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Impact of Facilitated Mentoring on Practices and Attributes of Science Teachers: Empirical Evidence from Primary School Context

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Abstract

The study aims to investigate the impact of facilitated mentoring on science teachers' practices and attributes in primary schools. The paper also focuses to examine the difference of facilitated mentoring perceived effect on primary science teachers' practices and attributes with regards to gender and sector. The primary school science teachers from public and private schools of Johar Town, Lahore were included in the population. The sample size consisted of 200 science teachers, out of which 100 were from public and 100 were from private primary schools. Further, 88 were male and 112 were female. This research implies quantitative method, data was collected using structured questionnaire based on five key factors to check perceived effect of facilitated mentoring on the primary school science teachers' practices and attributes. The results showed that facilitated mentoring has moderate effect on the attribute and practices of science teachers. The effect of facilitated mentoring on the science teachers' practice of 'Modeling' in private and public primary schools is significantly different. Further, the effect of facilitated mentoring on the science teachers' practice of 'Modeling' with reference to gender is significantly different. It is suggested that the teachers' facilitated mentorship program needs to be thoroughly examined and improved to make it effective, so that it could influence the science teachers' practices and attributes. This may in turn influence the students' performance positively along with improving the school performance.

Keywords: Facilitated Mentoring, Attributes, Practices, Science Teachers, Primary School Context.

Introduction

Teaching must be according to the current need because we live in the twenty-first century, when new discoveries occur daily. Teaching is just as much of a responsible career as any other, and it must also meeting the needs of the present era. Mentoring is a critical technique that may be observed being utilized to update teaching-learning experiences. Mentoring has been seen as useful process to improve the competencies of science teachers to perform their duties as per the defined standards and bring positive change in the students' academic progress. Various authors did research regarding mentoring practices in schools and highlight it as a useful process through supporting the above argument (Akhlaq, etal., 2015; Munir and Amin, 2020).

Fostering a culture of science learning in primary school pupils is critical for developing a country with burgeoning scientific progress. Interest in studying science can be produced solely via effective instruction, which may be strengthened through the use of mentoring methods and any other talents that benefit student learning as a consequence. Since the 1970s, mentoring has risen in popularity in the workplace, and it is often used to aid younger members of staff in progressing their careers. Thus, as the world progressed, this word evolved to be used in the sense of "a knowledgeable or trustworthy friend or counsellor" (Webster, 2001). According to the research, "mentoring relationships assist individuals in achieving their objectives by giving alternative means of accomplishing them" (Clutterbuck, 2002). By establishing teacher mentoring programs, the school

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system achieves two critical goals: new teachers get an early start in their careers, and experienced teachers who serve as mentors are acknowledged and rewarded for their contributions. Due to the innate curiosity of primary school pupils, science is an excellent subject for them to study in primary school. Children as early as five years old possess the requisite intellectual capacity to comprehend science. Recent research indicates that children's cognitive abilities are very sophisticated, in contrast to popular perceptions about their age. Children, for example, may exhibit causal reasoning and the ability to differentiate between trustworthy and inaccurate sources of information. So, it is important that teachers know to teach science effectively to primary learner and for this purpose facilitated mentoring can play its role (Darling- Hammond, 2000).

Importance of Facilitated Mentoring for Primary School Science Teachers

Facilitated mentorship is a method for meeting the requirements of PSTs and addressing their professional insufficiencies by providing them with ongoing professional development (Jacobi, 1991, Darwin, 2000). Teachers may improve their ability to address the needs of their students by taking advantage of the CPD opportunities available to them.

Facilitated Mentoring Practices in Public and Private Sector of Punjab- Pakistan

For the better part of a century, Pakistan, as a developing nation, lagged behind other countries in terms of scientific education and teacher preparation. In order to increase their professional talents and knowledge, primary school teachers in Punjab started getting regular professional development in 2003. The purpose of CPD was to assist PSTs in improving their job performance and expanding their learning capacity (GoP, 2012). The research conducted on these initiatives presents a holistic picture of government's fruitful initiative with reference to school effectiveness and students performance. Moreover, government made many collaborations with other organizations to provide mentoring programs for PSTs. Organizations involve are British Council (Connecting Classrooms), Quaid-e-Azam Academy for Educational Development (QAED), PEELI-Trainings and United Nations development programs for schools.

With the purpose of integrating learning into ordinary school activities and enhancing teaching quality, private schools created a strong mentoring culture and frequent peer coaching. Teachers at premier private schools prioritized creating learning environments and incorporating learning opportunities into everyday campus life. Teachers are being trained and mentored via a number of initiatives. Main-stream schools like Lahore Grammar School, Pak Turk International School, American Lyceum, like Beacon house, and LACAS provide frequent opportunities for its staff to participate in training and mentorship programs. For them, it allows them to maintain their in-service instructors up to speed with the most recent educational trends. Such schools possess a proper professional development departments and experienced supervisors/mentors to meet the teachers' mentoring needs.

Five factors of Facilitated Mentoring

First one is *"personal attributes"*- Mentoring focuses on the development of complex tasks taken out in different settings and scenarios at different educational levels (Wildman et al., 1992). To do it, mentors needs to be well developed to give teachers a complete view of specific teaching/learning abilities, an mentors also have to develop a two-sided relationship (Dynak, 1997). Second factor is *"system requirements*"- It is critical that all teaching activities be directed toward a common goal that is compatible with and fits the requirements of the state's scientific objectives (Bybee, 1997). Bybee stressed the importance of scientific change that needs to be originated by the central department.

Third one is *"pedagogical knowledge"*- it refers that teacher must have command not only on text in the book but also what's happening in relation to all that in surroundings. Through this way only she can address the curiosity of students for learning science. Fourth one is *"modeling"*- it refers to show casing your teaching abilities through concrete visual representations. The last one is *"feedback"*- Numerous research have established the critical nature of constructive feedback in the mentoring process of teacher preparation (Bishop 2001). So, if the mentoring is programmed considering all these factors in debate, then it would be fruitful and can enhance professional competency of science teachers making them more confident in classrooms.

The following researched questions of the investigation have been framed:

1. What is the perceived impact of facilitated mentoring on primary school science teachers' practices and attributes?

2. Is there any difference between the facilitated mentoring's perceived effect on primary school science teachers' practices and attributes based on school sector?
3. Is there any difference between the facilitated mentoring's perceived effect on primary school science teachers' practices and attributes based on gender?

Research Design and Methodology

The study is quantitative in nature and it falls in the positivism philosophical paradigm. The primary school science teachers from public and private schools of Johar Town, Lahore were included in the population. The sample size consisted of 200 science teachers, out of which 100 were from public and 100 were from private primary schools. Further, 88 were male and 112 were female. The data was collected using structured questionnaire named as Mentoring for Effective Primary Science Teaching (MEPST). This tool was developed by Peter Hudson, Keith Skamp, and Lydon Brooks back in 2005. This questionnaires was developed to measure the effect of facilitated mentoring on primary school teachers' practices and attributes. This instrument is consisted on five main dimensions including personal attributes, system requirements, pedagogical knowledge, modeling, and feedback. The reliability coefficient of Cronbach Alpha of the tool was 0.94. The data was analyzed through the use of mean and t-test. Mean was used to address the first research question, whereas t-test has been used to see if there is any significant difference between the facilitated mentoring perceived effect on primary school science teachers' practices and attributes.

Data Presentation and Interpretation

Table 1 shows that the mean value of the facilitated mentoring perceived effect on primary school science teachers' practices is 3.67 with Standard Deviation (0.54). The mean value is slightly greater than the reference value (3) which shows that the perceived effect is moderate. Similarly, the mean score of the facilitated mentoring perceived effect on primary school science teachers' attributes is 3.87 with Standard Deviation (0.57). The mean value is slightly greater than the reference value (3) which shows that the perceived effect is moderate.

Table 1

Perceived Facilitated Mentoring Effect on Primary School Science Teachers' Practices and Attributes

	N	M	S.D.
Practices	200	3.67	0.54
Attributes	200	3.87	0.57

Table 2 shows that *t*-test value for the personal attributes is 0.09 and the corresponding sig. value is 0.93, which is greater than the predefined *P*-value (0.05). So, it is inferred that there is no difference in the perceived facilitated mentoring effect on primary school science teachers' personal attributes based on school sector. The data on system requirements highlight that the value of *t*-test is -1.13 and the related *P-value is 0.26. Since, P* > 0.05, therefore there is no significant difference in the perceived facilitated mentoring effect on system requirements dimension of primary school science teachers based on school sector. The results point out that *t*-value for the pedagogical knowledge is -0.03 and the concerning significance value is 0.98, which is greater than 0.05 – the predefined value of *P*. Thus, it can be concluded that no significant difference in the perceived facilitated mentoring effect on pedagogical knowledge dimension of primary school science teachers based on school sector exists.

Table 2:

Perceived Facilitated Mentoring Effect on Primary School Science Teachers' Practices and Attributes based on School sector: Results of Independent Sample t-test

Factor	Variable	Mean	*t*-test Value	Sig.
Personal Attributes	Public	23.25	0.09	0.93
	Private	23.20		
System Requirements	Public	10.64	-1.13	0.26
	Private	10.84		
Pedagogical Knowledge	Public	41.25	-0.03	0.98
	Private	41.27		
Modeling	Public	28.36	-2.07	0.04
	Private	29.81		
Feedback	Public	22.86	-0.04	0.97
	Private	22.89		

N= 100 for Public & 100 for Private *P* = 0.05

The data on modeling highlight that the value of *t*-test is -2.07, and the corresponding value of *P* is 0.04, so $P < 0.05$. Therefore, it can be said that there is a significant difference in the perceived facilitated mentoring effect on modeling dimension of primary school science teachers based on school sector. The results on last dimension (feedback) indicate that the *t*-test value is -0.04, and the related value of significance is 0.97. So, $P > 0.05$, which shows that there is no significant difference in the perceived facilitated mentoring effect on feedback dimension of primary school science teachers based on school sector.

Table 3:

Perceived Facilitated Mentoring Effect on Primary School Science Teachers' Practices and Attributes based on Gender: Results of Independent Sample t-test

Factor	Variable	N	Mean	*t*-test Value	Sig.
Personal Attributes	Male	88	23.05	-0.68	0.53
	Female	112	23.05		
System Requirements	Male	88	10.51	-0.76	0.45
	Female	112	10.76		
Pedagogical Knowledge	Male	88	40.47	-1.6	0.12
	Female	112	41.88		
Modeling	Male	88	28.22	-2.21	0.03
	Female	112	29.77		
Feedback	Male	88	22.79	-0.28	0.78
	Female	112	22.94		

N= 88 for Male & 112 for Female $P = 0.05$

The data presented in Table 3 on personal attributes shows that the value of *t*-test is -0.68, and the related value of *P* is 0.53 – which is greater than the predefined value (0.05) of significance. So, it can be inferred that there is no significant difference in the perceived facilitated mentoring effect on personal attributes of primary school science teachers based on gender. The data on system requirements highlight that the value of *t*-test is -0.76 and the related value of *P is 0.45. Since, P* > 0.05, it may be concluded that there is no significant difference in the perceived facilitated mentoring effect on system requirements dimension of primary school science teachers based on gender. The data on pedagogical knowledge point out that the value of *t*-test is -1.6, and the concerning value of *P* is 0.12 – which is greater than the predefined value of *P* (0.05). Therefore, it may be said that there is no significant difference in the perceived facilitated mentoring effect on pedagogical knowledge dimension of primary school science teachers based on gender.

The results related to modeling dimension show that the *t*-test value is -2.21, and the corresponding $P < 0.05$. So, it can be inferred that significant difference in the perceived facilitated mentoring effect on modeling dimension of primary school science teachers based on gender exists. The data on final dimension (feedback) highlights that the *t*-test value is -0.28, and the related value of *P* is 0.78 – which is greater than the critical *P*-value (0.05). Thus, it is concluded that there is no significant difference in the perceived facilitated mentoring effect on feedback dimension of primary school science teachers based on gender.

Results and Discussion

Summarizing the findings after data analysis it can be seen that perceived effect of facilitated mentoring on both personal attribute and practices of primary school science teachers is notable and is moderate. The significant difference does not exist in the perceived effect of facilitated mentoring on primary school science teachers' personal attributes and all dimensions of practices (except modeling dimension) based on school sector (public and private). Similarly, the significant difference does not exist in the perceived effect of facilitated mentoring on primary school science teachers' personal attributes and all dimensions of practices (except modeling dimension) based on gender (male and female). The effect of facilitated mentoring on the science teachers' practice of 'Modeling' in private and public primary schools is significantly different. Further, the effect of facilitated mentoring on the science teachers' practice of 'Modeling' with reference to gender is significantly different.

For the purpose of improving the mentee's teaching practice, a good mentoring program necessitates the mentor displaying personal characteristics. Such qualities include the mentor being helpful, attentive, and at ease when speaking, all while fostering good attitudes and trust in the mentee's teaching methods. Notably, personal characteristics of the mentor might help the teachers

(mentees) give their reflection on practices more positively. Such techniques of mentoring were found to be significantly reflective with reference to "Personal Attributes" needed by the mentors (Hudson et al., 2005), and this was considered with regards to mentoring of primary school science teachers and teaching (Hudson, 2005).

Scientific literacy can be best achieved through effective teaching and effective teaching can be induced by effective mentoring practices. For this purposes stakeholders of these mentoring program must include these basic five factors introduced by Peter Hudson, Keith Kamp & Lydon Brooks. So the current study was done to see if these factors are followed equally in public and private primary schools of Punjab in mentoring practices. Results also provide the clear image of the difference between modelling practices in public and private sectors. Modeling refers to the exhibition of one's pedagogical knowledge through performing. Researches shows, that it makes teaching and learning process more interesting. There is a need that both sectors work closely to create a balance to ensure uniformity of the science through nation.

According to the data, slightly more than half of the mentors seemed at ease discussing primary scientific education. Mentors who are comfortable discussing scientific teaching can help their mentees gain confidence in their ability to teach in this subject. Mentors are looked by mentees as experienced teachers, confident, and if mentors have weak or no confidence during interaction with mentees, this might have a negative impact on the development of the mentee's core teaching techniques. Educators and researchers must continue to investigate and comprehend the consequences of marginalizing certain human characteristics in the mentoring process.

Effective mentoring can help mentors strengthen their own qualities. Mentors, according to Little (1990), learn how to be more persuasive and impactful while still being diplomatic in providing critical criticism (and conversing easily) to their mentees. According to Fresko (1991) the process of mentoring imparts patience and sympathy at individual and group level in the society, as well as more awareness about social aspect and a deeper sense of responsibility for the society. As a result, the mentor's personal qualities become an important aspect of good coaching. It's worth noting that mentors are frequently willing to continue mentoring after participating in preservice teachers' field experiences (Scott & Compton, 1996), implying that the mentor appreciates the process of mentoring and clearly obtain benefits for their own.

Conclusion

The science teachers of primary school are typically overworked, they have to cover all the subjects being offered at primary schools, and cannot be expected to be specialists in all of them. As a result, information that can help them to facilitate topic areas where they aren't specialists could also help their mentees grow. Furthermore, universities should focus on the better preparedness of pre-service teachers. Mentorship is one of these processes, and some personal characteristics have been linked to good mentoring.

Personal characteristics of the mentor (particularly interactive abilities) might affect the growth of the teachers (mentee) and may influence the mentoring process and its quality. Attributes related to the personality of mentors, for example comfort talking about teaching, and may put mentees at ease when it comes to question for clarification and investigating particular themes. The comfort level might also depend on developing relationship with the mentee, good relationship between mentor and mentee encourages dialogues, allowing the mentee to be at comfort level and share their creative ideas related to teaching. Being able to communicate about scientific education with ease may boost the mentee's confidence in the classroom and allow for more reflective and creative practice. The attitude of the mentor to creating chances for reflection with reference to the teaching process and facilitating feedback regarding practice and making himself accessible is critical for the process of mentoring. In conclusion, facilitated mentoring can improve the competencies and practice of science teachers, this will help the teachers to perform better and help students in improved learning. This will lead to school effectiveness and overall academic success. So, it is suggested that science teachers need to be provided facilitated mentoring in primary schools.

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