

PEDAGOGY OF BIOLOGICAL SCIENCE PART – 2
(PONDICHERRY UNIVERSITY)

STUDY MATERIAL

UNIT -8

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Unit - 8

Professional development of biological teacher

Syllabus: Professional development programmes of science teacher –seminar, conferences, online sharing – members of professional organization. –Teacher as a community of learners – collaboration of school with colleges and universities and other institutions – role of reflective practice in professional development. –Teacher as a researcher – action research in biological science– Special qualities of a science teacher.

Introduction:

A teacher of science needs to remain engaged in her professional development throughout her career as a teacher. Her learning and professional development does not end with the completion of pre-service education programme. She needs to continue her growth for enhancing her effectiveness as a science teacher. One of the main reasons behind it is that knowledge in science and its applications are ever expanding. Approaches to teaching-learning of science are being continually improved and made innovative as a result of researches in science education and educational psychology. New and better apparatus and kits are being developed and used in teaching-learning process of science. Information and Communication Technology (ICT) has opened up new opportunities in the field of education.

Moreover, teacher carries an enormous responsibility on her shoulders. The task of shaping the future generation lies in her hand. She has to pay attention to the holistic development of the students who can contribute constructively to the society. Thus, it is imperative that she realises the importance of her own contribution towards society and takes pride in her job of being a science teacher.

Teacher has to remain sensitive to the social, professional and administrative contexts in which she works. She has to consciously attempt to formulate her own professional orientation as a teacher in situation-specific manner.

Defining profession is the most challenging task at hand in general and teaching as profession in particular. Redefining teaching as a profession is no less a critical task in the world of today where every day the same age old concept gets a new meaning in the light of

experiences emerging out of interactions and confrontations with changed meaning of life. However, some **characteristics of profession** can be enumerated that are found to be relevant towards determining its existence as a profession.

- ❖ A profession requires specialised knowledge with extensive training and an advanced level of intellectual skills in carrying out its service to society.
- ❖ A profession provides an essential service that is both unique and definite to society and only the people within that profession should provide the service
- ❖ Members of a profession enjoy a considerable degree of autonomy and decision-making power. They are largely free of closely supervised performance. Members of a profession primarily make their own decisions and regulate their own activities.
- ❖ Members of a profession are required to accept personal responsibility for their actions and decisions.
- ❖ A profession is responsible for monitoring its own members and self-governing. The implications of the previous statement make it essential for professional groups to perform various duties to keep the level of their services high and to watch for the economic and social well-being of the members of the profession.
- ❖ A code of ethics exists within a profession that sets out acceptable conduct for its members. The existence of this code is necessary to enforce a level of high standards.
- ❖ A profession emphasises the services it provides over the financial rewards.
- ❖ It is generally agreed that members of a profession not only get paid for their work, but receive a high salary commensurate with the time and effort required to obtain their specialised knowledge and skills.
- ❖ Society must recognise an occupation as a profession.
- ❖ A profession is considered a lifework or terminal occupation. Those involved usually stay in the field for the rest of their careers.
- ❖ Professional development of a person in a profession is a continuous process.

It is important to remember that a profession needs not have all the above characteristics we have discussed above. Many professions do not satisfy all of the characteristics. You can reflect on the nature and dynamics of action of a teacher as a professional. Teacher needs to recognise herself as a professional endowed with the necessary knowledge, attitude, competence, commitment, enthusiasm, spirit of seeking new ways and means of dealing with teaching-

learning situations and capability of reflection on her own practices. She should be sensitive and perceptive not only to the learners and the institution but also the emerging concerns in a larger social perspective within which one functions. Do you think teaching profession is a profession which makes all other professions possible?

Professional Development Programmes

Seminar, Conference

In seminars and conferences, one gets an opportunity to meet a large number of teachers and exchange teaching-learning experiences and innovative ideas with them. By attending relevant science seminars and conferences, a science teacher can learn about the innovations that other teachers are doing. The science teacher herself might have developed a new idea to improve teaching- learning of science and she may present it as a paper in seminar or conference.

The notifications for seminars and conferences come out in newspapers and journals. These information are also available on the relevant websites. The teachers can send their request for participation after seeking permission from their school authorities. They should use opportunities of attending such programmes to enrich their professional experiences.

The teachers can also send their articles to any national or international journal or magazine for publication and wider dissemination. This is the most convenient way to exchange ideas with other science teachers. Usually, directions for submitting an article are given in each issue of the journal/magazine. Each journal/ magazine prescribes a special format and style that one has to follow for submitting the article.

Online sharing

Internet penetration is increasing in the country day-by-day and hence, the internet facility is becoming available to an increasingly large number of teachers. There are many online blogs, discussion forums, e-journals and e-magazines which provide teachers immense possibilities to share experiences and learn from each other.

Through internet, teachers across the regions and nations can connect with each other, discuss and exchange views. In fact, irrespective of the distance between them they can collaborate and work together.

In recent years, ICT and internet has emerged as a powerful and dependable media of interaction. We need to recognise the potential of internet to promote universal access, facilitate participatory forums and develop a learning community. This can be sound investment for continuous and on-demand teacher training and support, research and content depositories and value-added distance education.

Many online courses for professional development aim at increasing the access, equity and quality of education. Teachers can take courses on the topics for which learning resources are not available locally. They can also get ideas for teaching-learning on any topic from a variety of internet sites. They can evaluate website content for its quality and usefulness.

Membership of professional organisations

There are many national and international professional organizations which provide an excellent forum to teachers for exchanging their ideas. These are dedicated to the promotion of science education and professional growth of science teachers. You can also become a member of such organisations.

Professional organizations for science teachers

- All India Science Teachers' Association (Kolkata)
- Indian Science Congress Association (Kolkata)
- Indian Association of Science Teachers (Chandigarh)
- Delhi State Science Teachers' Forum (Delhi)
- Indian Association of Teacher Educators (Delhi)
- All India Secondary Teachers Federation (Delhi)
- National Science Teachers Association (Arlington, USA)
- National Association for Research in Science Teaching (Virginia, USA)

Collaboration of schools with university

Many colleges, universities and institutions conduct training for teachers in various areas of science. Teacher herself can visit laboratory and library and discuss with the professors on the concepts she needs elaborations. This can help her to plan field visit to these places for her students also. She can involve herself in the preparation of training modules, textbook

development, research project, etc. taken up by colleges and other institutions. This would break isolation among science teachers teaching at various stages at the school and college.

Role of reflective practices in professional development

A reflective teacher reflects on her action and strives to improve her practices continually for the growth in her career. Reflective practices help a teacher to make right choice and decision on the issues related to teaching-learning of physical science.

Reflective practice is a continuous and cyclic process as depicted in Fig. The cycle starts with planning. The teacher plans on the basis of evaluation of the existing ideas of her students and her previous science lesson. Next, she transacts the concepts. In this process she continuously assesses and evaluates performance of her students as well as her own practices. On the basis of this evaluation, she plans her next lesson. Thus, the reflective teacher never stops thinking about what is being learnt by her students and her own practices. She is engaged in self-analysis and self- evaluation for the improvement of teaching-learning of science.

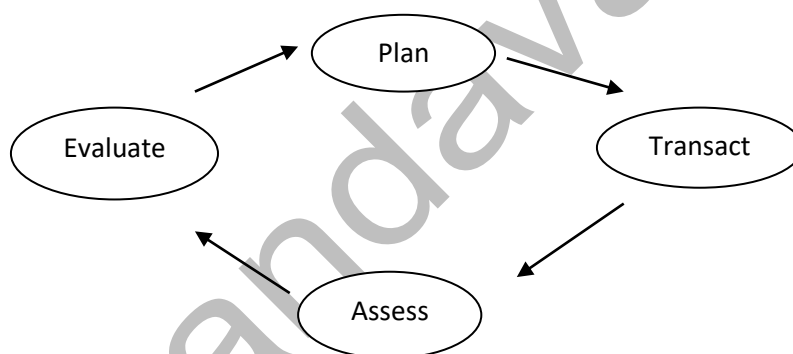


Fig. Reflective practice is a continuous and cyclic process

Thus, for her professional growth, it is essential for a science teacher to evaluate her classroom performance and be self-critical. After each class, teacher should reflect back and try to self-analyse the effectiveness of her classroom transactions. However, sometimes self analysing may not be the best way because a teacher may overlook certain things. So, the teacher may invite other science teachers to observe her classroom transactions to evaluate her performance and provide constructive feedback. She should develop professional skills not only in science and pedagogy of science but also in documentation, analysis and interpretation of

performance of students. Teacher needs to remain open-minded, listen with attention to others and work collaboratively for her professional development.

Research

Research is one of the important components of professional development of science teacher. Teacher can perform a systematic evaluation of her own problems related to various aspects of teaching-learning of physical science to find their solution and test her process and materials in the classroom. This type of research in the classroom is *Action Research*. It does not require extra time beyond daily routine.

Teacher can publish findings of her work in science journals and magazines. Such teachers are recognised by their students, colleagues, authority and communities for their work. A few enthusiastic students may come forward to help on the research. Observing their teachers actively engaged in the research, they can get motivated to work on their own investigatory projects. In fact many teachers do such type of study. However their work needs to be properly documented and disseminated.

“Research is the process of obtaining a dependable solution of the chosen problem by collecting data and its analysis and interpretation. Research is principled effort of obtaining new knowledge.”

In the light of the above definition, following important points emerge in relation to research:

- Research is a planned process of finding the solution of the problem based on certain strict principles.
- As a result of research, there is an increase in the knowledge of humankind.
- It is necessary to go through certain steps for conducting research.
- It is apparent that a formal training is required for conducting research and may everyone not find himself/herself proficient to conduct the research, though everyone in his/her field of work faces several work related problems and has to find a solution for them to proceed ahead.
- Formal research findings are many a time not applicable at ground level as in a formal research, professional maneuvers and limitations may make them impracticable.

On such a scenario, a functionary who needs an immediate solution of his/her problem, though may not be having the formal training in research, has to find a solution himself/herself. In order that solution is dependable, he/she himself/herself has to conduct a certain kind of study. Such a study is called action research.

Thus, action research is a research which a functionary conducts to find the solution of a problem; he/she is facing for his/her own benefits. The solution so found by applying the systematic procedure is the solution of his/ her particular problem and may or may not be generalisable. Action research is done by the practitioners themselves rather than professional researchers. In this case, the teacher is a part of the situation, rather than an outside spectator.

Teacher as a researcher

A successful teacher would always like to improve teaching-learning practices and grow in his career. If he collects evidences of problems and solutions regarding these practices and apply systematically in the class room, it would create more dynamic learning environment and lead to better understanding of students.

Moreover, the findings of the research will give him a sense of achievement, boost self-confidence and develop a sense of ownership to his own learning. Development and research in any field of life cannot be separated from each other. Development in any field is based on the quality of research under taken in the field.

Teaching-learning is no exception to the above statement. In order to effectively handle the intricacies of teaching-learning process, a teacher on the one hand has to be fully trained and on the other hands he should be able to comprehend the problems emerging at every step of the process and to find their appropriate and scientific solution.

A teacher comes across many problems and she tries to find an instant solution through her understanding of the problem based on her previous experiences. But many a time, such a solution is either partial or temporary. Thus, a teacher needs to find a solution which is based on 'research', so that the solution obtained really solves her problem. Generally, the procedure adopted by the teacher to solve the problem faced by her is based on:

- ❖ Analyzing her problem scientifically in the specific perspective in which the problem has emerged.

- ❖ Suggesting a solution based on the above analysis
- ❖ Testing the solution her self
- ❖ Accepting the solution only when it satisfies the above test

Such a process adopted by the teacher to solve her own problem is commonly called ‘Action research’. One of the important aims of action research for teacher is to hold himself accountable for his work and influence the learning of his students. An understanding and true appreciation of the matter that follows, can equip a prospective teacher with a solution of the problems she might face during her conduct of teaching learning process.

Action research

Action research is described as “small scale intervention in the functioning of the real world and close examination of the effects of such intervention” (Halsey, 1972). “Action research can be described as a process whereby in a given problem area, research is undertaken to specify the dimensions of the problem in its particular context; on the basis of this evidence a possible solution is formulated and is translated into action with a view to solving the problem; research is then used to evaluate the effectiveness of the action taken” (Town, 1973). “Basically classroom action research helps a teacher who is concerned with her own teaching and tries to improve its quality” (Elliott, 1978).

The teacher observes and understands what is happening in the classroom, realizes the problem, then tries to solve it by collecting information. In this way the teacher can attempt to make teaching-learning process more interesting and effective to improve the performance of herself and of her students. When the teacher comes across a problem like poor performance of the students or absenteeism, the teacher may try to find out the cause and solve the problem, thereby helping the students, school system and the society in general.

The action research helps the practitioner who may be a teacher, a headmaster/principal or any other functionary, or an NGO (Nongovernment Organisation) concerned with the school system to perceive the problem, analyse and assess the situation, and find possible reasons for the unsatisfactory condition. Similar way of carrying out action research may not work in all situations. Different persons may have different approaches to solve the problem.

Areas of action research

The action research may be carried out in different contexts related to:

- Learner
- Teacher empowerment
- Teaching-learning approaches and strategies
- Evaluation and assessment
- Curriculum
- School administration
- Parental Cooperation
- Societal Cooperation

Within some of these areas, the research problems may be:

Learner: The learners' achievement can depend on many factors such as her motivation, learning style, attitude towards learning and interest in particular area of content. One can carry out action research for each of these aspects to improve the achievement of the student.

Teacher empowerment: Teacher empowerment allows teachers to bring into their classrooms their own unique expertise, talents and creativity, so that they can implement teaching-learning programmes to best meet the needs of their students. For effective teaching-learning, some of the aspects that can be related to a teacher are commitment to her profession, updated knowledge of the content, teaching style, motivation, attitude towards students learning with different paces, etc.

Teaching-learning approaches and strategies: The teacher's effectiveness is reflected in her students' achievements. Achievements of the students are directly related to the teaching-learning approaches and strategies adopted by the teacher. The teacher should be well versed with new development in this area. She can conduct study to find the efficacy of various strategies for transacting the concept of science.

Evaluation: The action research related to evaluation may be carried out in different areas such as assessment for learning, assessment of learning, and various ways of Continuous and Comprehensive Evaluation (CCE).

Curriculum: One can do action research related to curriculum. It may include curriculum design, curriculum revision, curriculum structure, etc.

School administration: Classroom management, absenteeism, discipline and infrastructure facilities are some of the topics related to school administration on which action research can be carried out.

Parental cooperation: Without parental cooperation a child cannot utilise her optimum potential. Hygiene, distraction of students from studies, performance of activities and environment of study at home are some of the aspects which need parental support. One can do action research to evaluate parental cooperation rendered to the child.

Societal cooperation: Without the help of society neither the school administration nor the parents can help the children to have overall development of their personality. The society should create a conducive atmosphere for children providing them with learner friendly atmosphere. How community can be involved for the progress of the student? Should the use of loudspeakers, running of video game parlour in the vicinity of school premises be prohibited? Action research may be initiated in the above related topics which may contribute to the effective teaching-learning process.

A teacher can adopt a systemic approach to find solution when she realises concrete problems such as:

- Class X students do not understand the concept of magnetic induction;
- The differential achievement of boys and girls in the class;
- Understanding why do students find certain concepts difficult in science;
- Formation of misconceptions and naive concepts in science in various students; and
- The effect of using computers and various audio-visual aids for teaching-learning of science.

These are only suggestive examples. In fact, there are many aspects for which action research may be undertaken to improve the teaching learning and school system. Basically,

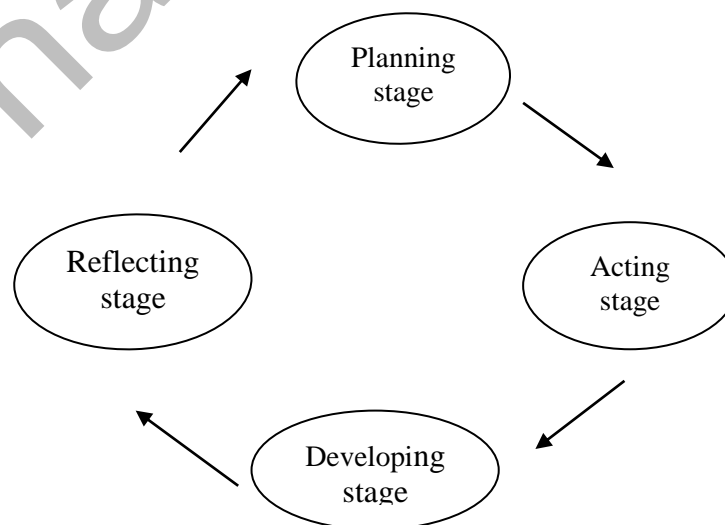
action research is a form of systematic investigation that helps you to look into the answers of the questions like, how am I doing? What do I need to do to improve teaching-learning process? How can I improve upon them? Action research enhances a teacher's professional learning. Teacher has to identify the problem and its solution herself. She may discuss and negotiate with others. However, no one instructs her how to solve the problem.

Steps in action research

Action research is a systematic inquiry into one's own practice. It allows teachers to review their own classroom practices in order to improve their effectiveness. The basic process of conducting action research consists of four stages.

1. Planning stage
2. Acting stage
3. Developing stage
4. Reflecting stage

If a problem is not solved, the planning can be modified. Accordingly, there can be some changes in the remaining three stages. Thus, there is action and reflection cycle which may lead to another cycle of action and reflection until the problem is solved (Fig.).



Special qualities of Science teacher

1. Good Academic Back ground:

For primary school, the teachers should possess at least 12th standard. For Secondary school, the teachers should possess at least UG degree and For Higher secondary school, the teachers should possess at least PG degree. In addition to knowledge of his subject, he should have sufficient general knowledge. For this he should have literary tastes .He must be a well read person.

2. Professional Efficiency:

Teacher must have some pre-service training like D.T.Ed for primary level and B.Ed for secondary and higher secondary level. While in-service, he should attend short term Refresher courses, workshops, seminars and educational conferences so that he goes on adding to this professional efficiency. The teacher should have a sense of dedication to the teaching profession. Teacher's enthusiasm, professional insight and sense of dedication are his valuable assets.

3. Personality Traits:

Teacher's personality traits have deep impact on the pupils.

Children friendly: The teacher must love his pupils. He must understand them individually and try to help them in overcoming their difficulties. His attitude should be sympathetic and friendly.

Sound character: The teacher should have high moral character. He should have sound Principle of life as his ideas and conduct will affect the children profoundly.

Emotionally Stable: The teacher must be emotionally stable. He must be free from complexes, worries and frustration. An emotionally unstable teacher cannot do justice to his work.

Clarity in thoughts: The teacher must be able to express his thoughts clearly His oral and written expression must be good. He has to write reports and so many other things. His speech, pronunciation and voice must also be impressive.

Sense of Humor: In the school, the teacher should have smiling face and a cheerful look while teaching. His sense of humor will help him to overcome very serious situations, which can be sometimes laughed away.

Social Traits: The teacher should be sociable in nature. He must maintain good relations with his colleagues, pupils and their parents and general public. He must be mixing with people. Only then he will be able to develop social virtues in students.

Leadership quality: The teacher should be able to provide effective leadership to the children who are immature and need guidance in matters of study, activities and other courses etc.

