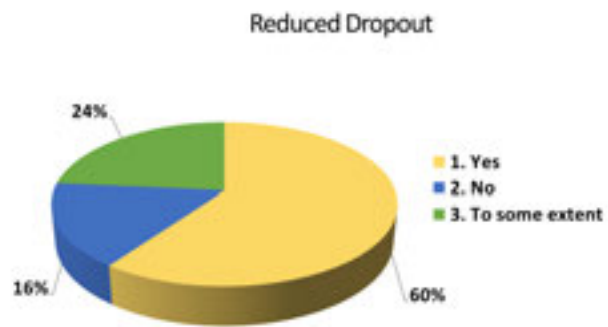
h) Introduction of INSTAL Enhanced the Attendance of Students

Another important finding of the study was positive effects of INSTAL on students' attendance. The teachers were asked if the Introduction of INSTAL enhanced students' attendance; 93% of teachers reported that INSTAL enhanced students' attendance, and 5% of teachers shared that INSTAL enhanced students' attendance to some extent. Whereas only 2% of teachers disagreed with the statement and shared that INSTAL didn't enhance students' attendance. This finding has also been reported in one of the research studies cited in the literature review. This finding is also validated by the students, as 80% shared that introduction to INSTAL improved their regularity and punctuality.



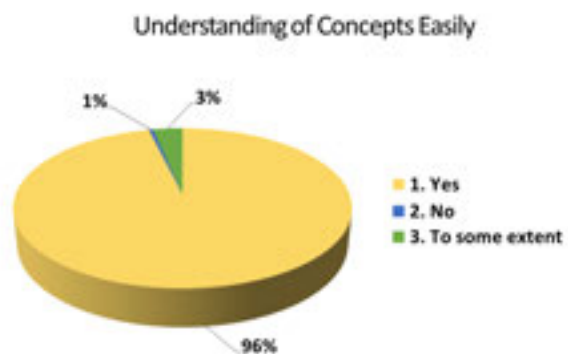
i) Introduction of INSTAL Reduced Dropout of Students

One of the exciting findings of the study was related to the effects of INSTAL on students' dropout. The teachers during survey were asked if the introduction of INSTAL reduced the dropout of students; 60% of teachers said yes, and 24% teachers reported that INSTAL reduced students' dropout to some extent. While 16% of teachers disagreed with the statement that INSTAL reduced students' dropouts. Although this finding could not be triangulated directly from students' surveys, it can be implied valid from students' responses where they shared that INSTAL improved their regularity, punctuality, and attendance.



j) INSTAL Makes Understanding of Concepts Easy

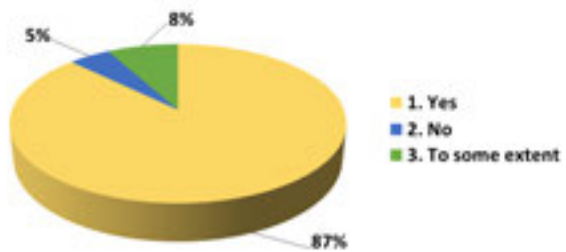
Responding to the statement that INSTAL makes understanding key concepts easy, 96% of teachers agreed with the statement, and 3% of teachers maintained that INSTAL makes understanding concepts easy to some extent, whereas 1% of teachers didn't agree with the statement. On the other hand, when students were asked if INSTAL improved their content knowledge, 91% of students agreed with the statement and shared that it improved their content knowledge, and 6% of students shared that it improved their content knowledge to some extent. The same finding has also been cited in the literature review quoted in two research studies on INSTAL. Therefore, this finding seems consistent and valid.



k) INSTAL Developed Critical Thinking in Students

As reported earlier, INSTAL digitized content and Teacher Guides consist of lesson plans incorporating project-based teaching and learning methods. Project-based learning methods are best for developing students' critical thinking and creativity skills. During the survey, when teachers were asked if INSTAL developed students' critical thinking skills, 87% of teachers agreed with the statement, and 8% of teachers shared that INSTAL improved students' critical thinking skills to some extent. While 5% teachers didn't agree with the statement and maintained that INSTAL didn't develop critical thinking skills in students.

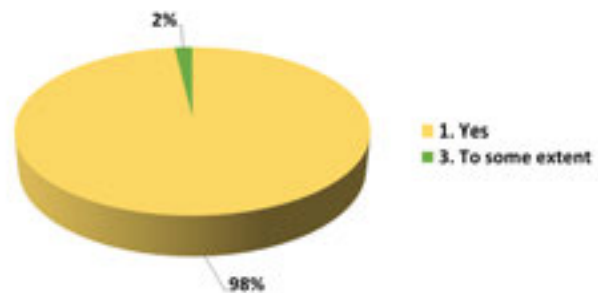
Critical Thinking among Students



l) INSTAL Developed Confidence in Students

During the survey, 82% of students reported that INSTAL enhanced their confidence level. When the same question was asked from the teachers, 98% of teachers agreed with the statement and said yes, it developed confidence in students. Whereas the remaining 2% of teachers shared that INSTAL developed students' confidence to some extent. No one disagreed with the statement.

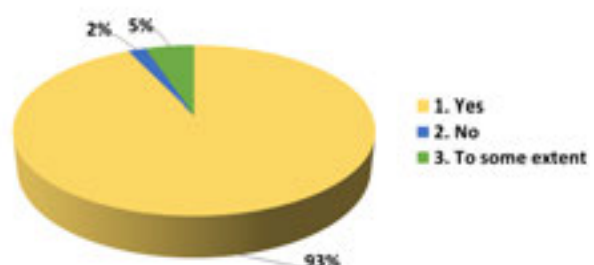
Developed Confidence in Students



m) INSTAL Improved the Presentation Skills in Students (Questioning, Debating etc.)

61% of students reported that INSTAL improved their presentation skills, while 14% students shared that INSTAL improved their presentation skills to some extent. To triangulate students' responses, 93% teachers agreed, 5% of teachers shared that INSTAL improved students' presentation skills to some extent. Whereas only 2% of teachers shared that INSTAL didn't improve presentation skills in students.

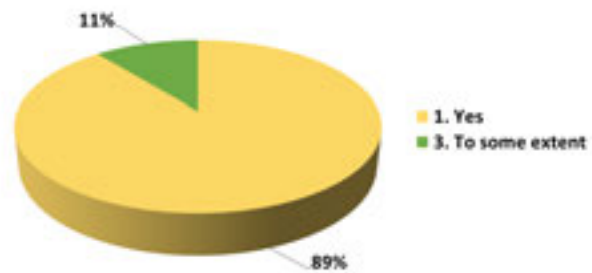
Improved Presentation Skills in Students



n) INSTAL Improved the Language Skills in Students (vocabulary, accent etc.)

During the survey, teachers were asked if INSTAL improved students' language skills; 89% of teachers agreed with the statement and said yes. Whereas 11% of teachers reported that INSTAL improved students' language skills to some extent. During the students' survey, students were also asked if INSTAL improved their language skills; 69% students agreed with the statement, and 17% of students shared that INSTAL improved their language skills to some extent. The same finding was also reported in one of the research studies conducted on INSTAL and cited in the literature review.

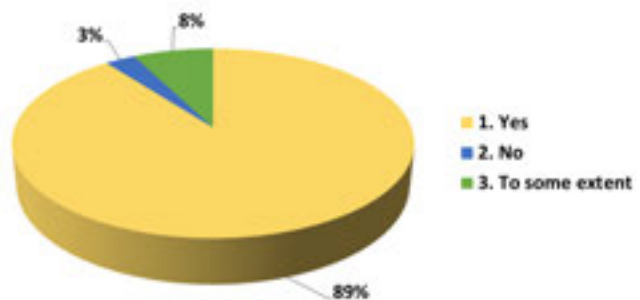
Improved Language Skills among Students



o) INSTAL Improved Attitudes & Behavior of Students

In the previous section, 84% of students reported that INSTAL improved their attitude and behavior toward classroom learning. The same finding was validated by the teachers when 89% of teachers agreed that INSTAL improved students' attitude and behavior, and 8% maintained that INSTAL improved students' attitudes and behavior. In contrast, only 3% of teachers disagreed with the statement that INSTAL improved students' attitudes and behavior.

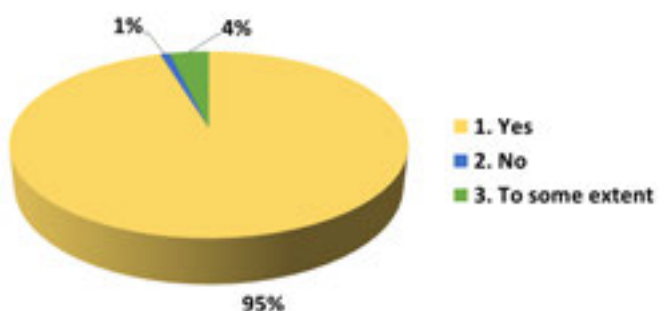
Improved Attitudes and Behavior of Students



p) INSTAL Enhanced Concentration of Students (focused, involved etc.)

During the survey, teachers were asked if INSTAL enhanced the concentration of students; 95% of teachers agreed with the statement, 4% of teachers shared that INSTAL enhanced students' concentration to some extent. At the same time, only 1% of teachers disagreed with the statement.

Enhanced Concentration of Students

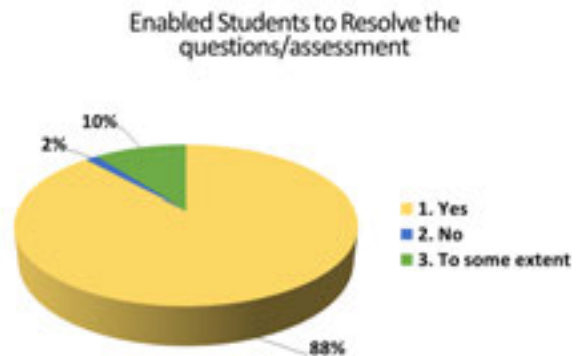


In one of the studies cited in the literature

review, it has been quoted that INSTAL improved students' engagement which testifies to this finding.

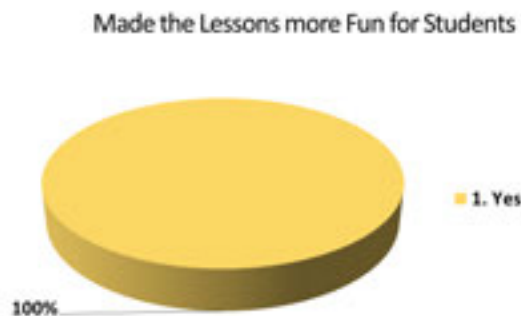
q) INSTAL Enabled the Students to Resolve the Questions/ Assessment Available at the End of Each Session by Themselves

As reported earlier, the INSTAL e-learning application consists of assessment banks, which are used for formative assessment at the end of each class. The teachers were asked if INSTAL enabled students to solve assessments by themselves; 88% of teachers agreed with the statement. 10% of teachers shared that INSTAL enabled students to solve assessments by themselves to some extent. In comparison, 2% of teachers didn't endorse this finding.



r) INSTAL Makes the Lessons More Fun for the Students

One of the important features of digitized and animated content is the fun embedded in the stories and animations. To find out this element, teachers were asked if INSTAL makes the lessons more fun for students; interestingly, 100% teachers agreed with the statement and shared that INSTAL makes lessons more fun for students. This finding can be correlated with one of the earlier findings in which the majority of the teachers and students reported that INSTAL improved their interest in learning and enhanced their understanding of different concepts.



iii. Effectiveness of Introducing Smart Teaching and Learning (INSTAL) Project for Teachers

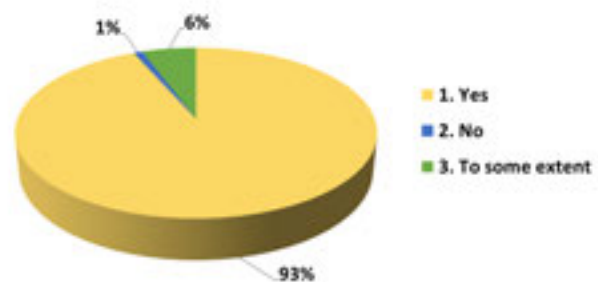
The study's objective was to determine the effectiveness of INSTAL for teachers. Incorporating e-learning applications in teaching required a shift in teaching practices from teacher-centered to student-centered, from merely delivering lectures to engaging students in project-based learning. So, the lesson plans designed for teaching through e-learning applications incorporated activity-based and project-based learning methods. The key areas related to pedagogy, content knowledge, classroom management, language skills, interest in teaching, confidence level, etc., were asked to determine the effectiveness of INSTAL for teachers. The findings from the survey are presented below. The findings also include teachers' comments during data collection for this research study.

a) Teachers' Teaching Practices

To determine the effects of INSTAL on teachers' pedagogical practices, teachers were asked if INSTAL enabled them to transform their teaching practices. Interestingly 93% of the teachers agreed with the statement and said yes. 6% teachers shared that INSTAL has transformed their teaching practices to some extent. Whereas only 1% of teachers reported no effect of INSTAL on teachers' teaching practices. However, it is difficult to verify these responses as 63% of the surveyed teachers received INSTAL training, whereas 37% of the surveyed teachers didn't receive INSTAL training.



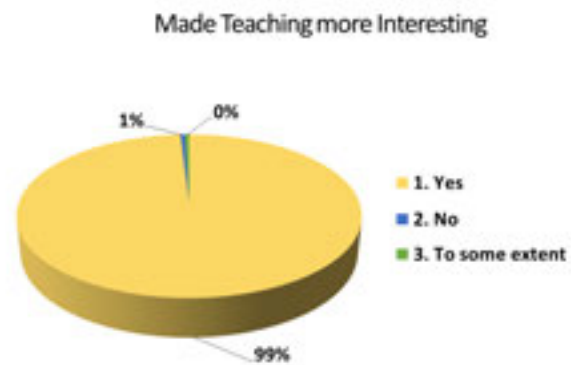
Enabled Teachers to Transform Teaching Practices



However, in responding to the statement that INSTAL enabled teachers to transform their teaching practices, 93% of the teachers agreed with this statement. The effects of INSTAL on untrained teachers' teaching practices are understandable because they have teaching guides consisting of lessons, peer support especially from trained head teachers of the school, or any other factor.

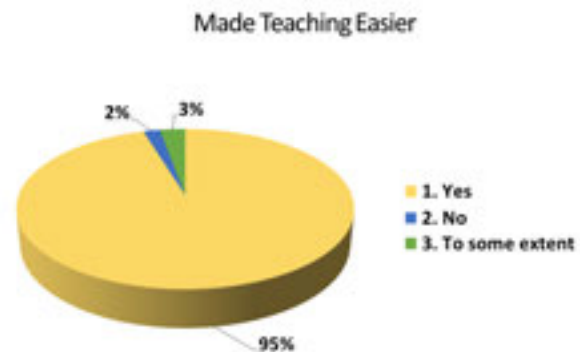
b) Interest in Teaching

Another important finding from the survey was teachers' increased interest in teaching owing to the INSTAL project. When asked if INSTAL made teaching more interesting for the teachers, 99% of them said yes. The rest of the 1% of teachers shared that INSTAL made teaching more interesting for them to some extent. In comparison, none of the respondents disagreed with the statement.



c) Made Teaching Easier

Besides story-based animated videos and flipbooks, INSTAL digital resource pack also includes lesson plans and teacher notes to enable teachers to teach through e-learning applications. It was important to explore teachers' views on whether INSTAL made teaching easier for them. Interestingly, 95% of the teachers held that INSTAL made teaching easier for them, and 3% of teachers maintained that INSTAL made teaching easier for them to some extent. Whereas only 2% of teachers opined that INSTAL has not made teaching easier for them.



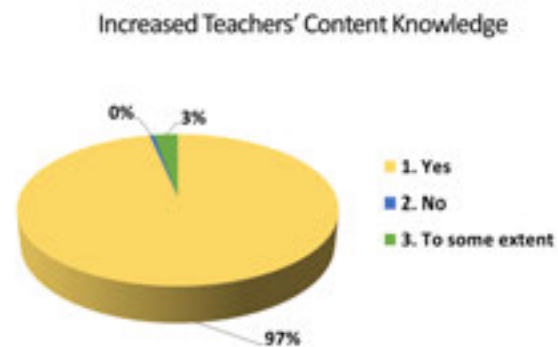
d) Teachers' Confidence

Teachers were also asked if INSTAL had any effect on their self-efficacy. 97% of the teachers confirmed that INSTAL increased their confidence; 2% of teachers opined that it had somewhat improved their confidence. While only 1% of the teachers shared that INSTAL has not improved their confidence.



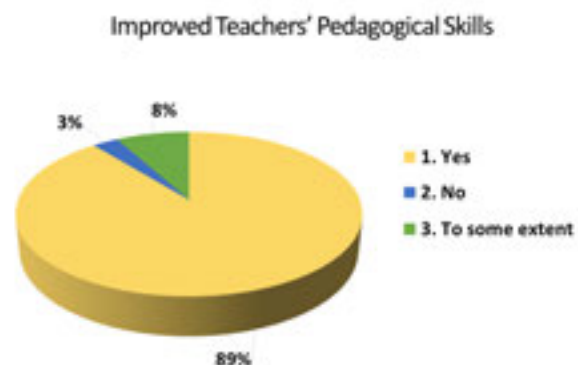
e) Content Knowledge

One of the study's interesting findings was the positive effect of INSTAL on teachers' content knowledge. INSTAL digital resource pack encompasses story-based animated video content of Science, Mathematics, and English subjects, teacher guides that outline the teaching strategies to implement the lessons, and teacher notes that focus on pedagogical content knowledge. When asked if INSTAL increased their content knowledge, 97% of teachers said yes. Whereas 3% teachers responded that INSTAL had improved their content knowledge to some extent, whereas none of the teachers disagreed with the statement.



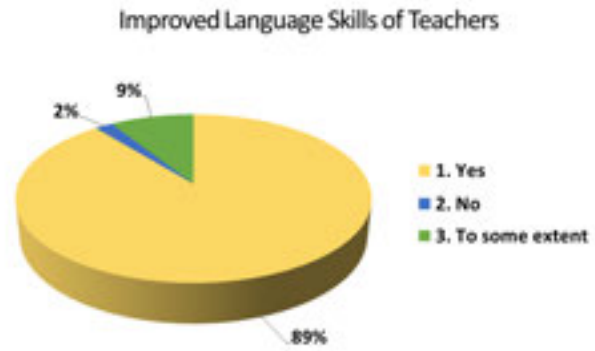
f) Pedagogical Skills

To determine the effects of INSTAL on teachers' pedagogical skills, teachers were asked if it had any effect on their pedagogical skills; 89% of teachers asserted that INSTAL improved their pedagogical skills; 8% of teachers shared that INSTAL improved their pedagogical skills to some extent. Whereas 3% of teachers opined that INSTAL didn't improve their pedagogical skills.



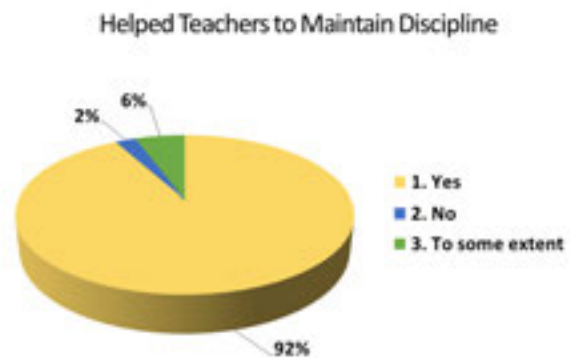
g) Language Skills

As discussed earlier, the INSTAL digital resource pack also includes Read with Me English Stories – to ensure correct pronunciation and understanding; these stories allow students to interact with their Tablets and get word definitions, visual clues, word reinforcement, and more, and Student Readers – simple readers allow students to scaffold their reading skills from beginner to advanced levels. Teachers were asked if teaching e-learning applications improved their language skills; 89% of teachers opined that INSTAL improved their language skills; 9% of teachers shared INSTAL improved their language skills to some extent. At the same time, only 2% of teachers reported that INSTAL had not improved their language skills.



h) Classroom Management

The teachers were also asked if INSTAL helped them maintain discipline in the classroom; 92% of teachers reported that INSTAL helped them maintain discipline in the class; 6% of teachers responded that INSTAL helped them maintain discipline in class to some extent. Whereas, only 2% of teachers disagreed with the statement. In the earlier sections, students reported that INSTAL enhanced their interest in learning that makes it easier for teachers to maintain discipline in class.



iv. Challenges to Effective Implementation of INSTAL

The finding also focused on the challenges faced by the students, teachers, and school partners, that they experienced in implementing INSTAL in Foundation Assisted Schools. The findings presented below are extracted from survey responses and comments from students, teachers, and school partners. It is important to highlight here that the school partners shared multiple challenges they experienced while implementing INSTAL during the survey in the comments section. A few of the most frequently reported challenges by the school partners were: low quality of Tablets, technical issues in Tablets and INSTAL application, an insufficient financial grant provided by the Foundation under the INSTAL project, inadequate training and mentoring for teachers, and high turnover of trained teachers. A good number of school partners shared that they didn't face any problems in implementing INSTAL.

Moreover, when teachers were asked about the challenges they experienced in the implementation of INSTAL, the most frequent challenges they reported were: lack of training and mentoring, low quality of Tablets, technical issues in Tablets and e-learning applications, insufficient space in AV rooms, inadequate Tablets, difficulty in understanding the content of English subject and electricity outage. The school partners and teachers shared these findings in the comments section of the surveys. However, the findings presented below also report the challenges the teachers and school partners reported during a survey.

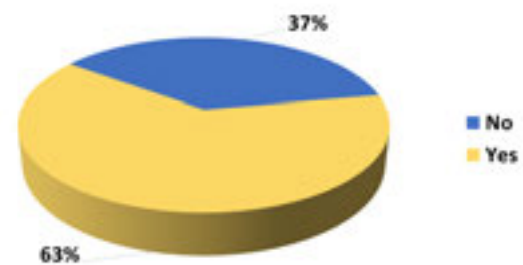


a) Lack of INSTAL Training for teachers

One of the major challenges to the effective implementation of the INSTAL project that emerged during this research study was teacher turnover. As per the present study's findings, around 37% of the trained teachers left their job mainly because of getting better job opportunity, marriages and domestic issues. INSTAL, being an innovative initiative, requires extensive teacher training and mentoring. The problem of teachers' turnover further complicates the situation when newly hired teachers are not provided training on INSTAL formally by SEF. It has been identified from the survey responses that INSTAL-intervened schools have not been provided any training in the last three years after the completion of the project. Currently, 37% of the teachers teaching through digital resources are untrained on INSTAL, reported school partners. Besides the quantitative survey, the lack of INSTAL training was cited as one of the significant challenges by the school partners in the survey. Most of the teachers, students, and school partners also reported the unavailability of INSTAL-trained teachers in the schools as one of the significant challenges to implementing INSTAL in the schools. During the survey, when teachers were asked about suggestions to improve the implementation of INSTAL, most teachers suggested providing training on INSTAL.



Number of Trained Teachers

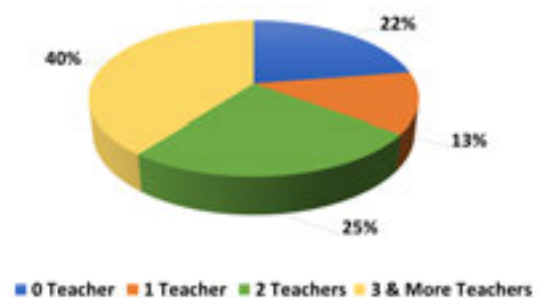


b) Trained Teachers Turnover

Another challenge to implementing INSTAL that emerged from the data was related to the retention of trained teachers. During the project, seven teachers from each school were trained for KG to grade V Science, Mathematics, and English subjects, including IT teachers.

In some instances, where schools had more than one section of classes, more than seven teachers were trained.

Retention of Trained Teachers



However, during the study, 22% of the school partners reported that they did not have any trained teachers available in the school; all the trained teachers left the school. 13% of the school partners reported that they have only 1 INSTAL-trained teacher, and 25% reported two trained teachers available in the school. Whereas 40% of school partners reported having three or more trained teachers available in the schools. The above figures show that trained teachers' turnover ratio is too high and is one of the major challenges to implementing INSTAL in schools.

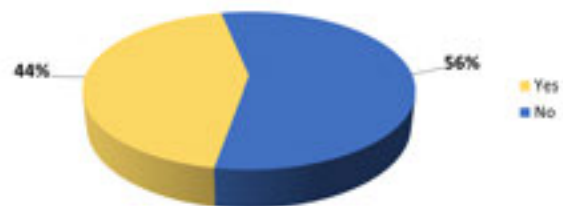
The school partners were asked if they replaced INSTAL-trained teachers; 44% of the partners reported having replaced 1 to 3 trained teachers. On the other hand, 56% of partners shared that they didn't replace any trained teacher. When the same partners were asked about the reasons for teachers' turnover, they reported different reasons ranging from marriage, migration, better career opportunities, and family issues.

c) Inadequate Mentoring

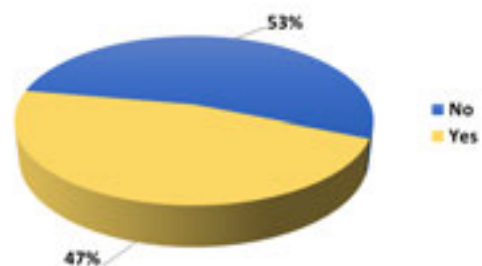
INSTAL Teachers Professional Development Model entailed off-site training and classroom-based support through mentoring. At the beginning of the project, teachers were imparted off-site training followed by lesson observations, feedback, and guidance. The mentoring sessions effectively addressed the challenges teachers experienced in integrating e-learning and enhancing their pedagogical skills through reflection in action and mentoring. However, after the end of the project, follow-up visits were not carried out as per the requirements, and teachers were not mentored.

The study's results unveiled that 53% of the teachers teaching in AV rooms have not received any classroom-based support. One of the most frequently cited challenges by the teachers and school

Replacement of Trained Teachers



Mentoring of Teachers



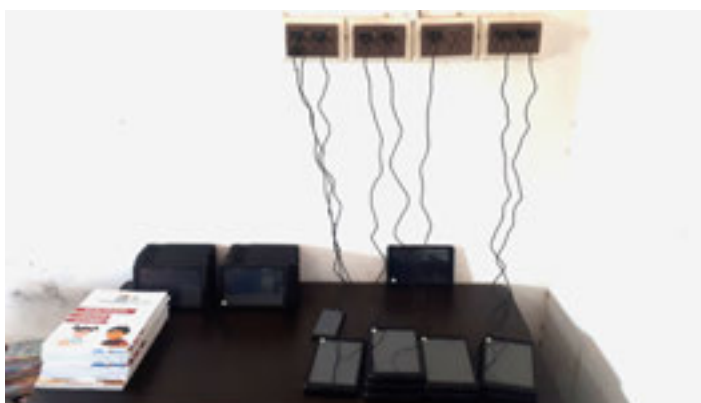
partners during the survey was the lack of classroom-based support. Teachers frequently faced problems in teaching through digital resource packs employing innovative pedagogies, but they did not get any support in the shape of mentoring or guidance from SEF officials. During the interviews, most teachers suggested regular mentoring to improve the effectiveness of INSTAL in the schools. Most of them suggested that mentoring follow-up visits should be done on a regular basis.

d) Technical Problems in Tablets

Another major challenge that emerged from the study's findings was technical issues with Tablets. The completion of the warranty period of issued Tablets and the closure of customer service centers across the country hampers the timely maintenance of technical issues in Tablets. The results showed that 15% of schools' Tablets were not functional. Whereas in 85% of the schools, a high number of Tablets were in working condition, they are facing a charging issue in Tablets that need frequent charging; if they have 2 or 3 INSTAL classes back to back, they are unable to charge the Tablets. This is a severe challenge as INSTAL lessons are incomplete without Tablets. The key features of the INSTAL digital resource pack, like flipbooks, interactive exercises, and student readers, are part of the e-learning application, which can be operated on Tablets. One major challenge the teachers and school partners reported during interviews was technical problems with Tablets. Issues related to tablet charging and e-learning application were among the most frequently cited barriers to implementing INSTAL in the FAS by the students, teachers, and school partners in the interviews. They all suggested providing quality Tablets and troubleshooting e-learning applications to overcome this challenge.

e) Dysfunctionality of LED TVs

The dysfunctionality of LED TVs was



identified as another significant challenge for the effective implementation of INSTAL in Foundation Assisted Schools (FAS). The findings show that 12% of the schools' LED TVs were not functional due to technical faults. As stated earlier, the unavailability of LED TVs in the AV rooms means no use of INSTAL e-learning applications.

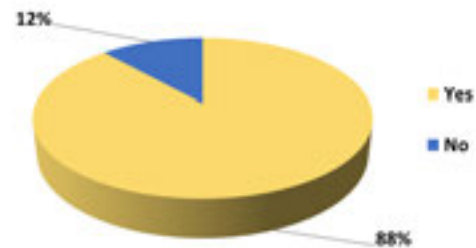
f) Irregular AV classes

Another challenge reported by the participants was irregular Audio-Visual classes. 14% of the participants reported irregular classes. Though there could be several reasons for irregular classes, one of the major reasons reported was the lack of power supply. During the interviews, teachers and school partners reported that technical issues with Tablets, frequent electricity outages, unavailability of trained teachers, and issues with LED TVs were the major barriers that influenced the regular AV room classes.

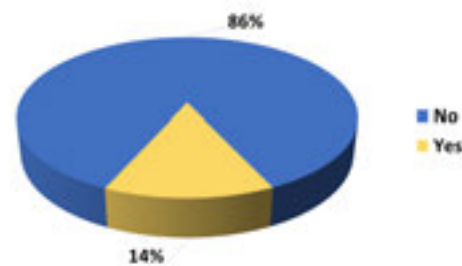
g) Unavailability of Electricity

All schools selected under the INSTAL project were provided the matching grant to procure solar panels to ensure uninterrupted power supply to the AV rooms so that INSTAL lessons can be implemented seamlessly. However, the findings of this study revealed that irregular classes of INSTAL were one of the major issues. The primary reason for AV classes' irregularity was the electricity outage and the absence of power backup. 14% of the participants reported a lack of power supply as the major challenge to the effective implementation of INSTAL in the schools. Most of the teachers reported during the interviews that frequent electricity outages and lack of power backup are significant barriers to regular AV room classes. This problem can be overcome with the maintenance of the solar system provided to the schools during the project

Functional LED TVs



Irregular Audio-Visual Classes



VII. Conclusion

It is concluded that the introduction of e-learning strategies via INSTAL project has been appreciated by the partners, teachers, students. The project successfully builds the capacity of teachers and students in the area of ICT. The introduction of digital resource has transformed the teaching and learning process. Students preferred to learn through technology-aided techniques as it enhanced their content knowledge, language skills, presentation skills. It impacted positively to the personalities of students by improving confidence, making them responsible towards learning, and hence their grades, enrolment and attendance. It also improved the knowledge delivery of the teachers. Partners have managed to sustain the project significantly and employed subject-specific teachers in INSTAL intervened schools. They requested to upscale the blended learning approach till the elementary level.

VIII. Recommendations

Based on the study findings, the following recommendations are proposed to improve the sustainability of INSTAL in the existing Foundation Assisted Schools (FAS) and to upscale and up scoping of INSTAL.

1. Follow-up visits and mentoring of teachers need to be done regularly. A dedicated team shall be appointed/assigned for follow-up visits and INSTAL-related support to the schools. During the follow-up visits, the e-learning application should be updated on the Tablets provided to the schools. This shall be the responsibility of INSTAL training and deployment officials previously appointed for the INSTAL project. They can better ensure that support to the schools as they already did during the project. They are trained in conducting lesson observations and teacher mentoring. They have a better understanding of the INSTAL e-learning application as well.
2. Regular and need-based teacher training shall be conducted for INSTAL teachers. Training Need Assessment (TNA) should be conducted to identify the needs of teacher training, and on the basis of that TNA, training sessions should be designed. The lead role of INSTAL teachers' training should be given to the Training Unit (TU). However, Training Unit (TU) should engage the former INSTAL training and deployment team in the process of teachers training.
3. Headteachers should also be provided training on INSTAL so that they can play their role in the implementation of INSTAL. The focus of training for head teachers should be on the leadership role for instructional technology and mentoring for effective technology integration for teaching and learning. The head teachers should provide instructional support to the teachers through lesson observations and mentoring. Developing head teachers' capacity to conduct lesson observations and mentoring will increase the effectiveness and sustainability of the interventions like INSTAL in the Foundation Assisted Schools (FAS).
4. School partners need to be oriented on the importance of INSTAL, and strategies should be suggested to them to play a leadership role in the effective implementation of INSTAL. Orienting school partners regarding INSTAL shall be the responsibility of former INSTAL training and deployment officials.

5. A focal person shall be appointed to look after matters related to INSTAL. The focal person shall coordinate with the training and deployment team appointed in the regional and district offices.
6. Allocation of annual maintenance cost is other than a subsidy for the schools with thin enrolment or in hard areas.
7. Grants shall be provided to the school partners to construct additional Audio-Visual rooms in densely enrolled schools.
8. The Tablets provided under INSTAL had quality issues. The significant improvement is required in the charging capacity because Tablets must run more than two back-to-back classes. Due to low capacity, they cannot continue to work. Hence, the quality of android Tablets is imperative for uninterrupted work. It is further suggested that the quality Tablets with insurance and maintenance policy may be provided with additional quantity as it has equipped the students with 21st-century learning tools and skills.
9. The digital resources that have already been provided must be adequately maintained and repaired whenever they have technical problems. The foundation must provide guidelines to the partners for maintenance and troubleshooting.
10. Digitized content should be updated in accordance with the updation in the syllabus.
11. INSTAL should be upscaled until the elementary level and more schools should be included.
12. INSTAL digitized content (e-learning application) should be used for AALTP learners

IX. References

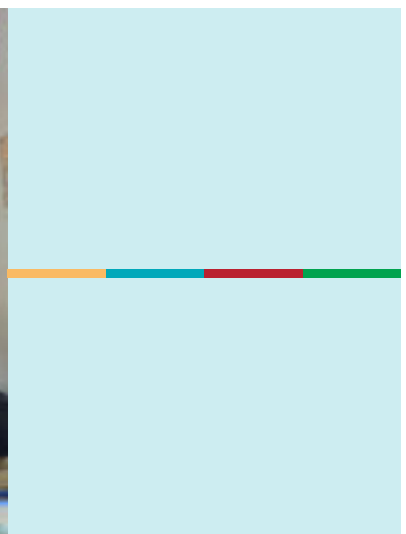
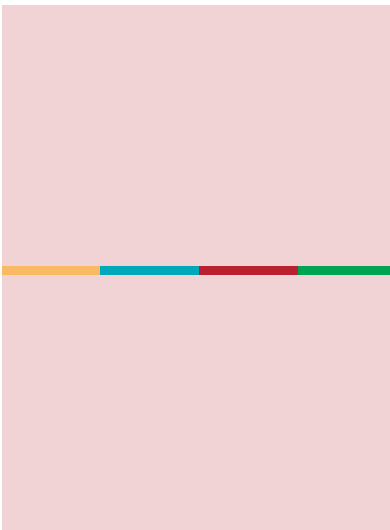
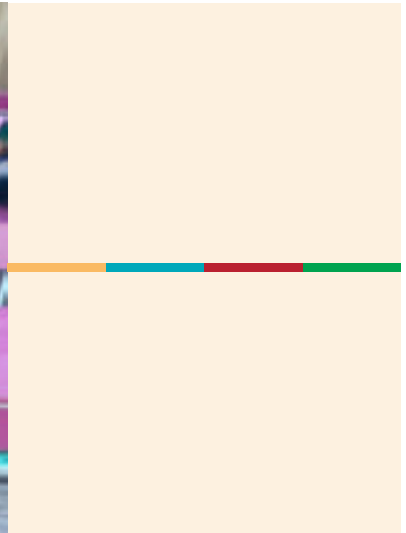
- Balanskat, A., Blamire, R., & Kefala, S. (2006). The ICT impact report. European Schoolnet, 1, 1-71.
- Beauchamp, G., & Kennewell, S. (2010). Interactivity in the classroom and its impact on learning. *Computers & education*, 54(3), 759-766.
- Bilwani, A., & Zehra, R. (2016). Perceptions of teachers regarding technology integration in classrooms: A comparative analysis of elite and mediocre schools. *Journal of Education and Educational Development*, 3(1).
- Cetinkaya, L. (2017). An educational technology tool that developed in the natural flow of life among students: WhatsApp. *International Journal of Progressive Education*, 13(2), 29-47.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 319-340.
- Ertmer, P. A.-L. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education*, 59(2), 423-435.
- Higgins, S., Xiao, Z., & Katsipataki, M. (2012). The Impact of Digital Technology on Learning: A Summary for the Education Endowment Foundation. Full Report. Education Endowment Foundation.
- Kapur, R. (2019). The Significance of ICT in Education. *IOSR Journal of Research and Methods*, 7(3), 43-49.
- Le Thi, M. A. I. (2020). Benefits and challenges to integrate ICT in EFL teaching and learning activities. *Journal of Research & Method in Education (IOSR-JRME)*, 10(3), 46-50.
- Opara, J. A., & Oguzor, N. S. (2011). Inquiry instructional method and the school science curriculum. *Current research journal of social sciences*, 3(3), 188-198.
- Rind, A. A., Asad, M. M., Marri, S. A., Sherwani, F., & Rehman, F. U. (2021). How integration of information and communication technologies impact academic achievement? An empirical study on Sindh education foundation. *Journal of Applied Research in Higher Education*.
- Roshan, M., Ahmed, M., Bano, S., & Hussain, N. (2022) Effectiveness of Information and Communication Technology (ICT) Integrated Teaching and Learning in Primary Schools. *International Journal of Innovation in Teaching and Learning*.

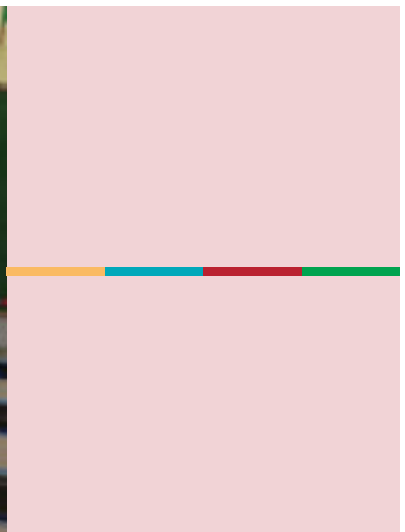
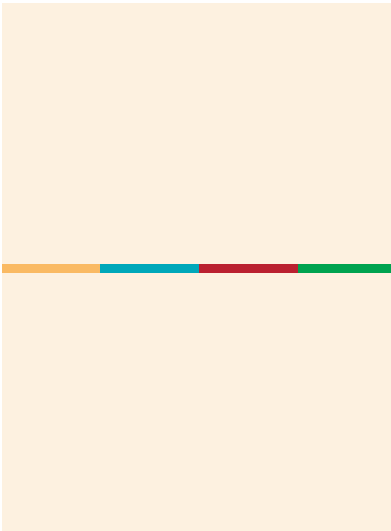
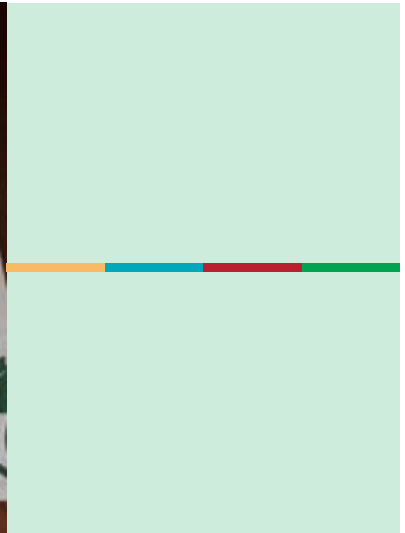
Seraji, N. Z. (2017). Teacher's attitudes towards educational technology in English language institutes. *International Journal of English Linguistics*, 7(2), 176-185.

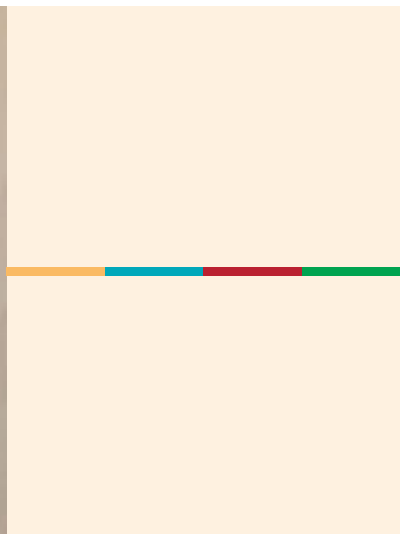
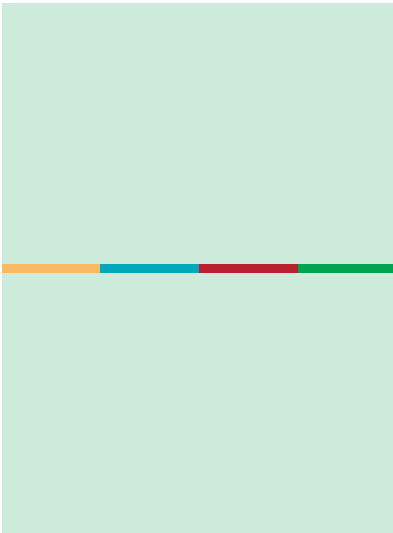
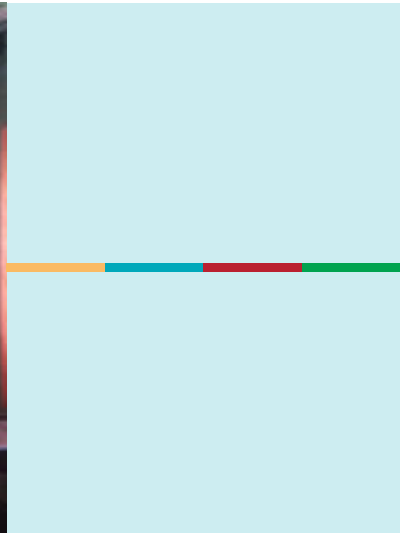
Smeets, E., van GENNIP, H., & van Rens, C. (2009). Teaching styles of teacher educators and their use of ICT. *İnönü Üniversitesi Eğitim Fakültesi Dergisi*, 10(3).

Tezci, E. (2010). Attitudes and knowledge level of teachers in ICT use: The case of Turkish teachers. *Journal of human sciences*, 7(2), 19-44.

X. Pictures Gallery









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