STRATEGIES OF EMPOWERING MATHEMATICS TEACHERS FOR THEIR PROFESSIONAL DEVELOPMENT

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ABSTRACT
This paper explores the strategies for empowering mathematics teachers for their professional development particularly in the context of Nepal. The main purpose of this paper is to highlight the motivating factors that facilitate for the professional development of mathematics teachers. The paper is based on qualitative inquiry with purposive sampling techniques of selecting mathematics teachers and mathematics educators as data sources. On the basis of interview with teachers and educators it was concluded that that opportunity for attending mathematics workshops, seminars and conferences sharing, job security, being provided the constructive feedback, getting promotional opportunity, attractive salary, develops professionalism, and use of technology were the main strategies for the professional development of mathematics teachers.

KEY WORDS: Strategies, Empowering, Professional Development, Mathematics Teachers.

1. INTRODUCTION
Teachers are the cornerstone of education. Good teachers are always required for quality education. For this, teachers' professional development is essential. Professional development is an ongoing process through which teachers keep on growing with their own voluntary effort [8]. Teachers' professional development is a lifelong process depending on knowledge, skills, and experiences necessary to provide effective instruction to the students and their progress. It is the process of keeping teachers up to date with the development in the field through regularly reviewing and evaluating their teaching skills [4]. In fact, teachers' professional development strengthens the purpose of teaching-learning activities, which ultimately raise the quality of education for their professional development. Since teachers as educators, they can raise their status and standard to improve teaching-learning activities. Teachers need to be updated with recent knowledge and skills because they are educators. Professional form is one of the characteristics of the professional development that professionals form an association and all professionals become the members of their association. Association plays an important role to standardize knowledge, skill, attitude and habits of its members. Therefore, teacher professional development concerns teachers' daily activities of their association as well as national development through ethical aspects.

Teachers' values, identities and moral purposes are the major affecting factors for effective teaching behavior. Their attitudes to learning care and commitment to the subjects that they teach are also associated with effective teaching. The best mathematics teachers are those who are confident in their discipline and commitment to their subject, and students. They are patient, caring and dedicated to their students' achievement.

Mathematics teachers' professional development includes the acquired skilled and emotional intelligence through formal education and trainings along with direct induction and second hand experience of the whole teaching career through a number of trajectories of achieving self-awareness and future direction in teaching. Without quality of the teachers quality of education is impossible. In this context, [3] states that teachers have the sole potential to enhance the quality of learning by bringing life to curriculum and inspiring students to curiosity and self-directed learning.

Professional development, in a broad sense, refers to a development of a person in his or her professional role. More specifically, "Teachers' development is professional growth a teacher achieves as a result of gaining increased experiences and examining his or her teaching systematically" [7]. Professional development includes formal experiences, such as attending workshops and professional publications, watching television documentaries related to an academic discipline, etc. [6]. This conception of professional development is, therefore, broader than career development, which can be defined as "the growth that occurs as the teacher moves through the professional career cycle" [7] and also broader than staff development, which can be "the provision of organized in-service programmed designed to foster the growth of groups of teachers; it is only one of the systematic interventions that can be used for teacher development" [7]. When looking at professional development, one must examine the content of the experience, the process by which it will take place [7].

This new emphasis has been welcomed by teachers and educators in general as it represents, a much needed appreciation of teachers' work, and promotes the concept of teaching as a profession. Unfortunately, others have taken this a new emphasis as a sigh from which teachers are not provided adequate teaching standards. Actually, it is for those hard working teachers and educators who need the professional development opportunities, not only to promote the recognition of their work as professionals, but also to raise the opportunities for growth, exploration, learning, and development for all professionals in any field. In this context, training is one of the means for teachers' professional development. Redefinition of teachers' staff development as a process of learning, role of leadership at the school level, the organizational culture at the school level and the role of external agencies at the local and regional levels are the contributing factors for successful teacher development [5].

Inside the classroom, teachers' roles are important. Teachers are learning to act as facilitators and mentors of their students' learning. Outside of the classroom, teachers are assumed to have collaborative team-building and decision-making roles. These roles of teachers can be accomplished through professional development. Professional development provides opportunities for teachers to explore new roles and develop their new instructional techniques. The nature of these opportunities depends largely on how professional development is perceived by the entire educational system. To fulfill the demand of stakeholders, such as the students, parents as well as mathematics teaching communities, it is necessary to explore the encouraging/contributing factors that can be broadly developed professional development of mathematics teachers. In this context, the major purpose of this paper is to explore the strategies of empowering mathematics teachers for their professional development in Nepali context.

2. CONCEPTUAL FRAMEWORK
A conceptual framework is an analytical tool with several variations and contexts. It is used to make conceptual distinctions and organize ideas. Strong conceptual frameworks capture something real and do this in a way that is easy to remember and apply. The conceptual framework helps understand the whole research concisely. In the below figure (1) conceptual framework depicts the main encouraging factors in left hand side and research process in the right hand side.
4. STRATEGIES FOR PROFESSIONAL DEVELOPMENT
There were many strategies of empowering for the professional development of mathematics teachers. The empowering strategies were thematized through the sequential processes of coding and categorizing the information explored through the interviews with the mathematics teachers and mathematics educators which have been presented in the subsequent sub-sections:

4.1. Opportunity for Attending Mathematics Workshops, Seminars and Conferences
Teachers as professionals need to get mastery over instructional competences which include the subject knowledge, awareness of the prescribed curriculum, pedagogical expertise, the capacity to manage and generate change, the ability to engage constructively in self-development through reflection as a teacher, and involvement in research development of schools and the educational service. This work is only possible by participation of different mathematics workshop, seminars and national and international conferences. In this issue teacher participant ‘A’ said,

“In my opinion, the different workshops, seminars and conferences are to be organized for professional development of mathematics teachers. And participating these functions, we share ideas, tendency to support dialogue and collaboration. We, teachers enjoy the chance of working together and exchange our ideas. If this is done at school, this can lead input and skill transformation to each other.”

From the aforementioned information, mathematics teachers need to participate in different conferences; workshops and seminars which will help develop the professionalism. Through involvement in such activities, mathematics teachers’ work together collaborative and sharing ideas about subject matter that can help in their professional development. [12] Claims that sharing ideas with the colleagues is one of the most important ways of generating professional knowledge.

In this issue my another participant mathematics educator E1 opined that,

“I think, through participating mathematics workshops; conferences and seminars, the teachers can exchange the ideas of diverse learners. Their participation in meetings, seminars, talk programs and conferences helps a lot to enhance quality of mathematics teachers and also helps to encourage their professional development.

In the aforementioned information, it came to know that discussion and interaction can make teachers more confident on their subject matters. Participation has such power from which it helps to encourage professional development of mathematics teachers.

4.2. Job Security
Fearful mind can’t do work. If there is no security for the job, the person will attempt to search new opportunities. So job security is one of the motivating factors for professional development of mathematics teachers. Motivation is commonly through of an inner drive, emotion that moves one to a particular action. [1] Job security plays a very important role in teachers’ professional development. In this issue, teacher participant ‘B’ said,

I think teaching mathematics is very complex mental process.

Figure 2: Data analysis Process

For better teaching, teachers are well satisfied for his/her job.
There is no acknowledgement of work which discouraged me for my professional development. If the government makes job
Guarantee/warranty, then I do better work in my field.”

The same types of opinions have been given by the mathematics
Educator ‘E’.

From the above information, it came to know that good teaching environment and job security are the encouraging factors for professional development of mathematics teachers. This means that teachers need permanency for their professional development. So job security and good working environment can play a great role for professional development for the teachers. Teachers’ working conditions affect their ability to provide quality learning.

4.3. Providing Feedback
Providing feedback to the teacher plays a very important role in teacher professional development. The feedback is not a summative end point; but starting point for future learning. Hence, feedback should indicate what is wrong to the work and what is needed to be done to improve our professional field. In this line teacher participant ‘C’ said,

Regular supervision and providing feedback can play a role for motivating teachers for their professional development.

From the above information, it came to know that constructive feedback encourages teachers to do better in their job and helps contribute for professional development of mathematics teachers. In this perspective, other participant Mathematics educator ‘E’,

Said,

We can’t be successful mathematics teacher until we take feedback from the other about our profession. After we finish our teaching or presenting the subject, we should ask: is there anything that I have to improve?

The comment of seniors and colleagues is always commendable. The feedback from others helps to foster the academic standard of teacher [10]. A professional mathematics teacher has to respect feedback from others.

4.4. Promotional Opportunity
Every mathematics teacher wants promotion in his/her teaching career. Mathematics teachers can be praised to succeed in their fields. Giving them complete recognition and credit for what they do, will positively motivate them to do better job. If teachers are once given their due respect, they become more constructive and loyal to the school. In this regard, one teacher participant ‘D’ said,

If the teachers’ upgrading system is more transparent and regular on the basis of their performance then mathematics teachers can do better in their profession.

The Promotion is based on their academic performance rather than year counting system. Then the teachers are encouraged for their professional development.

The view of the teacher informed that upgrading system of teachers helps encourage the professional development of mathematics teachers. The teachers seek not only the salary increase and teaching load decrease, but also see recognition and prestige in the society. So, the provision of promotion is one of the contributing factors for professional development of mathematics teacher.

4.5. Attractive Salary
For some teachers it is the attractive salary that motivate them for encourage in their profession. The teachers are frustrated with a very poor salary and try to change their profession. In this issue teacher participant ‘E’ said,

“Uncompetitive lower salary that encourage not bring job satisfaction. Salary must be transparent and consistent with present socio-economic condition and rising price in the market. I also sometimes think I should look for better job.”

From the above view of the teacher, it claims that at least living cost is necessary to cover the daily expenses of mathematics teachers. To fulfill the basic needs in life their salary cannot afford. So, providing handsome salary is encouraging factor for professional development of mathematics teachers.

4.6. Develops Professionalism
A professional mathematics teacher should be accountable, dutiful and trustworthy towards his/her profession. It is very difficult to earn trust; but it is easy to break it. Teacher is a social worker and s/he needs to be loyal to his or her profession. Teaching is a profession where a teacher requires professionalism. Professionalism comes from the heart of teachers and it is reflected on her or his profession. Professionalism captures what it means to be a professional, and what is expected of them. Professional activity is complex full of diverse activities. In this version teacher participant ‘F’ said,

For better teaching, teachers are well satisfied for his/her job.
There is no acknowledgement of work which discouraged me for my professional development. If the government makes job
Guarantee/warranty, then I do better work in my field.”

The same types of opinions have been given by the mathematics
Educator ‘F’.

From the above information, it came to know that good teaching environment and job security are the encouraging factors for professional development of mathematics teachers. This means that teachers need permanency for their professional development. So job security and good working environment can play a great role for professional development for the teachers. Teachers’ working conditions affect their ability to provide quality learning.
A professional mathematics teacher should have sincerity and love to one's profession. S/he should be transparent in his or her dealings, discussions, delivery and decisions. Moreover, s/he should earn trust among students, parents and teachers as well.

From the above information it came to know that what matters in the life of a mathematics teacher are care, concern and curiosity. The matter of patience, purity, passion and perseverance are always greatly required to be a professional teacher.

In this issue mathematics educator E, said,

A professional teacher should have command and control over the subject matter. S/he should have adequate mathematical knowledge, skills of handling mathematics knowledge, method of mathematics teaching, command on subject matter, confidence, encouraging personality, motivating ability etc. to become a professional mathematics teacher.

In the aforementioned information it was found that good mathematics teachers should have a complete understanding of subject matters. They teach in depth to convey the information in meaningful ways to help students grasp concepts. A specialized body of knowledge and mastery over pedagogical as well as mathematical content knowledge are the main characteristics of teaching. In this line [13] categorizes the knowledge base, essential for teaching domains, such as Content knowledge, pedagogical knowledge, curricular knowledge, knowledge of learners, purpose and values, their philosophical and historical grounds, and knowledge of educational context.

4.7. Use of Modern Technology

Technologies are merely the tools for delivering instruction for learning. It is an invention to understand the world with a click within few seconds sitting in a room. Modernization has developed such a technology and teachers can be a good agent with its use and can popularize it. If they have access to such technology, they can transfer learning skills effectively in teaching through these devices. The researcher was interested to explore the practices of using modern technology in teacher's classroom. Different teachers give the views regarding the use of technology, rare use of technology in the classroom, use of technology in personal learning, mostly use technology in the learning but it is better to use multimedia in mathematics teaching.

It was obvious that teacher 'A' was unwilling to use technology in mathematics classroom while teaching mathematics. But teacher 'B' said that he used computer, laptop and multimedia for his personal learning but did not use them for teaching. The same case was found to teacher 'C', 'D', 'E', and 'F' as well. They could not use multi-media for presentation. Student's learning would be faster and easier through such devices. But in real practices, there was lack of such technologies for effective transfer of learning skills to teaching. In my case, it was sometimes used multimedia, power point in classroom. Other technology was not practiced in my school too. It was used video record to find the strength and weakness yet which is the gaps in my profession. For the advanced use of such technologies by teachers and students, it was planned to use these devices now.

From the discussion above, it was realized that there are the professional, technological and organizational factors to apply modern technology in teaching. The technology is also the one of the strategies of empowering mathematics teachers for their professional development.

5. FINDINGS

Speaking of mathematics teachers' professional development, it was noticed that teachers are the key elements of whole teaching learning activities. Students' roles and responsibilities cannot be neglected. Teachers have more important role for managing teaching-learning activities within the mathematics classroom. Undoubtedly, appropriate teaching strategies are the important pillars of classroom activities that are acquired professional development of mathematics teachers. Developing appropriate environment for particular learners, a qualified professional mathematics teacher can manage classrooms well. From the above analysis and interpretation of information, the main strategies of empowering mathematics teachers for their professional development can be enlisted as follows:

- Opportunity for attending mathematics workshops, seminars and conferences
- Job security
- Constructive feedback
- Promotional opportunity
- Attractive salary
- Development of professionalism
- Use of technology.

6. CONCLUSION

It was concluded that the key strategies of empowering for professional development of mathematics teachers were opportunity for attending mathematics workshops, seminars and conferences, having job security, providing feedback, getting promotional opportunity, and attractive salary. The education practitioners and educational development actors should be enthusiastic on these particular aspects for the professional development of mathematics teachers so as to promote the meaningful learning in mathematics classroom practices. These particular strategies are hallmark for motivating mathematics teachers and hence for addressing the needs, interest and expectations of mathematics learners. Ultimately the motivated teachers can promote the emerging discourses of inclusive and child friendly mathematics classrooms. In addition, use of technology is also main strategies of empowering mathematics teachers for their professional development. So, we have to maintain these strategies for the mathematics teachers to enhance their profession.

REFERENCES