Teach To Learn's

Mentoring by Near Peers from HEI: A Promising Connection to Build Human Capital

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Abstract

The enclosed article introduces a promising School-Based Mentoring program that connects higher education and school education with the aim of building human capital by improving youth quality. The article also shares findings from the pilot implementations carried out in rural south India.

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Mentoring by Near Peers from HEI
A Promising Connection to Build Human Capital

Preface

Almost seven years ago, *'Teach To Learn'* (T2L) from the Indian Institute of Technology Madras (IITM), framed a set of questions:

1. How to effectively use the powerhouse of resources (i.e., premier higher education institutions in India such as the IITM) as the social capital to build human capital in a sustainable manner?

2. What is an effective mechanism to strengthen the tie between the two levels of education (i.e., higher education and rural school education) which can help develop personalities of the underprivileged youth?

3. How to systematically enhance the overall capacity of rural youth without making it an intervention for the distressed students or for specific situational needs?

In an attempt to find answers to these questions, T2L framed and implemented well-structured Mentoring-based programs across 70 rural schools of India. So far, over 1000 rural school students have been mentored by over 150 graduate student Mentors from IIT Madras. This article will try to present the approach, the possibilities and the pilot implementation outcomes, along with a few suggestions for best practices in framing effective Mentoring programs involving Higher Education Institution (HEI)s and rural schools.

Context

About 70% of India's population lives in the rural areas and a large number of school age children in rural and semi-urban villages study in government run schools. These students come from poor to very poor economic backgrounds and are often first-generation learners. NGOs and the government have been successful in increasing primary school enrollment rate and in increasing the national literacy rate. They also strive to address the visibly lacking basic infrastructure, poor quality teachers, insufficiently staffed schools and the basic nutrition of the students. However, the much-needed attention to personality and identity formation during adolescence is a far cry. Studies show that, during adolescence youth feel a greater need for autonomy, connections outside of parents, and they also have an elevated sense of self-consciousness (Pfeifer & Berkman, 2018). Engaging in experiences that meet developmental needs can improve the educational as well as the overall quality of rural youth (Schwartz & Rhodes, 2016).

The HEI-Rural School Mentoring Connection

Although history traces the beginnings of the progressive idea of school-college connection, it cannot be denied that over the years, a gap has developed between the two entities and are functioning at arm's length. A collaborative-partnership between schools and higher education institutions has substantial potential in strengthening educational outcomes (Lasley et al., 1992). The network between Indian HEI and rural schools, with respect to educational experiences of the youth, mainly fall in three domains:

- ***Infrastructure*** –laboratories, classrooms, equipment;
- ***Pedagogy*** –curriculum, teacher quality, administration, study and activity material;
- ***Learning*** – career guidance, workshops and trainings for skill development, recognitions and awards for academic achievements.

A closer look at the domains, shows that they are categorized based on certain types of need or for specific purposes. However, the pertinent problems lie beyond the mentioned domains. Studies show that less than 40% of the rural school enrolment at primary level reaches secondary level. The disparities in rural access contributes to very poor enrolment in higher education (Hosmani, 2014). The students who do pursue a degree struggle to keep up with the expectations and demands of college. This situation calls for measures to motivate and inspire adolescent youth and provide them with role models who can help with the skills and knowledge required to complete school and face the demands of college with confidence.

A formal HEI - rural school Mentoring program is one such measure and comprises of the following key connection aspects

1. Manner of Connection (provider and receiver)
2. Method of Connection (the mechanism)
3. Potential of Connection (Impact)
4. Duration of Connection (sustenance)

1. Manner of Connection

Unlike any run of the mill college, a premier HEI in India houses state of the art-technology, experienced faculty with global exposure, graduate students from diverse backgrounds and expertise and recognition for good quality work among institutions of the world. Therefore, the first important connection aspect is to consider a premier HEI as the **providing entity.** An HEI consists of multiple departments and diverse nature of work. When these departments (comprising of faculty as well as graduate students) come together as a team, the resource pool is strong and survives beyond the studentship of any individual student. For example: when a lab from a department run by a faculty along with his/her graduate students can be connected to a school, the connection between the lab and school thrives even when the students graduate. Therefore, the unique aspect of the connection with the HEI is that the school's engagement is with a resource group rather than with an individual.

2. Method of Connection

The outcome of a connection depends not only on the participating entities but also on the **mechanism** that engages them. The concept of Mentoring in India though is linked to the ancient gurukul system of residential education, in today's world, education primarily prepares candidates for economic contribution (Kumar, 2017). On the one side, a strong resource in HEI is available and has immense power to contribute, and on the other, high percentage of rural youth are eager and deserving of development-oriented engagements. Considering the established benefits of Mentoring, a development oriented, well-structured School-Based Mentoring (SBM) program can be considered a suitable mechanism to formally connect graduate students from HEIs with the rural youth.

3. Potential of Connection

While short-term programs can meet specific requirements, a long-term Mentoring program has the potential to strengthen the social capital and influence dimensions beyond youth development. The **impact** of such Mentoring connections can be seen at three levels: Micro, Meso and the Macro levels.

a) *Micro Level*

This is the individual gains of the Mentors and the Mentees. Focusing on the educational experience of the Mentees, the rural high school students not only get the necessary exposure and access to information, they also see the world beyond their school campus through a Mentor who is much like an elder sibling. The positive influence of and the ability to build trusting relationships with a 'special adult' has been studied extensively. These along with the skills and knowledge transferred during the interaction enhances the Mentees' capacity to learn and motivates them to dream big. Such changes over a period of time builds confidence, improves self-respect, enhances self-efficacy and contributes to changes in the key areas such social, emotional, psychological and intellectual development.

This Mentoring mechanism provides young adults (Mentors) a platform to think beyond their routine and understand the needs of others; the engagement will perhaps enable the graduate students to make meaningful social contributions as professionals and encourage their future students or subordinates to partake in similar engagements. Hence, there is potential for development of socially responsible youth. As a result of this connection, when rural secondary school dropout rates reduce and enrollment into HEI increases, these rural students who benefited from the connection will take it forward as resource providers. A potent resource loop is thus created.

b) *Meso Level*

This is the gains of the participating entities. One of the important benefits of a connection between two institutions catering to different educational levels is that, the process of transitioning from classroom to the field is made meaningful. While the college level curriculum is closely monitored by the demands from the industries, the high school curriculum can be kept relevant through the connection with HEIs. From a personality development perspective, with able support and timely guidance, the stormy transition from adolescence into adulthood can be eased off. Also, since the HEI works closely with schools there is a fair a chance to understand first-hand the barriers, challenges, limitations and needs of rural schools. Besides these, at the institution level, a connection between the two entities impacts players other than the Mentors and Mentees. Continued education of teachers, exposure to technology-based teaching methods and access to state of the art technology will encourage schools to think of teaching and learning beyond text books. Through a connection with ground reality, faculty from HEIs can perhaps take up socially relevant research work of which they have first-hand knowledge. They not only guide and supervise the graduate students who develop life skills as Mentors, but they also motivate the rural students to eventually become graduate students in the HEIs. Such a connection can reduce the present gap between the two levels of education (Jha et al., 2015).

c) *Macro Level*

A nations strength is its youth. When the adolescent youth in high school dream big and join higher education; when young adults in higher education become socially aware; when academic institutions join hands in developing personalities and providing collaborative platforms to enrich learning experiences; then, the nation will see vibrant, knowledgeable, competent, socially responsible professionals joining the work force. For a country like India which is fast becoming the youngest nation of the world, such a growth could be a game changer in the global scenario. A Mentoring connection between HEIs and rural schools has the potential to make this happen.

4. Duration of Connection

An engagement over longer periods of time increases the probability of program **sustenance**. For example, when the advisors encourage graduate students from his/her department/lab year after year, rural schools can get benefitted throughout high school period allowing sufficient time for not just exposure to information, access to material and infrastructure; but also, for knowledge building, skill development, and growth as well.

Field Work - Implementation Details of 1Lab-1School Mentoring Program

In an attempt to find answers to the questions mentioned in the Preface, and bearing in mind the above-mentioned aspects related to HEI-rural school connection, T2L has so far implemented a few Mentoring based programs. In the following pages the pilot implementation details of 1 such program called the '1Lab-1School' is presented.

Program Structure

Pilot implementation was carried out over two academic years (2018 June to 2020 March). Mentors visited their connected school 12 times during this period. Based on 100% attendance during the Mentoring sessions the sample Mentees considered for this evaluation is 73% (n=323) of the total participants (1295). Almost 95% of the students were from economically under privileged (Poor to very low income) families and where parents were either uneducated or had studied up to middle school. Of the two languages English and Tamil (regional language) as the primary mode of instruction in schools, 52% of our samples were from English Medium. Out of a total of 102 participants, 57 Mentors were part of the study. Over 60% were enrolled in Doctoral programs and the remaining were either Post-Doctoral Fellows or Masters students. Regarding the medium of instruction, about 51% of the Mentors were fluent in the English and Tamil, 13% were not fluent but familiar with the regional language, while the remaining 36% of the Mentors spoke only English fluently. Out of the 57 samples 30% had no prior teaching experience. A total of 11 teachers (1 teacher per school) participated in the study. Every participating teacher was a science teacher.

Method

A dedicated connection was established between Labs from IITM and rural schools. Graduate students from each lab visited the school they were connected to. Each member of a lab was responsible for approximately 6 to 8 Mentees. During the visits, they spent a day with Mentees to teach device-based science; provided academic, career related and general Mentoring.

The method of implementation comprises of 3 main steps a. Preparation b. Interaction c. Data Collection

a) *Preparation* – This phase consisted of activities prior to commencement of the interaction such as Orientations, Awareness Workshop, Participant Screening, Content Building, Mentor Training and Connection Meeting to formally set up the connection between schools and labs. The Mentors in this program were provided with a training module comprising of school syllabus compatible content. These were in alignment with Mentor's area of expertise and which allowed hands-on learning for the Mentees.

b) *Interaction* – This phase consisted of the Mentoring interactions between Mentors and Mentees during the implementation period. During each visit large group demonstrations, small group hands-on learning, general discussion, games, quiz, fun activities, career guidance etc. were carried out. Mentoring by college students who are more like an elder brother/sister, hands-on learning of device-based science, interactive learning, encouragement to ask questions, solve problems etc. were expected to inspire the Mentees, build on their science knowledge, inculcate curiosity, interest and critical thinking skills.

c) *Data Collection* – In this Phase, data was collected to streamline implementation and also to examine the impact. Data was collected from the Mentors, Mentees and the Teachers. A Pre-Test, Post-Test was administered to Mentees to see change in knowledge level in science. Survey was administered for understanding experience related feedback.

Outcome

The data was examined primarily to understand the impact of implementation. Since the interactions involved not just guidance and general motivation, but also systematic delivery of STEM content, the evaluation components included change in Mentee science knowledge and development of Mentee scientific thinking as well. The components are listed below.

1. Change in knowledge level in device-based science (in Mentees)
2. Change in interest level in learning science in general (in Mentees)
3. Change in motivation level related to academics and higher education (in Mentees)
4. Influence of Mentoring experience in general (on the Mentors and Mentees)

Cronbach's Data reliability test, Regression analysis, Percentage Analysis etc. were performed using SPSS. Only results relevant to above evaluation components are given below

1. Change in knowledge level in device-based science (in Mentees)

Mentee test performance and the survey responses related to knowledge area and attitude indicate modest improvement. The findings (see Figure 1). reveal that a significant majority (87%) of the Mentees showed 'Excellent' improvement in their performance. The Pre- and Post-tests administered during the Mentoring sessions tested short term retention leaving room for studying long term retention of Mentee knowledge. Details of test results are as below.

<u>Paired T Test</u>

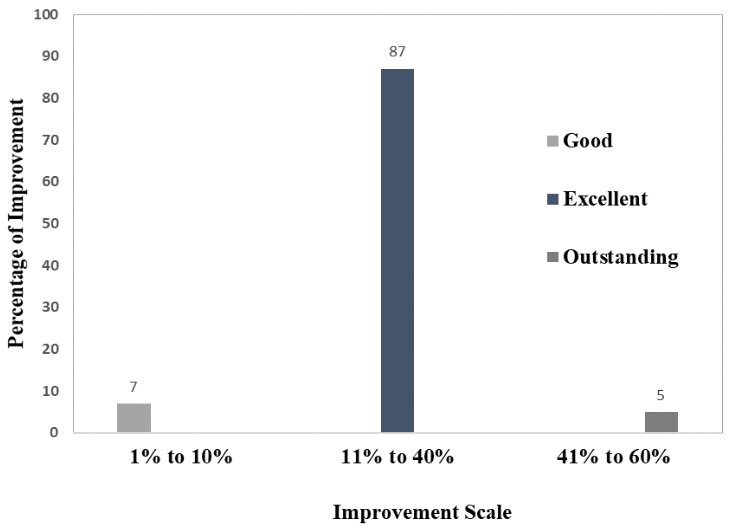
There was a significant difference in the Pre-Test (M = 38.93, SD = 19.163) and Post- Test (M = 63.40, SD =18.529) scores; t (2553) = -65.592, p = .000 with a statistically large effect size (Cohen's d = 1.26) between them. The results revealed that the students' performance in Post-Test had significantly improved when compared to the performance in the pre-test.

Percentage Analysis

i) A Percentage Analysis was performed on the Mentee Pre- and Post-test scores to measure overall improvement in performance (See Figure 1). The resultant scores were categorized in to scales ranging from 1% improvement up to 60% improvement as they were the minimum and the maximum improvement percentage secured by the Mentees respectively. Majority of the Mentees showed up to 40% improvement and 5% showed 'outstanding' improvement in their knowledge level. It was important to note that there was no Mentee who showed zero percent improvement.

Figure 1

Mentee Overall Test Performance



Note: This figure shows the percentage analysis of Mentee Pre- and Post-Test scores

ii) A percentage analysis was performed on application related questions in feedback survey to measure Mentee application of newly acquired knowledge particularly using scientific thinking skills (See Table 1). It was noticed that a significant 95% had developed a positive approach towards how they looked at devices. Almost 50% had attempted to repair a malfunctioning device and 70% had tried to make a device from scratch. A significant 71% of the Mentees have shown improvement in the test scores pertaining specifically to the 'application' oriented questions.

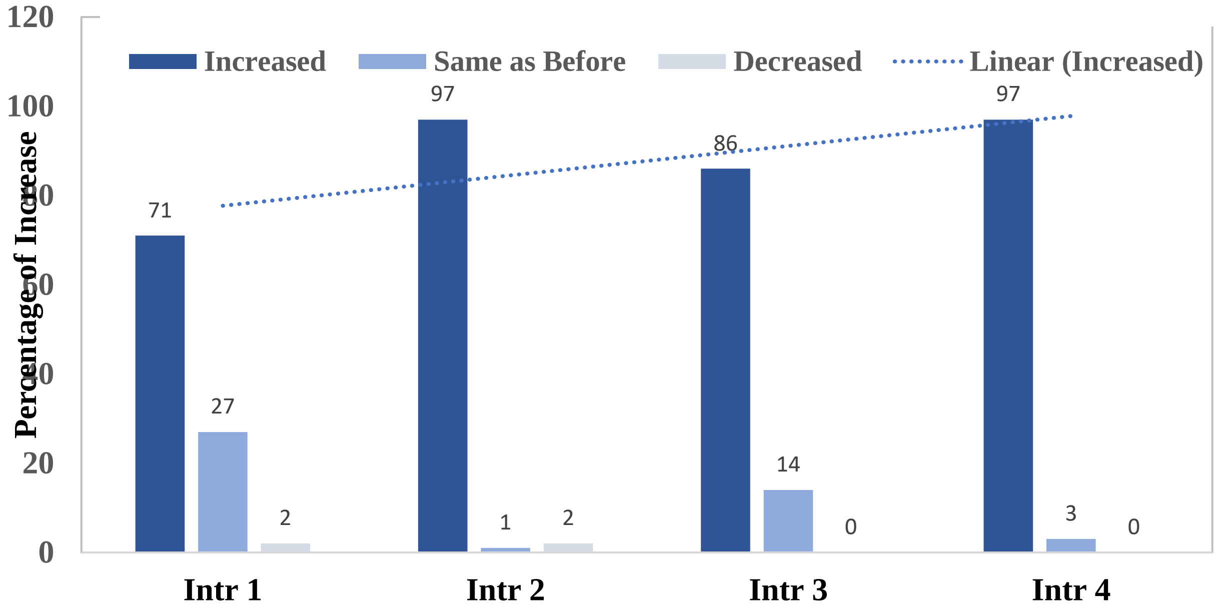
Table 1

Percentage Analysis - Development of Scientific thinking Skills

Approach toward devices	Positive	Neutral	Negative
	95%	4%	1%
Repaired devices	Yes	No	
	51%	49%	
Made devices from scratch	Yes	No	
	70%	30%	
Application-Based Test Scores	Improvement	No Improvement	
	71%	29%	

2. Change in interest level in learning science in general (in Mentees)

Figure 2
Mentee Level of Interest in Science



Note:
Intr 1: Rate the change in your frequency of asking questions in science class
Intr 2: Rate the change in your use of science-based materials and resources besides academic textbook
Intr 3: Rate the changed in your participation in science-based fairs and workshops
Intr 4: Rate the change in the level of your interest in science

To measure the change in interest level in science particularly after joining the Mentoring program and to examine the influence of the Mentoring interactions on the Mentees, percentage analysis of the Likert scale-based feedback survey was examined (see Figure 2). Responses showed an overall increase in science interest. A significant number of Mentees (97%) began referring to science related materials and books besides their academic text book; 86% started attending science fairs and workshops and, 84% of them had decided to take up science courses after class 10 (see Table 2); indicating development of interest in science. It is important to note that negligible number of Mentees have reported no change in the interest levels and none who reported that any prior interest level had reduced.

3. Change in motivation level related to academics and higher education (in Mentees)

Regarding change in the academic motivation level in Mentees (see Table 2), it is noteworthy that 84% of the Mentees have reported a new interest to pursue higher education. Almost 85% had decided to take science subjects at the higher secondary level. A significant 94% saw an increase in study time after school and 61% of the Mentees taught their friends and family what they learnt in this program. The interactions perhaps elevated their confidence and improved social skills which enabled them to teach others. Rather than passive listening, sensory experiences perhaps produced larger gain of achievement (Hammer & Giordano, 2012; Saunders, 1992)

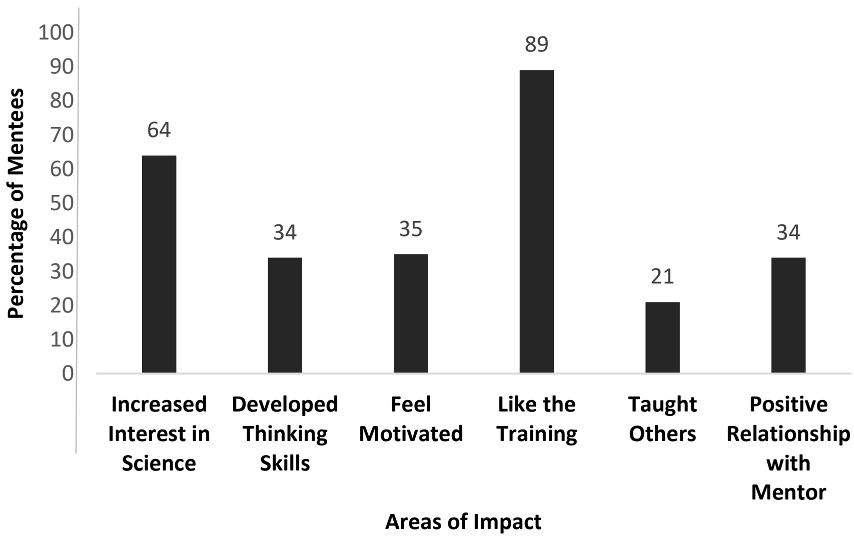
Table 2
Percentage Analysis of Influence of Mentoring on Mentee

	Percentage of Change		
Question Summary	Increased	Same as Before	Decreased
Study time after school	94%	5%	1%
Interest in Higher Education	84%	13%	3%
	Yes	May Be	No
Take science courses after class X	84%	13%	3%
	Often	Sometimes	Never
Taught others	61%	33%	6%

4. Influence of Mentoring experience in general (on the Mentees and Mentors)

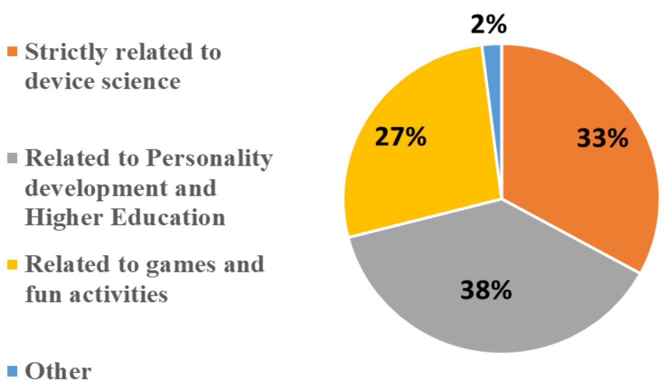
Percentage Analysis of open-ended feedback from Mentees on the overall experience showed the skills developed by the Mentees (See Figure 3). About 90% of the Mentees reported that they liked this program and wanted their 'anna' and 'akka' (elder brother, elder sister respectively in the regional language) to continue visiting. The experience of providing Mentoring had a positive impact on the Mentors as well. When asked about the type of interactions they had with the Mentees, 38% of the Mentors reported that they went beyond science and engineering when teaching (See Figure 4). Analyzing the responses to an open survey question related to what was the primary gain from this experience, Figure 5 shows that particularly from the interactions with Mentees, the Mentors developed social conscience and the much-needed interpersonal skills.

Figure 3
Mentee Qualitative Feedback



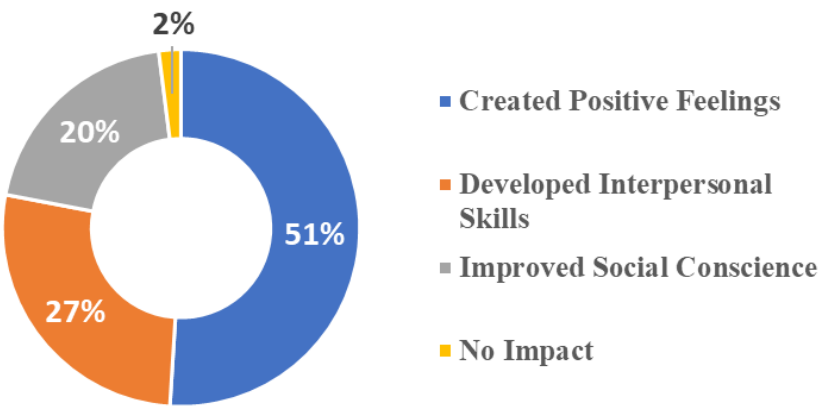
<u>Mentor Feedback</u>

Figure 4
Nature of Interaction



Percentage Analysis of open-ended feedback from Mentors on Nature of Interaction was believed to indicate the type of connecttedness between the Mentors and Mentees. Figure 4 shows the responses from Mentors regarding what their interactions with Mentees mainly comprised of. Figure 5 reports the Mentor responses to the open question related to what influence/impact the Mentoring experience had on them.

Figure 5
Mentor Qualitative Feedback



Teacher Feedback on Mentoring Interactions

The teachers expressed that the Mentors had the ability to manage the classroom extremely well (see Table 3). About 45% of the Teachers felt that language fluency of the Mentor and the medium of the Mentee did not play a barrier toward interactions and 91% of them reported that Mentors had the ability to connect well with class IX students. Almost all of the teachers strongly agreed that the training sessions were interactive.

Table 3
Percentage Analysis - Teacher Report on the Mentoring Sessions

Areas of Impact	% Of Teachers
Language not a Barrier	45%
Mentors' ability to teach class IX	91%
Classes were interactive	99%
Mentors managed class well	100%
Positive connection with the Mentees	100%

Impact evaluation

The data collected was expected to shed light on the probable impact of a Mentoring connection between graduate students from premier HEI and rural high school students. The results reveal that there is significant improvement in Mentee test performance and motivation levels. It also shows that Mentees have developed academic aspirations as well as an interest in science. The Mentoring experience seems to have had a positive influence on the Mentors as well.

Below is a list of the carefully-thought program elements that worked well in this implementation.

1. The Awareness Workshop provided a constructive interaction platform between the entities. This was also a great place to collect ground level input from both sides and frame a workable implementation plan.
2. A collective approach is already part of Indian culture. Within this 1-1 connection, the team of graduate students were connected with a group of high school students. This made dedicated relationships possible, yet provided the benefits of collective experiences.
3. Contextual understanding is critical to conceptualize Mentoring programs (Pryce et al., 2011). This realization helped in handling the functional dynamics of the relationships.
4. Mentor Orientation helped in setting reasonable expectations and preparing for effective interactions. The orientation included the Mentoring process, the rural set up, Mentee adversity, limitations and barriers in the school environment and skill/knowledge level limitations of Mentees, interaction curriculum etc., It also gave working framework related to preparation before interaction and documenting feedback after each visit to the school.
5. The interaction curriculum comprised of hands-on STEM content. This helped in the following ways:
   a. Learning something new, experiential and hands-on learning etc., encouraged the Mentees to engage with interest.
   b. Mentors were not overwhelmed with making interaction plans for every meeting from scratch. They could use provided content to connect with the Mentees, yet have the freedom and flexibility to take ownership of the meeting. This gave the Mentors the confidence that they had something to hold on to, yet were not held down by it.
   c. Instead of only focusing on issues and problems, this productive curriculum gave way for positive and constructive relationship building.

Suggestions for Framing Effective Mentoring Programs

1. For reaping the benefits from any program, it is not only important to implement the program successfully, it is equally important for the participants to realize their individual growth and development. Therefore, feedback and self-evaluation are a major part of the process (TESS-INDIA, 2017). It helps in streamlining the implementation by controlling deviation, and also helps Mentors and Mentees to track their own progress.
2. There are studies that talk about the possibilities of match break and deterioration in engagement quality after a short period and some studies even talk about the negative effects of match break after long engagements. Using technology and multiple methods of interactions during the same period may help in sustaining the strength of the relationship. For example: Combining in-person meetings with virtual face-face meetings and follow ups over phone calls may help in keeping the connection alive and also in maintaining continuity for a longer period.
3. Mentor training on Mentee background, mentoring relationship dynamics, Do's and Don'ts during interactions etc. will be helpful to set the right expectations and equip the Mentors to perform confidently.

Conclusion

In this brief article, some of the key aspects of a 'Mentoring Connection' between HEIs and rural schools and outcome of a pilot implementation of such a connection was shared. This type of give-and-take can enhance educational outcomes, and also give a refreshing meaning to social capital which considers relationships as resources that can lead to the development and accumulation of human capital (Hezlett & Gibson, 2007). The strength and applicability of this approach makes it versatile to use across borders. While, the critical need for context-based empirical research in school-based Mentoring has been realized, most programs are based on systems and needs within a geographic set up. Published studies are largely from America and then from Europe, Australia and other countries (Pryce et al., 2011). One of the ways to enrich international research in mentoring is, through global collaborations between HEIs across the world with a focus on the set up of the context-based Mentoring connection as well as in sustaining the efforts. Longitudinal studies to understand the impact over time, investigating the impact on the Mentors, and studying the formation of the Mentoring loop from adolescence to adulthood will enrich the research field and also provide the much-needed guidance to frame effective programs for bringing research to practice.

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Appendix

Below are few photos related to our implementations

The Awareness Workshop

Input and information exchange between School and HEI

Graduate Student (mentor) connecting with high school students (Mentee) through STEM teaching

Mentor-Mentee Interaction

The Mentoring relationship