

OUTPUT OF IMPROVEMENTS APPLIED ON SCIENCE-TEACHING

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Abstract—Application of teaching methods e.g. inclusion of ‘activity based teaching & learning’ and continuous analysis of progress for better training and timely corrections of weakness of students can improve understanding, knowledge, overall result and enhance interest and presentation qualities of students. Making goal of ideal result of any educational institution and progressing towards it, needs set of rules at every level and following them strictly, starting from (1) Principal level. (2) Teacher/(Teaching) level that includes teaching with different methods, evaluation and analysis of teaching outputs and their corrections for improvement before final exam occur (3) Student level : Efforts for improving performance, including remedial teaching, Mentorship-Discussions about weaknesses and finding need of motivations for better studies of students and better teaching (4)Appreciation for good efforts of students and teachers both. In the present *case study* the comparison of the results of students at higher secondary level before and after application of (a) methods of administration by Principal (b) teaching methods (c) methods of evaluation of teaching and learning (d) methods of motivation and appreciations for students and teachers both (e) involvement of parents at correct time have shown success of consistent excellent results every year since 2010 to 2018 at all level in R.V.C Higher Secondary School.

KEYWORDS—Teaching methods ; activity based teaching & learning, teaching aids, Mentorship;

II. Introduction: The *teaching methods* are very important aspect of ‘teaching and learning’ refers to the general principles of teaching and management strategies which determine the activities of teachers and students and the quality of the teaching process used for classroom instructions. They can enhance or prevent teaching effectiveness. Furthermore, teaching methods are only *one* component of the many occurring in a teaching event. Other components are: the commitment of the teacher; the physical and psychological conditions of the teaching space; the commitment of the learners; support of parents; the relationship between the curriculum and the needs and interests of the students. **Choice of teaching method** depends on the requirements of subject area(s) and learners and also depends on the aim / goal / objective of teaching. The teacher wants to impart knowledge or wants to enable the learners to acquire a skill or a competency of some kind or wish to change an attitude in learners and correspondingly decides the teaching. In classroom teaching mainly lecture method is used especially with larger classrooms of nearly hundred students, being convenient and cost-efficient. There are different *techniques of teaching* for increasing interest, making active participation of students, increasing attentiveness of learners in class room and in different programs e.g. demonstrations by teachers and followed by students and question-answer sessions or tests on explained matter, participation in exhibitions, discussions in small groups of students, collaborative learning ,explanation by senior gifted students to junior students as the part of mentorship by teacher and senior students. They provide students with opportunities to think about, discuss, and solve concept based real problems. Applying above techniques in teaching require much skills, creativity, and hard work as proposing and executing.

After teaching, most important part is testing/assessing the learner at different time intervals by *applying methods of evaluations* and then removing weakness by remedial teaching and bringing slow learners to the higher level before the final exam for proceeding towards the best results of the students.

After getting desired good results, the need is to analyze the positive steps, strategies and the efforts of hard work applied by teachers and students.They should be appreciated for getting same result every year to **sustain** at the same level. The *appreciation* for the contribution of hard work of teachers and students at right time gives satisfaction, *positive motivation* and increases their work efficiency. Other employees slowly follow the same work culture and the quality of education improves. The other important part of teaching and learning is the involvement of parents of learner in study while at home. If child faces any problem in communication with teachers, understanding subject, watching, writing, speaking, then parents’ role becomes more important to help the child and get help from teachers as well. Any problem which is badly affecting studies at home be sorted out in time to improve studies. Here come the important role of *mentorship* and counseling for discussion of personal and study related problems of learners. Parents should be in communication and support with student and mentor to be familiar with all developments of learner.

III. Material and Method:

“The Improvements applied in Science-teaching at higher secondary level and the analysis of their results” is the basis of the present *case study* which is based on the following model of assumptions/ instructions / rules made by Principal and tested by applying in 2010 and continue till date for improving teaching and learning of students and getting good results, as reported below-

Model: Methods for Improvements-

- (a) Methods of administration at Principal level.
- (b) Teaching methods.
- (c) Methods of evaluation of teaching and learning

(d) Methods of motivation and appreciations for students and teachers.

(e) Method of involvement of parents.

(a) Methods of administration at Principal level-

(p) To enhance students' performance:

(i) Principal has made it compulsory for teachers to use various suitable teaching methods applied for making strong foundation of students. For example- (a) Teaching through playing.(b)Teaching and helping in memorization with the help of Quizzes, activities, experiments and demonstrations on different topics in subjects. (c) Exhibitions on Arts ,Science and Craft every year.(d) In the morning during prayer session speech on 'science updates' and topics on 'moral values' by two students is made compulsory.

(ii) Teaching aids: ('Toys Bank') The toys used at home are collected in school in 'Toys Bank' and their use as teaching aids by teachers to explain basic phenomenon.

(iii) Compulsory Yoga session and PT periods daily performed.

(q) To enhance teaching performance of staff members:

(i) Taking random class in different sections by principal to check actual status of teaching.

(ii) Strict discipline with moral support and appreciation to students and staff members if their performance found excellent.

(iii) One student from each class is made 'Diary in-charge' who comes to the Principal to get signature and to show whatever is taught by each teacher daily.

(v)'Internal politics', a big hurdle in smooth functioning of school among teachers and among nonteaching staff is tried to remove.

(iii) Treating with love and respect as human being to lower income teachers, non-teaching staff and other employees.

(iv) Efforts applied to raise the salaries of primary section teachers from Rs 1500/m (basic earlier up to 2010) to Rs 5000/m (basic presently)

(r) Social service of principal for overall development of school as a good citizen-

(i)'Help Fund' generation: For poor students if fee deposition is delayed by parents then they are helped from 'help-fund' for time being. This help fund is maintained from teachers' contributions and returned back after fee deposition by poor parents. (ii) *Transport resources* started by Principal for far staying students specially for girls' safety and to maintain strength of students in school.

(iii) Definite compulsory sessions for *tree plantation, watering plant* by students and teachers to teach students about environment safety are included in curriculum, are organized every year.

(iv) Educating students for their cleanliness and their surroundings in *Health and Hygiene* sessions in beginning of the every year.

(v) Guest lecture on moral education.

Fig.8 & 9 (photos) one of the activities 'tree plantation' is shown in which active participation of students, teachers including Principal is clear.

(b) Teaching methods:-

Activity-based teaching which includes:

(i)Two times activities are given to learn and to practice by students in vacations, one before summer vacation and second before winter vacation in *every subject compulsorily*. Students have to perform those activities in class after reopening school e.g. Chart preparation on different topics as periodic table in chemistry, preparation of herbarium file in biology, model in geography ,history, social science and mathematics etc.

(ii)**Teaching aids:** Teaching aids are an integral part of any classroom teaching because they are helpful to make the learning environment interesting and engaging students' other senses also. They are helpful for learners to improve reading comprehension skill, illustrating concept, differentiating instruction and relieving anxiety or boredom by presenting information in a new and exciting way. Teachers have to use necessarily teaching aids in class e.g. in Biology plant should be with teacher to explain about trees/plant, model of box should be to explain area/Surface area/volume.

(iii)**Quiz:** To make the students study and be present mentally in class, teachers have to take quizzes on last working days of every month.

Rules of the quiz are-(1) students in a class divided in two groups.(2) All roll numbers of students written on the board.(3)Multiple choice type question to be asked by teacher.(4)Randomly any one roll number from one group is called to give answer of asked question within two minutes.(5)All students also have to solve the asked question in given 2 min.(6) if right/wrong answer is given, one/zero mark be written in front of that student's roll number.(7) if wrong then question be passed to other group and if they give right/wrong answer half/zero bonus mark is given to that group.(8) if wrong answer is given then question will be open to all class students, whoever student give maximum write answers will be given name hero of the quiz that day.(9) At the end clapping for the winner team and for hero of the quiz . (10) If any student absent that day and his roll number is called to give answer then team will be given zero mark.

(iv) **Preparing students for final exam (Revision session):** After syllabus of all subjects completed by teachers, revision-schedule of all the subjects is made in which per day only two subject teachers will be engaged with one class. Every day in class students will be given fixed portion to prepare and teacher will call one by one each student to give answer of the asked questions from the given portion. In one week ,full portion is prepared by students in presence of the subject teacher.

(c) Methods of evaluation of teaching and learning: There are many teaching methods which can be used by teachers. However, the focus should not be only in teaching, but also in students learning. This means in order to achieve both the teaching goals and the learning goals teacher has to carry out an evaluation to check whether students have met the learning

objectives. So the evaluation system used becomes especially important. For the evaluation of taught material by teacher and learnt subject by students different techniques can be used .e.g. Classroom quizzes and oral test, exams, Projects, Poster presentations laboratory session ,Standardized tests both within and across disciplines ,Questionnaires ,Interview etc. In present case regular test, preboard exams, Question-answerer sessions, after test discussions on solutions of questions of test are used, as reported below:

(i) For Xth standard every Monday test on the material taught, and test paper is based on board paper pattern for practice starting on mid march.

(ii) Monthly test and after test, every test paper solving sessions and discussion by teacher in class. Then submission of fully solved question paper by student to subject teacher.

(iii) After completing syllabus two times pre board exam on full portion and discussion on question paper after exam.

(d) Methods of motivation and appreciations for students and teachers-Awards are given every year for-(1) Best student of the class and of the school (2) best teacher.

Criteria for selecting best student are given below-

(1) Student should have 100% attendance.(2)He/she should be good in studies and scored very good/highest marks.(3) Well disciplined and punctual.(4) Student is good behaving to teachers.

(5) Recommended by every subject teacher with signature.(6) Have a desire of participation in different activities of class /school whether selected or not.(7) Always coming in neat and clean uniform with proper hair cut and nail cut.

Criteria for selecting best teacher are as follows-

(1)Teacher should be able to create a curious and interesting teaching-learning environment in class room for better learning of students.(2)Teacher should be able to identify the weak students & impart them proper learning chances repeating the topics till weaker students get convinced.(3) Punctuality of teacher reaching on time in class.(4) Use of proper teaching methods including Audio-Visual aids for explanation e.g. question-answer sessions based on theory, practical, and activities taught in class room teaching.(5) Record of activities performed by students in class given by teacher and certified by Principal.(6) Maintaining teachers' diary with students results .Result of the class taught should be greater than 90% pass.(7) Exemplary conduct with students and the colleagues.

(8)Teacher should be disciplined herself. (9) Good report with students & other staff members of the school. (10) Teacher should participate in extracurricular activities e.g. to prepare models of Science, Home Science, Craft and Math etc.

(11)Annually certificate of participation vide government Instruction either in exhibition or speech or debate/Scout guiding game. (12) Any participation in government recognized competition yearly certified by principal. (13)Teacher should be sincere & accountable for duty. (14) No disciplinary action is taken against teacher.

(e)Method of involving parents:

Inside the school, the teachers are most important factor in the success of a child and outside the school; the parent is the very important factor in the success of a child. Putting both important factors together i.e. family engagement in schools can make changes in performance. Students with involved parents or other caregivers earn higher grades and test scores, have better social skills, and show improved behavior. It improves student achievement, reduces absenteeism, and restores parents' confidence in education of their children. By monitoring, supporting and advocating, parents can be engaged for the positive impact and their children will have every opportunity for success.

In present case study-

(1)*Parent teacher meeting once in fifteen days* are organized compulsorily in which discussion about test marks, reason of absence of student, problems of students and parents, child's study pattern with subject teacher and mentor also takes place.

(2)*'Parents literacy sessions'*- if parents of any students are illiterate then some sessions for their literacy, health and hygiene in which good health effects of home-made food, handling child with patience are arranged.

IV: Result and Discussion:

In the present *case study* final result of Higher secondary (10th) standard is compared before and after application of different methods of improvements (a) methods of administration by Principal (b) methods of teaching (c) methods of evaluation of teaching and learning (e.g. test ,quizzes and exams of the knowledge gained by students) (d) methods of motivation and appreciations for students and teachers (the best student in class and in school and the best teacher, best activity performed by student in class and school *awards*) (e) method of involvement of parents at correct time in parent teacher meeting, twice in a month for betterment of students. After planning model of methods of improvements and their application in Jan 2010, have given **output of best results every year** .Figures 1 to 3 clearly shows that result of science (fig.2), result of mathematics (fig.3) and overall result of students (fig.1) improved drastically, and highest marks in Science, Math and in overall result also increased. The overall result (Pass percentage) of students reached to 100% from maximum 71% in year 1995 and highest marks percentage of student is gradually increased from 71% in March 2009, reached to 89% in March 2018 last year which is the consistent success of the applied methods. In fig.4 number of students appeared, number of students passed and number of students failed is shown year wise and it is found that number of appeared in final exam and passed has reached maximum nearly equal and number of failing is reduced to minimum which is positive response (**output**) of the hard work of students, teachers, Principal and the involvement of parents as well. In fig 5, 6, and 7 pass percentage in overall result, pass percentage in science and pass percentage in math respectively are shown separately from 1988 to 2018. It is found that all students were taking interest in studies, completing home assignments in time, participating in activities in class teaching and school as well. One of the activities at school level 'tree plantation'is shown in fig.8 & 9(photos). It is also found that on the last day of the month all students remain

present to participate in quiz and they used to like it. During mentoring sessions for weaker students, students and parents were able to communicate their problems and by discussion and counseling problems were sorted out up to the limit to increase interest in studies in time.

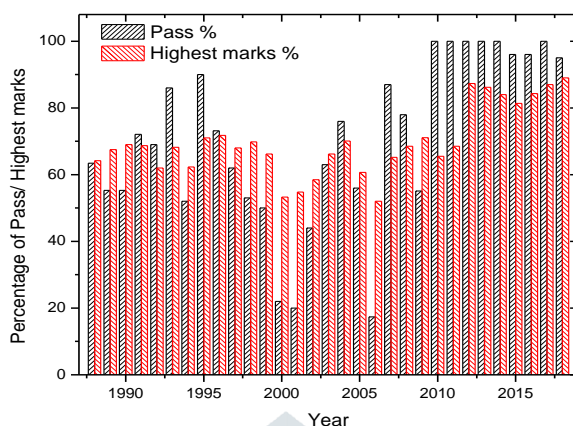


Fig.1 Overall result of Xth std[Pass % and highest Marks %] vs. year from 1988 to 2018

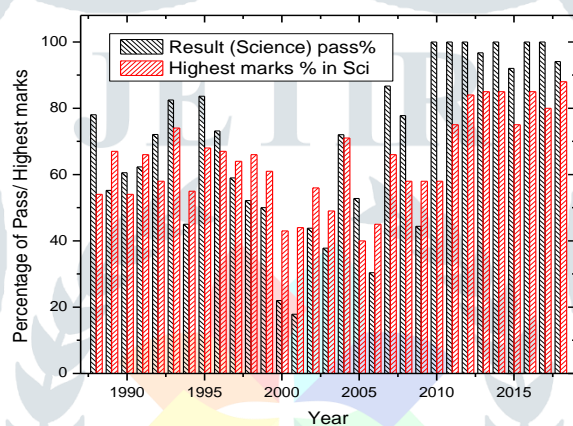


Fig.2 Result of Xth std of Science [Pass % and highest marks % of student] vs. year 1988 to 2018.

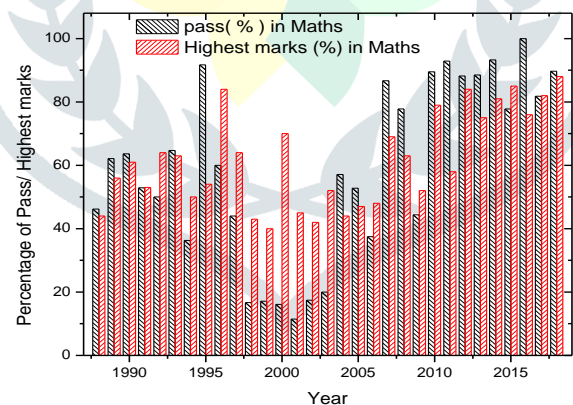


Fig.3 Result of Xth std of Math[Pass % and highest marks %] vs. year from 1988 to 2018

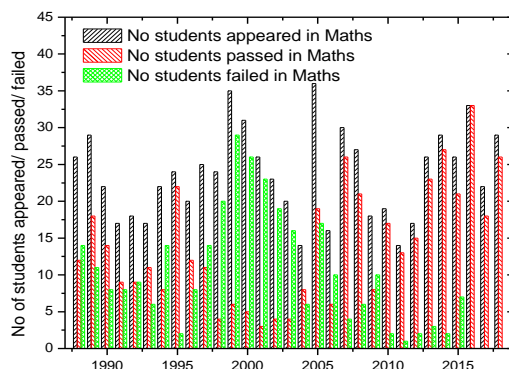


Fig.4 Result of Xth std of Math[No of students appeared (black),passed(red) and fail(green) every year] from 1988 to 2018

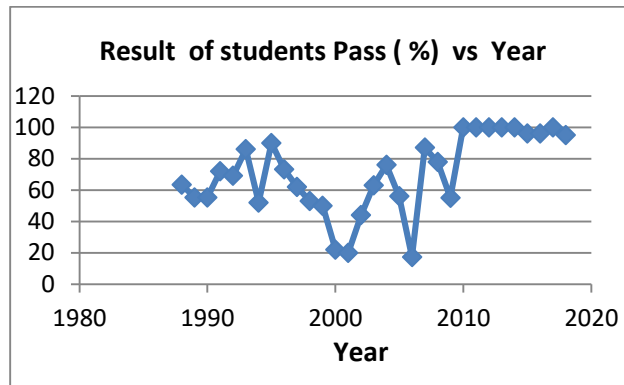


Figure.5 The result of Xth std students: pass % of students every from year 1988 to 2018)

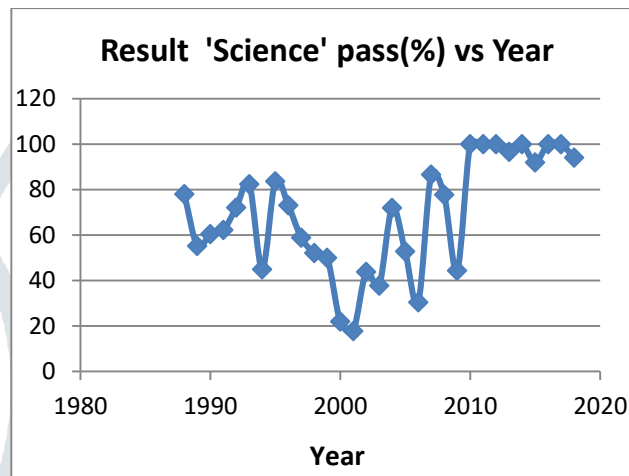


Figure.6 The result of Xth std students: pass % of students in Science from year 1988 to 2018)

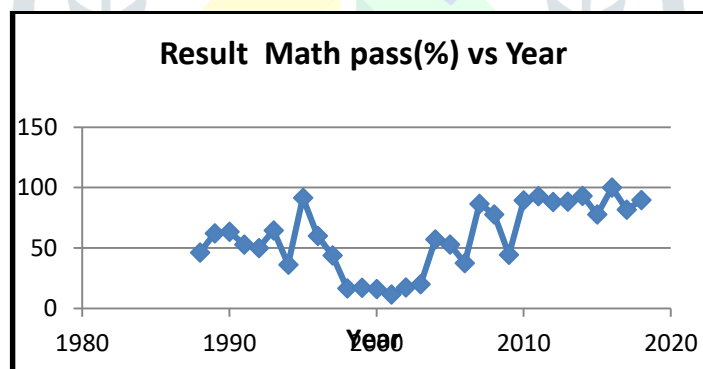


Figure.7 The result of Xth std students: pass % of students of subject Math from year 1988 to 2018)



Fig.8&9 Tree plantation by Students, teacher including principal.

V. Conclusion: Conclusion is ‘Activity based teaching and learning’ is the best method. Evaluation and continuous assessment of the progress of learners and teachers both is necessary. Remedial teaching for removing weakness of learners and involvement of parents informed from teachers at proper time is essential part of education. Comparative study of the results obtained before and after applying different methods of improvements by principal, have shown *success of the applied methods* and consistent ideal results at higher secondary level in R.V.C Higher Secondary School at Meerut(UP). It is the best example of fixing target of development of education and 100% success of hard work in application part for improvement. Inspiration from present work is “At least up to some extent quality of education can be enhanced in developing India” if same model of methods is followed by others with good spirit because good result of any institution is the output of group activity of the system of people working together whole year with same objective and same ultimate goal.

Most important need is mentorship for students for monitoring, interacting with them at individual level. In present case the number of students per class is around 40 to 50 so interacting with students and parents is possible.

VI. Acknowledgment

[I am very thankful to HOD (Physics) Dr. D.V.Kala and Principal of my college for inspiring, continuous support and cooperation. I am heartedly thankful to Dr. (Mrs) Uma Devi, Principal [R.V.C. Higher secondary school Meerut Cantt (UP) [U.P Code:121052]] who allowed me to study school data ,discussions & analysis on different methods and results, giving me the opportunity for writing on such important and interesting *case study* and her consistent good result of hard work done for progress of school in all dimensions for betterment of learners of our society made a path which can be followed by others.]

References:

- [1] “*Methods for teaching traditional physics*” by Kushal K. Shah, *Physics Today* 69, 12, 12 (2016);
- [2] “Teaching Methodology of Physics” by Metodika 17 (2/2008), 442-450

