



Swedish Committee
for Afghanistan



MATPD
A MULTI-MODAL APPROACH TO
TEACHER PROFESSIONAL DEVELOPMENT

Multimodal Approach to Teacher Professional Development in Low Resource Settings

Report on Beliefs, Attitudes, Knowledge and Skills of Nepal South Asian Teacher Educators Fellows

Centre of Excellence in Teacher Education

Tata Institute of Social Sciences

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Authors:

Dr. Ruchi S. Kumar (Co-PI MATPD) Assistant Professor, Centre of Excellence in Teacher Education, Tata Institute of Social Sciences, Mumbai.

Ms. Reema Govil (MATPD- Lead Researcher) Centre of Excellence in Teacher Education, Tata Institute of Social Sciences, Mumbai.

Dr. Parul Anand (MATPD- Post Doc Fellow) Centre of Excellence in Teacher Education, Tata Institute of Social Sciences, Mumbai.

Dr. Osama Qamar (MATPD- Senior Research Associate) Centre of Excellence in Teacher Education, Tata Institute of Social Sciences, Mumbai.

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Centre of Excellence in Teacher Education,

Main Campus,

Tata Institute of Social Sciences,

V. N. Purav Marg, Deonar

Mumbai- 400088

RESEARCH TEAM

Dr. Ruchi Kumar (Co-Principal Investigator)

Ms. Reema Govil (Research Manager)

Ms. Dhvani Bafna (Consultant-Program Design and Implementation- till October 2022)

Ms. Aditi Desai (Project Manager till August 2023)

Mr. Anirudh Agarwal (Research Assistant-participated till July 2022)

Ms. Priteegandha Naik (Research Associate-participated till July 2023)

Dr. Parul Anand (Post-doctoral Fellow)

Dr. Osama Qamar (Senior Research Associate)

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ACRONYMS

ACU Association of Commonwealth Universities

AM Academic Mentor

APQN Asia Pacific Quality Network

AR Action Research

BA Bachelor of Arts

BASK Beliefs, attitude, skills, knowledge

B.Ed. Bachelor of Education

B.Sc. Bachelor of Science

CDC Curriculum Development Centre

CEHRD Centre for Education and Human Resource Development

CETE Centre of Excellence in Teacher Education

CLIX Connected Learning Initiative

CL4STEM Connected Learning Initiative for STEM Education

COP Communities of practice

DTL Distance Teaching and Learning

ERC Educational Resource Centre

FM Field Mentor

GESI Gender Equality and Social Inclusion

GPE KIX Global Partnership for Education Knowledge and Information Exchange

IAU International Association of Universities

IDRC International Development Research Centre

IGNOU The Indira Gandhi National Open University

ICT Information and Communications Technology

INQAAHE International Network for Quality Assurance Agencies in Higher Education

ITE Integrated Approach to Technology in Education

KMO Kabul Management Office

LMS Landscape Mapping Study

MA Master of Arts

MATPD Multimodal approach to Teacher Professional Development

M.Ed. Master of Education

M.Phil. Master of Philosophy

M.Sc. Master of Science

OER Open Educational Resources

PCK Pedagogical Content Knowledge

PBL Project Based Learning

PD Professional Development

PDCA Plan-Do - Check- Act

Ph.D Doctorate of Philosophy

PhET Simulation Physics Education Technology Simulation

PLC Professional Learning Communities

RBA Rights Based Approach

SATE South Asian Teacher Educator

SCA Swedish Committee for Afghanistan

SESP School Education Sectoral Plan

SIDA Swedish International Development Agency

SSDP School Sector Development Plan

SSRP School Sector Reform Plan

SWOT Strengths, Weaknesses, Opportunities and Threats

TPACK Technological Pedagogical Content Knowledge

TE Teacher Educator

TELTA Technology enabled learning for teachers and adolescents for 21st Century

TEMP Teachers Education Masters Programme

TLP Teaching-Learning Processes

TISS Tata Institute of Social Sciences

TPD Teacher Professional Development

UNESCO The United Nations Educational, Scientific and Cultural Organization

VC Villa College

EXECUTIVE SUMMARY

The MATPD innovative model of continuous professional development aims to influence policy, practice, and further research in distance Teacher Professional Development (TPD) in South Asian countries. This was done through the South Asia Teacher Educators (SATE) Fellowship which was implemented in Afghanistan, Maldives and Nepal from May 2022 to May 2023. The project draws on TPD strategies developed and implemented in India, by the Centre of Excellence in Teacher Education (CETE), through its Connected Learning Initiative, and Integrating Technology in Education Project. MATPD was led by Villa College, Maldives with CETE, Tata Institute of Social Sciences as technical lead and implementing partner for Nepal, and the Swedish Committee for Afghanistan (SCA) in Afghanistan.

In Nepal, the South Asian Teacher Educators (SATE) fellowship program, part of the MATPD intervention, was undertaken by a cohort of 15 fellows across the country. The fellows were from diverse backgrounds and engaged in different professions linked to education (school teacher, professor at university, NGO professional, govt official etc.). Fellows were selected keeping in mind gender, geographic, and social inclusivity (male/female, urban/remote locations, minority and disability status).

As part of the fellowship program, fellows participated in different forms of professional development to build their capacities and leadership skills as teacher educators. These included (a) distance education courses on ICT, mentoring, (b) practice-based action research done collaboratively with teachers through mentor support, (c) enrichment webinar sessions that supported fellows with their action research study, (d) social learning through formal interactions on mobile chat-based (on Telegram app) groups. Additionally, there were face-to-face workshop sessions, virtual reflection sessions and interactions with core consortium team members to support them during the fellowship program.

Using learnings from the courses, interactions and enrichment sessions, the 15 fellows selected one of the six themes (language education, math education, science education, peace education, open educational resources, GESI) for their action research study. They collaborated with a set of 5-10 teachers to address local contextual issues related to the theme. Each fellow was supported by a team of an academic mentor and a field mentor to provide necessary technical and contextualization support for implementing their action research within the classrooms. During this process, the fellows transitioned from the role of being a mentee to a mentor for the participating teachers.

The fellows also participated in the baseline and end line surveys and interviews, prior and post intervention respectively. The aim of the BASK study was to understand the changes in fellows'

knowledge, skills, behavior and attitudes as a result of the MATPD project intervention. It also attempted to identify the levers and barriers for supporting pedagogically rich distance learning methodology for scaling the innovative MATPD model.

A mixed methods approach was used for the study. The surveys and interviews attempted to understand their experiences, opinions and insights within their contexts, on aspects of professional development opportunities, action research, mentoring, ICT, reflection, collaboration, social learning and inclusion. The surveys were administered as google forms, and the interviews were conducted online by the TISS team. The data collected, was transcribed, cleaned and analysed. The qualitative data was analyzed using a deductive analysis approach while the quantitative data was analysed using descriptive statistics followed by an inferential analysis method.

Summary of Findings

I. Role within the MATPD project

The fellows have a better understanding of their role post the completion of the fellowship, which they now perceive as multi-dimensional, combining supporting teachers' professional development while collaborating with them for action research. It is noteworthy to mention, that as a result of the fellowship, fellows now identify themselves as 'teacher educators' who have contributed towards the professional development of teachers. Some fellows articulated the need and significance of teacher educators' professional development through collaborative work, and the role of mentors in developing teacher educators' research competence.

II. Professional Development Experience

The SATE fellowship had a significant impact on the fellows understanding of the nature and mode of TPD which can be practice-based. They gave examples of how teachers learned through classroom implementation, action research, mentoring, and reflection, and how these processes are dynamically interconnected. Initially they had described TPD as a short-term, and content and curriculum-based engagement. Fellows could make the connection between theoretical ideas discussed and practice experiences during the fellowship. Fellows identified themselves as competent teacher educators, as a result of learning through reflection, constructive feedback from mentors, adapting plans by understanding teachers' context, and supporting them in classroom implementation. Most fellows agreed that a blended approach (distance learning) can be useful in Nepal context, but had concerns about accessibility due to unavailability of gadgets (mobile, laptops etc) and Internet and connectivity issues, due to which teachers faced challenges in engaging in online mode. On the other hand, it also provided opportunities to engage at their own pace and time as some fellows were able to connect with teachers and have sessions after school.

III. Action Research

Action research is already institutionalized in Nepal. However, Nepal SATE Fellows reported significant gain in their understanding the process of action research and developing research and communication skills needed to support the collaborative action research process. The fellows selected different themes but common learning was observed in adaptability and flexibility that one needs to exercise, to identify problems on the ground and to devise contextualized solutions with teachers. They assumed the identity of teacher educators through designing and implementing TPD for teachers in the course of action research. Fellows gained in-depth understanding of the theme and topic they focused on in action research, through reading existing research and literature, and engaging in research with teachers.

They found the fellowship useful in the professional development of both teachers and teacher educators, and the important role it plays in developing agency and autonomy to find solutions for problems one is facing in the field. Important learning outcomes were also reported for teachers who collaborated in the action research, and the students in these teachers' classrooms also benefited by developing better comprehension, opportunities of expression and use of various hands-on and digital resources to enhance their understanding. The two cycles of the action research contributed to these outcomes. SATE fellows connected and interacted with teachers using multiple online and offline modes despite the challenges of time and resources faced by teachers. The support of school principals and their positive beliefs about the usefulness of action research will be key factors that play a role in implementation and sustainability of action research in future.

IV. Mentoring

The concept of mentoring is new in Nepal and is not formally institutionalized within the system. The fellowship experience of mentoring, both as a mentee and a mentor enabled the fellows to develop a nuanced understanding of the concept & differentiate between mentoring & monitoring; build and strengthen skills and qualities to be effective mentors, and work collaboratively with teachers to facilitate their professional development.

The mentoring process adopted within the MATPD project helped the fellows to carry out their Action Research effectively. They received support and guidance on technical aspects and contextualization from their academic and field mentors in areas of pedagogical inputs, resource sharing, developing research questions and tools for data collection, report writing, contextualization of innovation etc. The fellows used these learnings while mentoring the participant teachers during action research and supporting them through TPD workshops, reflection sessions, classroom implementation. They found the mentoring approach useful as they could reach out to one mentor, if the other was unavailable. The blended approach of online and in person

mentoring helped address barriers of time and geographies. The fellows mentioned that this model of mentoring would be useful in their context, as traditionally, the support post training is weak in practice.

V. Reflection

In the Endline, it was revealed that fellows reflected on their decision-making during fellowship and made changes in their classroom practices. Through Action research and Mentoring support, they got opportunities to rethink their strategies, and fellows included new activities and were able to overcome challenges related to conducting research. At baseline, most of the reflective experiences described by fellows were not related to teaching. At endline, fellows mostly talked about self-reflection with reference to teaching experience. Peer reflection was not a common practice as reported in baseline study.

VI. Social Learning

The project provided the fellows with opportunities to engage in social learning through the formal telegram groups, course discussion forums and enrichment webinar sessions curated to support them with their Action Research. The interview responses indicated less engagement and participation of fellows. There were some challenges such as the app introduced was new for the fellows, and the language barrier, since most fellows were more comfortable communicating in their local language. While the primary objective of the groups was to engage fellows in learning from each other, the online discussions were a mix of pedagogical and administrative in nature. More facilitation is required to enhance discussions that enable fellows to share and reflect on their practice, learnings and experiences with each other.

The fellows had opportunity to collaborate with diverse stakeholders. They collaborated with participating teachers for their Action Research and for TPD workshop, classroom implementation and reflection sessions. they also collaborated with other teachers formally and informally to share their Action Research experiences and insights. A few fellows also mentioned collaborating with government officials to share their Action Research study work or collaborating with Kathmandu University and other organizations for carrying out TPD sessions. Prior to the fellowship, collaboration was primarily in the context of non-teaching activities. The fellowship helped them understand how collaboration in various forms can help improve classroom teaching-learning practices.

VII. ICT

By the end of the project there was some improvement in ICT use among research fellows. The BASK research recorded a shift from the 'no understanding or prior experience of use technology

into classroom', to 'meaningful use of technology'. A few fellows demonstrated improvement in ICT skills by using apps and ICT resources like PhET simulations, Piktochart for making learning meaningful through ICT. Most of the fellows were able to use PowerPoint, and Apps like Facebook and Telegram to communicate, share and collaborate. They learned the value of ICT for conducting meetings for ease of time, and access of participants from different parts of the country and region. Statistical analysis also shows a shift in the belief about integrating technology in teaching, with more fellows agreeing that ICT will improve classroom instruction and practice. Qualitative data analysis indicated that teachers were able to manage time better and their productivity and professional excellence increased owing to access to ICT resources.

VIII. Gender Equity and Social Inclusion (GESI)

The practical application of the concept of social inclusion in education is weak in the country, though an inclusion policy is in place. The education system is not very inclusive given low resources, lack of adequate infrastructure and untrained teachers. Additionally, there is a lack of female teachers at the secondary level for subjects like math and science.

The fellows came into the fellowship with a limited understanding of the terms "equity" and "inclusion", and while they had some knowledge of classroom diversity (gender, caste, socio-economic, culture, language etc.), they did not know how the classroom can be made inclusive using various pedagogical practices and strategies.

Fellows attempted to demonstrate inclusiveness in the classroom through their Action Research study by giving equal opportunities to weak students and fast learners, to facilitate/present, ensuring that all students could engage in PhET through additional classes in computer labs, creation of heterogeneous /mixed ability groups to ensure learning of diverse learners.

Section I: Introduction

Report on Beliefs, Attitudes, Knowledge and Skills of South Asian Teacher Educators Fellows in MATPD

This report discusses the BASK study findings. The (BASK)study was one of the outcomes of the MATPD project. The report provides a comparative analysis of various components of the baseline and endline study conducted with fellows, and aims to capture changes in beliefs, attitudes, skills, and knowledge of fellows over the course of the fellowship. It unpacks the data using quantitative and qualitative methodology around eight themes: role of fellows within the MATPD project, professional development experiences, action research, mentoring, reflection, social learning, ICT, and GESI. It draws conclusions from the findings around these themes, and discusses the levers and barriers for supporting pedagogically rich distance learning methodology for scaling an innovative TPD model.

Overview of the Research Report

The BASK Study report is organized into four sections.

Section I. The first section presents an introduction to the MATPD project, SATE fellowship program and the theory of change framework which guided this study.

Section II. The second section provides a brief overview of the sampling methodology, data collection tools designed for the study, and the approach to the analysis. The demographic profile of the fellows is also included in this section.

Section III. The third section presents findings on changes in fellows' knowledge, skills, behaviour and attitude, as a result of the MATPD intervention. It reports on themes such as role of fellows within the MATPD project, professional development experiences, action research, mentoring, reflection, social learning, ICT and GESI.

Section IV. The fourth and the last section comprises the conclusion, references and the appendix.

The MATPD Consortium

The project, A Multimodal Approach to Teacher Professional Development in low resource settings (MATPD) was a collaborative endeavour. A South- South collaboration of higher education institutions and a global non-profit entity. The consortium aimed to address the poor quality of teacher professional development, particularly for distance teaching and learning through this project. Villa College, Maldives was the lead partner of the consortium. The Tata Institute of Social Sciences (TISS) was the co-lead and knowledge partner for the proposed innovation, and the Swedish Committee for Afghanistan was the third partner, implementing the project in Afghanistan. The learnings from TISS's award winning and globally recognized initiatives on TPD developed in and for under-resourced and developing contexts were adapted, implemented and researched in Afghanistan, Maldives and Nepal.

Villa College is the first and largest private higher education institution in the Maldives offering a variety of academic programmes. The teacher training programs offered by Villa Collage at the Faculty of Educational studies are known to be popular.

The Swedish Committee for Afghanistan (SCA) has been involved in implementation of education projects that include capacity development, advocacy and service delivery since 1984. The SCA Teacher training aims at building teachers' capacities in subject knowledge and pedagogy which are geared towards teacher professional development, through short courses.

Tata Institute of Social Sciences, Mumbai, India (www.tiss.edu) is among South Asia's premier research and teaching universities in Social Sciences. The Centre of Excellence in Teacher Education (CETE), an Independent Centre on the TISS Mumbai Campus engages in teaching, research, and field action, and has multidisciplinary expertise in the use of ICT in Education for quality reform at scale. CETE envisages its role as a "Catalyst for Transformation in Teacher Education" through multiple activities. The Centre has hosted several UNESCO award-winning field action research (AR) projects including Integrated Approach to Technology in Education (ITE)¹ and Connected Learning Initiative (CLIX)². The Centre's in-service teacher education programmes and Communities of Practice have also been awarded a certificate of appreciation. The Centre has also delivered an international project - Teachers Education Master's Program

¹<https://tiss.edu/view/11/projects/integrated-approach-to-technology-in-education-ite/>

²<https://tiss.edu/view/11/connected-learning-initiatives-clix/>

(TEMP) for supporting professional development for Afghanistan's Teacher Educators in collaboration with SCA.

Introduction to the MATPD Project

A Multi-Modal Approach to Teacher Professional Development to Address Evolving Educational Changes in Low Resource Settings.

Overall Objective:

The MATPD project aimed to influence policy, practice, and further research in distance Teacher Professional Development in South Asian countries.

Specific Objectives

- Generate knowledge about the enablers for an integrative distance teacher professional development model in low resource settings.
- Enhance the capacity of teacher educators and teachers by developing their leadership skills and knowledge in constructive use of new media and technology to enhance their practices.
- To mobilize support of and share insights with relevant stakeholders on adapting, adopting, and sustainability of pedagogically rich TPD approaches

Research Questions

The following research questions paved the way to delve deeper and progress towards the core intended outcomes of the initiative.

- How can Teacher Educators (TEs) and Teachers be enabled to take ownership of adapting and adopting the proposed innovation with the support of relevant stakeholders in the education system?
- What are the levers for and barriers to delivering pedagogically rich distance teaching and learning experiences at scale?
- How can media and technology be used to enhance and develop leadership skills in TEs and teachers?

Project Activities

The project aimed to develop practice, engage in research and inform policy on teacher professional development using distance learning modalities, social learning communities, and practice-based and action-research based professional learning and development.

MATPD draws on TPD strategies developed and implemented in India, by the Centre of Excellence in Teacher Education, through its Connected Learning Initiative and Integrating Technology in Education Projects. These strategies were designed for low resource settings and adapted to suit the contexts of the participating countries (Afghanistan, Nepal and Maldives)

The main activities of the project were:

I. A Landscape Mapping Study on Teacher Professional Development across the three countries, which comprised an extensive secondary research and in-depth interviews with diverse stakeholders including teachers, teacher educators, government officials and policy makers. The landscape of TPD focused on aspects of mentoring, action research, inclusion, distance teaching-learning, and the use of ICT for constructive teaching-learning. The study aimed to:

- (a) Inform the projects' strategy, design, and activities
- (b) Identify available resources and contextual factors that could impact implementation,
- (c) Discuss adaptive management/risk mitigation strategies in case of a change in conditions.

II. The BASK research activity studied the change in beliefs and attitudes, skills and knowledge of teachers and teacher educators on aspects related to teacher professional development, action research, mentoring, social learning, reflection, ICT and GESI. This was enabled through collecting baseline and an endline data using qualitative surveys and in-depth interviews administered to the participants of the study.

III. The research fellows undertook a training program and carried out individual action research projects. They recorded and analysed outcomes of their interventions with approximately 5-10 school teachers with whom they collaborated for conducting their action research.

IV. A compendium of all the case studies/action research reports across the participating consortium members has also been compiled. The compendium presents emerging insights and provides a deep dive into some of the reflections of the fellows based on their professional development activities and peer-to-peer interactions.

V. In addition, a guideline document comprising perspectives for policy and practice of distance TPD in the South Asian region has also been developed.

Outcomes

- Based on the analyses of comparative data, the study generated knowledge relevant for improving the quality of Distance Teaching and Learning (DTL) in developing country contexts.
- The professional development opportunities provided to teacher educators during the program enhanced TEs' competency and skills, and gave them an opportunity to engage in hands-on practices and knowledge sharing with teachers. In addition, they benefitted from the coursework on meaningful integration of new media and technology for DTL, action research, mentoring, design thinking and leadership.
- It also fostered critical thinking, problem-solving, collaboration, and digital literacy in learners, thereby, creating space for iteration and dynamism in the TE's and teachers' practice.
- The case studies and action research reports provide emerging insights and a deeper understanding based on reflections of the fellows on the training program and peer interactions. It also gives an opportunity for TEs to get authorship and showcase their work as a knowledge product.
- Lastly, the guideline document offers observations and recommendations for governments and other stakeholders tasked and involved in distance teaching and learning.

South Asian Teacher Educators Fellowship and its implementation in Nepal

Introduction

South Asian Teacher Educators (SATE) fellowship was established in the MATPD project with a view to develop the capacities of the diverse stakeholders in the space of education as leaders, performing the role of teacher educators while collaborating with teachers. The main facets of fellowship that supported the capacity development were the blended courses (Integrating ICT in Teaching meaningfully, Mentoring and Action research) along with the in-person workshops and mentoring for action research. The main tasks for the fellows included establishing a collaboration with at least five teachers for conducting action research. This involved designing TPD activities for teachers and following up in the classrooms to support implementation based on the collaborative action plans developed with the teachers. The following section describes the need and design of the fellowship

for all 3 countries (Nepal, Maldives and Afghanistan). This is followed by a description of the process of implementation of the SATE fellowship in Nepal.

Need for South Asian Teacher Educators (SATE) Fellowship

The need for SATE fellowship was identified based on the findings of the landscape Mapping study of [Nepal](#), [Maldives](#) and [Afghanistan](#) as part of the MATPD project. In all the three countries there were limited opportunities for teachers or teacher educators to work together to find contextualized solutions to educational problems. TPD was conducted mostly by teacher educators working at university/teacher education institutions and experienced teachers, and other professionals in the space of education were not considered as teacher educators. There were few opportunities for collaboration among teachers, and opportunities to build communities to support the teaching learning process were therefore few. Another major issue was the low resource contexts in these three countries that constrained teachers in engaging in continuous professional development and engaging students in active learning. Considering these findings, a fellowship to develop capacities of stakeholders was designed as SATE fellowship and implemented in the three countries during the MATPD project. Some specific findings of Landscape mapping study in Nepal that indicated the need for fellowship for capacity development.

The LMS identified the following gaps in supporting teacher educators' and teachers' professional development in Nepal.

Policy:

- Professional development of teacher educators is not a key focus area for the policy makers, as it does not find a mention in the national educational policy and educational strategic plans. There is no budgetary allocation for the same.

Practice:

- There is a lack of opportunity to develop the capacity of mid-level teacher educators, who are key resource persons for training teachers. There is also a lack of opportunity for teacher educators to work with teachers and develop a contextualized knowledge of teachers' work and challenges.
- The teacher professional development programs in Nepal are designed centrally through a top-down approach, thus not adequately addressing the actual needs of the teachers and the classroom context. Though plans for school visits and observations are integrated in the strategic plans-SSRP and SSDP, only few trainers visit the schools

to support teachers in translating training into practice. Most stakeholders considered “Monitoring” and “Mentoring” to be the same approach for TPD. There is thus a need for the system to explore collaborative modes of professional development including mentoring and coaching.

- Action Research is an integral part of in-service teacher education mandated by policy guidelines. However, it rapidly falls out of practice once the training is over and teachers are back in classrooms as they merely write up action research reports to qualify for promotion. This is due to lack of awareness on how Action Research can be an effective tool to improve classroom practice, poor/no support and follow up by trainers/supervisors and low motivation of teachers.
- No opportunities for collaboration between teacher educators and teachers. Moreover, teachers were not considered as resource person for trainings.
- There is a need to support development of research culture among teacher educators and teachers through opportunities to engage in field-based action research, identifying challenges and finding contextualized solutions.
- Levels of ICT skills and knowledge for classroom instruction and practice remain low. ICT is used as a conduit for transmitting information and not used to provide opportunity to students for construction of knowledge and sharing their ideas.

Design of the fellowship

The fellowship program was conceptualized based on the contextualization of the CETE projects and the findings from the Landscape Mapping Study (LMS). An exhaustive desk research (106 documents) supplemented with primary data collection in the form of semi-structured interviews with 26 diverse stakeholders was carried out to understand the landscape of professional development of teachers and teacher educators in Afghanistan, Maldives and Nepal.

The SATE fellowship program aimed to address these gaps and build the capacity of mid-level functionaries as professional leaders through:

- Practice-based continuous professional development opportunity for teacher educators and teachers which supports social learning from peers and experts
- Addressing contextual problems through Action Research and enabling agency of teacher educators

- Enabling south-south collaboration and learning among South Asian countries.

The Fellowship Program

The SATE fellowship program, which was in a blended mode, spanned over a period of 12 months starting in May 2022, culminating with the fellow convocation ceremony in May 2023. Table 1.1 highlights the key fellowship activities and timelines.

Table 1.1:

Key Fellowship Activities

Key Activities: May 2022-May 2023

		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	MA	May
1	Selection of fellows													
2	Orientation													
3	Orientation (AM & FM)													
4	Course 1-ICT													
5	SCA online workshop													
6	F2F workshop at TISS													
7	In person meet with AM													
8	Enrichment sessions													
9	Course 2-Mentoring													
10	Course 3-Action Research													
11	AR Implementation													
12	Submission of AR Report													
13	Convocation													

The fellowship started with the fellows undertaking the 1st course titled “Using Educational Technology for Constructive Teaching & Learning” where they learned how to meaningfully integrate ICT for the purpose of classroom teaching-learning.

This was followed by virtual and in-person workshops which gave fellows an opportunity to meet with each other and get introduced to the course instructors, mentors and the MATPD consortium team. The workshop helped the fellows to better understand the different components of the project and their role within the fellowship.

Nepal fellows attended a 10-days in person workshop at TISS Mumbai, campus in June 2022. Given the socio-political situation in Afghanistan, only fellows from Nepal and Maldives could attend the face-to-face workshop. It was therefore decided that a separate 1-week virtual workshop be organized for the Afghanistan fellows. The workshop included specific thematic sessions where the fellows could interact and discuss their action research collaboratively with their academic and field mentors. The workshop concluded with the fellows making an initial presentation regarding their research questions and action plan and getting feedback from mentors, consortium team and other fellows.

The 10 days face to face workshop was predominantly in-person with a few hybrid sessions for the Afghanistan fellows. The sessions in the workshop were on TPD issues and challenges in Nepal and Maldives, ERC resources, action research, mentoring, well-being of teachers, toy making, designing collaborative modes of TPD, inclusive pedagogy, exploring clix resources, TELTA project, analysing classroom videos and institutional visit to TELTA project and Gateway School. The workshop also included focus group discussions on educational contexts in the two countries, daily reflection sessions, in person- and virtual interactions with academic and field mentors. The workshop concluded with the fellows making a presentation on their draft action research proposal and receiving feedback from mentors, consortium team and other fellows.

The fellows started with the remaining two courses “Mentoring for TPD” and “Action Research”, once they returned to their respective countries. In addition to the three courses, the fellows were required to carry out Action Research collaboratively with 5-10 teachers to address local educational issues in their country contexts and submit a project report at the end. They could choose to work on any one of the prescribed six themes. (language, math, science, OERs, peace, social inclusion & gender). The 15 fellows worked with 82 teachers across 56 schools for their Action Research activity.

In this process, they were supported by a team of an academic and a field mentor for the same who guided and supported them on technical aspects of AR and contextualization of the intervention respectively.

Process followed for SATE fellowship in Nepal

Recruitment and onboarding of fellows

In Nepal, a cohort of 15 fellows were recruited through interviews conducted by a panel comprising TISS faculty, MATPD program team and educational stakeholders from Nepal. A group of 4 faculty members at the School of Education, Kathmandu University were also onboarded in the capacity of field mentors for the project.

Once the Nepal cohort was recruited, the TISS project team members organized a virtual orientation session for the fellows and field mentors in May 2022. Participants received orientation to the fellowship: its relevance and context, the different phases of the fellowship: distance learning courses, practice based action research (AR) through mentoring by academic and field mentors, enrichment sessions, professional learning communities on telegram and last but the least, the role and expectations from the fellows and the field mentors. A handbook on the fellowship was shared with them.

Academic and field mentors were assigned to the fellows based on the formers' expertise and interest area. The TISS project team scheduled zoom sessions for interactions between fellows and the mentors. There were however, logistical issues in arranging the meetings due to the busy schedules of the mentors and in several instances, joint meetings with both the academic and field mentors became difficult. At times, meetings also had to be rescheduled due to unavailability of fellows on account of their work engagements or festival period. Fellows would also schedule independent meetings with mentors and teachers based on need through various other platforms like WhatsApp, telegram, Facebook messenger, Viber and email. They also created specific groups for communication with their AR participating teachers using the above mentioned platforms. Reflection sessions and presentation sessions were organized by the consortium team to support the fellows and address any concerns & challenges that they may have regarding their AR. In addition to the mentors, the core TISS team would also often engage with the Nepal fellows to provide feedback on their proposal, classroom intervention and AR report both individually and collaboratively as a group through reflection sessions.

A series of enrichment webinar sessions were curated based on needs of the fellows to support them with their Action Research study. These were primarily scheduled on Wednesdays based on availability of fellows across the three countries.

The consortium team also conducted a series of enrichment webinar sessions for the fellows to support them with their Action Research activity.

Table 1.2 :

Enrichment Sessions to Support fellows with their Action Research Study

	Enrichment Sessions	Date
1	Using technologies for constructive teaching and learning. Sync 1	24th May 2022
2	Fact sheet	7th June 2022
3	Academic writing	7th June 2022
4	Using technologies for constructive teaching and learning. Sync 1	9th June 2022
5	Mentoring For teacher professional development	21st June 2022
6	Designing surveys, interviews and classroom observations	30th July 2022
7	Insight from Literature review and Classroom Observation	3rd August 2022
8	Analyzing advantages and limitations of a resource	10th August 2022

9	Establishing rapport with teachers	17th August 2022
10	Lesson Plan as a tool for Reflection	24th August 2022
11	Working with teachers: How to capture experiences	7th September 2022
12	Data collection, Management	2nd November 2022
13	Inclusion in Action Research	23rd November 2022
14	Action Research Report Template Discussion	30th November 2022

A few members of the TISS Team visited Nepal in October and December 2022 (Kathmandu, Pokhara and Dhangadhi Kailali) to see AR classroom implementation, and to provide constructive feedback and support to the fellows.

There was some delay in completion of the Action Research activity due to (a) school closure on account of festival season and holiday period (b) unavailability of students and teachers due to assessments/term examinations.

As part of the project, 10 professional learning communities were created to engage in social learning across fellows and between fellows and their mentors. These were a combination of country specific groups + AR thematic groups.

The completion of the fellowship was marked by a fellow convocation in ceremony in May 2022, where the fellows spoke about their journey during the fellowship: their experiences and memories. They were provided certificates to celebrate completion of the fellowship and achievements during the course of the same.

Theory of Change

The theory of change provided a conceptual framework of how the important elements/levers of change would contribute to achieving the intended objective/impact.

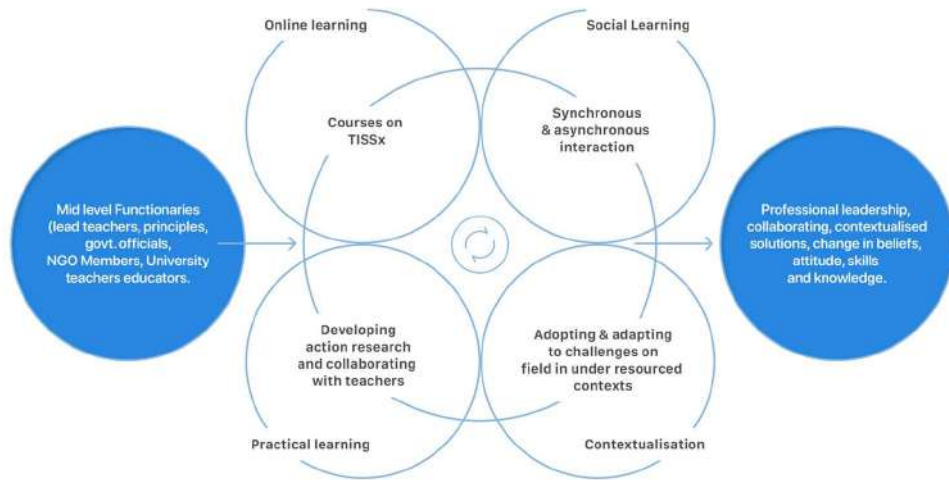
The MATPD project aimed to build the capacity of mid-level functionaries (lead teachers, principals, govt. officials, NGO members, University teacher educators) to become professional leaders and bring about a change in their practice and beliefs.

This change was expected to happen through engagement at various levels in the fellowship which included:

- (a) Distance learning courses on ICT, mentoring and Action Research
- (b) Practice based Action Research in collaboration with teachers
- (c) Social learning through mentoring by academic and field mentors and interaction with fellows
- (d) Addressing gaps and finding solutions by contextualizing the intervention to suit the low resource context.

Figure 1.1 :

Theory of Change



Section II- Methodology

RESEARCH METHODOLOGY

To understand the beliefs, attitudes, skills and knowledge of SATE fellows, a mixed method research approach was adopted. The study took place in two phases: Baseline and Endline. Baseline data was collected through surveys and interviews prior to the fellowship training to understand the current beliefs, attitudes, skills and knowledge of research fellows and field mentors, on different themes related to professional development. The fellowship training consisted of training in mentoring, reflection, use of ICT, action research, and understanding of teaching learning processes.

The baseline comprised the following:

- (a) In-depth interviews on themes of MATPD role, professional development experiences, mentoring, action research, collaboration, reflection and ICT
- (b) Thematic surveys on professional development experiences, ICT, mentoring, action research, PLCs, teaching-learning processes (TLP) and inclusion

The endline comprised the following:

- (a) In-depth interviews on themes of MATPD role, professional development experiences, mentoring, action research, social learning, reflection, ICT and gender equality & social inclusion (GESI)
- (b) Thematic surveys on collaboration, reflection, mentoring, action research, ICT and teaching-learning processes (TLP)

At the end of the fellowship, endline data was collected to observe the changes in belief, attitudes, skills and knowledge of the fellows on teacher professional development.

Research Questions

1. What are the beliefs and attitudes of the fellows with respect to the use of ICT, Action research, mentoring for supporting TPD? What are changes in beliefs and attitudes as a result of the participation in the fellowship?
2. What is the level of confidence among the fellows in the skills and knowledge required for the use of ICT, Action Research and mentoring for supporting

TPD? What is the change in skills and knowledge of the fellows as a result of fellowship participation?

3. What are the levers and barriers for supporting pedagogically rich distance learning methodology for scaling an innovative TPD model?

Data Collection

A mixed methods approach was adopted for the BASK study through interviews and surveys. The baseline-endline tools were developed collaboratively with the consortium partners. The baseline study was carried out with 15 Nepal fellows in June and July 2022. The endline was conducted with the same set of fellows in March and April 2023.

Data for baseline and endline was collected using google survey form, online and through face-to-face interviews. The six thematic surveys developed as google forms were shared with the participants to fill and submit within a week's time. The six survey forms covered the following themes of professional development:

1. Professional Development Experience and Beliefs of Teacher Educators - Collaboration and Reflection
2. Beliefs, Knowledge and Skills about ICT
3. Beliefs, Knowledge and Skills about Action Research
4. Skills for Teacher Educators - Mentoring
5. Knowledge and Beliefs about Professional Learning Communities
6. Beliefs about teaching learning process including GESI (gender equality and social inclusion)

Interview tool was shared with fellow 2-3 days in advance of the interview, so that they were familiar with the questions and could think about their responses.

Development of Survey tools

The six survey tools were developed by reviewing the relevant literature as well as published research tools on the specified topics. From the identified research tools, scanning of items was done to determine relevancy in the South Asian context as well as for ease of accessibility of the language of the items for the south Asian respondents. Previous research at Centre of Excellence in Teacher Education at TISS (Mumbai) were also taken into consideration. The tools were then

adapted for use in South Asia. The faculty involved in the particular content areas were consulted and were asked to review the finalised surveys as an expert for expert validity. The tools were shared with consortium team members for discussion and feedback so that they can be modified according to the three country contexts.

Development of the interview tool

The research consortium brainstormed on different themes to generate and align the interviews with the research objectives. The process for discussing and drafting the interview guide lasted for 3 weeks. The interview guide was then piloted to validate questions that were formulated to generate the intended responses. The pilot test interview was also conducted to check the duration for the interviews, and adjust questions for clarity and to avoid repetition, before being finalised (Appendix C). Baseline and endline interview guide had slight variations to cater to the evolving changes that took place. Both interview guides were aligned with the themes of professional development explored in the survey forms.

The interviews with the Nepal fellows were conducted by the TISS team virtually over zoom. The baseline interviews were completed in one round of 1-1.5 hours while the end-line was carried out in 2 rounds spanning 1-1.5 hours since the tool was longer. During the course of the fellowship, three fellows were found to be more comfortable expressing their thoughts and opinions in their local language. Hence, the end-line interviews for these fellows were conducted in the local Nepalese language. These interviews were taken by a Nepalese PhD scholar at CETE, TISS.

Data Cleaning

(a) Qualitative Data

The data collected for these three Nepalese speaking fellows was translated into English. The remaining interviews were transcribed into English using the Otter software and were cleaned for any gaps and errors. The cleaned files were used for the purpose of data analysis.

(b) Quantitative Data

The quantitative data collected through an online survey from the participants (Nepal fellows), was checked to ensure that the data was accurate, consistent and ready for analysis. Further, the data was processed at multiple levels and in a number of iterations before analysis. The data was inspected for missing values, outliers and inconsistencies. In one theme (ICT), normalization of two

items was done to achieve uniformity and coherence in responses. The data were also cleaned for duplicate responses and repetition.

Table 2.1

Data Collection Process Timeline

	Baseline	Endline
Number of Participants	15 Fellows	15 Fellows
Time Period	<ul style="list-style-type: none"> - Survey: 12th -25th May 2022 - Interviews: 2nd - 8th June 2022 	<ul style="list-style-type: none"> - Survey: 20th -28th March 2023 - Interviews: 27th March - 25th April 2023
Average Interview Duration	30 - 45 Minutes	1 - 1.5 hour

Data Analysis

(a) Qualitative Data

The method chosen for the analysis of the baseline-endline data was deductive analysis. In order to get deeper insights from the responses, this was followed by coding the interviews using an inductive approach, where the coding and the themes generated were directed by the research

questions, literature review and the content of the data. The phases of thematic analysis as described by Braun and Clarke (2006) allow for a systematic way of seeing, as well as processing qualitative information using coding. They also view thematic analysis as a “constructionist method, which examines the ways in which events, realities, meanings, experiences and so on are the effects of a range of discourses operating within society”. Thus, the research moves from simply describing what participants report to offering a nuanced interpretation of the patterns that the analyst has observed. The different phases of thematic analysis are: familiarization with data including transcription, generating initial codes, collating codes into potential themes, reviewing & defining the themes and developing the report.

A session on data querying and coding was provided by the TISS team for the consortium partners to ensure standardization in the process. Following steps were adopted for achieving reliability in coding and analysis

Step 1: All the interview transcripts were read and re-read by the respective research teams for familiarity with the data.

Step 2: The coding framework was applied to identify the codes from the interview transcripts. The code book was updated by all the researchers as and when new codes were identified.

Step 3: The codes were then examined to map the relationship between different themes and categories, to see which codes were overlapping with the different themes. Step 4: All research teams shared the analysed data with each other for verification. This was a crucial process to maintain the accuracy and monitor drifts in the data analysis process.

Step 5: Lastly, reporting of the findings involved summarizing the key themes and providing interpretations based on the findings.

(b) Quantitative Survey Data

The quantitative data was initially analysed through descriptive statistics such as measures like central tendency (mean, median and mode), frequency distribution (count and percentage) and measure of dispersion (standard deviation). Moreover, the dataset was observed for internal consistency reliability through Cronbach’s Alpha. It helped in converting the themes into scale. Further, the data was processed for inferential analysis. Parametric inferential statistics were used such as paired sample t-test for mean comparison and hypothesis testing, and the outcome of the analysis was then tabulated and summarized for interpretation.

Since, the majority of the questions were liker the scale questions, data was analysed descriptively. To compare any differences in baseline and endline data in each theme, the data was checked for normality, followed by the calculation of Cronbach Alpha value and performing paired sample t-test

where required. Regarding the feasibility of conducting paired sample t-test with an extremely small sample sizes, de Winter (2019) states that it was found to be suitable specially with higher within-pair correlation coefficient. This indicates that paired sample t-test is adaptable to constraints of sample size. Additionally, Heo et al. (2015) emphasizes the importance of using instruments with greater Cronbach Alpha value or greater inter-item correlations, which measure the internal consistency of parallel instruments, such as the baseline and endline survey used in this study to measure constructs such as beliefs, attitude and knowledge. The Cronbach Alpha value presented in Table 2.2 shows that it is greater than 0.8 for themes and sub dimensions, which is considered acceptable in studies.

Table 2.2

Cronbach's Alpha Values for Themes based on responses of Nepal Fellows

		Cronbach's Alpha	
Scale	Items	Baseline	Endline
Action Research Ability	6	0.922	0.927
Action Research Belief	19	0.09	0.768
Mentoring Skills	13	0.970	0.942
Reflection	13	0.919	0.906
ICT Belief	9	0.703	0.727
Collaboration	16	0.964	0.942

Paired sample t-tests were conducted for the themes Action Research Ability and Belief, Mentoring, Reflection and Collaboration in which the data was normally distributed, however, ICT and Teaching and learning data collected on the beliefs of use of technology were not normality distributed (Table 4), hence, was analysed based on the mean values.

Table 2.3

Test of Normality (Shapiro - Wilk)

Difference of Scales	W	p value
Action Research Familiarity	0.894	0.110
Action Research Ability	0.932	0.364
Action Research Belief	0.937	0.415
mentoring Skills	0.880	0.70
Reflection	0.974	0.934
ICT Belief	0.772	0.003
Collaboration	0.962	0.777

Action research familiarity was measured on a 5-point Likert scale (1=Not at all, 2=To a small extent, 3= To a moderate extent, 4=To a great extent, 5=To a very great extent), whereas action research ability was measured on a 4 point scale (1=No ability, 2=Low ability, 3= Moderate ability, 4=High

ability). Similarly mentoring skills were also measured using a similar 4-point scale (1=New to me, 2=Low ability, 3= Moderate ability, 4=High ability) as action research ability. Additionally, belief on action research and use of ICT was measured using a 5-point scale (1=Strongly disagree, 2=Disagree, 3= Neutral, 4=Agree, 5=Strongly Agree).

Lastly, data collected on the frequency of engagement in reflective and collaborative activities for professional development, a 5-point scale was used (1=Never, 2=Once a month, 3= A few times a month, 4=A few times a week, 5=Daily).

Demographic Profile of Fellows

The 15 fellows who were part of the study, are based in different regions across the country and are engaged in diverse professions. The sample comprises teachers, teacher educators, school leaders, government officials, NGO professionals and an MPhil student. With respect to education levels, three fellows had a B.Ed. degree and four an M.Ed. Five participants had an MPhil degree while one was a PhD holder.

Gender and social inclusivity were ensured in our selection of fellows. There were almost an equal number of male and female fellows in the cohort (8 M, 7F), predominantly from the urban districts (14/15). Within the urban district, around 50% of the fellows were based out of Kathmandu, while the remaining 50% resided in far eastern/western parts of the country. The cohort included two participants from minority groups, and two with disability.

The below table represents the demographic profile of the fellows.

Table 2.4:

Demographic Profile of the Fellows.

NEPAL FELLOWS: PROFILE

Fellow	Gender	Profession	Teacher Educator (TE) Not TE (NTE)	Qualification	City	Location	Minority	Disability
NF1	F	School teacher	NTE	B.Ed.	Kathmandu	Urban	No	No

NF2	F	Science teacher in a school	NTE	B.Sc, M.Ed., M.Bs.	Dhangadhi Kailali	Semi Urban	No	No
NF3	F	Pre-school principal	TE	Bachelors in social sciences, Masters in STEAM Education	Kathmandu	Urban	No	Yes
NF4	F	Faculty & ECA coordinator at a NGO	NTE	B.Sc, M.Sc, Ph.D in Education	Kathmandu	Urban	Yes (Jainism)	No
NF5	M	Assistant professor (TEI)	TE	B.Ed. and M.Ed.	Melauli	Rural	No	No
NF6	M	Government official (CDC, ERO)	NTE	B.Ed. and M.Ed.	Kathmandu	Urban	No	No
NF7	M	Science teacher in a school & Academic Coordinator	TE	B.Sc and M.Sc	Pokhara	Semi Urban	No	No
NF8	F	Student Scholar (Mphil)	NTE	B.Sc. and M.Sc (nursing) M.Phil in STEAM Education	Morang	Semi Urban	No	No
NF9	M	Science teacher in a school	NTE	B.Sc, B.Ed. and M.Ed.	Dhangadhi Kailali	Semi Urban	No	No
NF10	F	NGO Professional	NTE	Bachelors in business	Kathmandu	Urban	No	No

				studies				
NF11	M	Science/Math teacher in a school Head teacher	TE	M.Sc in Maths, B.Ed., M.Phil in STEAM Education	Lamki Kailali	Semi Urban	No	No
NF12	F	Science teacher in a school School Principal	TE	B.Sc, M.Sc and M.Phil in STEAM Education	Kathmandu	Urban	Yes (Newar)	No
NF13	M	Science teacher in a school	NTE	B.Sc, B.Ed. and MA (Anthropology)	Pokhara	Semi Urban	No	Yes
NF14	M	Freelance (Teaching bachelor students)	TE	Bachelors in engineering, M.Ed. (Maths)	Kathmandu	Urban	No	No
NF15	M	Science teacher in a school	NTE	M.Sc, Mphil in STEAM Education	Kushma Parbat	Semi Urban	No	No

Section III- FINDINGS

Introduction

The section on findings presents both qualitative and quantitative data analysis. Under each theme baseline and endline data is compared to capture the change post fellowship in the fellows' understanding around eight themes. These eight themes include MATPD role, Action research, Mentoring, Reflection, Social Learning, ICT and its usage, Gender Equity and Social Inclusion and Professional Development experiences of fellows.

MATPD Role theme discusses the role of fellows in MATPD. Action Research (AR) theme reflects the fellows' experience of conducting action research, subject knowledge fellows gained by engaging in particular theme through action research, how it strengthened the professional development of teacher educators, details of work with the teachers i.e. teachers' learning, how they will use the action research in future, challenges faced by fellows which hindered them to practice AR and support mechanism required to make Action research regular practice.

The theme of Mentoring gauged the fellows' understanding of mentoring, and how it is different from monitoring, It also tracked how mentoring facilitated the professional development of teacher educators, skills and qualities to be an effective mentor, mentoring experiences with academic mentor and field mentor and kind of support provided by each mentor, whether fellows found blended mode of mentoring useful, barriers encountered during mentoring process and fellows thoughts about how it could be scaled and implemented in their country context .

The theme of social learning explored fellows' engagement and participation in formal and informal groups, Interactions with MATPD Fellows, engagement with MATPD platform, communication with their participating teachers, and collaboration of teacher and teacher educator for professional development.

The fellows were introduced to ICT through various means such as an online course to integrate ICT in their pedagogy, the theoretical understanding of TPACK. Through interactions with mentors, the fellows were encouraged to use ICT embedded pedagogy. At the end of the fellowship, the fellows were asked about their journey regarding ICT. The professional development experiences within the fellowship were new for the fellows.

Under the theme of professional development experiences, the study investigated how fellows found them new and different, what their understanding of how teachers learn were, and skills and

competencies required to be an effective teacher educator, challenges faced by fellows during fellowship, and connections between different components of MATPD.

3.1 MATPD Role

Understanding of the fellows about their role within the project, appeared to have improved by the completion of the fellowship project. At baseline, the responses were vague and general, and primarily iterated (a) conducting action research and (b) being a research participant/fellow in the project.

‘And role, regarding the role, my role is reader and collaborator and researcher and to enrich, to depend them into the skills, educational skills. So, I can use such learning from this project to my work field.’ (NF6, Government Official)

‘I was selected as a fellow in this project; so my role during the fellowship is to take active participation in project as we’ll as teaching learning activities provided by the project and then I have to do an action research in the selected topic that I have selected and after the completion of this project, I need to continue the sharing of the knowledge that I have got in this project. Yeah, that’s I think.’ (NF12, School Principal and Science Teacher)

In the endline interviews, almost all the fellows (14/15) spoke about the role they played within the MATPD project. Only one fellow spoke about the project objectives instead, possibly because of misunderstanding of the question.

The fellows articulated the different roles that they adopted during the fellowship. While some only listed them, others gave descriptive responses.

‘In this context, I inspired teachers to conduct real action research, so that they could then change in their instructional practices. So, in this perspective, I feel better to say myself as teacher educator and mentor.’ (NF5, Assistant Professor at University)

‘So, on the other hand, our role was a researcher. Because I worked and inquired in my own context, I collaborated with school teachers that was convenient to me and to find out their teaching and learning issues by engaging with different teachers and like five teachers for selected schools and came up with solutions collaboratively. And for these, the main focus was to improve the way that teachers teach health subjects with the use of TPACK.’ (NF8, M.Phil. Scholar)

Figure 3.1 summarizes the different roles and identities identified by the fellows who participated in the SATE fellowship. The numbers in brackets denote the number of fellows who mentioned these roles. Other responses articulated by fellows included (a) integrating their learnings from the fellowship into their practice, (b) practicing innovative pedagogy in low resource settings and (c) advocating the importance of the MATPD project with the government to push for reforms at the policy level. It is noteworthy to mention that (6/15) (40%) identified themselves as teacher educators in the end-line, believing their purpose was to facilitate professional development and bring about a change in teachers' teaching-learning practice.

3.2 Action Research

Action research is already institutionalized in Nepal. However, Nepal SATE Fellows reported significant gains in their understanding about action research, the process of action research and developing research and communication skills needed to support the collaborative action research process. The fellows' responses at baseline and end-line are summarized below.

At baseline, most of the Nepal fellows who worked with private schools or were freelancers, had no prior experience of doing action research. The fellows, who were teachers in government schools or were teacher educators had prior experience of doing action research either as part of their core skill training or for promotion. Most of the fellows at baseline, described the action research in the form of steps – plan, act and reflect, but did not discuss its cyclic nature. The purpose of action research was described as to improve one's practice and to devise local solutions. Most of the fellows talked about AR for improving teacher's practice and a few discussed the possibility of teacher educators collaborating with teachers. Moreover, only a few identified themselves as teacher educators. They were able to imagine the role of action research in developing understanding of the teachers' contexts and in problem solving for devising local solutions. They felt it would help them to identify their own strengths and weaknesses by engaging in action research.

By end line though, fellows had taken up diverse themes for conducting action research in Nepal, and there were many learnings and reflections that were common across the fellows. The fellows designed and conducted workshops with teachers based on themes that they had selected and



discussed with the academic and field mentors. Though the themes were decided by the fellows, the workshops conducted were interactive in nature and provided opportunities to build action plans and lesson plans collaboratively with the teachers. To accommodate for time constraints and workload of the teachers, many fellows opted for a blended mode of workshops (in person + online) and some had to conduct workshops completely online as it was difficult to get teachers from different schools in one place. Some had individual informal conversations with teachers to make up for their missing the workshop.

Most of the fellows in Nepal were able to complete two cycles of action research. They had reflective discussions with the teachers after the first cycle to identify the changes that need to be brought in the second cycle. Most fellows reported that the second cycle involved students more actively by giving them more opportunities to express their ideas, do activities in groups, and engage actively with ICT tools if focused.

The outcomes of the action research are reported in three categories in this section. These categories pertain to learning of the fellows themselves, learning of the collaborating teachers, and learning of students. Fellows described their learning as developing their identity as teacher educators and described improvement in skills like communication and collaboration through the experience. They gained knowledge about the under-resourced contexts and contexts other than their own schools as they had to collaborate with teachers across different schools. They also developed deeper knowledge about action research, especially research skills, techniques and strategies for developing tools and conducting action research collaboratively with teachers, and using ICT tools for supporting students' and teachers' learning.

Most of the fellows felt that the workshops conducted by the Project team and the online courses helped them to build knowledge and skills, along with their interactions with the academic and field mentors, and while collaborating with teachers and with the core team members. They developed deeper knowledge of the topic focused in the action research as they explored research literature, tools and activities for supporting students' learning and tried it out collaboratively with the teachers to see what worked.

The teachers' learning was also reported in terms of depth of content, pedagogical and technological knowledge (Some focused on TPACK), self-reflection on their regular practice and teaching in Nepal, collaborative reflection on learning from AR participation, and change in teachers' practice to adopt the pedagogical innovation focused in the AR. Some fellows reported the differences in the implementation by the teachers depending on their context, wherein they had to contextualize according to the situation like translating in Nepali language and making smaller groups of students in large classes to ensure participation. Some teachers implemented the innovative pedagogy beyond the grades and topics that they had focused on in the AR indicating

the transfer of learning. Student learning was reported in the form of greater engagement, improved learning of the concept and using ICT tools beyond the topic focused.

Fellows also reported some challenges in conducting collaborative action research with teachers. Most often cited challenges included time constraints due to busy school calendar and heavy syllabus, lack of essential resources like hands on materials and ICT resources, lack of support by school heads/administration and lack of incentives and negative beliefs of the teachers about engaging in action research. The fellows negotiated the time of teachers for AR engagement by making the timings and implementation mode of workshops flexible, and allowing for flexible deadlines and pace of work, and persuading the school heads to support teachers' engagement. Some fellows felt that connecting student work with internal assessment and building teachers' communities would support adopting action research culture in the schools. Other support mentioned were translation of resources in local languages, developing policy for supporting AR in schools through mentoring. Fellows reflected on their experiences of AR for policy provisions and also talked about extending the scope of AR in future by collaborating with new groups of teachers on other topics/ grades.

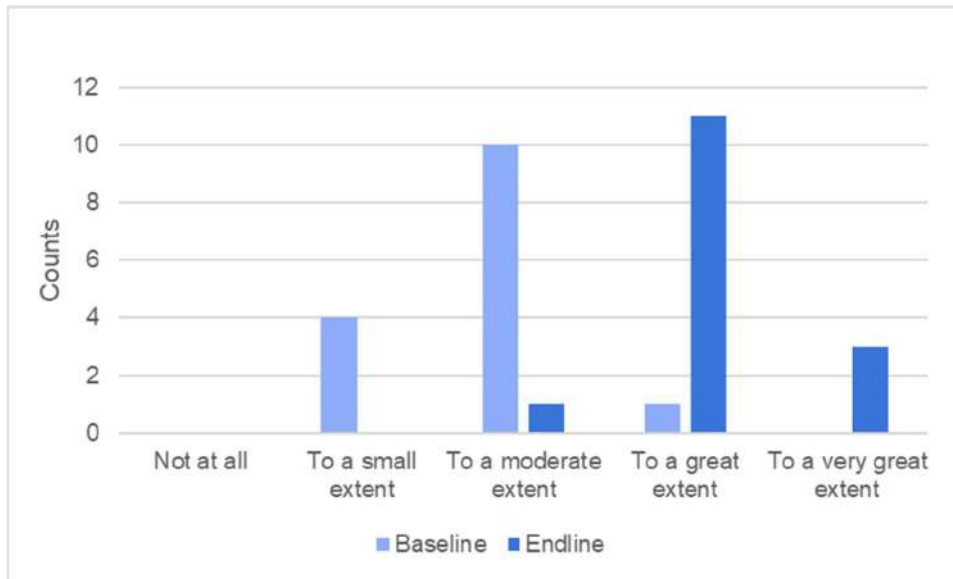
Understanding about the purpose and scope of action research

The understanding of action research changed radically among the fellows as indicated by the end line findings. Some of the fellows had prior experience of doing action research, while for some it was a completely new experience. Most fellows who had prior experience were from the government sector as it is mandatory in Nepal to go through Action research training as part of pre-service teacher education program and to conduct action research in the school for promotion in their career. However, despite institutionalization of AR, it is performed mostly as a formality, and hardly any school or follow up support is provided to teachers for conducting action research.

All the fellows were familiar with the purpose of the action research in devising local solutions and its role in improving one's practice. They felt that it provided an opportunity to the teacher to reflect on their practice. However, there were differences in terms of understanding the scope of action research. It was perceived as an individual endeavour conducted by the teacher in her/his classroom to improve her practice or to find a solution to a contextual problem. Most of the fellows did not talk about action research beyond the scope of a single teacher/school in the baseline.

Figure 3.2

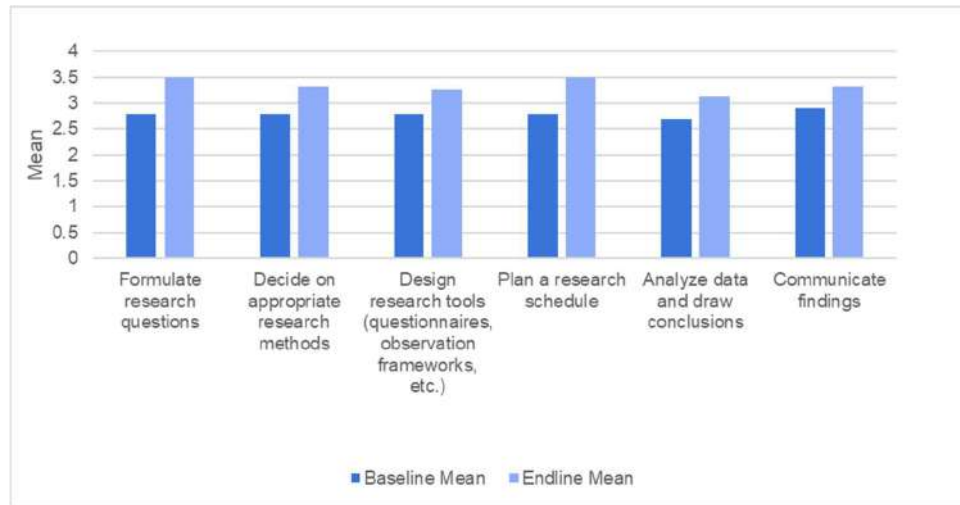
Fellows Familiarity of Action Research - Baseline-Endline Comparison



The tool assessing familiarity with action research shows a positive shift in the mean of the baseline 3.3(0.49) and end line 4.1(0.52) responses (See Figure 3.2). In the baseline the majority (10) of responses are around 3 (moderate familiarity) and in the end line the majority (11) responses are around 4 (great extent). It shows a positive shift toward their familiarity with action research. The Cohen's d (1.58, Effect size) indicates a large positive change in the fellows' perception of familiarity with action research, which had increased after the SATE Fellowship. This was further corroborated by their responses to baseline and end line interviews.

Figure 3.3

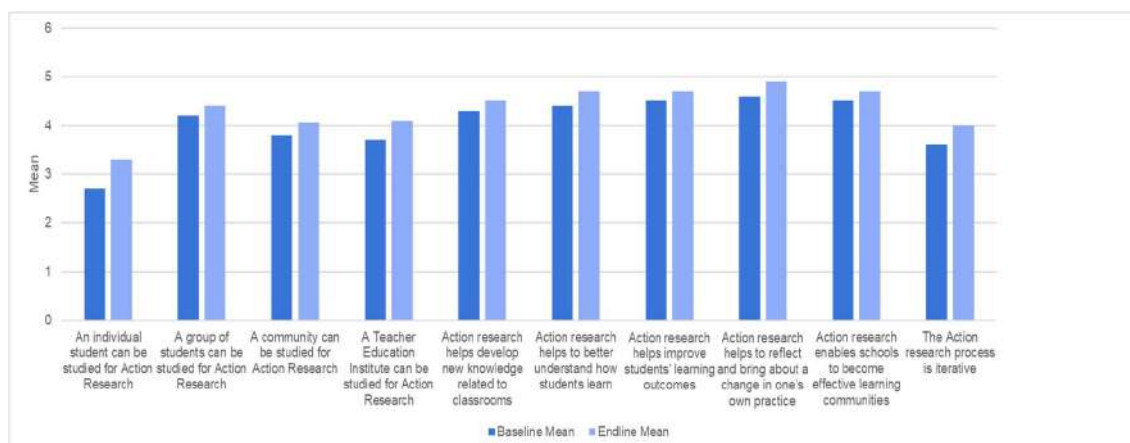
Fellows Ability of doing Action Research - Baseline-Endline Comparison



The tool assessing fellows’ perception of “Ability to conduct action research” comprised of 5 items in both baseline and end line and its Cronbach alpha is 0.922 and 0.927 respectively. This indicates that the tool has acceptable internal consistency since the reliability coefficients are higher than 0.7. On comparison, the paired t-test (two-tailed) comes out 0.0001, which is less than alpha (0.05) level of significance. It indicates a significant difference between baseline and end line mean responses. Positive change can be seen in the ability to formulate research questions, decide appropriate research methods, design research tools, plan a research schedule, and analyse data and draw conclusions. Moreover, Cohen’s d (Effect size), moderate change (medium effect size=0.7) has been found on the ability to analyse data and draw conclusions. However, the fellows acquired a high ability (large effect size) to formulate research questions, decide appropriate research methods, design research tools and to plan a research schedule.

Figure 3.4

Fellows Beliefs about various aspects of Action Research - Baseline-Endline Comparison



The tool “Beliefs about various aspects of action research”, consisted of 19 items. In the baseline and end line, Cronbach alpha is 0.09 and 0.768 respectively. This indicates that tool has acceptable internal consistency given that the reliability coefficients are above 0.7. The same scale (items) was used for baseline as well as end line data collection. On comparison, the paired t-test comes out 0.010, at alpha (0.05) level of significance. It indicates that a significant difference exists between baseline and end line mean response. The majority of the items (15) show positive change on the belief about various aspects of action research. Furthermore, the change in the beliefs about action research is organized into two categories: low and medium change. The change in the belief related to classroom, school or government functionaries (Education department) through action research is low. However, majority of the items show medium positive change (Cohen’s d), such as to study a single or a group of students for action research, to study a community or a teacher education institute for action research. The other aspects which show medium positive change are the role of action research in developing new knowledge related to the classroom, to understand student learning behaviour to improve learning outcomes, to develop reflective practices in teachers, to take ownership in problem solving, constructing knowledge and professional growth, to enable schools to develop into effective learning communities. On the knowledge of the action research process, the change is medium according to Cohen's d (Effect size).

Prior experience of Action research and its influence on SATE fellowship

A number of fellows had limited or no experience with action research. In the baseline, they mostly focused on explaining the steps of the action research, as in plan, act, and reflect. Four fellows in Nepal had extensive prior experience conducting action research. Two of them (females) had received training as part of the government training program for teachers, while the other two (males) had received training from NGOs working in the space of teacher education. The examples that they gave of action research previously conducted by them included solving the problem of students not doing homework and low attendance in school. The examples indicated generic issues

faced by the teachers but were not necessarily related to the teaching-learning process. One of the fellows, who was a teacher educator at a university, had extensive experience participating in the project that integrated mentoring and action research and talked about how it had helped him conduct the action research with teachers. At end line, when fellows compared their engagement with the action research as compared to their earlier experiences, they felt that their prior knowledge was more theoretical, and the SATE fellowship allowed them to gain experiential learning by conducting action research in collaboration with the teachers. They valued learning about how to do research, identify research literature to support classroom implementation, design and implement research tools, and analyse data.

Action Research helps to develop new techniques and it's an ongoing process. So, the teacher educators can identify new process and developed new skills and develop new skills, use of the tools that can be helpful. (NF 10, F, NGO Professional)

Fellows reported that both the TISS courses on mentoring and action research as well as the webinars conducted by the core team to address the issues faced during the action research, were useful. They felt supported by their field and academic mentors as well as core team members and other fellows within and across the country. To some fellows, the field mentor was more approachable, while it was helpful to interact with academic mentors for some to get fine-grained inputs about the conceptual ideas and the resources to be used in the classroom. Some fellows formed informal groups with whom they regularly interacted, exchanged notes, and reflected on their progress in action research with teachers. Almost all the fellows also reported significant learning through collaborations established with the teachers, knowing their contexts, and exploring resources and pedagogical strategies together with the teachers in the course of the action research. Fellows shared how teachers' feedback and comments played an important role in shaping the action plan for implementation and specifically in the second cycle.

Because I conducted the research myself during conducting this research, I also get support from my academic mentors. So it helped my research skills. It also helped my let's say, skills to work with other teachers (NF 5, M, Assistant Professor)

The feedback in the webinars helped and in the mentoring course ..how to work with the teachers helped a lot..(NF9 , M, Science Teacher)

Fellows' experience of action research in the SATE fellowship was supported by a number of structures and mechanisms in the fellowship, which included the courseware and webinars. The social learning opportunities and mentoring support also played a crucial role in supporting the fellows in conducting action research with greater depth and being able to complete the two cycles of action research with the teachers.

Action research for capacity development of the teacher educators

In the baseline, most of the fellows discussed how action research can support capacity development of the teachers but very few were able to talk about the capacity development of the teacher educators. They were not able to visualize that teacher educators can be knowledge producers or have knowledge to act as facilitators in the workshops for other teachers. It is because the idea that was prevalent was that teacher educators are mostly from university who have engaged in research or teach in pre-service teacher education as they have the knowledge to inform classroom practice. This one-way hierarchical understanding of teacher education constrained the fellows who were teachers to consider themselves in the role of teacher educators. However, all the fellows discussed in the baseline, how collaborative action research can provide feedback about their own strengths and weaknesses and can help them to improve their practice. They also hoped to learn about teachers' context for designing meaningful professional development opportunities. Some of the fellows referred to the practice of teachers while others recognised their role as teacher educators. Some of the fellows indicated that they hope to develop the skills of problem solving and reflection as a result of their engagement.

The fellows' discourse at the end line indicated a shift to considering themselves in the role of teacher educators after having successfully led the action research with a group of teachers. Almost all of them identified themselves as a teacher educator and felt that they had a deeper understanding of teachers' contexts and what works in the classroom beyond their own schools.

But the action research during the MATPD project is kind of a large one and with the teachers from different school... Initially before the MATPD project, I know, the context of my school only, and after the MATPD project, I could understand the context of different schools, and different administration of those schools. (NF 12, F, Science Teacher)

A fellow recognised the role of 'power play' in the dynamics of teacher educator and the collaborating teachers, and discussed how some problematic practices or weaknesses may become evident in the implementation, without proper planning and discussion. Therefore, it is important to develop a balanced approach in the role of teachers' mentor which is empowering for the teachers even as it allows problematising certain classroom practices.

anyone can deliver that theoretical part... The most important thing is the experience. And so, experience is the one of the key terms for that (teacher educator) ... and for that teachers educators must have to be bold... (NF 15, M, Science teacher)

However, other fellows tried to make the process more democratic by involving teachers in the taking sessions together and supporting them to learn from each other.

I never approached my teachers as I never approached as a trainer... So, I always approach that I am the teacher like you all. I am also in the learning and change process. Let's develop our one learning community created creative collaborative opportunity during that my workshop module, I did not personally design and impose it , we discuss it what the things we learn it that the seven teachers and me ... During the workshop, they led the workshop sessions so that other teachers and myself could learn. (NF 7 , M , Science teacher)

Another fellow highlighted the importance of knowledge about the action research itself that can give confidence to the teacher educator to conduct collaborative action research. Many fellows felt that they had developed in depth knowledge of the action research process through the engagement, and felt confident of undertaking action research on their own as well as with other teachers in the future. One fellow highlighted the idea of communities of practice that was developed through collaboration with the teachers, and how it supported articulation and exchange of knowledge of content, resources and teaching practices.

... The new techniques or strategy that I learnt... that I implemented during this MATPD course, action research was using community of practice. And that was new and that was that I found really helpful to you know, keep your participant in contact and to share the experiences through community of practice (NF 12, F, Science Teacher)

One of the most important learning discussed by almost all fellows was learning about classroom culture, students' responses to teachers' questions and challenges faced by the teachers when collaborating. This was an important insight, which is mostly missed following the traditional approaches for TPD like workshops. The fellows, even those working as teachers, were able to visualize themselves in the role of a teacher educator, for providing academic support to other teachers. The fellows were able to distinguish how action research will support learning of the teacher as well as that of a teacher educator.

...For a classroom teacher, it (action research) might enhance the existing teaching pedagogy. Teacher Educators are not only the classroom practitioners, I guess, they are to some extent, in their own school, also the institution, also the policymaker. Plan maker, vision maker, the strategy maker. So, I think this will enhance and extend to identify the local need and make policy plans within their school or within their organization or catchment areas... (NF 7, M, Science Teacher and Academic Coordinator)

As a teacher educator, one needs to know what really is happening inside classroom practices because as a teacher, educator, you are educating teachers, you are training teachers, but if you don't know the classroom scenario, you cannot guide the teachers on how they can actually conduct activities inside the classroom. So, I think action research is one of the best strategies to identify different issues and problems having in the classroom and as a teacher educator, you can use it as a guide to design your different training models accordingly. (NF 3, F, Pre-school Principal)

The fellows discussed various skills and knowledge that they developed as a result of engaging in action research. They explained how these skills and knowledge can be useful to the teacher

educator to address local issues and develop new strategies to promote effective teaching practices. Some of the skills that fellows felt were important for teacher educators to develop and for which they got opportunities in SATE fellowships included problem solving, research, reflection on one's own practice and helping others to reflect, collaborating with teachers, and mentoring.

... before planning, we do some research in that area... we try to find the issues, what is the problem in that context that needs immediate solution ... So, in order to address these issues, one needs innovation skills, like creativity... It motivates the teacher educators to try new approaches to teaching and learning and it also helps to develop and update these strategies to improve the teaching practices... And the practice of reflections and self-evaluation also helps to strengthen professional development. For teacher educators, and like action research helps to encourage us as a teacher educator to reflect our own practice and evaluate its effectiveness. As educators like, I reflected my activities, like what I did, how I conducted the research, and what went well, what didn't work, well, what were the challenges, what should I do next, in next round, or what in the next hour or so the reflection is the important aspect that helps to strengthen the professional development for the teacher educators. (NF 8, F, MPhil Scholar)

Fellows also understood the significance of contextualisation solutions, and why that is important. They understood that policy borrowing and implementation of reforms that have worked in other countries may not be effective in under-resourced contexts and therefore, may need contextualisation to adapt to local needs and infrastructure.

... a practical example on adaptability... Generally, in Nepal, people often talk about- "oh, the education in Finland is this... we should do this, education in Singapore is this... we should do this. And in Nepal some people try to copy or imitate it. But our classroom and our resources, our teachers, our students, our socio-economic background, and our cultural background is totally different from those countries. So, we need to adapt according to our local contexts... while empowering teachers, mentoring teachers, we need to think on these factors. (NF 7, M, Science Teacher and Academic Coordinator)

we have to give the choice and voice what they [teachers] need and how they need and what they require how they want to change to be changed and that is also quite important thing is that means good listening skills, (NF 7, M, Science Teacher and Academic Coordinator)

Fellows discussed different capabilities they had developed through engagement in action research, which helped them to become teacher educator. Most notable was the understanding of the classroom context and the contextualisation of interventions and adapting innovation to classrooms. The interaction with the communities was also considered a helpful strategy. Some fellows gained awareness of the hierarchy that came into play when collaborating with teachers and tried to actively engage teachers as knowledge producers.

In depth learning about the theme and content of action research

The fellowship was designed to focus on certain predetermined themes and the fellows were encouraged to select the topic of action research to focus on specific content rather than generic ideas. In the end line interviews fellows illustrated in-depth knowledge of the theme and the content focused in their action research. This knowledge ranged from knowing about new low-cost activities, inclusive pedagogies, design of project based learning for students, identifying misconceptions and conceptual difficulties of students in a particular topic, to using Open Education Resources and connecting the teaching- learning in the classroom to students' real/everyday lives. It is not possible to discuss all examples here, but a few of the examples are presented in the following paragraphs.

One fellow working on the theme of science education designed activities for teaching Newtons' law of physics. He initially came up with examples of an accident to show equal and opposite reactions. The discussion with mentors and co-team members highlighted how the topic could be disturbing and scary for some students, and the need to consider the socio-emotional aspects before taking an example for discussion in the classroom. After discussion with mentors, he came up with simpler illustrations using syringes, which are low-cost material.

Another fellow working with fractions was able to understand the significance of focusing on how fractions are composed of units less than one and had discussions with teachers about conceptual aspects of fractions using manipulatives rather than focusing only on the procedural aspects. Yet another fellow worked on OER for supporting students' understanding of flow of electricity in circuits in collaboration with teachers. Almost all the fellows discussed how action research helped them to deepen their content knowledge along with the contextual knowledge of the real classroom.

I think that when teacher educators are doing action research, they are going out into the field, working with the teachers trying to get some solutions and seeing it being implemented more actively. And at the same time, they are working on to solutions to the problems which keep on popping up. When you have problems and you are looking for solutions. So identifying the problem and looking for solution is the way to professional development. That's what I'm trying to say. (NF4, F, Faculty & ECA Coordinator)

A fellow working on inclusive education as a theme discussed how her idea of inclusion was broadened through the engagement with the academic mentor and how it shaped her action research to develop inclusive classroom

Initially, in my interviews, I told that I'll be doing, research in context to the special child, autistic child, how we can, have an inclusive learning environment for those kind of nerves, children, but later on, when I sat with Radhika , and when we had introduction, when we were in India, that introduction made me think that inclusion doesn't really means that we need to have a special child in the classroom, and we need to create an inclusive learning environment for regular time and special side. So, from that interaction, the whole idea of my action research changed, and I focused my exhibitions on learning difficulties, and we plan activities accordingly. So, I think that in that way, also, having an academic mentor really helped me to make a framework on how I'm going to conduct my attend issues. (NF 3, F, Pre-school Principal)

Another fellow discussed how he understood the role of practice of using ICT for teachers in being able to implement it confidently in the classroom. It helped in developing his understanding of teacher learning, curriculum as well as how to address student thinking in the classroom.

I asked my participating teachers to practice by themselves and during that period, I told them you can select any functions of your textbook and define the area under that curve and bring it back tomorrow in your system. So, three to five teachers actually practice that and bring it on the next day on the classroom and we have discussion on that, whether it was correct or not, what method you have applied and we just got in the classroom, the next day other teachers show to each other so they practice that in the workshop session only, and even some of the teachers stay after the workshop also to practice with me about these tools. So, in this way, we have run the workshop so that it contains the curriculum also it contained topics under the textbooks also (NF 14, M, teacher educator)

Another major kind of learning for fellows was the knowledge about the action research process and research skills. Almost all the fellows talked about how their understanding about action research deepened through engagement. Fellows shared that they had learned about how action research can help in connecting theory with practice, techniques and strategies that can help teachers, and most importantly they were able to understand the significance of action research as a cyclic process when they made changes in their action plan and implemented the modified plan for the second time.

Whenever, I felt difficulty with my participant. I constantly go through the theory, especially adult learning theory and materials transformative, transformative learning theory, and I realized that, yeah, there are 10 states, 10 phases of transformation and they are in this state. That's why they are facing the disorienting dilemmas and all that you know, and that really helped me. (NF 12, F, Science Teacher)

The fellows recognised the agency of the teachers in implementing an idea in the field, and how action research needs to be collaborative and consider the viewpoints of all the teachers engaged.

In this action research project, I have learned that instead of getting some idea working on getting an idea, and then Action Plan, the good way of doing action research would be to just pick up a problem something which needs to be changed, discuss it and shape the action plan accordingly, the implementation and everything you cannot get into the action research, with everything sorted out that okay, this is my problem. This is you know the way we had submitted the action plan. This is what I'm going to do. Let me speak very specifically about what I was doing was the role of OER in astronomy that was the idea. So, okay, I'm going to introduce astronomy to the students using these OERs, the teachers are going to do this, this is going to be the lesson plan and it didn't work that way. Because there were lots of things that teachers put in the feedback from the teachers, why it wouldn't work, why some changes need to be done and we had to revise the action plan to make it more actually it became better when we were able to revise it. (NF4, F, Faculty & ECA Coordinator)

Thus, engagement in action research not only helped the fellows in developing deeper understanding of the particular content and topic in focus but also about useful resources, methods to engage teachers in learning about resources, about pedagogy, and addressing student learning. Moreover, it helped in deepening their understanding of action research and developing mentoring and research skills while working on their action research project.

What aspects of SATE fellowship supported Fellows learning from Action research

All the fellows discussed various aspects of the SATE fellowship that supported their learning. These aspects included the face-to-face workshops, online courses, enrichment workshops, the interactions and collaborations with other teachers, and interaction with academic and field mentors, and the core team members. SATE fellowship was supported by structuring activities around deadlines, supporting the fellows' writing work with templates for writing, presentations, and action plans. Many fellows appreciated these different kinds of supports to their learning. They discussed how the online courses provided them the perspective and the background knowledge about meaningful use of ICT, AR and mentoring to prepare them for their collaborative action research with teachers. The in-person workshop at TISS was crucial in development of action research proposals, and the enrichment workshops provided ongoing support by identifying the skills/knowledge fellows needed on-the-go while conducting action research. They felt that the sessions on conducting interviews and data analysis were most helpful as they had little prior experience or expertise in these research skills. The mentoring course was also found to be especially helpful in planning interactions and work with teachers for collaborative action research.

The most effective one I found is mentoring and an action plan of those interventions, these things are very effective for my research purpose. (NF 15, M, Science Teacher)

Mentoring course helped me during the teachers' workshop, the ICT helped me how to make a content, how to create activities and how to make it connect with the content and curriculum that first was held, the second, the action research actually, how to do the action research this add on and also my academic mentor and the field mentor, both have a good knowledge and about the action research and research and all these things. So, they support me a lot during this project. (NF 14, M, Teacher Educator)

Collaboration, sharing of ideas with teachers and reflecting together was another frequently cited reason for learning from action research. Fellows discussed how first talking to mentors and then to teachers and receiving suggestions and feedback from both helped in shaping their action research collaboratively.

If we collaborate with teachers, we will find the exact problem. collaborative work in terms of collaborative designing of projects is collaborative work. And the reflection is also collaborative work. And individually driven from me was the first workshop that is about the orientation of the project-based learning in curriculum. That is the individually driven idea. However, they were sharing their previous experience in this first workshop also. (NF 6, M, Govt Official)

Working with the teachers, like starting to communicate with the teachers, their challenges and the problems that your students have been facing was another component. So, during this action research, I'm listening to the problems while identifying the problem statement I wrote with the teachers... communicate with the teachers informally. I worked collaboratively with the teachers. (NF 1, F, Science Teacher)

One fellow talked about how feedback from the academic mentor and the mentoring course helped him to rethink the strategy for implementing Open educational resources like PhET simulations in Nepal

In the first cycle of the action research, I, along with the teachers, used the PhET simulation, demonstration we liked, the teachers, the activities through the projector, and just the students are doing that, just watching that in the projector and on the basis of that they are doing, but, later on from the telegram and from my own academic mentor, he has suggested that how, you know, this hands-on experience can again be able to give the hands-on experience to students, then we realized that no, let's also provide the computers to the group of the students and do that. So, basically, this is just one example of how the feedback you know is given in the various seminars, especially in the mentoring course, and we know that you know how to work with the teacher, how to motivate them, how to, you know, work with them. So, all these things helped me directly and indirectly, and likewise, sometimes we do have, you know, our thematic, you know, meetings or the academic and field mentors (NF 9, M, Science Teacher)

Another fellow emphasized how it was the practice-based learning by doing action research after the course that helped in connecting theory with practice

We got about the action research and the course action research and the course mentoring; these helped me a lot, and because when we were studying, like, action research is this and action research is that, and at the same time, we went into the field here to experience those kinds of theoretical knowledge and we experienced what kind of challenges that we had in our own context, because we do have different contexts and different situations in different parts of the country. So, in my context, what were the challenges while conducting these, and that may not be the challenge in another context? So, that was the major component that helped me. (NF 8 , F, MPhil scholar)

The fellows were encouraged in reflecting upon their learning and actions through discussion in webinars and writing a reflective journal. This helped in establishing reflection as a regular practice and fellows acknowledged that it helped them to be a good teacher educator.

For teacher educators, action research helps to encourage us as a teacher educator to reflect our own practice and evaluate its effectiveness. As educators, I reflected my activities, like what I did, how I conducted the research, and what went well, what didn't work, well, what were the challenges, what should I do next, in next round, or what in the next hour or so (NF 8, F, Mphil scholar)

Thus, Nepal fellows reported that the online courses, opportunities for practice-based learning to connect theory and practice, collaboration and reflection with teachers, writing reflective journals, discussion with their peers and MATPD team during webinars and mentoring support helped them in conducting action research and learning from it. Repeating this does not add value.

Comparison of Nepal SATE fellows' perceptions about Action research before and after the SATE fellowship

Before SATE fellowship, Nepal fellows had shared that though action research is mandatory in Nepal, in practice, it is completed as a formality. They were aware of its use in finding local solutions and improving teachers practice through feedback on strength and weakness. However, it was construed as an individual activity engaged by teachers with no support. By the end of the fellowship. Fellows had developed research skills and knowledge, deeper content knowledge, received and given mentoring support through collaborative action research, and developed the identity of a teacher educator. The comparison of perceptions of Nepal SATE fellows before and after the fellowship is illustrated in figure 3.5.

Figure 3.5

Perceptions of Nepal SATE fellows about Action Research before and after the fellowship



Variability in the implementation of the action research by the teachers

Content-based ideas were further contextualized to be implemented in the different teachers' classrooms. Since the fellow had to collaborate with different teachers across different types of schools the classroom and school situations were different in each school/ classroom, and fellow had to think with the teacher for ways in which new ideas could be implemented in the particular classroom, as well as to address the variability of students' understanding in different classrooms. There were classrooms which were relatively well resourced than others in terms of infrastructure. However, teachers still had to compromise in terms of providing students access to learning

materials. Some decided to use grouping among students to provide opportunities to engage in classroom interaction and access to the materials and ICT resources. The implementation was different for different teachers and classrooms due to differences in their content and pedagogical content knowledge, and knowledge of how to use resources for developing understanding. The teachers within the same school were able to provide support to each other in implementation, and even had informal meetings outside of the formal meetings when convenient.

Teacher Learning from action research

The teachers' learning was also reported in terms of depth of content, pedagogical and technological knowledge (Some focused on TPACK), self-reflection on their regular practice and teaching in Nepal, collaborative reflection on learning from AR participation and change in teachers' practice to adopt the pedagogical innovation focused in the AR. Some fellows reported the differences in the implementation by the teachers depending on their context, wherein they had to contextualise according to the situation like translating in Nepali language and making smaller groups of students in large classes to ensure participation. Some teachers implemented the innovative pedagogy beyond the grades and topics that they had focused on in the AR indicating the transfer of learning.

Reflecting on self or by engaging in our courses, there have been different processes of learning from the day to day activity, by learning from the new technology, by learning from the other teachers, or from the social media through all this we can continuously refine ourselves. And for this, we have to do action research in our classroom, our search console, then it will definitely help to increase our practice and also stay up to date with the current scenario. So action research really helps strengthen the professional development of teachers. (NF14, M, Teacher Educator)

Teachers used varied manipulatives/resources which were suggested and introduced through TPD workshops by the fellows and integrated into classroom teaching through a collaborative action plan. These use of resources as a learner and then as a teacher empowered the teachers to develop confidence in using these resources.

So, in the second cycle, the first day they used the manipulatives to give the input in some part in whole again, and on the second day, they had focused on the operational part of the fraction with the help of fraction tiles, fraction tiles are the manipulatives. (NF1, F, School Teacher)

There was a few interactions being first implementation then having interview with them and then again a second cycles and after having a second interview with the one [teacher] so I found that there was some confidence and empowered because they start to say that I can use these tools during my classroom from the next lesson when I teach calculus and they even start exploring by themselves in YouTube and they used to say that I can use this other ICT tools also , like using in probability also , geometry also, trigonometry also. I found that we have started to build up the confidence on using algebra tools and even the ICT tools in class11 and 12. So, I believe that it helped to improve the teachers' teaching practice. (NF 14, M, Teacher Educator)

Almost all the fellows reported change in teachers' practice through engagement in action research. The most often cited change was promoting active learning of students and adopting reflective practice.

Student learning

Student learning was reported in the form of greater engagement, improved learning of the concept and using ICT tools beyond the topic focused.

I think because students were engaged, students has increased their interest in science after the implementation of this art based pedagogy and the teachers also even to today, when I meet them, they used to say that students are more interested in science these days (NF 9 , M, Science Teacher)

Teachers also reported improved understanding among students about the topic focused in the action research. Students understood the content as well as learned to use new digital resources. The students connected content with their daily life when discussing food pyramids and had insights about their harmful food habits.

And it helped, for the student, also for better understanding of the content of the knowledge. They learnt to use it to explore other topics also. (NF 8, F, Mphil Scholar)

I took the reflections from the students and they prepared the food pyramid and from that food pyramid, they presented that food pyramid at last at the end of the implementation there, they presented many students are told that like in the food pyramid in the top, there is the part for the junk food and they said that they realised from the food pyramid that what needs to be eaten in adequate amount and what needs to be eaten in less amount, something like that they verbalise their understanding and they mentioned that they will limit the habits of taking junk food, something like that. (NF14, M, Teacher Educator)

In the second cycle of the action research most fellows reported that the teachers were open to giving students more opportunity to express their ideas and explore the resources on their own. One of the fellows discussed how flipped learning benefited the students.

So, in the second cycle, we give the students projects and divide them into the group. So, the students discussed within themselves and chose a certain topic for themselves and when they went home and did research on the topic. Day after they came to school, they had their notes with them. (NF 10, F, NGO Professional)

Some fellows reported how due to the design of project-based learning activities, students developed observation skills and connected what they learnt in classroom and from textbooks with their daily life. They developed ownership of learning through engaging in observations in their own contexts.

Initially, they briefly give the concept of the biotic abiotic factors and their relationship different elements of the ecosystems and general other concept of the content on the topic and they send the students in the field and during the vacation and then they are provided with the vacation work to observe and collect the photos which may indicate the relationship which may indicate the biotic and abiotic factor or which may indicate the how the ecosystem part of the ecosystem and such reviews and photos were collected. And after collecting the photos and videos during the vacation the cluster the photos and videos provided to the group of students and the group observe such photos videos and share their experience of observing photos and videos collected. (NF 6, M, Govt Official)

The fellows reported considerable learning in terms of their own beliefs, knowledge and skills as well as of participating teachers and students learning through transforming the pedagogy used in the classroom along with the resources. Though the implementation was done in varied contexts

across different themes, these learnings in form of beliefs, knowledge and skills were reported across all contexts and levels of engagement.

What are the challenges and how can they be addressed?

Though the fellows successfully conducted action research collaboratively with teachers, and most of the Nepal fellows were able to conduct a second cycle of action research, the process was fraught with some challenges. These challenges can be categorized at the level of the teachers themselves, classrooms, schools, and finally at the systemic level within the country. Most fellows were able to talk about the challenges faced at the teacher/classroom/ school level. However, some of them were also gained insight into systemic challenges, and were able to recommend changes needed at the policy level to support and sustain collaborative action research with teachers.

Challenges discussed at the teacher and classroom level were mostly related to lack of motivation or incentives for the teachers to engage in action research. This led to considerable difficulties in recruiting teachers voluntarily for collaborative action research. Only a few teachers had prior experience of action research and were motivated due to that experience. Even when the action research is required for promotions in the government sector, teachers are not keen to engage, and none continues with the action research once it is done; it is treated merely as a formality to be completed.

Most often mentioned reason for lack of teachers' enthusiasm for engaging in action research was the time constraint due to busy school calendar and heavy syllabus that teachers are mandated to complete. Teachers tend to focus more on content for exam preparation rather than exploring new practices in the classroom. Some teachers also held negative beliefs about action research not leading to anything productive, while some others thought it to be like a rigorous academic engagement. Some even treated it as a joke and not required to be taken seriously and only a formality. Some fellows mentioned the lack of digital skills and awareness or knowledge about action research also deterred them from using ICT based resources and participating in the action research.

Fellows tried different ways of motivating teachers to participate in the action research. Some resorted to informal gatherings for lunch or coffee, while others motivated teachers by talking about the opportunities in future, opportunity for professional development and earning certificates for participating in an international research program. Some fellows acknowledged teachers' important role and developed confidence and skills of teachers through engagement in workshops prior to implementation and even providing support while they implemented in the classroom through observation, feedback and analysing student work. However, another challenge was that the teachers' attitude varied throughout the action research. Some teachers were

enthusiastic in the beginning while others got motivated after looking at the students' engagement and understanding due to use of new resources/ pedagogic practice.

some teachers do not understand the value of action research because there is no practice of conducting action research as a result, only few teachers conducted action research (NF5, M, Assistant professor)

I was an outsider, and I convinced them that we are going to learn something new, and this is an international project and all that, but at the middle of the project, they lost the interest in the AR that I have conducted, and it was quite challenging for them to you know, keep on doing the things in this action research (NF 12, F, Science Teacher)

A considerable number of teachers were motivated at the end of the action research due to the learning opportunities it offered them through collaboration with other teachers and access to resources and ideas.

Some teachers expected mentors to will tell them what to do. Fellows had to spend time making the teacher understand the importance of their own role as a decision maker in the classroom through workshop discussions. Teachers also faced challenge in understanding what data to collect and fellows collaborated with the teachers on these tasks.

At the school level, the most significant challenge identified was the lack of support of head teachers for teachers participating in action research. Some fellows met with the head teacher and discussed the benefits of teachers participating in action research and the theme on which they were working, to garner their support. This helped the teachers in participating. Another significant reason at school level was lack of hands-on and ICT based resources making teachers stick to traditional teaching practices. In fact, when some of the fellows provided the resources and made teachers aware of Open educational resources, they were enthusiastic in implementing action research. Teachers also struggled with maintaining student engagement and managing their behaviour when introducing new activities and practices showing a lack of culture of promoting student active engagement. However, some teachers found the solution by connecting students' presentations to the internal grading.

Challenges at the systemic level are related to the challenges faced at the school level. These challenges pertain to lack of availability of resources for teachers and students especially in local languages. Additionally, the action research skills are not adequately addressed in pre-service or in-service teacher education and principals are not trained as enablers for such collaborative research by teachers.

3.3 Mentoring

Mentoring was a new concept and terminology for the fellows. It is less practiced and not formally institutionalized within the education system in Nepal. The fellows had a limited understanding of the concept and this can be attributed to (a) no formal training (b) low engagement with content related to mentoring and, (c) lack of experience of being a mentor/mentee especially in the context of teaching-learning space. The most common definition mentioned by them at baseline was: "A more experienced person guiding and supporting a less experienced person", while a few equated mentoring with training and counselling. Their definitions or descriptions did not indicate mentoring to be a continuous long-term engagement facilitating professional development of the mentee.

No, I haven't undergone mentoring as such but again, although not very well equipped; I have been a mentor for a couple of students, just because we would say, there were no other resources available so you fill in the gaps. (NF4, Science Teacher)

I don't have any experience of professional mentorship, or I haven't yet mentored professionally to someone. But I have experience of being mentored during my scouts training. We were assigned mentors, we were divided into groups, and they were, every group is assigned a mentor. They used to guide us to our physical training as during the scouts training. (NF10, NGO Professional)

The fellows' experiences of mentoring at baseline were mostly one-off events indicating that these engagements were not continuous. Some of the experiences articulated include training (participation and giving inputs), career counselling, academic supervision, disaster management hacks, overcoming fear of a subject, encouraging teachers to attend trainings.

The fellows were introduced to this concept through the mentoring course and practice-based Action Research (AR). During the course, the fellows were oriented to the concept of mentoring and peer mentoring, mentoring values and Professional Learning Communities, as a means to facilitate professional development of teachers. The fellows were co-mentored for their Action Research by a team of an academic mentor (AM) and a field mentor (FM) who supported and guided them on technical aspects of AR and contextualization of the intervention respectively. During this process, the fellows also transitioned from being a mentee to mentoring a group of 5-10 teachers with whom they worked collaboratively for their Action Research. The mentoring process took place in a blended approach, which included both in person and virtual interactions. Fellows were part of thematic COPs on telegram where they communicated with their mentors for scheduling meetings, seeking clarification and information, mentor support at various stages and sharing their AR work. Learning from their experience as mentees, fellows created COPs with their teachers on Facebook messenger, WhatsApp, Viber, or Telegram, to provide support as needed, on aspects such as lesson

planning, action plan for implementation, reflecting on the classroom implementation, teachers' experiences and challenges.

Understanding of mentoring

Having experienced mentoring as part of the fellowship, both theoretically and in practice, the end line interviews suggested that the fellows had gained a nuanced understanding of the concept and its process, and could distinguish mentoring from monitoring, which they had previously used interchangeably.

Monitoring involves overseeing and checking on the progress of an individual or group to ensure that they are meeting specific goals. Mentoring is often more personalized and tailored to the mentee's individual needs and interests, and it typically involves a deeper level of engagement and interaction between the mentor and mentee. (NF13, Science Teacher)

So, before this fellowship, I used to think that a mentor is someone who knows everything. Like, we can ask anything, and he seems to be giving all the answers and solutions directly. But after this policy, I understood that even mentors, sometimes they cannot, give us the proper guidelines or like, proper solution, but still, they can suggest us or they can motivate us to do something differently, but he's the one or he or she is the one who guides us to move on. (NF1, School Teacher)

The fellows understood monitoring to be an administrative, instructional and hierarchical process in order to evaluate, observe, track progress of teachers. Through their experience fellows understood that mentoring was to guide/support the mentee through a collaborative process of engagement between the two individuals, where the mentee learns new things and is empowered to address issues and arrive at solutions. They understood that:

- (a) Mentoring is a continuous and collaborative process that helps the mentee in his/her professional development
- (b) The role of mentor and the mentee is equally important in this process
- (c) Mentoring is not about direct answers or solutions to the mentee, but it is about guiding, supporting, empowering the mentee to help them address issues for themselves and take ownership of their own learning.
- (d) Mentoring can also be done by peers who have similar levels of career.

Mentoring facilitating the professional development of teacher educators

During the baseline interview, the question about mentoring facilitating development of teacher educators was missed by three fellows; the remaining majority (12/15) were unable to respond to the question from the perspective of "teacher educators." Instead, they described mentoring of

teachers when asked about teacher educators, indicating unfamiliarity either because of lack of previous opportunity of being a teacher educator or lack of such initiatives for teacher educators in their contexts. It was interesting to note that even fellows who were teacher educators themselves could not respond to this question.

Mentorship can help teachers with content and pedagogical knowledge. Every teacher should have a mentor. (NF1, School Teacher)

Teachers tend to have adequate subject/content knowledge, but if they want to be good educators or develop professionally, they need guidance on dealing with class, rowdy students, bring out creativity in class etc. (NF4, Science Teacher)

that the general understanding was that mentoring was important, especially for those who were new to the teaching profession. It was also articulated that mentoring could help address teacher issues, build their pedagogical content knowledge (PCK), and enable them to become good educators through support. One fellow mentioned that mentoring should be beyond content and pedagogy.

One sees a shift in the end line interviews. The conversations indicated that fellows were able to identify themselves as teacher educators post the fellowship. They had worked with teachers and mentored them to facilitate their professional development and improve their practice. A sizeable majority (10/15) of fellows were thus able to respond in the context of “teacher educators”.

Teacher educators through working /mentoring with teachers, can understand their classroom context, teaching practices, problems and challenges and accordingly provide meaningful valuable insights for improving the mentee's teaching practices. (NF5, Assistant Professor at University)

At end line the fellows mentioned that the teacher educators can learn and grow professionally from his/her own experiences of mentoring.

Their responses in end line interviews highlighted the following aspects of mentoring:

1. Understanding the teachers’ issues and concerns better
2. How to working collaboratively /effectively with the teachers
3. Better understanding of the classroom context
4. Teaching-learning pedagogical processes that teachers engage in so that the TE can give the mentee valuable insights on how the mentee can improve his/her own teaching practices
5. Improving their own skills and knowledge
6. Mentee’s feedback is significant for the TE to reflect and self-evaluate himself/herself to better understand own strengths and weaknesses

7. It can also facilitate change in the perspective of teacher educators eg. that they are working with teachers and not teaching them, develop a culture of continuous learning for the TE and also facilitate development/building of professional networks.

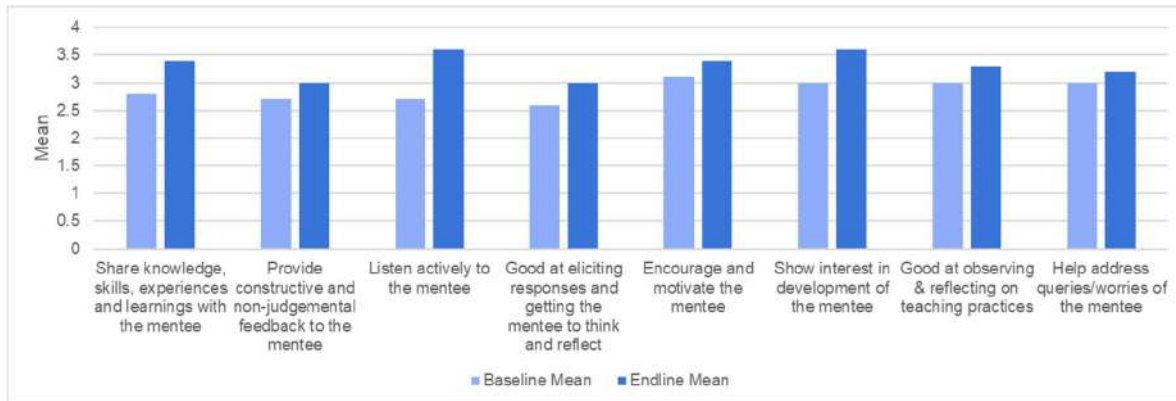
Skills and qualities to be an effective mentor

In the course of the project, Nepal fellows acquired and strengthened a host of skills to become effective mentors during the process of mentoring teachers. Some commonly mentioned skills included: working effectively with teachers, listening attentively, empathy, reflective practice, communication skills, providing constructive feedback, not being judgemental, and providing continuous support. In addition to the above, the other qualities and skills that the fellows assimilated during mentorship, but didn't voice much during the interview conversations were (a) trust building, (b) approachability and accessibility of the mentor (c) adaptability (d) problem solving (e) content and pedagogical expertise and (f) collaboration. These qualitative findings corroborate with the quantitative survey data.

The baseline end line survey scale "Mentoring-skill and qualities to be an effective mentor" consisted of 13 items on different aspects of mentoring. The Cronbach alpha is 0.970 and 0.942 for baseline and end line scale, respectively. On mean comparison of baseline and end line, the paired t-test is 0.005 at 0.05 level of significance. The p value is less than alpha, that is, there is a significant difference between baseline and end line mean. It was also found that the majority of items show positive change, in favour of mentoring skills and qualities. On further analysis to quantify change, Cohen's d method was used to compare mean. The large and meaningful change was found in fellows regarding sharing knowledge, skills, experiences and learnings with the mentee, listening actively to the mentee and showing interest in development of the mentee. Moreover, moderate change was found for an effective mentor to provide constructive feedback, encourage and motivate mentee to think and reflect and good at observing and reflecting on teaching practices and help address queries/ worries of the mentee. However, Low change was found in being good at showing/ demonstrating solutions to the mentee.

Figure 3.6

Skills and qualities to be an effective mentor



The fellows discussed various qualities of the mentor that they developed through working with teachers and how these qualities of empathy, communication, problem solving, reflective practice, planning and giving feedback are essential to support the collaboration with teachers.

“The qualities like listening to their complaints, effective communication, ability to solve their problems, reflective practice, ability to set goals and action plans, giving feedback and being supportive are required. In terms of interaction with teachers, I supported them in effective communication and collaboration, helped them to use Phet simulation offline and solved their problems. To add to this, I supported them in making action plans, models of research, and strategies for TPD.” (NF2, Science Teacher)

.....And yeah, and previously, I used to disseminate my ideas or impose my ideas to the teachers now, we openly discuss it. And we come to the conclusion that what things can be done for the best and we decision making processes more inclusive, I guess, a collaborative, I guess, in my perspective and trust building, and I try started to become more collaborative. (NF7, Science Teacher)

The acquisition of these qualities and skills can be attributed to the learnings gained from the mentoring course and the experience of being both a mentee and a mentor in their action research study. Many fellows during the interview, also mentioned that the enrichment webinar session on “building rapport with teachers” was useful in working effectively and collaboratively with the participating mentee teachers.

Mentoring experiences

Unlike their previous experiences of mentoring which were one off events, the fellows within the project received continuous professional support from their mentors (academic and field) for their Action Research activity which included technical support by AM and contextual field support by FM, as distinct roles were allocated to them. The frequency and mode of communication varied for each of the fellows. Some interacted equally with both mentors, while some more with their AM than FM and vice versa.

The below table gives an estimate on the number of meetings the fellows had with their mentors and participating teachers, as per the data shared by them. There were additional meetings over and above these with both mentors and teachers, that aren't captured in the below mentioned statistics.

Table 3.1

Meetings Between fellows, Mentors and Participating Teachers

	Total meetings	Number of meetings with AM	Number of meetings with FM	Joint meeting with AM & FM	Number of meetings with teachers
NF1	13	6	2	Not indicated	5
NF2	21	4	5	Not indicated	12
NF3	15	4	2	Not indicated	9
NF4	17	3	2	1	11

NF5	9	8	Not indicated	Not indicated	1
NF6	17	4	2	1	10
NF7	11	4	0	Not indicated	7
NF8	6	1	1	Not indicated	4
NF9	16	3	1	1	11
NF10	28	4	3	1	20
NF11	20	3	3	1	13
NF12	12	8	1	Not indicated	3
NF13	15	7	2	Not indicated	6
NF14	19	3	2	Not indicated	14
NF15	10	4	3	Not indicated	3

The responses of fellows in the interview indicate that the academic mentor support was more viz a viz pedagogical practices while the support from the field mentor was geared towards research activity and contextualization. The guidance and support received was categorized into various themes, as mentioned below.

Academic Mentor

(a) **Pedagogical support (12/15 fellows)** such as better understanding and clarity of the concept e.g. inclusion; sharing resources on action research, PhET simulation, PBL, GeoGebra and art-based pedagogy; support with the intervention itself e.g. concept of developing 3D models, designing practical worksheets, applications to teach students nutrition, suggestions on manipulatives; activities students can engage in for increased participation in the class.

(b) **Research related support (7/15 fellows)** such as making research questions specific; designing data collection tools e.g. pre-post-test survey; developing the theoretical framework e.g. connecting learning theories with research; how to make field notes and carry out classroom observations; probing participants to elicit responses.

(c) **Support on working with teachers (7/15 fellows)** such as onboarding teachers; motivating teachers to stay in the project; not burdening them with tasks; giving teachers the autonomy to design activities so that there is greater ownership.

(d) **Other support (3/15 fellows)** including help with topic refinement, action plan, research proposal, TPD workshop for teachers.

While writing a problem statement, I didn't have any idea about how to present it in my context, so my field mentor guided me to write it in the context of my classroom and my experience and suggested adding points about research and data later on. (NF2, Science Teacher)

I received regular support on writing, how to write a report and also I got resources on GeoGebra and calculus and also get feedback on workshop plan and content from the academic mentor actually I got on how to work, how to, how to run a workshop, what content to include on the GeoGebra topic. All this feedback I got from my academic mentor and from field mentor, I got most support while writing my action research report, and also helped me on what kind of teacher will be suitable for you during this, personal teacher will be suitable for me. (NF14, Teacher Educator)

Field Mentor

(a) **Pedagogical support (4/15 fellows)** such as resources on peer learning activities; articles on PBL; contextual readings on art-based pedagogy; designing specific activities related to the intervention.

(b) **Research related support (10/15 fellows)** such as refining the research questions, writing the research gap in context of Nepal, APA referencing.

(c) **Support on working with teachers (3/15 fellows)** such as selection of teachers; how to talk with teachers and the school administration, addressing the challenges faced by the teachers.

(d) **Contextualization support** (3/15 fellows) such as identifying the research gap on inclusion in the context of Nepal; contextual readings on art-based pedagogy for teaching science; researches and resources on using GeoGebra in secondary school in Nepal.

(e) **Other support** (2/15 fellows) such as writing the problem statement with respect to the classroom context.

All the fellows received the above-mentioned support for their Action Research study from their mentors, related to pedagogy, research, contextualization, working with teachers or the classroom implementation itself, though the degrees may have vary based on their roles and expertise.

For e.g. in case of one of the fellows, the field mentors' area of subject expertise was different from the selected AR topic. In such a scenario, the fellow approached the academic mentor much more when it came to designing the intervention and its implementation. Having said that, in the interviews fellows reported only the most important ones based on their experience, or may have missed mention of other areas and forms of mentor support they received.

Fellows also mentioned some challenges that they faced while working with the mentors. This was mostly related to getting time from AM and FM.

(a) Not getting feedback on their work immediately from their respective AM/FM or both. (7 fellows)

(b) Didn't receive adequate support from their field mentors (5 fellows)

(c) Not being able to have joint meetings together with their academic and field mentor. It was difficult to get both the academic and field meteor together because of their busy teaching schedules. (3 fellows)

(d) Other responses include: reduced support from AM during later stages of their AR, difficulty in conducting online meetings with AM etc. Some of the academic mentors had mentioned that they were not able to give the desired time as they would have liked.

The fellows articulated that had they received regular/timely feedback, mentoring would have been more effective. A few other areas where they would have liked further support was contextualization of intervention, field observations, and the active role of FM.

It is important to note that the mentors had busy schedules of their own given their teaching, research and other commitments and hence, there were times, when instant feedback, response was not possible. There were a few mentors who would let the fellows know that there would be delays from their end.

The co-mentoring model was found useful by everyone. They thought that co-mentoring was beneficial in 2 ways. (a) if one mentor was busy/occupied, they could reach out to the other, (b) they benefitted from diverse ideas and perspectives. However, the challenge of co-mentoring could be receiving contrasting/conflicting suggestions/opinions resulting in a dilemma for the mentee. A few fellows mentioned that when such a situation arose, they would go ahead with what had been recommended by the Academic Mentor.

The mentoring support provided to the fellows enabled fellows to work effectively and collaboratively with the teachers. The fellows indicated that they had frequent communication with their mentee teachers - mostly daily and in some cases weekly. The modalities of communication ranged from in-person school visits to phone calls and online exchanges over Messenger, Viber and WhatsApp, and in some cases email.

Telegram is not a commonly used platform in the country and therefore, many were reluctant to use it. The fellows supported the teachers in several ways to facilitate their professional development for effective and meaningful teaching-learning practices. Some of the support provided to the teachers included:

- (a) Building teachers' conceptual knowledge on the intervention they worked on. E.g. Action Research, PhET simulation, inclusion, open educational resources (OERs), Project based learning (PBL), engaging students using 5E instructional model, art-based pedagogy using worksheets for practical, GeoGebra
- (b) Lesson planning and designing activities for implementation
- (c) Sharing resources such as books on action research, videos on PhET simulation, articles on art-based pedagogy, lesson plans
- (d) Self-reflective practice
- (e) Other responses included providing teachers feedback on their work, classroom observation and addressing gaps, contextualization of resources, collaborative learning through reflection, providing experiment materials to schools

There was some interplay of gender and/or seniority (age/experience) during the mentoring process; however, it was not significant enough to impact their Action Research work in any way.

Almost 50% of the fellows mentioned that there was no impact of gender or seniority on their role as a mentor or a mentee. While the remaining 8/15 fellows spoke about instances of gender and seniority being issues. It was interesting to note that only two fellows spoke in context of their

mentors while the other 13 viz a viz the AR participating teachers. Some of the examples mentioned by them were:

(a) Gender: Female teachers were unavailable during the evening time due to household responsibilities and hence it was difficult to schedule meetings during that period, A few female teachers were not comfortable with extending engagement period due to other commitments, and hence had to drop out. Some were not comfortable calling the opposite gender over phone. Some male teachers were reluctant to use art-based pedagogy, as they consider science to be a serious subject.

(b) Seniority: One fellow mentioned that since she was the least experienced amongst all the fellows her FM had, she would feel ignored or the field mentor wouldn't be able to give her time in the group meeting and hence, she had to change her meetings from group to individual meetings to get extra support and guidance from the mentor. In another case, a fellow had a bias towards one of the mentors given the latter's experience and credentials.

Blended Mode of mentoring

Majority (13/15) fellows articulated that the blended approach to mentoring was useful. The mentoring process included both in-person and online interactions with the academic and field mentors and the participating mentee teachers. The fellows stated that the face-to-face meeting that took place at TISS Mumbai was beneficial, as it helped to know the mentors better and form a relationship as well as share the initial concept and ideas of their Action Research. They also mentioned that subsequent online interactions through various channels of communication (zoom, Telegram, Messenger, WhatsApp) helped address geographical barriers and time constraints. The meetings could be scheduled at mutually convenient times and they could reach out to mentors at any time for suggestions, feedback, discussions etc. Additionally, sharing of resources and knowledge became easier through the online mode. Having said this, a few did mention challenges of ICT viz a viz internet connectivity and access to devices.

Barriers to mentoring

The fellows did not mention barriers to the mentoring process especially, when it came to their mentors. Perhaps this had to do with social desirability given that the academic mentors were TISS faculty. Few of the challenges/difficulties mentioned were related to mentor time, online modality, language. E.g. not being able to get mentor response /guidance on time, unable to clearly express and articulate in online modality, better able to express their viewpoints and opinions in local language compared to English language.

In some cases, while developing the proposal in that sense. In the online meeting, I couldn't properly form the concept and problem statement. I couldn't state the problem properly in the first attempt. I needed to repeat the issue of the problem statement of my research. (NF6, Government Official)

One of the fellows mentioned that she felt ignored by her mentor as she was the least experienced in the mentor group.

With my FM, there was a barrier of understanding, Because I experienced it and was experienced in writing the research paper. And also, I was the only one. So, I felt a little bit neglected regarding the writing process, because he used to say that we have taught this in our classroom and you don't know about this topic? And how, how will you write about this? Instead of you can go from this way, he used to say, we have already taught this in our classroom. So you were the only one who didn't know. So, you go and ask your fellow about this topic. So, experience was a big problem with my field mentor. (NF10, NGO Professional)

And the other challenging part is like, while approaching the teachers. It was like, I was completely from the new world, like, they had not seen me before. So, whenever I approached, they had a very strict schedule, and it was difficult to get their time. And I had to wait for long hours, but just taking the 15 minutes of their time and how, and talking about, their practices, their knowledge, and so that in the beginning, it was silence. But when I spent a lot of time with them, like, I stayed the whole hours, like the school started at 11am, and ended at 5am. So, I went to school with them. I was there when they were there, and I was out with them from the schools, I had lunch with them, and slowly that process became easy for me. (NF8, M.Phil. Scholar)

Time was a common barrier that came out in mentee discussions as well, about not having enough time easily. Many would have classes in the morning, had to go for tuitions in evening, had household responsibilities (female teachers). Other issues stated were related to (a) low resource context such as non-availability of materials/equipment in labs, computer lab not being able to accommodate all students at a given point, (b) logistical issues such as internet, physical distance and hence, challenging to meet teachers collaboratively, (c) teachers not motivated enough to carry out AR. In a few cases, teachers lacked the interest/motivation to try new pedagogical approaches.

Scaling of the mentoring process

The fellows were introduced to the concept of mentoring during the fellowship. They are still in the process of understanding the concept in depth, learning new skills and internalizing the same, and were therefore, unable to think of the concept at a community/national level. They talked about mentoring from their own individual perspective and experiences gained during the fellowship. Having said that, two fellows mentioned that teachers must be provided with mentoring support post training and that should be a policy mandate. The concern is the policy-practice gap, as school-based mentoring does feature in the country's national educational policy.

The small part of mentoring we can observe and that is after the training centre when the teachers return back to the school they implemented their learning in the school and the trainer observes their class and goes to a school visit ... I think this is a good idea to have a mentor in our contexts. Now, because after the federal system only few one or two manpower human resource is working in the local level education and they have many administrative works, so, no time to visit the school and support them and they are not enough competent to support that teacher also, because the background is not of an experienced teacher also. So, the recent provision, the policy provision if implemented properly in the field, in the schools or local levels, and that will obviously work and can support the teachers I think so. (NF6, Government Official)

So that model is working in the context of Nepal. But I think we have to switch to the MATPD model only. I don't know, regarding the resources and all the cases, but this is what it should, you know implemented in context of Nepal as well. And that is it this model is capable of bringing some you know, real change in the field, rather than the model that rather than the TPD that we are having now, this will definitely bring some change. So, I think this will work. (NF12, School Principal and Science Teacher)

Some of the fellows mentioned the MATPD model may work in Nepal, however the resources need to be considered given its a low resource context country and hence perhaps, one local mentor would be realistic. Fellows agreed that mentoring should be long term. One person felt that in-person mentoring would be better than online modality while another mentioned that peer mentoring could be considered.

Reflection

Reflection was one of the essential and important elements of the learning in the fellowship. The fellows got the opportunity to reflect upon their practice through various components of the fellowship such as workshops, reflection journals, action research, courses etc. At the end of the fellowship, fellows were interviewed about the role and experience of reflection in their practice.

Role of Reflection

Fellows discussed the important role that reflection played in their fellowship in terms of improving ones' practice, identifying strengths and weaknesses, asking relevant questions and problem solving.

Eight fellows said that reflection is a powerful tool that helps in improving one's own practice. A fellow shared how reflection is initiated by gut feeling they have after taking a class or lesson being good or bad. It is a self- reflection on whether one was able to deliver what he/she had planned and hoped to achieve.

You know, after everything you do, you kind of get a gut feeling that, okay, it was good, you get a good feeling about it, or you have a bad feeling about it. If you are able to spend time reflecting on what is actually disturbing you regarding that particular activity, would you learn more? Regarding my classes when I take classes at the end of the class, sometimes I would end up with a feeling that yes, I was able to deliver what I wanted to. And sometimes even though I have done the same things, I just end up with the feeling. (NF5, Assistant Professor at University)

Three fellows explained the meaning of improving practice by asking themselves questions. NF 8, emphasized on asking why questions on her actions. Naryan talked about raising questions related to challenges and best things.

until and unless we ask the why questions, why critical questions? Why did I do that and why? I did not do that. (NF8, MPhil scholar)

What were the challenges and what were the best part of it- (NF7, Science teacher)

Under the theme of improvement of practice one more subtheme came up, which was resolving issues of schools and working with colleagues. This was highlighted by one fellow.

issues in the school and we have to reflect on that particular issue. So, yes, we can, you know, for the next time we can have some learning to deal with certain scenarios. So, this is like kind of situation thing. (NF1, School teacher)

On the professional practice Yes, that would help our teaching and with dealing with the, you know, certain problems or like Working with the colleagues as well, well if we reflect on our practice. (NF1, School teacher)

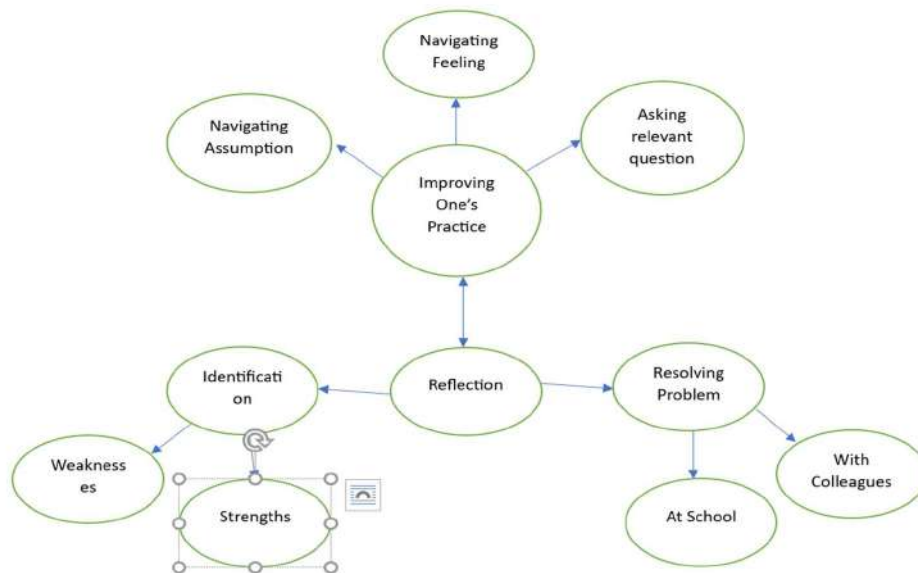
Through reflection one can examine one's own experience and can connect their practice with theoretical concepts. One Fellow also mentioned that reflection makes learning meaningful and self-directed.

Three fellows described reflection as a tool to identify strength and weakness, to enable improvement in the practice. A fellow talked about tools Like SWOT to identify strengths and weakness. The other two fellows explained reflection in terms of examining the impact of teaching on students. Fellows explained the role of reflection in understanding one's strengths or positive areas and identifying the areas of improvement, based on development of students.

Reflection, actually, plays an important role to improve one's professional practices by providing an opportunity to think critically and analytically about one's actions and experiences. By reflecting, for example, on my teaching practices, I can identify areas of my students' areas for improvement, and areas that require further development. So, it allows me to examine the impact of my teaching on students' learning, and it also identifies the ways to improve my pedagogy to better meet the needs of the students. It also enables us to identify and address any challenging situations or problems in the classroom. It also enhances a different understanding of my own teaching ideology, my teaching philosophy and how my teaching ideology aligns with the beliefs and values globally, and my contacts. So it actually develops or enhances a kind of self-awareness for my professional growth and development as well. (NF5, Assistant Professor at University)

Figure 3.7

Roles of reflection



The above data revealed that the role of reflection is to improve one's own practice by identifying one's strengths and weaknesses, by asking relevant questions, and also dealing with problems by working with colleagues on issues of school as well. In the baseline data, fellows demonstrated an understanding of the role of reflection in improving one's own practice. The role of reflection in improvement of practice was extended to include asking questions, reflecting on ones' feelings and identifying one's strengths and weaknesses. Another aspect of the role of reflection mentioned by one fellow was to be able to deal with the problems, which did not come in baseline study.

Experience of reflection

Modes of reflection- During the fellowship, fellows got the opportunities to reflect through various modes. These included a) writing research reports, b) writing reflection journal, c) mentoring during action research (in conversations and interactions), d) face to face workshops/webinars (specifically questions asked about the end of webinars).

As per the baseline data, although the fellows had agreed that reflection is an important practice for improving one's own classroom teaching-learning process, it was not a practice that the fellows engaged in frequently due to lack of a culture of self-reflection within the teaching practice. In the end line study fellows described frequent and regular opportunities to reflect on their practice through various modes as mentioned above. Reflection helped fellows to know their strengths & weaknesses, in terms of what they had learned and what they hadn't. Through reflection fellows could change their practice. For example, a fellow changed the topic they would like to take up in the class after reflecting on their decision.

I critically examined what went well and in the next sessions I could progress more. I could add some more sessions on certain topics, or I could remove some topics and that could have been irrelevant, something like that. Our topics on TPACK included some activities. I could assess that like whenever in the first session, when I had a face-to-face meeting, the teachers were, like, monotonous, there were no any activities. So, I reflected on my own actions. And the next day, I added certain activities for the teachers like who I provided certain questions in between the sessions and then questions and then they would answer that question that quiz, and also some of the activities like measuring BMIs and something like that. To make it more interesting, making it monotonous, and more part (NF8, MPhil Scholar)

Reflections were new for me and you suggested to me at some point and I also practiced these things and in the second and first cycles, I found it very helpful when developing a course also on the first day of workshop also. I do it the after completing the session I reflect on how was your day and some teachers say you are very fast and it is due slowly and second day I run the workshop on online mode slowly and then on the second day they asked for the ,for the this topic to be covered on tomorrow and then we cover that topic in this way taking a reflection that has also helped me a lot and also reflection helped me during the writing action research which I have taken during a field note and intervention and all these things giving a first and second cycle. (NF 14, Teacher Educator)

A few fellows could see improvement in decision making mentoring, and in their action research through reflection. For example- two of the fellows talked about how they made changes in their practice by including some of the activities and changed their practice through mentoring support.

Regarding the survey tools, I that helped me and the main challenges I had was in designing the survey tools. That is where I reached out to Shamim and that was a time when I was actually struggling with the action research. Earlier during the webinars, I had noted down some points I had asked them questions, those were the things which actually helped. (NF4, Faculty & ECA coordinator)

For example, when I did when Radhika ma'am suggested I choose attention grabber activities, I also asked the participants that I'm actually going to have a session on attention grabber activities, and this will help you to do this, will it be okay or not? When they said, okay, then only I developed this workshop PPTs. And I gave them a session. So that is how I worked. (NF3, Pre-School Principal)

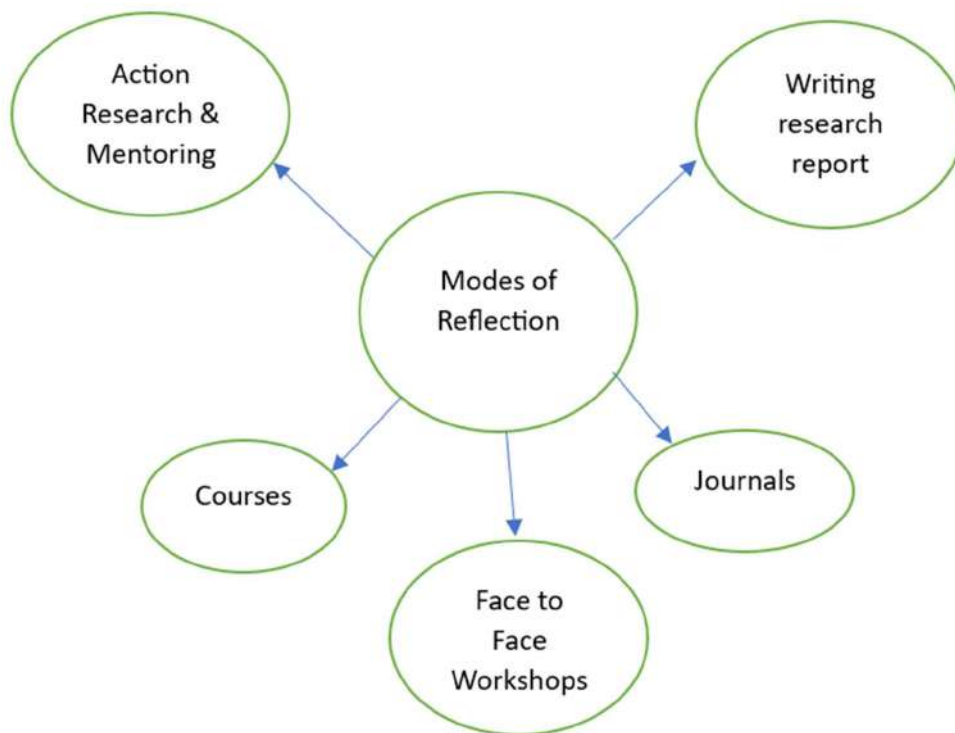
One fellow described how reflection had helped in navigating their own assumptions by raising questions about how the situation would have been different if decisions had been taken differently.

Yeah, really, really hard Ma'am during the time of the reflections. Because reflection is required simply not just to explain what happened and what happened. And then after its about, some assumptions also assumptions meaning some assumptions like the what if I could like that don't happen if I have done like that. And what would happen is that assumption also for that also reflections important which I have known about from the course part one. So that's why the course from the reflecting part of that is very important, and that I have found the potent and used (NF 15, Science teacher)

By end line fellows reflected frequently on their decision making during the fellowship, and made changes in their classroom practice. Through Action research and Mentoring support, they got opportunities to rethink, and fellows included new activities or overcame the challenges of conducting research. While in the baseline study most of the reflective experiences described were not teaching related, at end line Fellows mostly talked about teaching experience, and that too about self-reflection. Peer reflection was not commonly practiced as reported in the baseline study. This finding was corroborated by the statistical analysis as well wherein, moderate change($d \cong 0.5$) was found in the following areas: self-reflection, after taking class, visiting colleagues lessons to learn from them, asking colleagues to learn from them , asking colleagues to observe some of the class to get feedback on teaching, discussing the teaching experience with a colleague, and participating in peer review meetings to learn from colleagues, thoroughly analysing problem in practicing before choosing solution, observing artifacts from students to understand the approach, asking students to fill feedback forms about lessons, and sorting out problem in teaching through literature review, student performance data, and through conducting small research project into possible cause and solutions.

Figure 3.8

Modes of reflection during fellowship



3.5 Social Learning

This section focuses on understanding the nature of fellows’ interaction and engagement with diverse stakeholders during the fellowship program. These include communications with other fellow colleagues, teachers, government officials, others teachers/teacher educators.

Social Learning was an integral part of the MATPD project design to facilitate collaborative learning and development of a discourse of practice amongst fellows within and across the three countries. The objective was to engage fellows in collaborative learning by sharing about their classroom teaching practices, sharing resources, reflecting on the learnings of the fellowship and their teaching practices, discussing contextual solutions to local problems, sharing thoughts on various pedagogical practices, seeking information and asking queries etc. The following initiatives were taken:

- Professional learning communities: We attempted to build a community of shared learning through 10 formal telegram groups (country wise -3, combined south asia-1, AR thematic groups -6) as part of the project.
- Course discussion forums: ICT, mentoring for TPD and action research. Fellows would share about their own understanding of concepts, their experiences and teaching learning practices. They would also learn about others' experiences and share how similar or different they were from their own.
- The enrichment webinar sessions to support fellows with their Action Research study. The sessions would allow for fellows to share about their own teaching-learning contexts, practices and research experiences in the field.

Engagement and participation in formal and informal groups

In the baseline interviews fellows said they were part of some formal and informal groups. Most of the fellows (67%) were already part of subject specific registered professional learning groups, which organize a variety of sessions to discuss changes in the curriculum, strategies to make classrooms more participatory and engaging, as well as annual conferences to present research findings. Some of them were also part of informal groups (33%) with other teachers and educators where they discussed immediate concerns related to classroom teaching, dealings with management, and issues related to school discipline. They articulated that being part of these groups had increased their knowledge in classroom teaching, research, and educational theories due to exchange of ideas and knowledge-sharing. While there was collaborative learning that took place in these groups, the link between participation in these groups and professional development opportunities and experiences, was weak.

Interaction with MATPD fellows

Nepal fellows had limited interaction with fellows from Afghanistan or Maldives. Nepal fellows were not able to meet Afghanistan fellow in person but remembered interaction with them during the face-to-face workshop, webinar sessions. One or two fellows also mentioned having connected with them over social media. Nepal fellows however, interacted formally or informally with other Nepal fellows. A few of them were already familiar with each other prior to the fellowship, and hence, there were frequent interactions between these cohorts. One fellow mentioned that she would work on the courses together with two other fellows and they would discuss activities and assignments and also share AR experiences and challenges with each other. Fellows were positive about continuing interactions with the other fellows post the fellowship through exchange of ideas, sharing contextual practices, and planning research with other fellows. The fellows mentioned that Nepal fellows had an informal group, primarily used for administrative purposes like submissions,

form completions, timelines, remuneration related queries, status of tasks, fellowship related delays, workshop preparation.

Engagement with the MATPD platforms: telegram, discussion forum and enrichment sessions

The platforms introduced in MATPD project were fairly new to the fellows who were more comfortable in using Facebook, Messenger and Viber for communication. As a result, there was not much engagement of fellows with the various platforms. Five of the fellows stated categorically that they had been inactive and did not post/participate in discussions that took place in these telegram groups. A few fellows mentioned about participating in administrative queries, seeking clarification, sharing some resources, sharing pictures of their Action Research work. Challenges related to participation emerged as the platform was new to them and one of the impediments in fellows' participation was about getting familiar with the new platform. The discussions mostly took place in English while Nepali fellows were more comfortable in using Nepali for communication. They, however, interacted well with the field mentors and connected with them using messenger.

Majority of the fellows (13/15) mentioned having participated in the discussion forums as it was a mandatory component of the course also. Two fellows mentioned that they took interest in responding to others' views/opinions related to the topic. The fellows were more comfortable in having verbal interaction with others and were not used to participating in the academic discussion.

About half (8/15) the fellows mentioned that they participated in enrichment webinar sessions; three fellows mentioned that they would ask questions if things were unclear or out of curiosity.

Interviews revealed some examples of learning through participation on MATPD platforms. Some examples shared by fellows were: learnt from discussions that took place on telegram, better understanding of Nepal policies, time management, understanding of the educational context of other countries during the face to face workshop. Action Research related Support on AR action plan, support on AR report writing, support on AR proposal, data collection and organization, how others are doing their AR]

Communication with Action Research participating teachers

The fellows used a diverse set of platforms to communicate with their participating teachers. These included Facebook messenger, WhatsApp, Telegram, email, phone, Zoom and Viber, with Facebook messenger emerging as the most common mode of communication by the fellows. These platforms were used in addition to in person meetings between fellows and teachers either individually or in

groups. Based on the responses, the discussions that took place in these groups have been categorized into the following themes:

(a) Logistic: e.g. Setting time/schedule for interaction with teachers or for observing classroom implementation, asking teachers to fill survey and/or reflection forms and project planning

(b) Academic: sharing resources, content and pedagogy related (art-based pedagogy, practical worksheets etc., queries/clarification regarding the intervention (e.g. how to handle misconceptions of students or constructing solid materials in schools where there is lack of resources etc.)

(c) Classroom Implementation: e.g. discussions around implementing the intervention in the classroom, sharing of experiences and learnings post classroom implementation

Sharing Action Research work with stakeholders

A majority of the fellows (12/15) shared their Action Research experiences and learnings with others in their network. These stakeholders were predominantly teachers, with a mention of government officials by a handful. As many as 73% (11/15) fellows mentioned sharing/discussing their AR work with teachers in different spaces - own school teachers, other teachers (informal spaces, workshops) and MPhil colleagues, since this was a space, they were familiar and well-versed with. Around 26% (4/15) were able to interact with government officials at different levels. These included local supervisors at the provincial level, CEHRD officials, and officials at the ministry. A few fellows had voiced their keenness to engage with officials but stated that they did not know how to approach them.

Collaboration with teachers and/or teacher educators for their professional development

There is cognisance and understanding amongst the fellows that collaboration with peers/colleagues is crucial for improving one's own teaching-learning processes while simultaneously enhancing their professional development. During the baseline interviews, participation in collaborative activities was mentioned by only 60% fellows and these were primarily non-teaching engagements. E.g. collaboration with Curriculum Development Centre (CDC) for developing school curriculum and resource materials, collaboration with other student teachers on projects as part of their masters/MPhil. degree programs. It is important to mention that 33% of those who spoke about collaboration equated it with having discussions with teachers. The fellows were perhaps not completely aware of the different modalities, or hadn't had opportunities to collaborate with others for their professional development.

The shift at end line was interesting to note, where the fellows (8/15) spoke about collaboration primarily in context of their Action Research work; everyone collaborated with the teachers for the same.

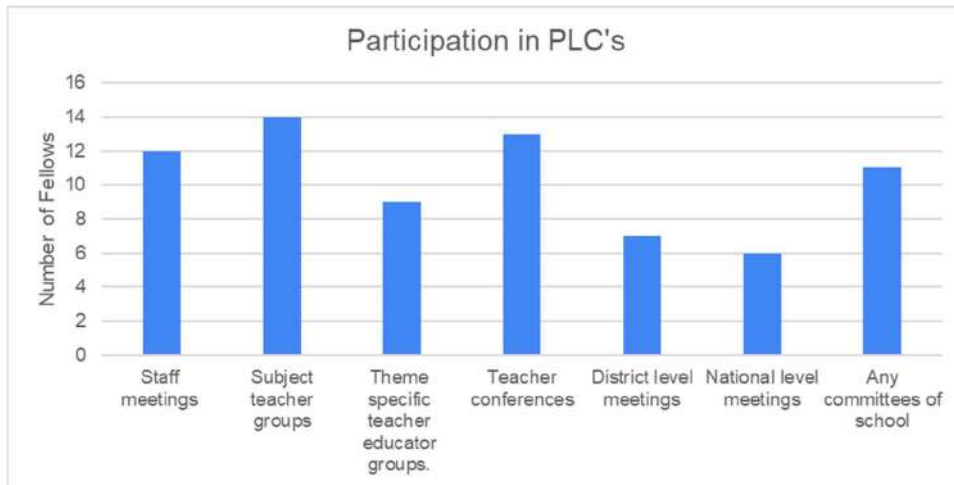
A TPD workshop was conducted by me, during which a collaborative discussion was held to determine the appropriate course of action plans to be developed. Furthermore, the data collection and analysis were conducted and there was a collaborative discussion on the modification of data collection tools and the progression in the second cycle. (NF2, Science Teacher)

We work collaboratively. We talk about classroom issues. And, we also talk about the possible solutions or techniques that teachers have practiced and have worked in the context. And, on the basis of these discussions, they made their own plans. This is how we work both collaboratively and individually, In collaboration, we have discussion and we have sharing of best practices or challenges. (NF5, Assistant Professor at University)

They mentioned collaboration with their participating teachers at different phases in the AR e.g. understanding problems of students and teachers and discussing possible solutions, designing and implementing lesson plans, designing student activities, discussing pedagogical practices, sharing feedback and reflecting on the 1st cycle to make modifications in the 2nd round of implementation. A few also mentioned designing tools collaboratively.

Figure 3.9

Fellows Participation in Professional Learning Communities



As Figure 1 shows, the majority of the fellows (n=14) took part in subject specific teacher groups. Next, an almost equal number of fellows benefited from teacher conferences (n=13) and staff meetings (n=12). Moreover, some of the fellows also engaged in the theme specific teacher educator groups (n=9) and committees established within the school. However, only some fellows attended district level meetings (n=7) and national-level meetings (n=6).

Other forms of collaboration mentioned by a few fellows (4) included:

- Collaboration with Kathmandu University for taking sessions on curriculum and assessment
- Delivering a TPD session on project-based learning for science teachers in collaboration with NGO Karkhana
- Collaboration with teachers eg. designing student activities for dyslexic children (workshop)
- Delivering TPD sessions for science teachers across Bagmati province
- Collaboration with CEHRD, Curriculum Development Centre (CDC), National Examination Board for official purpose

The survey data on “engagement in collaboration activities” consisted of 16 items. The Cronbach alpha for baseline and end line is 0.964 and 0.942 respectively. On comparing the mean, the difference found is significant. The paired t-test value (P) at alpha (0.05) level of significance is 6.79E-09. It indicates a significant difference between baseline and end line mean responses. The changes are positive, in favour of collaboration and engagement (Please refer to Appendix). On further analysis for Cohen’s d, one item that showed large positive change with practical significance was

that the fellows began to collaborate with colleagues to solve teaching problems. However, a moderate level of collaboration was practised in supporting colleagues in their teaching problems, sharing new teaching ideas, sharing classroom teaching-learning experiences, using colleagues' teaching material in lessons, collaborating in writing curriculum, constructing digital teaching material, test and examination materials with colleagues, or for preparing lesson plans, team teaching and experimenting new teaching methods with colleagues. The change is low on the collaboration among fellows to discuss scientific educational theories with colleagues. (Refer to appendix ..).

Increasing participation in chat groups

Suggestions were given by (12/15) fellows on how to increase participation and engagement in groups to facilitate shared learning amongst members. Most of the responses were pedagogical in nature. These included (a) posting questions for discussions, engaging participants in activities, conducting group activities related to teaching learning pedagogical practices, (b) posting context that is relevant and of interest to the participants, (c) sharing resources and (d) sharing photos/videos of classroom practices. The non-pedagogical suggestions included limiting group size and ensuring groups are inclusive.

In Nepal, Facebook messenger is the main online platform used for communication and interaction. The fellows were using the Telegram App for the first time during the MATPD project and thus, were not fully aware of its functionality. During the sessions and our conversations, it became evident that the fellows were more comfortable conversing in their local language compared to English and therefore not much conversation happened in the main telegram groups steered by the core project team. The fellows had created an informal group of their own on another platform where they would have discussions in their vernacular language. Many Nepal fellows were able to conduct the second cycle of action research with the teachers owing to this facility of communication, while Afghanistan and Maldives fellows were not able to do so due to lack of time and school calendar scheduling difficulties. Nepal fellows reported that these groups helped them in engaging teachers in reflective dialogue about the first cycle of implementation of action research and what changes needed to be made for the second implementation. Additionally, the fellows were more comfortable in speaking on these platforms so they participated in a series of reflection sessions with them during the course of the fellowship for them to share their thoughts and opinions on various themes during the face-to-face workshop and subsequently regarding their experiences, challenges and findings from their Action Research study. While the objective of the groups was to engage fellows in cross learning, the discussions were a mix of administrative and pedagogical in nature. More facilitation & proper orientation was required to spearhead discussions that would enable fellows to share and reflect on their practice, learnings and experiences with each other.

3.6 ICT and its usage

The fellows were introduced to ICT through various means such as an online course to integrate ICT in their pedagogy including the theoretical understanding of TPACK. Through interactions with mentors, the fellows were encouraged to use ICT embedded pedagogy. At the end of the fellowship, the fellows were asked about their journey regarding ICT. Below are the major findings.

No prior experience

The end line study revealed that fellows had no prior experience of using ICT and its theoretical understanding for pedagogy. It was only after the covid-19 pandemic, that the fellows started working online and only after the fellowship that they started engaging with the use of ICT for teaching-learning.

There was no tradition of using online resources for example, they were not familiar, if they didn't know that, there are faster resources available even on the internet, in different websites. (NF5, Assistant professor at a university)

Meaningful use of ICT and meaningful ICT are a different thing that I understood after this (Fellowship) So I used to also use during COVID. But, meaningful use of ICT? I once started to do it during a fellowship and what I realized is that so meaningful use of ICT, if you will, through inquiry-based learning pedagogy, right? My opinion is that so instead of just replacing teacher with the digital board or smart boards or PowerPoints, all those things that is not meaningful use of ICT (NF7, Science teacher)

Technology for Professional development of Teacher Educators

three Nepal fellows said that ICT could contribute to the professional development of teacher educators. They mentioned various platforms and social media through which they could engage in meaningful discussions, to exchange ideas and build a community of practice.

And there are many online platforms, such as social media, social groups like Facebook, WhatsApp, Instagram, or Telegram. And different website and different discussion forums. And different, software, different modules for virtual meetings. This can provide us with opportunities to engage in a meaningful discussion and to exchange knowledge, to share ideas with peers and experts. So, this can really help to build that community of practice among teacher educators. So, this is really valuable for teacher educators to support and to grow professionally. (NF7, Science teacher)

Two fellows mentioned that ICT helped them in collaboration. Despite being at different locations, teacher educators and teachers could collaborate to share ideas and exchange practices and share experiences.

Collaboration among teachers, teacher educators from different locations are which could not be possible, or which is not possible, sometimes, physically, so if we get this opportunity, we can share our experiences, ideas, our best practices that will help others to replicate in their own contexts as well. (NF7, Science teacher)

Through the ICT tools, we can communicate, we can collaborate with the teachers, we can share the experience in the common collaborative tool of ICT. (NF6, Govt Official)

Two other fellows (NF1 and NF6) shared that as teacher educators, they learned ICT skills such as presentation skills for facilitation.

ICT can help you to educators on you know presenting themselves to the teachers or in any other platform the skills of presentations the way they are making the slides or the while adding the different, you know, pictures and different kinds of different designing kinds of things in the presentation that is the very important part of the ICT basically Nepal all teachers are lacking in the ICT tools (NF1, School Teacher)

ICT also provided the opportunity to connect with different teachers at flexible timings and sharing resources through different mediums. Hence, time management was another aspect which fellows (NF4 and NF 6) said they were able to do using ICT.

It will help counterbalance the time constraint, the resource constraint for teacher educators, ICT is what has to be used, it is going to be more effective if backed up by just as I told you one face to face one interaction and then everything can move on to ICT. (NF 4, Faculty & ECA Coordinator)

In relation to their research, fellows mentioned that ICT allowed them to stay updated about the research and best practices, and also to learn about the different research tools.

ICT teaches us to stay up to date with the latest research and search for best practices. (NF2, Science teacher)

Technology for Professional Development

For the professional development of teachers, the fellows mentioned that various ICT platforms, resources, websites and software, social media apps were used for various purposes for their own professional development. These included presentations, Google docs, google forms, quizzes, google scholar, smart board and white board. Platforms like Microsoft teams, zoom, google meet to conduct online meeting to share and collaborate.

Apart from these for resources YouTube, Piktochart, gaming tools and PhET simulations were used. Kahoot or story telling apps were not used by the Fellows.

I utilized my usual tools, such as Google Forms, Google Docs, and Google Sheets, during my fellowship. I have also utilized Padlet and quizzes. and I utilized a Piktochart as one of my new tools. I didn't look for such things at first, but later I did, and I looked into them further. I learned how to utilize them and taught my pupils how to do so. Since it wasn't all that difficult to learn how to use them, I didn't find using them to be difficult. I did learn it for myself and taught it to my pupils. However, I believe they know more today than I do. I used Google products like forms, documents, sheets, etc., for my action research. I employed the same Google tools and Padlet while I was teaching instructors. I also used the Google tools and quizzes in the classroom and the Zoom app's whiteboard to present my ideas. (NF13, Science Teacher)

I generally use google meet, zoom, PowerPoint, etc. From this session, I have started using Smartboard. Using these tools, I've discovered that the classroom has been more effective than before. We used gaming tools when we had enough time which was new for me. During my fellowship, I saw one of the teachers using PhET simulation and tried to learn how to use it so it was also new for me. (NF11, Science/Maths Teacher)

Specific purpose mentioned by the fellows for which they used ICT were: reflections (for taking notes), pre intervention, to gather information on the related topics on which fellows were given workshops, sharing resources and links of app, searching relevant tools and resources, using platforms to conduct meeting to share and collaborate, to make videos and develop OER. With the introduction of CLIX OER during fellowship, two of the fellows said they stopped using pictures and used only creative common license pictures.

I used PowerPoint slides without knowing that it has the plagiarism effect. So, after these sessions, I knew we could not randomly use all the pictures from the internet and to use it for our own purpose. So, we should have a Creative Common Licence for that and how to source that. (NF 8, MPhil Scholar)

The major challenge which fellows faced was connectivity & internet issues and power cut in the classroom.

In the context of Nepal, power cuts are the major problem. We were disturbed while teaching the students through the projector. Also, we faced many internet problems. (NF 11, Science teacher)

Technology for Training

Fellows used online resources for training teachers such as YouTube videos and video editing software such as CAPCUT. Fellows used different messengers and apps, google search engines, google forms, Pikto chart. For conducting training of teachers they used platforms such Microsoft, zoom, google meet.

The major challenges faced by the fellows with the teachers were that-

- 1) Teachers did not have any prior experience using technology
- 2) Internet issues and
- 3) Language barriers as some of the teachers did not understand the English language and fellows had to translate in Nepali to make teachers understand the concept or the context.

Technology used for classroom Teaching Learning

For their classroom teaching fellows used PowerPoint slides, google slides and google forms for quizzes, Jam board, to summarize the points, google doc. Phet Simulation, GeoGebra and Desmos were the other tools used by fellows in their classrooms. Fellows used mobile, laptop and projectors and digital resources from YouTube.

After the fellowship fellows could differentiate between OER and Digital resources. Google form for feedback for a reflection after the class. Platforms like Zoom were used for communication. CAPCUT and PPT were used to develop voice recorded PowerPoints.

Application of Technological Pedagogical and Content Knowledge (TPACK)

It was found that only 4 fellows out of 15 were able to apply TPACK in their class. Three out of four fellows (NF15, NF14 and NF9) used Phet Simulation to teach science concepts and explained how they were able to combine technology, content and pedagogy. One more fellow NF8 used excel to calculate and represent data collected by students through the features of excel such as pie charts and comparative tables.

...while teaching the chemical reaction... we need to teach them the balance balancing of the chemical reaction. ...in conventional way you know we generally what we used to do that we used to write chemical reaction and we used to you know ask them for count the number of you know atoms, number of atoms in the left hand side and number of atoms inside and now try to make them equal right... if I use the PhET that is one of the technology now, from that technology is student able to visualize like a student able to see actually the atoms like in the form of balls right now, what they are doing instead of you know abstract way now, they are able to you know, see the nitrogen for example, there are the sun the nitrogen is seen in the form of ball of red coloured balls, oxygen is seen in the form of black colour ball like that, now, able they able to count that and I think that in comparison to the, you know, conventional in an abstract way counting now, they're able to count that in a in a very visualised manner. So, I think that this much technological you know, model actually helps to visualise the idea, yeah, that could be useful (NF9, Science teacher)

Phet simulations I have used all that kinetic energy temperature not seen them? Yeah. Yeah. For that, how the temperature changes temperature changes the molecular kinetic energy of a body in substances. For that purpose, I have used one Phet simulation, and (not clear) for particles or substances particles or molecules increases and increasing temperatures, and suddenly it expands and sorry it explodes. So that is very helpful. And that is very conceptual thing to use....(NF 15, Science teacher)

9 fellows showed no understanding of TPACK. Out 9, 5 fellows said they talked about video recorded presentations, which they used in their classroom or for the training purposes. 3 of them also talked about the challenges they faced - not fit for their local context and students will misuse the technology or wander off from the real task. 2 Fellows also said they understand it theoretically and not have understood or developed understanding of TPACK.

using and exploring ICT in their practice in the future.

Fellows mentioned that in future they would use ICT in their practice for developing resources such as flyers, videos, simulations and digital resources, as well as for conducting meetings with teachers in blended mode.

Fellows also said that they would like to explore and learn about further ICT tools such as OER with which fellows (mentioned as one of the challenges as well), develop their own videos and slides, pair simulations, open YouTube channel, Google classroom, Facebook, online platforms such zoom, WhatsApp.

To Summarize there is a shift from the 'no understanding or prior experience of use technology in the classroom' at baseline, to meaningful use of technology at end line. a few fellows did show some shift by using PhET simulations, Piktochart, Cap cut for making learning meaningful through ICT. Most of the fellows mostly used PowerPoint, Apps like Facebook, telegram to communicate, share and collaborate. For conducting meetings, they recognized the importance of ICT because of ease of time and access of distant participants.

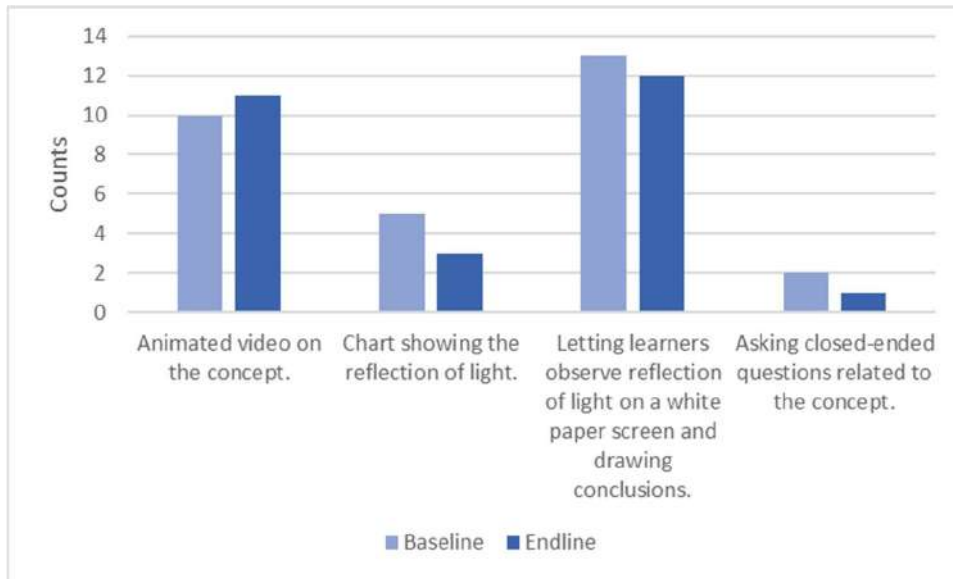
In terms of recognizing importance of ICT, statistical analysis also showed a shift in the beliefs($d=0.44$) of integrating technology in teaching, with more fellows believing ICT use would improve classroom instruction and practice at end line. Qualitative data analysis finding that teachers were able to do better time management with availability of ICT, was supported by statistical analysis. It was perceived that availability of ICT resources increased their productivity and professional effectiveness.

Evaluating Effectiveness: Perspectives on the Impact of Technology in Education

There was a noteworthy shift in perspectives regarding the effectiveness of animated videos. While the baseline study highlighted getting learners to observe reflection of light on a white paper screen, and drawing conclusions as a meaningful strategy ($n=13$), the end line survey revealed that not all fellows considered it useful ($n=12$). This shift suggests a nuanced evolution in the perception of the effectiveness of letting learners observe reflection of light on a white paper screen and drawing conclusions for teaching the concept of reflection of light over the course of the study. For more detailed insights, (please refer to the figure ...) [Not sure what this example has to do with ICT use.]

Figure 3.10

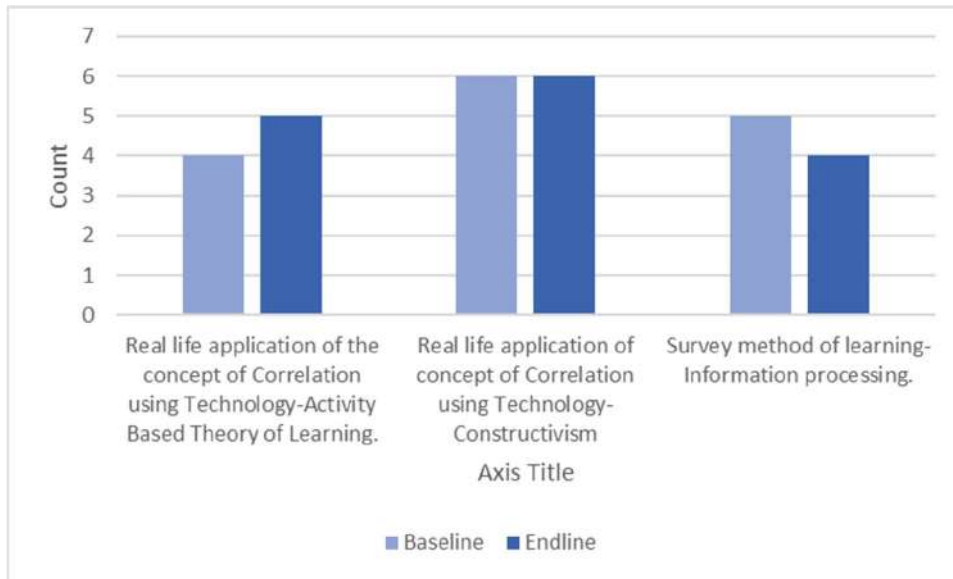
Strategy that can Provide a Meaningful Explanation of Concept of Reflection



The baseline and endline study results indicate no significant difference under the question that tests fellows' knowledge of teaching method and learning theory. The fellows (n=15) consistently highlight the utility of real-life examples and applications in teaching the concept of correlation, emphasizing the role of technology-based activity theory of learning. The integration of technology is seen as aligned with constructivism, leveraging real-life experiences and examples in the teaching and learning process. Furthermore, the respondents recognize the survey method as an effective approach for learning information processing. This consistency in perspectives underscores a shared belief in the efficacy of these teaching methods and learning theories throughout the duration of the study. (refer to appendix)

Figure 3.11

Teaching Method and Learning Theory

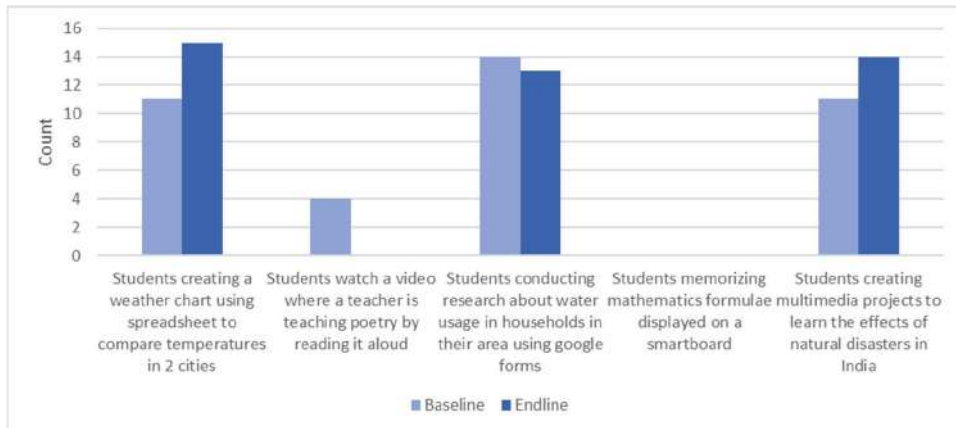


Meaningful Integration of ICT in Teaching and Learning

The respondents consistently highlighted several meaningful ways of using ICT in teaching and learning. Creating a weather chart using a spreadsheet to compare temperatures in two cities, conducting research on water usage in households using Google Forms, and having students create multimedia presentations or projects to learn about the effects of natural disasters in India were all listed as impactful methods. It is noteworthy that there is a significant difference between the survey results of the baseline and end line data. This suggests a sustained agreement among respondents regarding the identified meaningful uses of ICT in the context of teaching and learning. (Figure 3.12)

Figure 3.12

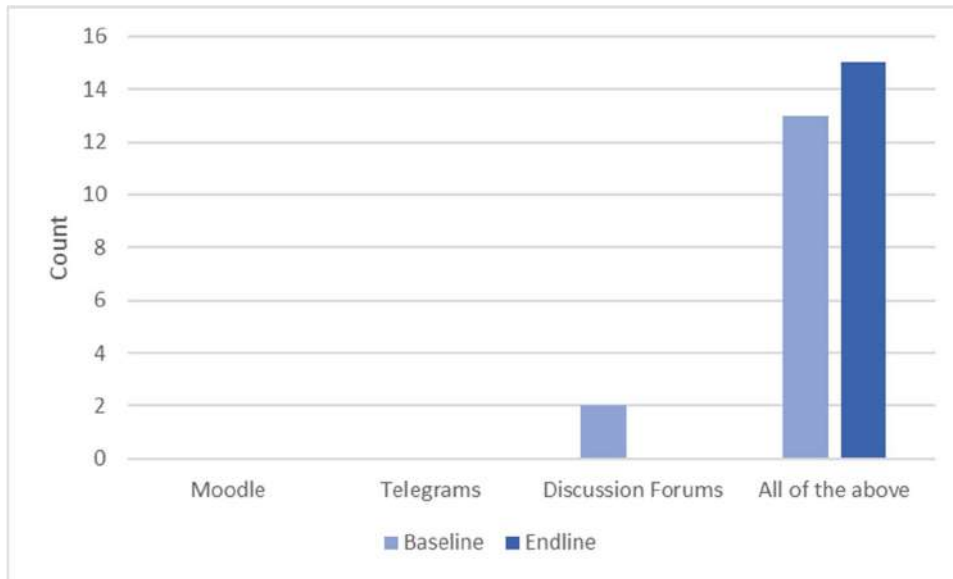
Meaningful Use of ICT



In the context of online learning, all the asynchronous communication tools identified, such as Moodle, Telegram, and discussion forums, were considered useful by the fellows. Additionally, applications like Zoom, Microsoft Teams, and WebEx were recognized as examples that cater to both synchronous and asynchronous learning methods. This comprehensive acknowledgment of the utility of various tools underscores the adaptability and versatility of the mentioned communication and collaboration platforms in the online learning environment.

Figure 3.13

Examples of Asynchronous Communication Tools



3.7 Gender Equity and Social Inclusion (GESI)

This section focuses on understanding the GESI context in the country. It also aims to understand the fellows’ conceptualization of “inclusion” and how they attempted to make their Action Research study inclusive for learners in the classroom.

The education system in Nepal does not come across as very inclusive with respect to integrating students with disabilities, on account of fewer specialized schools, inadequate infrastructural facilities, and lack of teacher training in pedagogical practices needed to teach students with special needs.

The baseline survey focused on understanding fellows’ beliefs about inclusive educational practices in their context. A majority of fellows believed that gender, class, and socio-economic backgrounds may affect equitable access of students to learning in the classroom. A majority of fellows considered weak economic background also an issue with inclusivity, with only 40% opining that students from economically weaker backgrounds were given fair & equal treatment, and close to 50% believing that students with disability & those from marginalized sections were provided adequate time and given extra attention. The baseline survey findings indicated a gap between policy and practice. While policies emphasize pedagogical strategies and practices and need for resources to support inclusiveness of diverse learners, the on-ground field reality suggested otherwise. The table below is a representation of the baseline survey responses of fellows’ beliefs about inclusive educational practices in their context.

Table 3.2**Fellows' Beliefs about Inclusive Educational Practices**

<i>Percentage</i>		<i>Beliefs</i>
1	60%	There are rarely any schools for students with disabilities
2	66.7	The teachers were rarely provided training on methods and pedagogy to teach students with disabilities
3	66.7	Parents are sometimes interested in educating children with disabilities while teachers are sometimes keen to help children with disabilities
4	53.3	Their schools rarely allow students with disabilities to study with other students or rarely have any special educators for students with disability
5	53.3	Students with disabilities and from economically weaker sections may face discrimination; they are also rarely provided adequate time and extra attention
6	60%	Girls are mostly given equitable treatment
7	40%	Students from economically weaker sections are provided equitable treatment
8	46.7%	Report that most of the time , students are treated fairly, irrespective of their gender and backgrounds

The fellows had limited understanding of the concept of inclusion when they joined the fellowship and were unable to think of it from multiple lenses. For e.g. the concept of learning disability was new for them. During the course of the fellowship, they were oriented to the concept through sessions on inclusion and pedagogical practices for making classrooms inclusive for diverse learners e.g. universal design for learning (UDL), differentiated instruction which enabled them to

understand the different strategies and approaches they could adopt in their practice. During the end line conversations with the fellows, they described how they had developed an understanding of inclusion, the kind of diverse and inclusive practices they have observed, and how aspects of inclusion had been integrated into their Action Research work.

Understanding Inclusion

Close to half of the fellows (8/15) spoke about inclusion viz a viz the educational context iterating equal access and opportunities for all students (e.g. access to resources like textbooks, teaching-learning materials etc.) in the classroom and their individual needs being addressed.

A few (5/15) mentioned inclusion in generic terms such as including everyone and treating them equally. Two fellows spoke about inclusion with respect to social justice and providing equal opportunities for participation to all. Fellows spoke about inclusion and diversity through the lenses presented in the below table, most common being gender and caste.

The below table enlists the different diversities that the fellows have seen in their teaching practice as a teacher/observer.

Table 3.3

Diversities in Teaching Practice

No of fellows	Lens	No of fellows	Lens
9	Gender	2	Resources
7	Caste	2	Language
6	Ethnicity	2	Culture
3	Disability (P-3, L-2, M-1)	2	Ability
3	Socio-economic status	1	Literacy
3	Religion	1	Digital Literacy
3	Geography	1	Race

Diversity and inclusion in teaching practice

The fellows primarily listed the different kinds of diversity that they had seen in their classroom experiences, either as a teacher or as an observer. These included gender, caste, socio-economic status, language, cultural, resources, digital literacy, religion, disparity between private and government schools. Six fellows mentioned that they had not seen physical disability in their teaching experience, with a few stating that teachers and parents do not focus upon them. Two fellows during the conversation mentioned that they hadn't seen much diversity in the capital city Kathmandu.

So, we generally used to face the, the challenge of this we can say the cultural kind of thing, if some teacher who is living and studying in our 'terai' region, and for example, if he goes to the teaching in the hilly region. So, if he goes to the hilly part of the region for the teaching, he did not know about the different contexts, what are the common kinds of things, what is the language, what are the various festivals, what are the various you know, various cultures activities, he did not know the all the kind of thing, so, he will not able to make the rapport with the students because he's not so much in touch with that culture right. So, sometimes it may also affect some the learning because learning will be effective, if the teacher will able to bring out the real world experience real world example, if the teachers and the students are from the hilly regions, if the teachers are able to explore the examples of the hilly region then a student can, really visualize that scenario, but if the teacher is from some different culture some different region , so, he may not able to, bring out those experiences so, that may affect, learning in my opinion (NF9, Science Teacher)

Responses did not include fellows talking about aspects of diversity/inclusion/exclusion within the teaching-learning context. It was primarily enlisting the different kinds of diversities that exist within the school system.

Challenges in addressing diversity

Fellows (66%) articulated some of the challenges they believe are critical in addressing issues of diversity. These included: lack of resources e.g. funds, lack of teachers who cognisant of existing student background/diversity and adequately trained in addressing the same, infrastructural issues. One fellow also mentioned social taboos and weak law enforcement/policy implementation.

So, we usually use Nepali and English language as a medium in our school, but there are the students who are from other communities who feel difficulty in writing in Nepali speaking and speaking in English and writing speakers is very far, but even an event is difficult for them. And even though they have conceptual understanding, they are not able to write their answers properly in their exam paper in their homework copies. And they're not, you know, fluent in speaking Nepali and they can't answer the things that teacher has asked them. So, these are some of the challenges and teachers are teachers, teachers are just blaming the students that they are not learning. Well, actually, the problem is the language problem, and because of that low economic background, they do not have enough self-confidence to talk with teachers. So, teachers are not so empathetic regarding this, I think that was one of the challenges, because they are not aware of that. So proper training and workshops are not given to them in this regard. (NF12, School Principal and Science Teacher)

Inclusion in Action Research

(a) Teacher Selection:

Some of the fellows had a criterion for selecting their participating teachers while for others it was based on convenience. Only three fellows stated they consciously attempted to work with a mix of both male and female teachers in their sample. The remaining did not consider inclusion or diversifying their sample with mixed genders, social groups, minority, disability, or other aspects of class/caste. It is likely they were unaware of how an inclusive sample of teachers could enable unfolding of multiple perspectives and lateral thinking. Other criteria that a some of them

considered while selecting teachers were: background in math education, 2 years of teaching experience in health education, teachers from all 3 branches of science: physics, biology and chemistry, teachers with a basic knowledge of computers.

- (b) Male and Female Teachers: **The below table highlights gender inclusivity viz a viz teacher selection.** One of the key reasons for not being able to maintain a balanced ratio of both genders is the shortage of female teachers at the secondary level for subjects like math and science.

Table 3.4

Gender Inclusivity viz a viz Teacher Selection

Number of fellows that worked with all female teachers	Number of fellows that worked with all male teachers	Number of fellows that worked with a combination of male and female teachers	
		Balanced	Imbalance
1 (ECCE) : at this level, the teachers are only female based on govt policy guidelines	6	3	2-more female teachers compared to male 1: fewer male teachers in the country 1: no reasons stated
	3: very few female teachers at the secondary level 2: no reasons stated 1: own comfort level		3-more male teachers compared to female 1: scarcity of female math teachers at secondary level 2: no reasons stated

(c) Inclusion in fellows' AR intervention

The fellows adopted different measures to make the AR intervention inclusive.

Some of the examples cited by them were:

- Ensuring engagement and participation of students: e.g. giving all students the opportunity to share their views on the material that they had developed; the teacher was instructed not to move onto the next activity until all students were engaged in the activity, getting the low performing students to participate in the skit activity

- Grouping of students: e.g. encouraging high performing students to help/support weak students, creating heterogeneous groups of girls & boys, creating heterogeneous groups of mixed ability students

In first cycle I suggested them to prepare the heterogeneous group, not thinking that the heterogeneous group, the low, the high performer students will support to the low performers students and learn from each other. (NF6, Govt Official)

- Others: using pictures/visual descriptions like YouTube videos for students who have low concentration levels, students were called before start of classes and post classes to access computer labs to get hands on experience of PhET simulation, conversion of English resources into local language for students who were not fluent & conversant in English, training session for students on GeoGebra -how to install and use it to make visual animations.

The low performing students were active and participated in the skit activity got the opportunity to show their talent. Art based pedagogy ensured inclusiveness of all students. Found the low performing students more creative than high performing students who are always into books. (NF12, School Principal and Science Teacher)

The fellows had not implemented inclusive strategies in their own teaching practice. Many fellows mentioned during the fellowship that “inclusion” was a new theme and that they had previously been unaware of the various approaches that could be used by teachers. While an inclusion policy exists in Nepal’s education system, the implementation is weak. Perhaps due to lack of adequate training on the theme, fellows were not been able to think of inclusion beyond creation of groups within their Action Research study.

3.8 Professional Development Experiences

The MATPD Experience

The professional development experiences within the fellowship were new and different for the fellows.

The nature of teacher professional development experienced by fellows before the project was different in terms that they had engaged in professional development as short-term interventions. The trainings they had experienced was focused more on theoretical and pedagogical knowledge; on content and not on curriculum, and mostly provided resource material. In the course of the fellowship fellows developed their professional development skills by engaging in activities such as communication, planning and conducting workshops. They learned how to partner with teachers, and how to conduct research. Fellows connected with teachers over an extended period, and they not only delivered theoretical applications but also provided practical support to enable learning

from the teaching experience. Another aspect of TPD that was new was that this kind of TPD was both online and offline and fellows realized that working with teachers and students was different.

the TPD workshops were more about somebody delivering a lecture or giving you some resource materials. It wasn't so practical... where we were exploring things on our own... distance learning was being tested, we were using both the online mode and offline mode. And we had the mentorship also at three stages... at the TISS (was) providing us with the distance overall training in the workshop, whereas our academic mentors and the field mentors were more into a little bit closer, a little bit more specific training. This was different compared to any other things which I had undergone earlier. There were different levels of training. going simultaneously. (NF4, Faculty and ECA Coordinator)

The mode of TPD was also different; before the fellowship it was a short, one-way delivery process and included 2-3 days of workshop and writing report. During the Fellowship, fellows experienced TPD through collaboration and creating professional networks in which they were able to share and exchange ideas. Fellows found this experience supportive, empowering, self-directed, and more appropriate for resolving problems & difficulties.

A teacher educator or someone will come; give a lecture in about a nearly 24 hour, two to three days sorry, three days of TPD programme will be conducted and we have to participate there. And we have to just listen to them. We have to write reports. It's simply like that one way or no more interactions further. It is all about receiving the data or receiving that information, the theoretical information from that teacher or that trainer. (NF 15, Science Teacher)

Another dimension of novelty was the link between theory and practice in the TPD experience in the project, as opposed to their earlier experience where there was no extension of workshops, no practical implementation, and the focus was primarily on only the theoretical aspects. It was based on delivering lectures and providing resource materials. Fellows experienced the culture of continuous learning, active engagement and practical application of acquired knowledge in the classroom. The fellowship provided the Nepal fellows an experience of diverse training sessions and practical implementation of the learnings in the field.

The concept of mentoring was new for the fellows; they said that they knew about mentoring more theoretically through workshops, but during the MATPD project, they got an opportunity to experience mentoring. They worked with a team of an academic mentor and a field mentor, who supported them on technical aspects of action research and contextualization of the intervention. They received pedagogical support, emotional, psychological support and guidance & suggestions whenever required. Enrichment sessions conducted by faculty & MATPD Project Team were also found to be supportive by fellows as they helped them in conducting action research.

And similarly, the enrichment session and weekly enrichment sessions were also different. Generally, what happened, there were TPD sessions certain times, and you were never given extra help, or extra support before. (NF 12, Science Teacher)

We used to have enrichment sessions and whenever I had some difficulties and confusion and that, I used to ask this in the enrichment session or I could request the enrichment session on that topic. (NF 12, Science teacher)

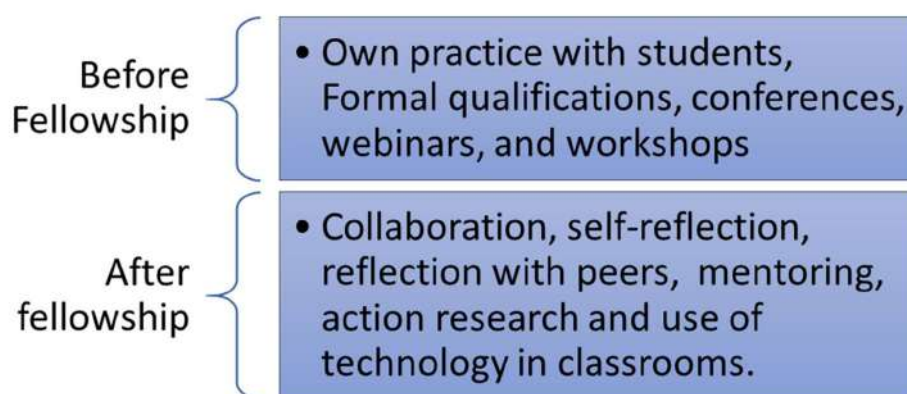
In Nepal, action research is studied as part of teacher training, but the learning is superficial and theoretical, and is limited to documentation only for the purpose of promotion. Through the MATPD, Nepal fellows got an opportunity to engage in practical action research and work as a teacher educator. They got to learn hands-on, through involvement in AR and TPD which was absent from their prior training experience, and was a new and different experience for the fellows.

How teachers learn

Fellows' understanding of how teachers learn changed over the course of the fellowship. Before joining the programme, they understood it as learning from their own practice with students, from formal qualifications, conferences, webinars, and workshops. Through their participation in the fellowship, they became aware of other modalities of learning to improve their teaching practices. These included collaboration with other professionals, self-reflection, reflection with peers, mentoring, action research and use of technology in classrooms.

Figure 3.14

Fellows understanding of how teachers learn



Teaching-learning practices

In addition to fellows gaining better understanding of how teachers learn, a positive shift in their beliefs about teaching-learning practices was also observed. Their beliefs about teaching and learning improved and were strengthened over the course of the fellowship. The survey scale consisted of 16 items. The Cronbach alpha for the baseline and endline is 0.769 and 0.672, respectively. The paired sample, two tailed t-test is 0.008 at 0.005, level of significance. The p value is less than alpha which indicates a significant difference between the baseline and the end line. The most change was seen on parameters: 1. students learn best by finding solutions to problems on their own and 2. everyone can learn irrespective of their gender or status. Moderate change was observed on the following parameters: (a) direct transmission of knowledge is the right approach to teaching, (b) students should be allowed to think of solutions of the problem before teacher shows them how they are solved, (c) instruction should be built around problems and ideas that most students can grasp quickly, (d). instruction should foster collaboration among students, (e). the role of a teacher is to facilitate students' own inquiry and thinking and (f). reasoning processes are more important than specific curriculum content.

Skills and competencies required to be an effective teacher educator

While comparing baseline and end line data, it was found that fellows had learned new skills and competencies. The data is organized into categories of knowledge, skills and capability.

I. Knowledge

During the baseline interview, fellows mentioned different knowledge components that are critical to be an effective teacher educator. For e.g. technological knowledge, pedagogical knowledge and content knowledge. At end line, they were able to go beyond mere listing, and explained what it meant according to them. For example, five fellows mentioned that content knowledge meant sound knowledge of related subjects, being an expert in the subject matter, having content knowledge regarding the field or topic.

Five fellows talked about the need for pedagogical knowledge to be an effective teacher educator and the ability to employ diverse pedagogical approaches. One fellow also mentioned the importance of psychological learning principles to understand how children learn.

Furthermore, it is imperative to cultivate a comprehensive understanding of which learning principles are best suited for specific types of children. It is imperative to comprehend the psychological makeup of children, which encompasses a range of distinct needs, in order to impart knowledge tailored to their individual requirements effectively. (NF2, Science Teacher)

I would like to say sufficient content knowledge regarding the field or the topic in which he is giving teacher education. (NF1, School teacher)

respective subject matter and possess a deep understanding of the teaching and learning process. (NF2, Science Teacher)

Pedagogical skills, all the necessary like tools, there are various tools, good research, skills, and pedagogical skills. (NF9, Science Teacher)

II. Skills

In the baseline study, fellows identified the following skills as essential for teacher educators: Teacher educators should have Interpersonal skills, Communication, Networking, Collaboration, Research, Writing, Planning, Organization, Time Management, Leadership, Facilitation, critical reflection, problem solving, critical thinking skills, a growth Mindset and open mindedness.

At the end of the fellowship six fellows added the new skill of mentoring to the list, as a requirement to be an effective teacher educator-

- Mentoring Skills- Six Fellows said Mentoring is an important skill required for a teacher educator. They also further elaborated on what kind of mentor/mentorship should be there. A good mentor needs to be democratic, unbiased, motivate teachers to agree to learn new skills and knowledge, guide teachers, and can facilitate learning as required.

So, the effective teacher educators should be, who can mentor who can guide the teachers, and similarly, we can facilitate, whenever they require. (NF 9, Science teacher)

Other new skills that found mention in the end line interviews were ICT Skills, and collaboration skills for sharing ideas, knowledge, skills thoughts among teachers, and listening skills. Creating Space for teachers' perceptions and existing practices was also considered important.

Other common skills which were mentioned by fellows in both baseline and end line were reflection- for updating practices periodically, Leadership skills, Research skills, Observation skills and Time Management skills.

III. Capability

At baseline, the fellows mentioned that the teacher educators should be capable of providing constructive feedback, be flexible and be able to deal with a diverse range of personalities of teachers and students. Five fellows spoke about the importance of flexibility and adaptability. In the baseline, while only the term “flexibility” was mentioned, at the end of the fellowship they elaborated on the meaning of flexibility as giving space to the teacher, being able to cater to diverse teachers, reflection in action while facilitating, drawing insights from sharing of teachers, being adaptable to different situations and having to be fast learners themselves.

Also adaptable for all situations ... and for doing these things, the teacher educator has to be a fast learner, (to be able to) react to any situation of the teacher faced by them. (NF 1, School teacher)

Four fellows mentioned the capability of the teacher educator to understand the circumstances and environment of teachers on the basis of the school settings, the resources & apply strategies, collaboration and plans that actually work for the teachers understand the context of teacher, knowledge of teaching culture, student & teaching culture (Bring out innovative idea & Context specific pedagogies, bring out change as per needs of students, student-centered teaching and inclusiveness).

The fellows also mentioned giving timely constructive feedback and responding to the problems of teachers through social media platforms as another capability of teacher educators.

A comparison of baseline and end line data revealed that by the endline fellows had discovered additional skills needed for teacher educators including mentoring, reflection, extended understanding of flexibility & adaptability, constructive feedback, as well as understanding circumstances and environment of teachers, and responding to the problems of teachers.

Challenges during the fellowship

While there were learnings and enriching experiences, the fellows faced some challenges as well. The following challenges were identified with regard to (a) teachers and (b) the fellowship itself.

I. Challenges with teachers: The fellows spoke about some of the challenges or adjustments that they had to make while working with teachers for their action research. Some of these included implementations of the action plan and synchronizing with the routine practices of teachers, convincing teachers to implement the second cycle i.e. peer observations and peer support.

Eight fellows said that time management was a challenge, given the busy schedule of teachers, and demands of the job. Organising a common time when all participating teachers could participate in TPD sessions. In addition, personal issues of teachers also posed challenges to implementing the AR action plans. Fellows also faced challenges in helping teachers to adopt and apply new learning and

changes in the teaching and learning culture and pedagogy. Practice of collaboration and mentoring were new for teachers and took time to be accepted.

Another practical challenge was to secure permission from school administrators to undertake AR, especially since no monetary incentive was offered for participation. Usually, it is common to expect such extraneous projects to offer some monetary compensation. This made convincing principals and teachers even more challenging., Choosing the topics for action research was also a challenge at the outset. Lack of coordination between teachers and fellows was also a problem.

II. Challenges related to the Fellowship: At the fellowship level, the challenges were mainly related to the action research activity which included making the academic mentor (AM) understand the context of Nepal or being able to connect regularly with academic and field mentor (FM).

A few also mentioned that prescribed frameworks for proposal plan and report writing limited flexibility.

Fellows Identification as a Teacher Educator

Most of the fellows were able to Identify themselves as teacher educators, as they had developed TPD skills by the end of the fellowship.

Yes, I learned many ideas, especially collaborative learning and engaging students in their learning tasks and also to carry out the action (research) this is to solve the classroom problems. So, these are the ideas that will strengthen my expertise in this field. (NF 2, science teacher)

Yes, I identify myself as a teacher educator, because throughout this whole fellowship programme. I have conducted two workshops for the teachers wherein I have worked hard, because when we conduct workshops for the teachers, we need to do lots of preparations and strategies, and deliver contents during the workshop. So, not only during the workshop, I would like to say that throughout the whole project, of doing action research, I have been with the teachers in various stages, like initially, I sat with them to identify the problems and challenges they were having. Then later on, I conducted a workshop to support the teachers to overcome the challenges and issues in their classroom. And then I went to observe and make sure that the things they have learned in the classrooms were actually implemented and I also collected the reflections of the same. So, I think these all things are the activities and things that are teacher educator needs to know- what a teacher's problem or issues are and how to address them. (NF3, Pre-School Principal)

Fellows practically experienced functioning as a teacher educator through mentoring teachers and working collaboratively with them. They observed the classroom teaching, supported teachers to overcome challenges and issues in their lessons, conducted formal TPD workshops, updated and empowered teachers with new technological and pedagogical tools, and demonstrated effective learning and teaching strategies in the classroom.

Connections between different components of the MATPD project

This section discusses the understanding of fellows about the connection between the different components (AR, Mentoring, ICT, Collaboration) of the MATPD project. Fellows described the use of ICT for communication, for finding learning resources, and platforms for sharing. Action research was associated with learning concepts related to teaching and learning in an in-depth manner. They understood collaboration to mean developing a learning community, professional networks for sharing ideas and reflections. Meaning of Mentoring came up as guidance, communicating with teachers, listening to teachers, resolving challenges of teachers together. One fellow associated the reflective process with collaboration.

When fellows talked about connections between the different components, some of them talked about connections between four components and some of them between three components while some of them between two components only.

These all aspects are well connected, ma'am in my context, why because mentoring and then after the action research and constructive use of that ICT and design collaborative TPD opportunities. We have gone through a certain development, in those online courses, also we are assigned to make a certain plan and certain thoughts concerning these all the same thing, the same thing. While conducting the action research, we have implemented that plan. While mentoring teachers, we were assigned to write about the teachers as the mentor and mentee. And the same thing I have applied ... we have understood about how to conduct action research how to write these starting from the problem identification and then after the action plan and then after the cycle one implementation cycle two implementations and workshop; connect respective data and data collection data generating these all are important. Then the constructive use of ICT and using that ICT, as my resource also in that blended form some parts I have conducted in the online and some parts I have conducted physically, so that one ICT (course) is used. So, I have used ICT tools to store the data to collect the data and then after that, analyse the data. (NF 15, Science Teacher)

The connections that emerged are given below in tabular form.

Table 3.5

Number and type of components emerged in TPD Connections

sS S.No	Types of Connections	No of components	No of fellows
1	Mentoring - AR- ICT- Collaboration ICT- Mentoring- collaboration- AR Coll- reflection- mentoring- Professional networking	4	3
2	Mentoring- AR- ICT Seminar- Mentorship -ICT ICT- AR- Collaboration Mentoring- AR- Collaboration AR- Mentoring- ICT AR- Mentoring- ICT ICT- Mentorship- AR Mentorship- Webinars - AR ICT- Mentoring- AR	3	9
3	AR- Mentoring ICT course- Action Research AR- Collaboration	2	3

The above table shows that three fellows identified the connection between two

components, and nine fellows could establish links between three components. Only four fellows talked about the connections between four components.

Another observation about connections was that inclusion was not mentioned by any of the fellows. Training courses were mentioned by only 1 or 2 fellows. AR, ICT and mentoring came up more frequently and prominently.

Blended approach of TPD in their country context

More than half of the fellows (9) agreed that the blended approach for teacher professional development could be fruitful in their country's context, but they also mentioned some of the barriers because of which implementing the blended approach could be challenging. Applying the blended approach can minimize the barriers to connecting with teachers located at distant places, or teachers who cannot be physically present, thus addressing geographic barriers and helping teachers with time management.

The blended approach was also considered flexible and convenient for conducting meetings, webinar etc with the teachers located at different places.

Fellows raised some concerns about its applicability to the context of Nepal. They were:

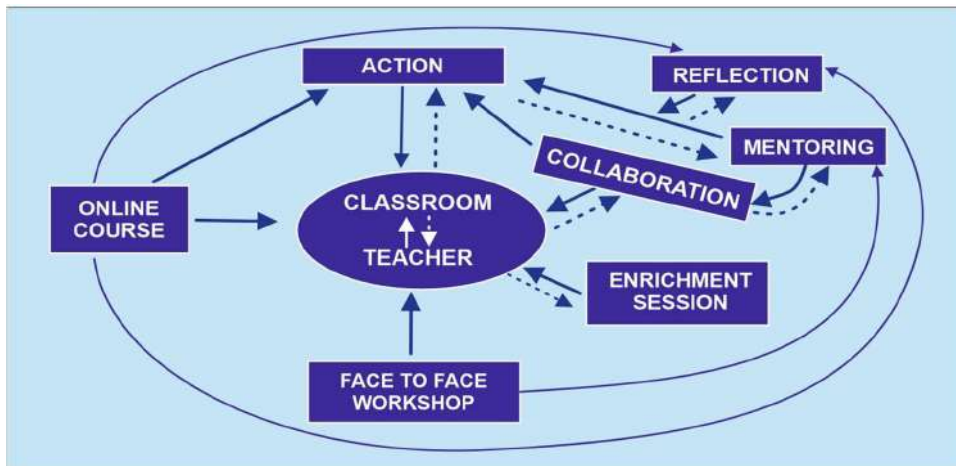
- 1 Lack of access to devices like mobile, laptops etc.
- 2 Internet and connectivity Issues
- 3 Teachers were not regular in the online sessions.
- 4 Participation in discussions in online mode was also limited

To summarize the discussion on TPD, the fellowship was impactful in terms of changing understanding of fellows about the nature of TPD which transitioned from the earlier understanding of short-term training courses about theory, to practice based and curriculum based immersive training. Fellows also understood how teachers learn through practical experiences, action research, mentoring and reflection. They identified connections between various components of fellowship such as AR, ICT and Mentoring was frequently and prominently mentioned by the fellows as a valuable practice in TPD. Fellows developed skill and competencies required to be and started identifying themselves as teacher educators. Other new skills fellows learned were mentoring, reflection, flexibility, constructive feedback, and adaptability, understanding the circumstances and environment of teachers and responding to the problems of teachers. Most fellows agreed that a blended approach (for distance learning) was applicable in Nepal's context, but they also raised concerns about unavailability of required gadgets (mobile laptops etc), Internet and connectivity Issues, as well as the problem of teachers not being regular in online sessions, and the difficulty in

optimising participation in discussions in online mode. The uniqueness of the MATPD project and the TPD model it executed, was the interconnectedness of various components and processes, which ensured its potential for lasting impact. The AR could bring positive change in the classroom practice, and in teachers' beliefs about pedagogy and how children learn. Kennedy (2002) calls it a transformative model of CPD involving the combination of a number of processes and conditions. He argues that it cannot be defined in a particular way; it recognizes the range of different conditions as in the case of Nepal practice- policy gaps, steering a model of CPD instead of taking a pre-defined one model of AR or mentoring etc.

Figure 3.15

Transformative model of TPD



Section IV Summary of the Findings and Discussion

a) Role within the MATPD project

The fellows had a better understanding of their role post the completion of the fellowship, and they were able to perceive their role as multi-dimensional with respect to supporting teachers' professional development while collaborating with them for action research. It is noteworthy to mention, that as a result of the fellowship, they were able to identify as teacher educators who had contributed to the professional development of teachers. Some were able to articulate the need and significance of teacher educators' professional development through collaborative work and the role of mentors in developing teacher educators' research competence.

b) Action Research

Action research is already institutionalized in Nepal. However, Nepal SATE Fellows reported significant gains in their understanding about action research, the process of action research and developing skills of research and communication to support the collaborative action research process. Phayak, Negi and Acharya (2024) analysed the action research of 88 teachers and found that though teachers considered the action research useful, their reports were lacking in evidence of impact on pedagogical action in the classroom. The teachers also required mentoring for conducting and writing action research. This study is consistent with the findings on this study as fellows communicated that they needed the most help in tool construction, data analysis, and writing the report. Presence of academic and field mentors as well as support through professional learning communities greatly supported the fellows.

The fellows engaged in different themes but the common learning was observed in adaptability and flexibility that is needed to identify problems and to devise contextualized solutions in collaboration with teachers. They developed the identity of a teacher educator through designing and implementing TPD for teachers in the course of the action research, though at the outset they had not identified as teacher educators. Fellows gained in-depth understanding of the theme and topic of their focus in action research through reading research and engaging in research with teachers. They appreciated the usefulness of action research in professional development of both teachers and teacher educators, and the important role it plays in developing agency and autonomy to find solutions for problems a teacher is facing in the field. Dhungana, Luitel, Gjötterud, and Wagle (2021) reflection on participatory action research in community schools indicates that cross professional collaboration enhanced the professional agency to integrate curriculum and professional development programs. This study also illustrates cross professional collaboration among educational stakeholders at different levels with a group of teachers. In this study these

collaborations also contributed to development of professional identity of teacher educators. Identity is formed as a result of interactions with others while performing particular roles and gradual internalization and acceptance by oneself as well as within that particular professional community (Wenger, 1998). There is dearth of research that talks about the development of diverse educational stakeholders as teacher educators apart from the teacher educators aligned to a university. This study provides evidence of how principals, experienced teachers, and professionals in NGO can also play the role of teacher educator effectively through leading collaborative action research. Some of the factors identified by Tan, Van der Molen and Schimdt (2017) for developing professional identity like knowledge of professional practices, professional as a role model, experience of profession and preference of self-efficacy for the profession were visible among many fellows for becoming a teacher educator. They exhibited knowledge of content, teaching practices and resources, as well as of designing teacher professional development activities needed by a teacher educator. They had academic and field mentors as role models and they got authentic experience during the action research, through which they exhibited self-efficacy as teacher educators.

Important learning outcomes were also reported for teachers who collaborated in the action research, and the students in these teachers' classrooms also benefited by developing better comprehension, opportunities of expression and use of various hands-on and digital resources to enhance their understanding. The two cycles of the action research implemented were significant in contributing to these outcomes along with the various modes used by SATE fellows to connect and interact with teachers despite the challenges of time and resource constraints faced by teachers. Principals' support and positive beliefs about usefulness of Action research among teachers were reported as key factors that played a role in successful implementation and sustainability of action research in future. These findings align with findings of a study by Wagle, Luitel and Krogh (2017) wherein teachers' autonomy and agency to address diverse pedagogical contexts is enhanced through participatory approaches.

c) Mentoring

The concept of mentoring is new in Nepal and is not formally institutionalized within the system. The fellowship experience of mentoring, both as a mentee and a mentor enabled the fellows to develop a nuanced understanding of the concept, & differentiate between mentoring & monitoring; build and strengthen skills and qualities to be an effective mentor and work collaboratively with teachers to facilitate their professional development.

The mentoring process adopted within the MATPD project helped the fellows to carry out their action research effectively. They received support and guidance on technical aspects and contextualization from their academic and field mentors. They received pedagogical inputs as well as inputs on the teaching-learning resources, developing research questions, tools for data

collection, report writing, and contextualization of innovation in the teachers' classroom. Hudson (2013) emphasizes the dialogic interaction between mentor and mentee in building the skills of the mentee and maintaining motivation due to mutually shared interest in the tasks. Open communication and accessibility are the key for effective mentoring (Eller, Lev and Feurer, 2014). Moreover, Mclaughlin (2010) describes how mentee can benefit from the experience of the mentor through interactions.

Fellows found the approach of co-mentoring useful, as they could reach out to one mentor if the other was unavailable. The blended approach of online and in person mentoring helped address barriers of time and geography. The fellows mentioned that this model of mentoring would be useful in their context, as the support post training is weak in practice.

Venkataraman (2023) has highlighted how mentoring relationships can contribute towards professional identity formation. In MATPD, the fellows used the learnings and insights from their interactions with their mentors and applied them in their practice while mentoring the teachers for action research, and supported them through TPD workshops, reflection sessions, and classroom implementation. This helped in developing their professional identity of a teacher educator.

d) Reflection

Dewey (1938) talked about reflection as a critical part of practice. According to him, reflection is all about responding to situations through practical wisdom based on experience and this differentiates professional practice from a routine. Schon (1983) differentiated between two types of reflection -- reflection-in-action and reflection-on -action. Reflection in action is thinking about the practice or activity while it is unfolding. Reflection on action is thinking about it after the activity is over. Fellows defined the role of reflection as improving ones' practice, identifying their strengths and weaknesses, asking relevant questions and problem solving. Fellows engaged in reflection on action by asking relevant questions and thinking on the action they took during their classroom practice. At end line it was revealed that fellows reflected on their decision-making during fellowship and made changes in their classroom practice. Through the action research and mentoring support, they got opportunities to rethink, & fellows included new activities or overcame the challenges of conducting research. Similar findings emerged in another research conducted in Nepal on the EFL teachers' perceptions about exploratory action research conducted by Shrestha et al (2023). Shrestha et al (2023) also states in her study that action research has the potential to make teachers reflective. In the later stages of action research, the study also revealed that teachers modified their classroom practice as they became more reflective.

In the SATE fellowship fellows got opportunities of reflection through different modes. These included a) writing research reports, b) writing reflection journals, c) mentoring during action research (in conversations and interactions), d) face to face workshops/webinars (specifically

questions asked about the end of webinars). Although in the baseline study most of the reflective experiences reported, were not related to teaching, by endline fellows mostly talked about their teaching experience, and that too self-reflection. Peer reflection was not common practice as reported in the baseline study.

e) Social Learning

The project provided the fellows with opportunities to engage in social learning through the formal telegram groups, course discussion forums and enrichment webinar sessions curated to support them with their Action Research. In Nepal, Facebook messenger is the main online platform used for communication and interaction. The fellows were using the Telegram App for the first time during the MATPD project and thus, were not fully aware of its functionality. During the sessions and our conversations, it became evident that the fellows were more comfortable conversing in their local language compared to English and therefore not much conversation happened in the main telegram groups steered by the core project team. The fellows had created an informal group of their own on another platform where they would have discussions in their vernacular language. Many Nepal fellows were able to conduct the second cycle of action research with the teachers (Afghanistan and Maldives fellows were not able to do so due to lack of time and school calendar scheduling difficulties). Nepal fellows reported that these groups helped them in engaging teachers in reflective dialogue about the first cycle of implementation of action research and about changes needed to be made for the second implementation. Additionally, a series of reflection sessions were also organised with the fellows to allow them to share their thoughts and opinions on various themes during the face-to-face workshop and subsequently regarding their experiences, challenges and findings from their Action Research study. While the objective of the groups was to engage fellows in cross learning, the discussions were more administrative than pedagogical in nature. More facilitation & proper orientation were required to steer discussions that would enable fellows to share and reflect on their practice, learnings and experiences with each other.

The fellows also got an opportunity to collaborate with diverse stakeholders. They collaborated with their participating teachers for the Action Research and for the TPD workshop, classroom implementation and reflection sessions. They also collaborated with other teachers formally and informally to share the learnings from their Action Research experiences and insights. A few also mentioned collaborating with government officials to share their Action Research study work, and there was also some level of collaboration with Kathmandu University and other organizations for carrying out TPD sessions. Prior to the fellowship, collaboration was primarily in the context of non-teaching activities. The fellowship helped them understand how collaboration in various forms can help improve classroom teaching-learning practices.

f) ICT

Scholars in the field of education have raised concerns regarding ICT policy in Nepal and implementation gaps (Baral and Bhruyal, 2010). It was found in the landscape mapping study (2022) that there was low ICT knowledge and skills. Similar findings came in the end line study where fellows agreed that they had low and no knowledge of ICT skills. In the BASK study it was found that there was a little shift from the 'no understanding or prior experience of use technology into classroom' to 'meaningful use of technology'. Few fellows did show some shift by using PhET simulations, Piktochart, cap cut for making learning meaningful through ICT. Most of the fellows majorly used PowerPoint, Apps like Facebook, telegram to communicate, share and collaborate. Social media as a platform is used by the teacher to collaborate and it can be an effective approach for TPD (Henessay et al. 2022). Henessay et.al (2022) has done an extensive review of research on the use of technology in low- and middle-income countries and found that the effectiveness of such TPD models depends upon specific individual factors. In the context of Nepal teachers, one can deduce that the low digital literacy skills before MATPD could be responsible for little shift even after the engagement and education provided during MATPD.

Another finding is that for conducting meetings they did recognize the importance of ICT because of ease of time, and access of distant participants. In terms of recognizing importance statistical analysis also shows a shift in the beliefs of integrating technology in teaching with more fellows agreeing it would improve classroom instruction and practice. Qualitative data analysis revealed that teachers were able to manage time better using technology; this finding was supported by statistical analysis that availability of ICT resources increased fellows' productivity and professional effectiveness. Teachers relied heavily on mobile phones as there was lack of infrastructure such as laptops as well as the access to internet due network issues in some parts of Nepal. Lack of infrastructure was another hurdle which needed to be dealt with at policy level to meet the demands of professional development requirements in the field. Koirala (2019) also places infrastructural problems as one of the challenges of implementation of ICT skills at school and University level.

g) Gender Equity and Social Inclusion (GESI)

The concept of inclusion is weak in practice and implementation in the country, though there is an inclusion policy in place. The education system is not very inclusive given low resources, lack of adequate infrastructure and lack of teachers trained in inclusive pedagogy. (Shahi 2022). Similar findings emerged in the LMS study (Kumar et al. 2022) where practice and policy were highlighted. The fellows came into the fellowship with a limited understanding of the term and while they had some knowledge of classroom diversity (gender, caste, socio-economic, culture, language etc.), they did not know how the classroom could be made inclusive using various pedagogical practices and

strategies. Additionally, there is a lack of female teachers at the secondary level for subjects like math and science.

After engaging in the project there was significant change visible in the fellows' understanding. Fellows applied their knowledge of inclusive education learned during the course. The fellows attempted to create inclusiveness through their Action Research study. They adopted classroom strategies such as giving an opportunity to weak students to facilitate/present, ensuring all students got an opportunity to engage in PhET through organising additional classes in computer labs, creating heterogeneous /mixed ability groups to ensure learning of diverse learners.

This implies that a meaningful engagement with teachers through a comprehensive teacher professional development programme can make a difference to make learning more inclusive in the classroom. According to Thomas and Loxley (2001), in order to develop an inclusive ethos, educators must accept diversity in all of its forms, including cultural, linguistic, and cognitive distinctions. Findings reveal that this is possible with an effective teacher professional development programme.

h) Professional Development Experience

Scholars in Nepal have reported that professional development has remained ineffective (Panthee 2021; Bhatt 2021; Khanal, P & Adhikari, P 2020; Niraula, 2018; Pokhrel & Behera, 2016) and has not catered to the teachers' classroom needs. It has been poorly managed, opting for a blanket approach in terms of cascade model. Gautam (2016) in his study asserts training enters into the classroom only if it caters to classroom needs. It is imperative not to ignore teachers' needs whether it is subject knowledge, pedagogical knowledge, context of learners or classroom management issues or knowledge of constructive use of ICT.

The SATE fellowship had a significant impact on the fellows' understanding of the nature and mode of TPD which can be practice based. The MATPD transformative model offered teachers to own their learning autonomously by conducting action research and also understanding the need for support realizing the low resource setting of teachers. The MATPD project provided platforms for collaboration among teachers and development of professional networks with other fellows in Nepal and in other South Asian countries. Kandel (2022) also asserted in the study of teacher learning schools that teachers in Nepal's context learn through collaboration with enthusiasm and bring their previous knowledge to make learning more meaningful. SATE Fellowship extended the understanding of dimensions of how teachers learn for fellows. Before the fellowship it was limited to teachers' own practice with students, webinar, conferences, workshops and through formal qualification. Post fellowship, the fellows could give examples of how teachers could learn through classroom implementation, action research, mentoring and reflection and how these processes were dynamically interconnected. Thus, the understanding of fellows changed and evolved by the end of the fellowship.

Fellows could make the connection between theoretical ideas discussed and practical experiences during the fellowship. Pokhrel & Behera (2016) in their study of expectations of teachers from Teacher Professional development programme states that teachers also expect from TPDs to make linkages between theory and practice. Fellows identified themselves as competent teacher educators, as a result of learning through reflection, constructive feedback by mentors, adapting plans by understanding teachers' context and supporting them in classroom implementation.

Most fellows agreed that a blended approach (distance learning) could be useful in Nepal's context. Thirumalai et al (2019) also advocated that only reliance on technology-based CoPs is insufficient. For sustaining the quality of CPD that is practice based, there is need for in-person meet ups. Findings from this study supported this argument of having a blended approach to sustain a quality TPD programme. Some limitations also emerged for accessibility due to unavailability of gadgets (mobile, laptops etc) and Internet and connectivity Issues due to which teachers faced challenges in engaging in online mode. On the other hand, it also provided opportunities to engage at their own pace and time; some fellows were able to connect with teachers and have sessions after school. Barksdale et al. (2021) in his study also found that mobile based technologies are more effective and accessible to teachers. It was revealed in his study that there is a value in mobile technology and it allowed teachers to integrate technology into instruction and for classroom requirements.

Section V. Conclusion

Part 1: Objective of the project, components, how did we measure change and what were the parameters

The MATPD project aims to build the capacity of teachers and teacher educators to become collaborative and reflective practitioners in order to bring a change in their beliefs and classroom practices. To meet the objective, the project design included components of distance learning courses on ICT, mentoring and action research; 10 days in person workshop; practice based collaborative action research with teachers through mentoring, social learning through formal telegram groups and course discussion forums; enrichment webinar sessions and reflection sessions. A mixed methods approach of baseline and end line interviews and surveys were carried out to understand change in fellows' skills, knowledge, beliefs and attitudes about the different components of the fellowship program.

Part 2: The findings from the BASK study indicate a positive change/shift for most of the parameters.

The multi-modal approach for continuous professional development through distance learning was a new concept for the fellows in Nepal. TPD programs have largely been in-person following a conventional cascade approach through workshops and seminars, that focus primarily on content rather than student-centered pedagogical practices. This experience allowed participating fellows to understand that a distance teaching-learning model can work effectively in building capacities in low resource context areas. Having undergone this experience, fellows became aware that teachers can learn effectively through modes of reflection, collaboration, mentoring and action research. They learned that this model of TPD helped develop the culture of continuous sustained learning, active engagement and participation and reflecting on teaching practice for improvement.

The diverse set of professional learning experiences not only provided them an opportunity for their own development, but also develop their leadership skills as teacher educators, to work collaboratively and mentor teachers to help them improve their classroom practices. They identified themselves as teacher educators by the end of the fellowship program, as they worked collaboratively with teachers to construct and develop subject knowledge.

Most of the fellows in Nepal started with a theoretical understanding of the concept of action research since it's a mandatory component of the TPD programs, though its implementation is weak in practice. The experience of conducting action research helped them to:

(a) understand the action research process in a more nuanced way and develop skills to implement the same.

(b) understand the field and context, teaching practices and on ground challenges by working collaboratively with teachers.

(c) become aware of and design student-centered innovative pedagogical practices suited for low resource context that can improve teaching learning processes, build capacity of teachers and improve student engagement.

(d) reflect on their practices and make required changes. This process of carry out action research has strengthened their belief that AR can help bring about changes in beliefs and teaching practices, help better understand how students learn and most importantly, helps teachers to take ownership in problem solving, constructing knowledge and one's own professional growth.

In terms of knowledge and skills, fellows characterized their learning for developing their identity as teacher educators, and described new abilities gained such as communication and teamwork. As fellows had to collaborate with instructors from different schools, they learned about under-resourced contexts and contexts other than their own. They also gained a deeper understanding of action research, including research skills, procedures, and strategies for designing tools and conducting action research together with teachers, as well as leveraging ICT tools to assist students' and teachers' learning. Fellows acquired a deeper understanding of action research as they used research material, tools, and activities for enhancing student learning and tested them out together with instructors to evaluate what works. The majority of fellows believed that the project team's workshops and online courses, as well as interactions with academic and field mentors, collaborating with instructors and with core team members, provided possibilities for them to gain knowledge and skills.

Teachers' learning was also reported in terms of content depth, pedagogical and technological knowledge (some of which focused on TPACK), self-reflection on their regular practice, and teaching in Nepal, collaborative reflection on learnings from AR participation, and change in teachers' practice to adopt the pedagogical innovation focused in the AR. Fellows observed variances in teacher implementation based on their environment, where they had to contextualize according to the scenario, such as translating in Nepali language and forming smaller groups of students in large classes to ensure participation. Some instructors extended the innovative pedagogy beyond the grades and areas on which they had emphasized in the AR, suggesting learning transfer.

The baseline and end line studies indicated a statistically significant difference between the baseline and endline mean response about the beliefs related to various aspects of action research. Maximum of the measures (15) demonstrated a positive shift in attitudes about various components of action research. Furthermore, the change in beliefs about action research was classified as minimal or medium. The role of action research in developing new knowledge related to the classroom, understanding student learning behaviour to improve learning outcomes, developing reflective practices in teachers to take ownership in problem solving, constructing knowledge, and professional growth, and enabling schools to develop into effective learning communities are other aspects that show medium positive change. The modification is medium, related to understanding of the action research process.

The experience of action research provided the fellows with an opportunity to be mentors and mentees, which many fellows didn't have prior to the fellowship. Mentoring is not formally institutionalized within the education system in Nepal. Fellows were able to develop a nuanced and in-depth understanding of mentoring as a result of being mentored by their academic and field mentors and mentoring teachers for their action research. The understanding of mentoring deepened by the end of the fellowship, and they were able to distinguish between mentoring and monitoring. Fellows experienced mentoring both theoretically and practically. The fellows gained knowledge that:

- (a) Mentoring is a continuous and collaborative process that assists the mentee in his/her professional development.
- (b) Both the mentor and the mentee play an equal role in this process.
- (c) Mentoring is about guiding, supporting, and empowering the mentee to help them address issues for themselves and take ownership of their own learning.
- (d) Peers with similar degrees of experience can also have a mentoring relationship.

USE OF ICT

Fellows had no prior experience of using ICT and its theoretical understanding for pedagogy. Use of computers was linked with laziness initially, and did not appreciate the use of technology to draw out real-life examples of concepts in textbooks. At the end of the project, fellows were in favour of the constructive use of technology.

Fellows got introduced to many new technologies and learnt new ways to use technology in constructive meaningful ways in their own classroom as well as to train or mentor teachers. Some examples of ICT tools used by fellows were PowerPoint, Google docs, google forms, quizzes, google scholar, smart board and white board. Platforms like Microsoft teams, zoom, google meet, were used to conduct online meetings to share and collaborate. Apart from these for

resources, YouTube, Piktochart, gaming tools and PhET simulations were used by fellows for making meaningful and constructive learning. Specific purposes mentioned by the fellows for which they used ICT included reflection (for taking notes), pre intervention, to gather information on the related topics on which fellows were given workshops, sharing resources and links of app, searching relevant tools and resources, using platforms to conduct meeting to share and collaborate, to make videos and develop OER.

ICT platforms were used by fellows (teacher educators) to collaborate with their colleagues and teachers, developing professional networks for sharing resources and exchanging ideas and best practices. This changed attitudes towards collaboration and the use of ICT and fellows themselves developed their parallel groups using different apps where they could talk about their issues and concerns with each other in their language.

Part 3: Levers for scaling and innovative TPD Model

It is important to understand for a low resource country context where teachers do not get opportunities of participating in quality CPD, that most of the training they had previously experienced was short term and theoretical in nature. No extension and follow up of training were done to understand the impact of training in teachers' practice.

The levers of scaling were discussed in terms of processes and stakeholders/actors involved in the model.

Action Research which is institutionalized as a process that teachers engage in, as part of their CPD, can become one of the levers for scaling innovation. Action research in the cyclic form of step- plan, act and reflect can be very effective if scaled. Therefore, Action research has the scope and potential to give autonomy & agency to teachers for their own professional development by conducting research directly based on classroom practice. This allows teachers to make connections between practice and theories.

One of the findings of the project was also that fellows, could bring this change in their practice with appropriate mentoring support. By doing a theoretical course on mentoring through distance learning and practically experiencing it with two mentors (academic and field mentors), fellows could differentiate between monitoring and mentoring. It also emerged from the study that both the mentors were supportive in action research effectively and enrichment sessions with academic mentors were leveraging in clarification of teachers' problems. Hence, mentoring support can be the second lever which has lasting impact and can contribute positively in classroom practice. This model where mentoring is inbuilt in the action research can make a lot of difference in teachers' professional development. Therefore, it becomes imperative to institutionalize mentoring as well

or one would say mentoring is a part of the type of action research model which can be effectively implemented in Nepal.

Reflection is the third lever which is recommended for scaling as an inbuilt process of action research. It emerged from the quantitative analysis that teachers do reflection collaboratively and by the end of the fellowship, it was revealed that there was positive change in the peer reflections rather than individual reflection. Hence it is suggested that weekly meetings for sharing videos for peer analysis and taking feedback from colleagues should be instituted as a regular practice. In this way action research can become a germinating ground for collaboration and reflective practice where teachers are reflecting through various modes such as writing journals, reflecting with mentors' support and peer reflection also.

Qualitative data also revealed that most of the fellows found that reflection had contributed to improving their practice, navigating their assumptions and identifying strengths and weaknesses. These reflections can be conducted with peers in asynchronous and synchronous mode. Field mentors can facilitate peer reflections and individual reflections can be facilitated through academic mentors.

Last but not the least ICT for meaningful and constructive learning can be the fourth lever for scale. This is one of the most important levers which cuts across all the levers. This is the lever which can help in scaling in terms of providing access quality to make learning meaningful for both teachers & students. It was found in the research that fellows have used ICT tools and applications for resource sharing, conducting meetings and best practices. These apps can be used for the purpose of collaboration for reflecting on practice as mentioned in the above paragraph. One finding was related to OER, where fellows expressed the need to explore it further if given the opportunity. Hence, websites and resources should be provided to teachers and teacher educators to explore further. This has implications for training of teacher educators who can curate OERs as per their context in their language. Even Teacher Educators can be trained for developing their own OERs, which can be uploaded on websites with the common core license. Fellows agreed that the blended approach or distance learning is useful as it gives access to distant resources, and increases efficiency by providing flexibility of timings as well. Hence it is recommended that further opportunities of distance learning should be explored with universities or at Ministry level and there is no doubt that it will be a scalable and cost-effective method.

The uniqueness of the MATPD project and the TPD model it executed, is the interconnectedness of various components and processes it included. Due to this nature of the model, it has the potential of lasting impact. Interconnectedness of the different processes such Action research, Mentoring, reflection & collaboration and ICT will be of help in scaling and innovation as the structures to expand further to numbers.

Part 4: Barriers For Scaling

Barriers in scaling are systemic. It came frequently that fellows were not able to manage their time given the routine practice of fellows and teachers involved in Action research. AR- Mentoring model cannot be scalable until and unless an allotted time for mentoring, reflection and Action research is provided to teachers and teacher educators, so that there is no clash with the routine practice. It can be a point of demotivation if perceived as doing something new and additional for teachers, and may be considered a burden by teachers. Therefore, it is important to make it a part of the routine of teachers' and teacher educators' professional lives. If the systemic barrier is removed, time management will not be an issue for CPD. This way teachers will be able to make their action plan and sync it with their routine practices and not hinder teachers from adopting something new.

Another barrier was the non-availability of resources in Nepali language. It is important to develop a team or an AI technology which can translate appropriate resources in Nepali language so that it can reach maximum teachers and teacher educators.

Infrastructural and logistic barriers such as unavailability of gadgets, internet and connectivity issues are also barriers that hinder the action plans of teachers. This can further hamper the possibility of collaboration and participation in discussion in online mode. It can impact the regularity of teachers in online sessions. Other stakeholders such as mid-level bureaucrats and school principals should be in alignment with any new adopted culture and encourage teachers to mentor and conduct action research to further collaborate and reflect on their practice. Principals and bureaucrats must understand the purpose of action research for the CPD of teachers, and trust teachers and provide necessary support in their journey of Professional Development.

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Appendix 1 : Quantative tools used for BASK study

Tool 1: ICT Tool

BELIEFS ABOUT USING TECHNOLOGY	BASELINE (N=15)		ENDLINE (N=15)		Cohen' s d
	Mea n	SD	Mea n	SD	Effect Size
Integrating technology in teaching will improve classroom instruction and practice	4.6	0.5	4.8	0.41	0.44
Instruction is most effective when teachers collaborate with other teachers or experts	4.7	0.49	4.5	0.83	-0.29
Availability of ICT resources increases my productivity and professional effectiveness	4.7	0.62	4.9	0.26	0.42
Integrating technology in teaching can improve students' learning outcomes	4.6	0.74	4.7	0.49	0.16
Computers make students lazy	2.3	0.96	1.86	0.83	-0.49
Computers help students grasp difficult curricular concepts	4.1	0.70	3.6	0.74	-0.69
Students create better projects with computers than with other traditional material.	4.1	0.99	3.7	0.46	-0.52

Integrating technology in teaching will increase collaboration among students	4.5	0.63	4.5	0.83	0
Use of Technology is mostly for developing technical skills and it is not useful in applying or drawing out real life examples of concepts in textbook	2.1	0.83	1.8	0.77	-0.37

*Cronbach Alpha (Baseline= 0.703, Endline=0.727)

* Paired sample, two tailed t-test at 0.05 level of significance=0.726

Tool 2: AR-Familiarity and Ability

FAMILIARITY WITH THE CONCEPT OF ACTION RESEARCH	BASELINE (N=15)		ENDLINE (N=15)		Cohen's d
	Mean	SD	Effect Size	SD	Effect Size
To what extent are you familiar with the concept of Action Research?	3.3	0.49	4.1	0.52	1.58
ABILITY TO CONDUCT ACTION RESEARCH	BASELINE (N=15)		ENDLINE (N=15)		Cohen's d
	Mean	SD	Mean	SD	Effect Size
Formulate research questions	2.8	0.41	3.5	0.52	1.49

Decide on appropriate research methods	2.8	0.41	3.3	0.62	0.95
Design research tools (questionnaires, observation frameworks, etc.)	2.8	0.35	3.3	0.46	1.22
Plan a research schedule	2.8	0.41	3.5	0.64	1.30
Analyze data and draw conclusions	2.7	0.49	3.1	0.64	0.70
Communicate findings	2.87	0.35	3.3	0.49	1.00

*Cronbach Alpha (Baseline= 0.922, Endline=0.927)

* Paired sample, two tailed t-test at 0.05 level of significance=0.000135

Tool 3: Beliefs about Action Research

BELIEFS ABOUT VARIOUS ASPECTS OF ACTION RESEARCH	BASELINE (N=15)		ENDLINE (N=15)		Cohen's d
	Mea n	SD	Mea n	SD	Effect Size
An individual student can be studied for Action Research	2.7	0.96	3.3	1.44	0.49
A group of students can be studied for Action Research	4.2	0.68	4.4	0.83	0.26
A classroom can be studied for Action Research	4.4	0.51	4.5	0.83	0.15

A school can be studied for Action Research	3.9	0.96	4.1	1.06	0.20
A community can be studied for Action Research	3.8	0.77	4.1	1.22	0.29
A Teacher Education Institute can be studied for Action Research	3.7	0.88	4.1	1.06	0.41
Government functionaries (Education Department) can be studied for Action Research	3.7	0.96	3.9	1.22	0.18
Action research helps develop new knowledge related to classrooms	4.3	0.49	4.5	0.74	0.32
Action research helps to better understand how students learn	4.4	0.63	4.7	0.46	0.54
Action research helps improve students' learning outcomes	4.5	0.52	4.7	0.59	0.36
Action research helps to reflect and bring about a change in one's own practice	4.6	0.51	4.9	0.26	0.74
Action research helps to take ownership in problem solving, constructing knowledge and one's own professional growth	4.6	0.51	4.9	0.35	0.69
Action research enables schools to become effective learning communities	4.5	0.64	4.7	0.46	0.36
Action research can only be done by individual teachers in their classroom	2.9	1.19	2.1	1.22	-0.66
Action research can only be done at school level and not at large scale	2.3	0.82	2.1	1.06	-0.21
Action research helps to base decisions about teaching and learning practices in data driven, classroom-based research findings	3.7	0.97	4.1	0.83	0.44

The Action research process is iterative	3.6	1.05	4.0	1.19	0.36
Action research can be used to explore solutions for effective professional development of teachers	4.3	0.49	4.5	0.64	0.35
Action research helps improve teacher educators/teachers' chances of promotion	3.7	0.82	3.9	0.91	0.23

*Cronbach Alpha (Baseline= 0.09, Endline=0.768)

* Paired sample, two tailed t-test at 0.05 level of significance=0.0108

Tool 4 : Beliefs about Collaboration and practice

ENGAGEMENT IN COLLABORATIVE ACTIVITIES	BASELINE (N=15)		ENDLINE (N=15)		Cohen's d
	Mean	SD	Mean	SD	Effect Size
I talk about teaching problems with colleagues	3.4	1.12	4.3	0.72	0.96
I support colleagues in their teaching problems	3.5	1.19	4.1	0.92	0.56
I share new teaching ideas with colleagues	3.5	1.19	3.9	0.88	0.38
I share learning experiences with colleagues	3.6	1.06	4.1	0.7	0.57

I discuss my classroom teaching experiences with my colleagues	3.5	1.1 3	4.1	0.8 8	0.59
I talk to colleagues about what I think is important in education	3.5	0.9 9	4	0.7 6	0.57
I discuss scientific educational theories with colleagues	3.1	1.0 3	3.3	1.2 3	0.18
I discuss improvement and innovation of education at my school/teacher training institute with colleagues	3.2	1.2 1	3.6	0.9 1	0.37
I use colleagues' teaching materials in my lesson	2.7	1.1 1	3.2	1.2 6	0.42
I write a new curriculum with colleague	1.7	1.2 2	2.1	1.3 6	0.31
I construct (digital) teaching material with colleagues	2.7	1.3 5	3.4	0.9 9	0.59
I construct testing and examination materials with colleagues	2.7	1.2 8	3.1	1.1 3	0.33
I study student/student teacher performance data with colleagues	2.3	1.4 5	3	1.3 1	0.51
I prepare lesson plans with colleagues	2.9	1.3 6	3.5	1.1 9	0.47
I experiment with new teaching methods with colleagues	2.7	1.2 8	3.47	1.1 9	0.62

I give lessons with peers/colleagues (team teaching)	2.4	1.18	2.7	1.39	0.23
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*Cronbach Alpha (Baseline= 0.964, Endline=0.942)

* Paired sample, two tailed t-test at 0.05 level of significance=6.79E-09

Tool 5: Beliefs and practices about Mentoring

SKILLS & QUALITIES TO BE AN EFFECTIVE MENTOR	BASELINE (N=15)		ENDLINE (N=15)		Cohen's d
	Mean	SD	Mean	SD	Effect Size
Share knowledge, skills, experiences and learnings with the mentee	2.8	0.86	3.4	0.63	0.80
Provide constructive and non-judgemental feedback to the mentee	2.7	0.96	3.0	0.66	0.36
Listen actively to the mentee	2.7	0.80	3.6	0.63	1.25
Good at eliciting responses and getting the mentee to think and reflect	2.6	0.83	3.0	0.46	0.60
Encourage and motivate the mentee	3.1	0.74	3.4	0.52	0.50
Show interest in development of the mentee	3.0	0.70	3.6	0.63	0.90
Willing to put aside one's own beliefs and/or prejudices	3.0	0.74	2.9	0.70	-0.14
Have expertise in the area of mentoring	3.0	0.83	3.0	0.93	0

Good at setting realistic goals for the mentee	3.0	0.74	3.0	0.96	0
Good at observing & reflecting on teaching practices	3.0	0.64	3.3	0.62	0.48
Good at showing/demonstrating solutions to the mentee	3.0	0.74	3.1	0.64	0.14
Introduce timelines and stages for a classroom based exploratory action research project	3.0	0.91	3.0	0.76	0
Help address queries/worries of the mentee	3.0	0.86	3.2	0.88	0.23

*Cronbach Alpha (Baseline= 0.970, Endline=0.942)

* Paired sample, two tailed t-test at 0.05 level of significance=0.005

Tools 7: Beliefs and practices about Professional Learning communities

ASPECTS	BASELINE (N=15)		ENDLINE (N=15)	
	Yes	No	Yes	No
Staff meetings at school/teacher education institute	13	2	12	3
Subject specific teacher/teacher educator groups (e.g., Maths/Science/English)	13	2	14	1
Theme specific teacher/teacher educator groups. (e.g., ICT, pedagogy, content)	6	9	9	6
Teacher/Teacher Educator conferences	13	2	13	2

District level meetings	4	11	7	8
National level meetings	3	12	6	9
Any committees of school/institute functioning	12	3	11	4

Tool 8: Practices related to Reflection

ENGAGEMENT IN REFLECTIVE ACTIVITIES	BASELINE (N=15)		ENDLINE (N=15)		Cohen's d
	Mean	SD	Mean	SD	Effect Size
After taking the class, I self-reflect on how my teaching went	3.8	1.21	4.3	0.82	0.48
I analyze video recordings of my lessons to improve my teaching practice as a teacher educator	1.4	0.91	2.6	1.3	1.07
I discuss with my students/student teachers what they experience in my lessons to improve my teaching practice as a teacher educator	2.9	1.19	3.7	0.82	0.78
I visit lessons of peers/colleagues to learn from them	2.2	1.01	2.8	0.94	0.61
I ask my peers/colleagues to attend some of my lessons to get feedback on my teaching	1.9	0.88	2.6	1.18	0.67

I discuss my classroom teaching experiences with others to learn from them	2.7	0.8 8	3.3	0.9 8	0.64
I participate in peer review meetings at my school/teacher education institute to learn from peers/colleagues	2.2	1.3 2	3.1	1.1	0.74
I analyze a problem in my practice thoroughly before choosing a solution	3.3	1.2 2	3.9	0.9 6	0.55
I study artifacts (student homework, models, lesson plans, blackboard work) from students/student teachers to understand how my approach has worked	3.5	1.5 5	4.2	1.0 1	0.54
I ask students/student teachers to fill out surveys for feedback on my lessons	2	1.3 1	2.3	0.9 6	0.26
I deal with problems in my teaching by looking at what the literature says about them	2.7	0.9 6	3	1.3 1	0.26
I use student/student teacher performance data to, where needed, adjust my teaching	2.1	1.1 8	2.7	1.1 6	0.51
Once a problem or question arises in my teaching practice, I carry out a small research project into possible causes and solutions	2.2	1.1 6	2.8	1.2 1	0.51

*Cronbach Alpha (Baseline= 0.919, Endline=0.906)

* Paired sample, two tailed t-test at 0.05 level of significance=4.43E-07

Tool 9: Beliefs about Teaching Learning Practices

BELIEFS ABOUT TEACHING-LEARNING PROCESSES	BASELINE	ENDLINE	Cohen's d
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	(N=15)		(N=15)		Effect Size
	Mean	SD	Mean	SD	
Direct transmission of knowledge is the right approach to teaching	1.9	0.70	2.3	1.22	0.40
Teacher and text are primary authorities on knowledge	2.2	1.08	2.3	1.33	0.08
Effective/good teachers demonstrate the correct way to solve a problem	3.0	1.00	3.2	1.15	0.19
Students should be allowed to think of solutions to practical problems themselves before the teacher shows them how they are solved	4.4	1.05	4.8	0.41	0.50
Instruction should be built around problems with clear, correct answers, and around ideas that most students can grasp quickly	3.2	1.21	3.9	1.36	0.54
Students learn best by finding solutions to problems on their own	4.1	1.25	4.9	0.35	0.87
Use of groups for collaboration on tasks with instructions to foster collaboration among students	4.3	1.05	4.6	0.51	0.36
How much students learn depends on how much background knowledge they have; that is why teaching facts is so necessary	3.0	1.00	3.5	1.25	0.44

A quiet classroom is generally needed for effective learning	1.9	0.9 9	2	1.2 0	0.09
Good teachers always know more than their students	2.5	1.3 0	2.2	0.9 4	-0.26
My role as a teacher is to facilitate students' own inquiry	4.0	1.1 3	4.6	0.5 1	0.68
Thinking and reasoning processes are more important than specific curriculum content	4.2	0.8 6	4.5	0.6 4	0.40
Students from poor homes tend to struggle learning in schools.	3.1	1.1 3	2.8	1.0 8	-0.27
Students whose parents are well educated and students whose parents are not well educated face the same level of difficulty in learning.	2.5	1.1 9	2.5	1.3 0	0
Boys are more interested in learning than girls.	1.7	0.7 2	1.5	0.7 4	-0.27
Every one can learn irrespective of their gender or status	4.3	0.9 0	4.9	0.3 5	0.88

*Cronbach Alpha (Baseline= 0.769, Endline=0.672)

* Paired sample, two tailed t-test at 0.05 level of significance=0.00809

APPENDIX 2 : Tools for qualitative data

Tool 1: BASELINE INTERVIEW SCHEDULE

Q1. What is your understanding of the MATPD project and your role within it?

Q2. As a teacher educator/teacher-how will you use the learnings from the fellowship in your practice and in mentoring teachers?

Q3. Why do you think professional development of teacher educators is important?

- (a) In your opinion, what are some of the key skills and competencies required to be an effective teacher educator?
- (b) How do you think the meaningful use of ICT can help enhance/strengthen the professional development of teacher educators?
- (c) How do you think mentoring can help enhance/strengthen the professional development of teacher educators?
- (d) How do you think Action Research can help enhance/strengthen the professional development of teacher educators?

Q4. What type of professional development activities have you been part of in the last 5 years as a teacher educator/teacher? Did this include any trainings on Action Research, Mentoring and ICT? What were the components of these training sessions?

(probe: courses/workshops/seminars/conferences/reading literature/online or face to face meet-ups with teachers/teacher educators, exchange programs/observation visits to other schools/teacher education institutes etc.)

- (a) Describe your experience and learning?

- (b) What has been the most valuable form of professional development for you and why?
- (c) Was there something that you remember changing about your practice/something you did differently in your teaching after this professional learning experience?
- (d) Please enlist some of the areas where you require professional development.

Q5. (a) What does Action Research mean to you ?

- (b) How do you think it can help address local contextual educational problems of teachers?

Q6. (a) What does Mentoring mean to you ?

- (b) Reflect on any experiences you have had of mentoring or being mentored.

- How did this benefit you as a mentor or a mentee?
- Was this a structured mentoring process (by government/school management/any other institution or organization) OR was this an informal mentoring session (by head teacher/other experienced teachers/teacher educators)

Q7. Are you part of any group for discussing educational issues/teaching learning for enhancing your own professional development? Are these:

- (a) Physical meetups/online spaces? (*probe: what online spaces-whatsapp, telegram , social media groups etc, how many people are part of the community*)
- (b) Formal spaces-Formal mentoring program in place by government/school management/any other institution or organization)
- (c) Informal spaces- Informal sessions by head teacher/other teachers/teacher educator
- (d) What kind of activities/discussion take place in the/these group

- (e) Frequency of engagement.
- (f) In what ways has engagement in the group helped you in improving your practice?
- (g) Have you faced any challenges being part of the group?

Q8.

(Part A) What are the different modes of distance teaching that are used for professional development of teacher educators/teachers (teacher training)?

(Part B) What has your experience been of using ICT for

- (a) professional development activities (training of teachers)
- (b) constructive teaching-learning in the classrooms?

(Probe:)

1. tools used: only devices OR
2. apps like zoom, google meet etc. OR
3. high order applications/means like geogebra, kahoot, simulations etc.- aware/not aware of the tools)/ aware but not received any training)/received training on these but do not have resources or school support to use these in classrooms) OR
4. Any other tools used

(c)How useful were these in your practice? Did you face any challenges in using ICT?

Q9 Give an example of any activity in which you collaborated with a teacher/ teacher educator? What did you learn from the experience? what will change in process/ interaction if you get a chance to collaborate again?

Q10 What is the role of reflection in improving one's professional practice? How often do you get a chance to reflect on your practice? Give an example of an activity that was useful in promoting

reflection on the practice? How do you engage your students/ student teachers in reflection on their learning?

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Tool 2: ENDLINE INTERVIEW SCHEDULE

Understanding of MATPD

This section focuses on understanding fellows' role in the SATE fellowship.

1. Now that you have completed the SATE fellowship, what do you think was your role within the MATPD Project?

Teacher Professional Development

This section focuses on fellows' learnings and experiences of the fellowship with respect to TPD. Questions are related to TPD experiences, teacher learning and collaboration.

1. What were the main aspects of the fellowship that were different for you? Please give examples.
2. Which aspects of the fellowship were challenging for you? Please give examples.
3. (a) How do you think teachers learn?
(b) Has there been any change in your thinking about teacher learning during the fellowship? Explain what and how?

(b) Adjustments that both you and teachers made to conduct Action Research

(c) What was the attitude of the teachers in the beginning and at the end of the Action Research? Please give examples.

(d) Methods used to encourage/motivate teachers to participate and conduct Action Research

(e) What kind of TPD workshop did you design for the teachers that participated in your action research study? (*probe: workshop, workshop days, mode of workshop, tasks/concepts/pedagogy discussed in the workshop*)

(f) Can you describe how the teachers implemented Action Research in the classroom?

(g) What did you change in the second cycle based on reflection and feedback of the 1st cycle?

(h) Were there any differences in the way different teachers implemented the intervention?

(i) Challenges faced in working with teachers and solutions to resolve the issues faced

4. (a) Do you think your Action Research intervention worked well? If yes, please give reasons.

(b) Do you think there were any gaps/any aspects did not work well? If yes, please give examples.

5. Do you have any idea or any area where you intend to use Action Research in the immediate future? If yes, can you elaborate on it?

6. (a) What do you believe are the challenges that may prevent you /other teachers & teacher educators from engaging in action research as a routine part of their professional practice?

(b) What do you think are some of the support mechanisms you need to make it part of your regular practice?

Mentoring

This section focuses on fellows' conception of mentoring, their learnings and experiences of the mentoring process, both as a mentee and a mentor.

1. How has your understanding of “mentoring” changed post the fellowship? Do you think mentoring is different from “monitoring”? If yes, how?
2. How do you think mentoring can help strengthen the professional development of teacher educators?
3. How will you use the learnings from the fellowship in mentoring teachers for their professional development?
4. What are the different skills and qualities you have acquired during the fellowship to be an effective mentor?

(Probe: to answer this question, please think about the mentoring course, your AM-FM interactions and your experience of mentoring the teachers for the Action Research study?)

5. Based on your experiences of being mentored, how different/useful was the blended mode of mentoring? (probe: in-person versus online (zoom) did language pose as a barrier for mentoring; if yes, then how?)
6. Has gender & seniority (experience) in any way impacted you as a mentee or in your role as a mentor to the teachers? *(probe: easy/difficult to work with same gender/opp gender mentors/teachers)*

7. **Role as a mentee** (*being mentored by academic & field mentor*)

- (a) How often did you communicate with your (a) academic mentor and (b) field mentor? (*probe: monthly frequency, if frequency of communication has been low, then why?*).
- (b) What suggestions given by your (a) academic mentor (b) field mentor have been critical in shaping your action research study? Please give examples. (*probe: resources, ideas & strategy, contextualization, data, report writing, decision-making, did AM give any readings etc.*)
- (c) Has mentoring by AM & FM helped you in working effectively with the teachers for your action research study? If yes, please give examples.
- (d) What problems did you face while working with your mentors? What further support would you have liked from them during the fellowship?
- (e) What have been the advantages and challenges of having two mentors (academic and field mentor) and why? Please give examples.

8. **Role as a mentor** (*mentoring participating teachers for action research*)

- (a) How often did you communicate with the teachers you mentored in your action research study? (monthly frequency and mode (online/offline/both))
- (b) What kind of support/assistance did you provide to your mentee teachers? Please give examples. (*probe: resources, ideas & strategy, contextualization, classroom implementation, lesson plan, etc.*)
- (c) Can you give examples of suggestions the teachers found helpful in implementing Action Research in the classroom?
- (d) If you were to mentor your mentee again, what would you do differently and why?

9. Describe the mentoring model/process that will work in your country context?

Social Learning

This section focuses on understanding the nature of interaction amongst MATPD fellows and how these interactions have helped the fellows in their PD.

1. (a) Did you connect with any MATPD fellow within the country and across countries?

(b) Do you plan to continue these interactions beyond the fellowship? If yes, In what ways?

2. (a) How did you engage in MATPD telegram groups, webinars, course related discussion forums?

(b) did you get an opportunity to learn from other MATPD fellows?

(c) Did you face any challenges/difficulties while participating in these MATPD Telegram groups? If yes, please describe.

3. How have you shared your action research experiences and learnings with other people? (*probe: teachers/teacher educators/government officials etc.*)

4. What platforms did you use to communicate with teachers for your action research study? What kind of discussion happened in these groups and how did they benefit the teachers? (*probe use framework - whether it was used for administrative purpose or academic discussion on content and pedagogy*)

through different modes - online/offline/calls/emails. Administrative : was the group used for giving information, direction, deciding about the dates etc.; Academic discussion: discussion about the content, the kind of misconceptions the students have about the content, pedagogic approaches and resources)

5. Were you part of any informal group with the MATPD fellows apart from the groups formed by the CORE MATPD team? If yes, what is the nature of interactions within these groups? What was the group used for? (*probe: online/offline/calls/emails. Administrative : was the group used for giving information, direction, deciding about the dates etc.; Academic discussion: discussion about the content, the kind of misconceptions the students have about the content, pedagogic approaches and resources*).
6. What should be done differently to increase participation and engagement of people (fellows/ teachers) in chat groups for future projects/collaborations?
7. Give an example of any activity in which you collaborated with a teacher/ teacher educator during the course of the fellowship for your professional development? What did you learn from the experience?

Reflection

This section relates to reflective practices learnt and adopted by the fellows after the SATE Fellowship.

1. What is the role of reflection in improving one's professional practice?
2. (a) Have you reflected upon the different components of the fellowship and how has this been useful to you (*probe: courses, action research, enrichment webinar sessions, writing etc*)?

ICT

This section focuses on understanding what the fellows learnt about ICT during the fellowship through courses, webinars, etc. and in what ways did they use these learnings

1. How do you think the meaningful use of ICT can help strengthen the professional development of teacher educators?

2. For your own professional development, what are the different types of digital tools/applications that you have used in this fellowship? Were any of these new for you? Did you face any challenges while using these? Please give examples.

(Probe: action research, training teachers, mentoring, classroom teaching etc.)?

3. (a) What are the different types of digital tools/applications that you have used in the classroom or for training teachers during the fellowship?

(b) What kind of challenges did you face while using these? *(Probe: action research, training teachers, mentoring, classroom teaching etc.)?* Please give examples.

4. (a) Can you give an example of how you will combine content, teaching approaches and technology for a lesson that you teach?

(b) Please state why you have selected this particular technology and how will you integrate it for meaningful teaching-learning to take place?

5. Do you think you will continue using and exploring ICT in your practice? If yes, in what ways?

6. Based on your experiences after the fellowship, how relevant are blended approaches for effective TPD in your context?

Gender equality and social inclusion (GESI)

This section focuses on understanding fellows perception of inclusion and diversity in their country-context and how these operate in their classrooms. We want to understand the various ways in which fellows have dealt with gender and inclusion-related issues in their AR.

1. What is your understanding of the term 'inclusion' in your context/country?

2. (a) What kind of diversity have you seen in your teaching experiences?

(probe: social-gender, class & caste, minority and other ethnic groups, physical disability, and learning disability)

(b) What are the challenges in addressing diversity?

3. AR & GESI

(A) Selection of teachers

- What was your criteria for selecting teachers for your Action Research study? (probe: gender, different social groups, disability?-probe reasons)
- How many male and female teachers participated in your AR? (probe: if they mention that they worked with only male/female teachers-ask why?)

(B) Classroom Observation

- What kind of inclusion/exclusion did you notice when you first observed the classrooms, prior to the implementation of the intervention? (*probe: social-gender, class & caste, minority and other ethnic groups, physical disability, and learning disability*)

(C) Classroom Implementation

- What kind of teaching-learning practices did you include in your AR to make the classroom more inclusive for the learners?

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Tool 3: BASELINE ENDLINE SURVEY USED FOR STUDYING CHANGE

AR

Q1. To what extent are you familiar with the concept of Action Research? Please select one option.

S.No	
1	Not at all
2	To a small extent
3	To a moderate extent

4	To a great extent
5	To a very great extent

Q2. How would you rate your ability to conduct Action Research... [from 1 (No ability) to 4 (High ability)]? Please mark your answer for each statement given below.

S.No		1	2	3	4
1	Formulate research questions				
2	Decide on appropriate research methods				
3	Design research tools (questionnaires, observation frameworks, etc.)				
4	Plan a research schedule				
5	Analyze data and draw conclusions				
6	Communicate findings				

Q5. Given below are some statements about the concept of Action Research. To what extent do you agree or disagree with these? Please mark your answer for each statement given below.

S.No		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	An individual student can be studied for Action Research					
2	A group of students can be studied for Action Research					
3	A classroom can be studied for Action Research					
4	A school can be studied for Action Research					

5	A community can be studied for Action Research					
6	A Teacher Education Institute can be studied for Action Research					
7	Government functionaries (Education Department) can be studied for Action Research					
8	Action research helps develop new knowledge related to classrooms					
9	Action research helps to better understand how students learn					
10	Action research helps improve students' learning outcomes					
11	Action research helps to reflect and bring about a change in one's own practice					

12	Action research helps to take ownership in problem solving, constructing knowledge and one's own professional growth					
13	Action research enables schools to become effective learning communities					
14	Action research can only be done by individual teachers in their classroom					
15	Action research can only be done at school level and not at large scale					
16	Action research helps to base decisions about teaching and learning practices in data driven, classroom based research findings					
17	The Action research process is iterative					

18	Action research can be used to explore solutions for effective professional development of teachers					
19	Action research helps improve teacher educators/teachers' chances of promotion					

Mentoring

Q1. To what extent do you think you possess these qualities and skills of being a mentor? Please mark your answer for each statement given below. [from 1 (new to me) to 4 (highly developed)]

S.No		1	2	3	4
1	Share knowledge, skills, experiences and learnings with the mentee				
2	Provide constructive and non-judgemental feedback to the mentee				
3	Listen actively to the mentee				
4	Good at eliciting responses and getting the mentee to think and reflect				
5	Encourage and motivate the mentee				
6	Show interest in development of the mentee				
7	Willing to put aside one's own beliefs and/or prejudices				
8	Have expertise in the area of mentoring				
9	Good at setting realistic goals for the mentee				
10	Good at observing & reflecting on teaching practices				
11	Good at showing/demonstrating solutions to the mentee				

12	Introduce timelines and stages for a classroom based exploratory action research project					
13	Help address queries/worries of the mentee					

Reflection

Q1. Please indicate the frequency of your engagement in the below mentioned reflective activities as a Teacher Educator.

S.No		1- Daily	2-A few times a week	3-A few times a month	4- Once a month	5- Never
1	After taking the class, I self-reflect on how my teaching went					
2	I analyze video recordings of my lessons to improve my teaching practice as a teacher educator					
3	I discuss with my students/student teachers what they experience in my lessons to improve my					

	teaching practice as a teacher educator					
4	I visit lessons of peers/colleagues to learn from them					
5	I ask my peers/colleagues to attend some of my lessons to get feedback on my teaching					
6	I discuss events in my teaching with others to learn from them					
7	I participate in peer review meetings at my school/teacher education institute to learn from peers/colleagues					
8	I analyze a problem in my practice thoroughly before choosing a solution					
9	I study artifacts (student homework, models, lesson plans, blackboard work) from students/student teachers to understand how my approach has worked					

10	I ask students/student teachers to fill out surveys for feedback on my lessons					
11	I deal with problems in my teaching by looking at what the literature says about them					
12	I use student/student teacher performance data to, where needed, adjust my teaching					
13	Once a problem or question arises in my teaching practice, I carry out a small research project into possible causes and solutions					

Collaboration

Q1. Please indicate your engagement in the below mentioned collaborative activities as a Teacher Educator.

S.No		1- Daily	2-A few times	3-A few times a month	4- Once a	5- Never
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			a week		mont h	
1	I talk about teaching problems with colleagues					
2	I support colleagues in their teaching problems					
3	I share new teaching ideas with colleagues					
4	I share learning experiences with colleagues					
5	I talk about the way I deal with events in my lessons with colleagues					
6	I talk to colleagues about what I think is important in education					
7	I discuss scientific educational theories with colleagues					
8	I discuss improvement and innovation of education at					

	my school/teacher training institute with colleagues					
9	I use colleagues' teaching materials in my lesson					
10	I write a new curriculum with colleague					
11	I construct (digital) teaching material with colleagues					
12	I construct testing and examination materials with colleagues					
13	I study student/student teacher performance data with colleagues					
14	I prepare lesson plans with colleagues					
15	I experiment with new teaching methods with colleagues					

16	I give lessons with peers/colleagues (team teaching)					
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ICT

Q1. To what extent do you agree or disagree with the following statements regarding beliefs about use of technology? Please mark your answer for each statement given below.

S.No		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Integrating technology in teaching will improve classroom instruction and practice					
2	Instruction is most effective when teachers collaborate with other teachers or experts					
3	Availability of ICT resources increases my productivity					

	and professional effectiveness					
4	Integrating technology in teaching can improve students' learning outcomes					
5	Computers make students lazy					
6	Computers help students grasp difficult curricular concepts					
7	Students create better projects with computers than with other traditional material.					
8	Integrating technology in teaching will increase collaboration among students					
9	Use of Technology is mostly for developing technical skills and it is not useful in applying or drawing out real life examples of concepts in textbook					

Professional Learning Communities (PLCs)

Q1. Are you part of any of these groups/communities for your professional development?

S.No		Ye s	N o
1	Staff meetings at school/teacher education institute		
2	Subject specific teacher/teacher educator groups (eg. Maths/Science/English)		
3	Theme specific teacher/teacher educator groups. (Eg. ICT, pedagogy, content)		
4	Teacher/Teacher Educator conferences		
5	District level meetings		
6	National level meetings		
7	Any committees of school/institute functioning		

Teaching Learning Processes (TLP)

Q1. Given below are some statements describing classroom teaching & learning practices. To what extent do you agree or disagree with these? Please mark your answer for each statement given below.

S.No		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Direct transmission of knowledge is the right approach to teaching					
2	Teacher and text are primary authorities on knowledge					
3	Effective/good teachers demonstrate the correct way to solve a problem					
4	Students should be allowed to think of solutions to practical problems themselves before the					

	teacher shows them how they are solved					
5	Instruction should be built around problems with clear, correct answers, and around ideas that most students can grasp quickly					
6	Students learn best by finding solutions to problems on their own					
7	Use of groups for collaboration on tasks with instructions to foster collaboration among students					
8	How much students learn depends on how much background knowledge they have; that is why teaching facts is so necessary					
9	A quiet classroom is generally needed for effective learning					

10	Good teachers always know more than their students					
11	My role as a teacher is to facilitate students' own inquiry					
12	Thinking and reasoning processes are more important than specific curriculum content					
13	Students from poor homes tend to struggle learning in schools.					
14	Students whose parents are well educated and students whose parents are not well educated face the same level of difficulty in learning.					
15	Boys are more interested in learning than girls.					
16	Every one can learn irrespective of their gender or status					

Beliefs about teaching learning process using GESI

Q4. Please respond to the following statements based on your experience of schools/teacher education institutes in your country

S.No		Most of the times	Sometimes	Rarely	Never
1	Schools/Teacher Education Institutes are inclusive as they allow students with disability to study with other students				
2	There are separate schools for students with disability				
3	There are special educators for students with disability				
4	There are adequate infrastructural resources for students with disability in the schools				
5	The teachers are trained in methods and pedagogy that can support learning of students with disability				

6	Teachers are keen to help the students with disability				
7	Parents are interested in education for children with disability				
8	Students with disability are discriminated against in the society				
9	Girls are given equitable treatment in schools				
10	Economically weak students are given equitable treatment in schools				
11	General education teachers are adequately prepared in teacher education to address learning issues of students with disabilities				
12	Students with disabilities get adequate time from the teachers in the integrated classrooms				
13	Students with disabilities are not preferred in integrated classrooms due to their behaviour problems.				

14	Students with disabilities and economically weaker sections get extra time and assistance from the teachers.				
15	All the students irrespective of their gender, class and ability get the opportunity to express their ideas/opinions in the classroom.				

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