

Effectiveness of Applying Integrated Strategies of Microteaching Skills in Teaching Science

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Abstract:

The Teacher Education Institutions plays a crucial role in improving the system of education by training, educating and inspiring the future student teachers. A teacher requires understanding and mastering of skills to make his classroom interactive. For this purpose, the exercise of instructional designing or lesson planning becomes very essential. Although innovative lesson plans based on behaviourist, cognitive and constructivist approaches are introduced in teacher education, the learner today, who is more ICT-enabled, requires modern 21st century skills and competencies. A skill constitutes a series of inter connected teaching acts or behaviours with an objective to attain desirable learning outcomes. Teaching skills constitutes teaching act which occur one after another in co-ordination to facilitate the learning in students whereas a micro teaching skill is a brief encounter with a skill for a period of 3-5 minutes in a controlled condition. The teaching skills are practiced through microteaching cycle where the emphasis is on knowledge acquisition, skill acquisition and transfer phases. The integrated microteaching skills is brief encounter which compare the traditional teaching with technology-based-teaching i.e. combination of pedagogical approaches and mixing of forms of instructional technology.

Keywords: Teaching skills, microteaching, integrated strategy, Additive strategy, Diode strategy, traditional teaching, technology- based- teaching.

1. Introduction:

The strength of our nation will be determined by the development through education of our future generations. The training of the skilled teachers is a matter that concerns every country in the world. Teacher skills can be divided into two groups; personal and professional. Personal characteristics include interest in the profession and being a model person (Kavcar,2002)¹. In general, professional skills include planning, identifying and using the right strategy, effective communication, maintaining student's attention and being aware of their needs, class management, grading and evaluation (MEB,-2008;-Demirel,2010)².

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¹Kumar, D., &Kavcar, C. (2002). Cumhuriyet Döneminde dal öğretmeniyetiştirme. Ankara ÜniversitesiEğitimBilimleriFakültesiDergisi, 35(1-2), 1-14.

² MEB. (2008). ÖğretmenYeterlikleri. Ankara: DevletKitaplarıMüdürlüğü.

The basic difference between personal and professional skills is that the later one can be taught (Demirel, 2010). Teaching is of great importance to a teacher and contributes the maximum to the institution of education. 'Teaching about teaching' has already been yielded a scientific basis. Though teacher education was first introduced in India in the middle of the eighteenth century, research and development in this field has only recently begun.

2. Relevant Issues related to the Study:

There are several relevant and important issues related to the present study, which are briefly discussed below-

2.1 What is Microteaching:

It is a system of controlled practice that makes it possible to concentrate on specific teaching behavior and to practice teaching under controlled conditions (Allen-&Eve,1968)³. Microteaching was first developed at Stanford University in 1960, as a part of an experimental program conducted to train high quality teachers (Demirel,-2010;-Chen,-Zeng-&Yang,2010)⁴. Despite the obvious weakness of conventional practices, there has been little development of alternative procedures. Among those alternatives, such as the microteaching technique, competency performance-based teacher education programme role playing self-confrontation, one of the most effective technique is microteaching. Microteaching is an approach developed at Stanford University from 1963 onwards (Allen-and-Ryan,1969)⁵.

2.2 Integration Defined:

Integration is the process of completing an imperfect thing by the addition of the relevant part which combines the parts into a meaningful whole. The conceptual model for integration of skills (Passi&Sharma,1974)⁶ involves two dimensions, i.e. analysis and synthesis or part and whole. Further these two dimensions are visualized on a complex or a system.

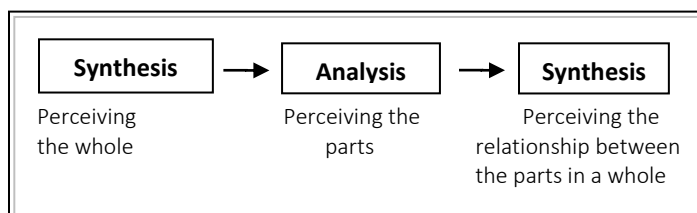


Fig. 1 : Conceptual Model of Integrating Instructional Skills (Passi-&-Sharma,1974)⁷

³ Allen, D. W., & Eve, A. W. (1968). *Microteaching: Theory and Practice*. 7(5), 181 – 185

⁴Chen, Q., Zeng, F., & Yang, Z. (2010). Study on the effects of multimedia monitoring system in medical teacher's microteaching training. *Comput. Inf. Sci.* 3, 241–243

⁵ Allen, D. W., & Ryan, K. (1969). *Microteaching*. Addison Wesley. U. S. A.: Reading Mass

⁶Passi, B.K. and Sharma, K.K. (1974) A changing view of student teaching. In *Teacher Education* 9, 1, 11-17.

⁷ Ibid, (Footnote-6)

The main purpose of this study is to examine the impact of microteaching practices in preparing the student teachers in Life Science and Physical Science in their teaching practicum and how it has improved their classroom instructional delivery. This in the future will determine the overall performance in their future career as a science teacher.

2.3 Significance of the Study:

Microteaching is an excellent way to build up skills and confidence, to experience a range of lecturing / tutoring styles and to learn and practice giving constructive feedback. Microteaching trains student-teachers' teaching behaviours and skills in small group settings supported by observation schedules. Microteaching also provides skilled supervision with an opportunity to get a constructive feedback. Microteaching makes the teacher education program, more purposeful, goal oriented and helps to define common objectives for the programme. It provides individualized education with more realistic evidence to students. This enables them to develop competency in using specific teaching skills in view of their unique needs.

2.4 Purpose of the Study:

This study is aimed at -

- i) Investigating competency level of microteaching skills of student-teachers they were exposed to.
- ii) Investigating the extent to which microteaching has influenced the delivery of instructional objectives of student-teachers in the teaching practice exercise.
- iii) Suggesting possible ways of improving microteaching skills and integration strategies of skills to enhance student-teacher's preparation for real classroom situation.

2.5 Microteaching Skills taken in this study :

Following eight Skills have been taken in to consideration for the present study, which are discussed briefly below-

- i) **Skill -1: Reinforcement:** This skill contains the components that a trainee should use when a student gives correct response. These components are positive verbal reinforcement, positive non-verbal reinforcement, repeating and rephrasing students' correct answer and writing students' correct answers on the chalk-board.
- ii) **Skill-2: Probing Questioning:** This skill contains the components that examines whether students genuinely know the correct answers. The components of this skill are – prompting, seeking further information, refocusing, redirection and increasing critical awareness.
- iii) **Skill -3: Illustrating with Example:** This skill contains components that train the students in using simple, relevant and interesting examples.

- iv) **Skill- 4: Stimulus Variation:** This skill contains components that encourage student-teachers to change stimuli to sustain students' attention. The components of this skill are movements, change in speech pattern, gestures, focusing and oral-visual switching.
- v) **Skill- 5: Explaining:** The acquisition of this skill enables the student teachers to explain the content properly. The components of this skill are explaining links, beginning statements, concluding statements, questions to test pupils' understanding and questions followed by pupils' correct responses.
- vi) **Skill-6: Interacting with Diagrams and Models:** The nature of Science is such that real clarification is developed through diagrams and models. The various components of this skill enable the student teachers to identify the various parts of the diagrams & models, explain their respective functions, draw one more parts of the diagrams and explain how the same can remain intact. This is a specific subject skill.
- vii) **Skill- 7: Additive Strategy:** Additive strategy refers to the strategy of integration of the skill components of different skills wherein, after mastering the first skill, second skill is practiced and then the trainees practice the skill components of both the skills together. This process is followed by adding a new skill every time till the desired skills are mastered.
- viii) **Skill- 8: Diode Strategy:** In this strategy, training is given in pairs. The first two skills are practiced separately, and then training is given by integrating the components of these two skills. After this training is given in the third and the fourth skill separately, followed by the integration of these two skills. The same process is followed for the succeeding pairs. Finally, all the pairs are combined in an integrated manner.

3. Review of Related Literature:

This study contains several related studies of microteaching. [D.D.Tewari\(1967\)](#)⁸ initiated a project of microteaching in the Government Central Pedagogical Institute at Allahabad. He found that microteaching could be used profitably in training institution and secondary schools. [Sharma\(1977\)](#)⁹ concluded that the microteaching approach was more effective than traditional teaching approach in developing general teaching competence among trained teachers. He used parallel group experimental design and took student teachers teaching Hindi as sample to prove

⁸ D.D Tewari (1967).Retrieved from Indian Scholar, An International Multidisciplinary Research e-Journal 149 Vol. 3 Issue I September, 2016 ISSN 2350-109X www.indianscholar.co.in MICRO TEACHING SKILLS BASED SECOND LANGUAGE LEARNING Dr. Afsha Jamal Asst Professor English PSAU, Saudi Arabia ,Dr. K. Sandhya Reader , English Department Maris Stella College, Vijayawada.

⁹R.D.Sharma(1977).Retrieved from [Ambili Remesh Journal](#) of Research in Medical Sciences : the Official Journal of Isfahan University of Medical Sciences, 31 Jan 2013, 18(2):158-163, PMID: 23914219 PMCID: PMC3724377.

it. Passi&Shah(1976)¹⁰ had undertaken an institutional project (CASE) and found that microteaching is effective in developing the skill of questioning, reinforcement, stimulus variation, nonverbal cues and illustrating with examples. They also found that attitudes of the teachers were favourable towards the feasibility of microteaching in teacher training programme in simulated and real conditions. Lalitha(1977)¹¹ found that microteaching is an effective technique in developing the skill of writing instructional objectives, explaining; increasing pupils participation and using black-board. Passi;et,al.(1974)¹² explored that microteaching under simulated conditions and that under real classroom conditions do not produce different effects on the development of general teaching competence and on its retention gains by the two groups.

4. Methodology:

The nature of this study is quite indicative that an experimental design needs to be adopted for the comparison of performance by the student-teacher between Pre-Treatment (PT) and Post-Microteaching Treatment (PMT). In the experiment, the micro-lesson plans which are to be manipulated may be considered as the independent variable. As this study is experimental in nature, it is based on pre-treatment and post-microteaching treatment design. It is conducted on 100 student-teachers of different B. Ed. colleges of West Bengal. Qualitative and Quantitative Observation schedules were prepared on the basis of microteaching skills and their components.

The pre-treatment observation was considered to be a significant factor related to the post-microteaching observation of the student-teachers in terms of values. Comparative observations were done from qualitative and quantitative schedules of various microteaching skills through PT and PMT. Component-wise mean score is obtained during PT and PMT and have been computed and analyzed their significant level through 't'-test.

4.1 Sample: The sample consists of one hundred (100) student-teachers of B. Ed. colleges of West Bengal. Fifty (50) student-teachers were selected having Life Science as their method paper and fifty (50) student-teachers were selected having Physical Science as their method paper. The selection was done through the use of purposeful and random sampling techniques.

4.2 Tools Used: Two (2) types of tools are designed for this study.

(i) **Lesson Plans:** Total sixteen (16) lesson plans, eight lesson plans for each of Life Science and Physical Science have been designed and prepared according to the criterion of the

¹⁰Passi B.K., Shah M.M. (1976). Microteaching in Teacher Education. In: CASE Monograph. Vol.-3. Baroda: Centre of Advanced Study in Education, MS University of Baroda.

¹¹Passi BK, Lalitha (1977). MS. Microteaching in Indian Context. Indore: Dept of Education, Indore University.

¹²Passi, B.K. and Sharma, K.K. (1974). A changing view of student teaching. In Teacher Education 9, 1, 11-1

microteaching skills for the development of teaching-learning processes among the student-teachers.

- (ii) **Observation Schedules:** Eight (8) Observation Schedules, one for each of eight skills are designed for Life Science and Physical Science separately. Quantitative and Qualitative development of different components of each skill are assessed through teaching-learning of that particular subject (Life Science and Physical Science separately) by the student-teacher concerned through Quantitative Observation Schedule and Qualitative Observation Schedule.

4.3 Preparation of the Tools:

- (i) Content on Life Science and Physical Science are chosen for micro-lessons and accordingly prepared on each microteaching skills.
- (ii) Quantitative Observation Schedule and Qualitative Observation Schedule of each skill along with their components are designed for observation of teaching-learning process of the student-teachers.
- (iii) Tally marks are given against each components of each skill and these tally marks are converted into values and further computed as data.

5. Application of Tools and Data Collection:

The student-teachers belonging to Life Science and Physical Science method applied the tools of this study during teaching-learning session. They made a peer group and responded to one of the student-teacher who were teaching through microteaching skills. The teaching-learning process was observed by sitting at the back of the class and tally marks were given against each component of a particular teaching skill on both the observation schedules. These tally marks were further converted into values and further computed as data.

5.1 Data Analysis and Interpretation:

The collected data have been analyzed statistically for determining the means of PTs and PMTs, mean difference (md), Standard Error of Mean (SE_m) and test of significance (t' -value). Thirty-two(32) tables and thirty-two(32) graphs are developed with the help of statistical analysis of each skill of Life Science and Physical Science separately in this study.

5.1.1 Skill-1. Skill of Explaining: Component-wise Quantitative and Qualitative Analysis and Interpretations of Teaching Life Science:

Tables and graphs of Component-wise Comparative Analysis of Means obtained during PT and PMT from observations of Quantitative and Qualitative Schedule of Skill-1. Skills of Explaining during teaching of Life Science and Physical Science with their interpretations are shown below.

(i) Quantitative Analysis of Teaching Life-Science:

Table No.1A: Quantitative Analysis:
Component-wise 't'-test Analysis of teaching Life Science of Skill-1. Skill of Explaining

Quantitative Schedule								
Components	PT Mean	PMT Mean	n	md	Df (n-1)	SE _m	t	Significant Level
1	0.27	0.67	50	0.40	49	0.04	9.75	0.01
2	0.19	0.28	50	0.10	49	0.02	4.18	0.01
3	0.12	0.25	50	0.13	49	0.02	6.32	0.01
4	0.20	0.31	50	0.11	49	0.02	5.66	0.01
5	0.14	0.25	50	0.11	49	0.02	6.14	0.01
Total	0.91	1.76	50	0.85	49	0.08	10.60	0.01

t at 0.01 level = 2.68 for df 49

[N.B.: PT= Pre-Treatment, PMT = Post-Microteaching Treatment, n = No. of samples, md = Mean Difference, SE_m = Standard Error of Mean, t = test of significance level]

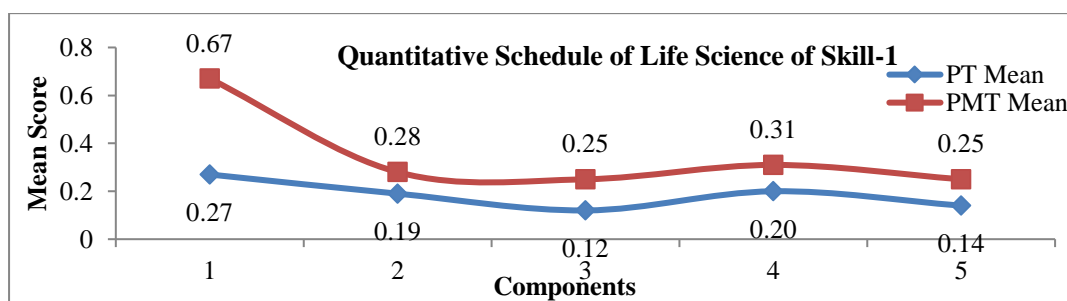


Fig. 2 : Line Graph showing the mean scores of different components of PT and PMT (Quantitative Schedule of Life Science of Skill-1)

(ii) Interpretations about Quantitative Analysis of Teaching Life-Science: 'Explaining' is a skill that brings about an understanding a concept, a principle or a phenomenon. It requires various logical steps in arriving at inferences. The components involved in this skill helps to find out the consequences of a phenomenon, action or an event.

In **Table-1A**, the Quantitative analysis shows significant differences at 0.01 level of the means of all components of Skill of Explaining (Skill-1) of Pre-Treatment (PT) and Post-Microteaching treatment (PMT). The obtained 't'-values are greater than 2.68 for df 49. It has been observed that the maximum PT mean and PMT mean (0.27 and 0.67 respectively) is found in the component 'Objectives of the unit' (component-1). The minimum PT means (0.12) is seen in component 'Connective and Relevance' (component-3) and PMT means (0.25) in 'Connective and Relevance' (component-3).

Figure-2 of Quantitative Schedule of Life Science shows the mean scores of different components of PT and PMT. The Post-Treatment scores are higher than Pre-Treatment scores of all components. In case of component 1, there is a huge difference in Pre-Treatment mean scores

and Post-Treatment mean scores(0.27 and 0.67 respectively).The 't'-values at 0.01 level are greater than 2.68, so all the components are significant at 0.01 level.

(iii) Qualitative Analysis of Teaching Life-Science:

**Table No.1B : Qualitative Schedule Analysis:
Component-wise 't'-test Analysis of teaching Life Science of Skill-1 (Skill of Explaining)**

Qualitative Schedule								
Components	PT Mean	PMT Mean	n	md	Df (n-1)	SE _m	t	Significant Level
1	0.28	0.74	50	0.46	49	0.05	9.23	0.01
2	0.17	0.39	50	0.22	49	0.03	6.45	0.01
3	0.09	0.27	50	0.19	49	0.02	8.30	0.01
4	0.18	0.32	50	0.14	49	0.03	5.01	0.01
5	0.14	0.29	50	0.15	49	0.03	5.19	0.01
Total	0.86	2.01	50	1.15	49	0.11	10.72	0.01

t at 0.01 level = 2.68 for *df* 49

[N.B.: *PT* = Pre-Treatment, *PMT* = Post-Microteaching Treatment, *n* = No. of samples, *md* = Mean Difference, *SE_m* = Standard Error of Mean, *t*' = test of significance level]

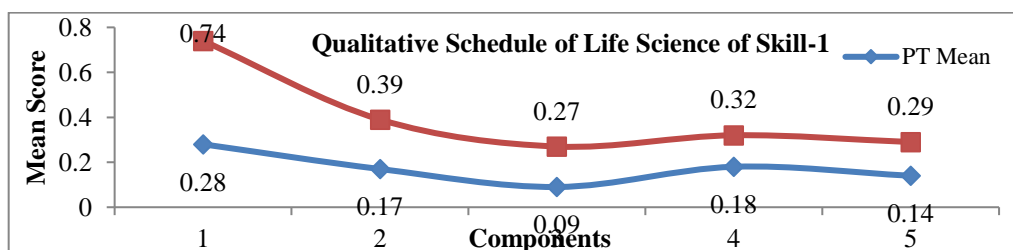


Fig.3 : Line Graph showing the mean scores of different components of PT and PMT (Qualitative Schedule of Life Science of Skill -1)

(iv) Interpretation about Qualitative Analysis of Teaching Life-Science:

In **Table-1B** the Qualitative analysis shows significant differences at 0.01 level of the means of all components of Skill of Explaining (Skill-1) of Pre-treatment (PT) and Post-Microteaching treatment (PMT). The obtained 't'-values are greater than 2.68 for *df* 49. It has been observed that the maximum PT mean and PMT mean (0.28 and 0.74 respectively) is found in the component 'Objectives of the unit' (component-1). The minimum PT mean (0.09) is seen in component 'Connective and Relevance' (component-3) and PMT mean (0.27) in 'Connective and Relevance' (component3). Figure 3 of Qualitative Schedule of Life Science shows the mean scores of different components of PT and PMT. The Post- test scores are higher than Pre-Treatment scores of all components. In case of component 1, there is a huge difference in Pre-Treatment mean scores and Post-Treatment mean scores (0.27 and 0.67 respectively).The 't'-values at 0.01 level are greater than 2.68, so all the components are significant at 0.01 level.

5.1.2 Skill-1. Skill of Explaining: Component-wise Quantitative and Qualitative Analysis and Interpretations of Teaching Physical-Science:

Table No.2.A: Quantitative Analysis of Physical Science::
Component-wise 't'-test Analysis of teaching Physical Science of Skill-1 (Skill of Explaining)

Quantitative Schedule								
Components	PT Mean	PMT Mean	n	md	df (n-1)	SE _m	t	Significant Level
1	0.26	0.69	50	0.43	49	0.04	9.55	0.01
2	0.12	0.28	50	0.16	49	0.02	8.06	0.01
3	0.13	0.24	50	0.12	49	0.02	6.38	0.01
4	0.20	0.35	50	0.16	49	0.03	5.92	0.01
5	0.14	0.30	50	0.17	49	0.02	8.56	0.01
Total	0.84	1.87	50	1.03	49	0.08	12.18	0.01

t at 0.01 level = 2.68 for *df* 49

[N.B.: PT = Pre-Treatment, PMT = Post-Microteaching Treatment, *n* = No. of samples, *md* = Mean Difference, SE_m = Standard Error of Mean, 't' = test of significance level]

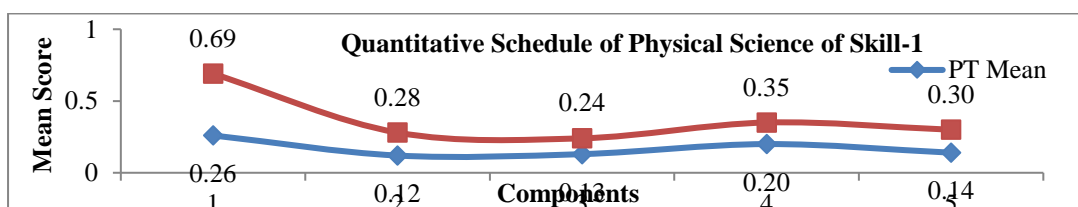


Fig.4: Line Graph showing the mean scores of different components of PT and PMT (Quantitative Schedule of Physical Science of Skill -1)

Interpretation:

In Table.2.A the Quantitative analysis shows significant differences at 0.01 level of the means of all components of Skill of Explaining (Skill-1) of Pre-treatment (PT) and Post-Microteaching treatment (PMT). The obtained 't'-values are greater than 2.68 for *df* 49. It has been observed that the maximum PT mean and PMT mean (0.26 and 0.69 respectively) is found in the component 'Objectives of the unit' (component-1). The minimum PT means (0.12) is seen in component 'Precision and clarity of language' (component-2) and minimum PMT means (0.24) in 'Connective and Relevance' (component-3).

Figure 4 of Quantitative Schedule of Physical Science shows the mean scores of different components of PT and PMT. The Post-Treatment scores are higher than Pre-Treatment scores of all components. In case of component 1, there is a huge difference in Pre-Treatment mean scores and Post-Treatment mean scores (0.26 and 0.69 respectively). The 't'-values at 0.01 level are greater than 2.68, so all the components are significant at 0.01 level.

Table No.2.B: Qualitative Analysis of Physical Science: Component-wise 't'-test Analysis of teaching Physical Science of Skill-1 (Skill of Explaining)

Qualitative Schedule								
Components	PT Mean	PMT Mean	n	md	df(n-1)	SE _m	t	Significant Level
1	0.25	0.58	50	0.33	49	0.03	9.88	0.01
2	0.16	0.27	50	0.10	49	0.02	5.00	0.01
3	0.10	0.21	50	0.11	49	0.02	5.66	0.01
4	0.15	0.28	50	0.13	49	0.02	5.64	0.01
5	0.18	0.25	50	0.08	49	0.02	3.93	0.01
Total	0.84	1.59	50	0.75	49	0.07	10.77	0.01

t at 0.01 level = 2.68 for df 49

[N.B.: *PT* = Pre-Treatment, *PMT* = Post-Microteaching Treatment, *n* = No. of samples, *md* = Mean Difference, *SE_m* = Standard Error of Mean, '*t*' = test of significance level]

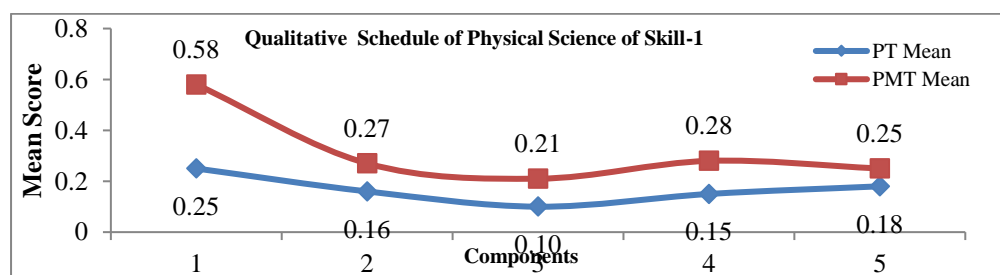


Fig.5 : Line Graph showing the mean scores of different components of PT and PMT (Qualitative Schedule of Physical Science of Skill -1)

Interpretation:

In Table.2.B the Qualitative analysis shows significant differences at 0.01 level of the means of all components of Skill of Explaining (Skill-1) of Pre-treatment (PT) and Post-Microteaching treatment (PMT). The obtained 't'-values are greater than 2.68 for df 49. It has been observed that the maximum PT mean and PMT mean (0.25 and 0.58 respectively) is found in the component 'Objectives of the unit' (component-1). The minimum PT mean (0.10) is seen in component 'Connective and Relevance' (component-3) and minimum PMT mean (0.21) in 'Connective and Relevance' (component-3).

The Figure 5 of Qualitative Schedule of Physical Science shows the mean scores of different components of PT and PMT. The Post-Treatment scores are higher than Pre-Treatment scores of all components. In case of component 1, there is a huge difference in Pre-Treatment mean scores and Post-Treatment mean scores (0.25 and 0.58 respectively). All the 't'-values at 0.01 level are greater than 2.68, so all the components are significant at 0.01 level.

Similarly, such types of study have been conducted for the other seven (7) Skills and data have been analyzed and interpreted. On the basis of the data analysis results of eight (8) Skills have been revealed; and those have discussed below.

5.2 Discussion of Results:

The results obtained from data analysis and interpretation are given below according to each of eight skills.

- i) **Skill –1: Skill of Explaining:** In case of Skill-1, the Quantitative and Qualitative analyses of Life Science show they are significant at 0.01 level. The mean scores of all the components of skill-1 are also higher in PMT. Similar results are found in Physical Science also.
- ii) **Skill – 2: Skill of Stimulus Variation :** In Skill-2, the Quantitative analysis of Life Science shows that all components are significant at 0.01 level. But the Qualitative analysis shows that component 2, 3, 4 and 5 are not significant. In Physical Science, component 2, 3, 4 and 5 are not significant and there is no difference in mean scores between PT and PMT in case of component 5 (0.22 and 0.23) in Quantitative analysis. Qualitative analysis shows that only component 1 is not significant.
- iii) **Skill – 3: Skill of Reinforcement:** The mean scores of PT and PMT show no difference in component 2 of Quantitative schedule in Life Science (0.42 and 0.44) except component 2, all the components are significant at 0.01 level. Qualitatively all the components are significant. In Physical Science, all the components of Skill-3 are significant at 0.01 level Quantitatively and Qualitatively.
- iv) **Skill – 4: Skill of Probing Questioning :** In Life Science, there are difference in means scores of PT and PMT. Mean scores of PMT seems to be high and all the components are significant at 0.01 level Quantitatively. But Qualitatively, component 2 and 5 are not significant. In Physical Science, the mean scores of each component are higher in PMT and they are all significant – Quantitatively and Qualitatively.
- v) **Skill – 5: Illustrating with Examples:** In Life Science, there is a remarkable difference in the mean scores of PT and PMT. PMT scores are much higher and they are significant at 0.01 level quantitatively. But qualitatively, component 2 is not significant and the mean score of PT is much higher than PMT (1.91 and 0.43) in component 2 and component 3 (0.22 and 0.05). In Physical Science Quantitative analysis shows that none of the components are significant and the mean scores are very close to each other (PT and PMT). In Qualitative analysis, component 3 and 4 are significant, but the PT mean score is higher in case of component 2 (0.88 and 0.40).
- vi) **Skill – 6: Additive Strategy:** In Life Science, Quantitatively component 5, 6 and 7 are not significant and on an average the PMT mean scores are higher than PT mean scores. It is similar in the case of Qualitative analysis. In Physical Science, most of the components are not significant in both Quantitatively and Qualitatively. The mean scores also do not show much difference.

vii) **Skill – 7: Diode Strategy:** In Life Science, the Quantitative and Qualitative analyses show significant values of all components. The mean scores of all components are also high in PMT than PT. In Physical Science, the 't'-values of all components are significant mostly at 0.05 level, Quantitatively and Qualitatively, PT and PMT means scores show that there is a difference. PMT mean scores are high.

viii) **Skill – 8: Skill of Interacting with Diagrams and Models:** In Life Science, all the components are significant at 0.01 level Quantitatively and Qualitatively and they possess high PMT mean scores. In Physical Science, Quantitative Schedule shows that components are not significant and the mean scores do not vary much between PT and PMT. But Qualitatively, it is found that component 1 and 5 are significant. The mean scores of PT and PMT do not vary much.

6. Conclusion:

This research has demonstrated that microteaching is an essential programme which should be made to have a significant existence because of the role it plays as the foundation for all forms of success in teaching-learning process. The completion of the study led to the conclusion that the student-teachers trained through microteaching attain higher level of competence to teach science at secondary stage than those trained through conventional practice teaching as observed in the observation schedule. The student-teachers have attained level of teaching ability on applying integrated strategy of microteaching skills.

7. Delimitation of the Study:

The present study is delimited in certain respects; confirmed to student-teachers, both pre-service and in-service. Many teaching skills have so far been identified but due to limitation of time and resources, only six skills namely skills of Reinforcement, Probing Questioning, Illustration with examples, Stimulus Variation, Explaining and Interacting with Diagrams & Models have been selected for the present study.

There are different strategies of skill integration, namely the Summative strategy, the Additive strategy, the Diode strategy and the Subsumption strategy. The two strategies - the Additive and Diode integrative strategies have been selected for the present study. The study can be conducted in a number of curricular areas, but the present study is confined to the student-teachers of science.

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