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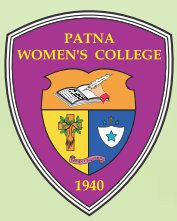

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NAAC Accredited – 'A' Grade with CGPA 3.52/4

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'College with Potential for Excellence' (CPE) status
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Editorial

The noble duty of schools and teachers is to nurture individuals to live and work with dignity and contribute substantially to the well-being of the nation. It is vital that the teachers continuously reflect on their teaching methods, inquire into the existing practices and connect theory with practice so that education becomes meaningful for the lives of the modern students. This requires a tenacious effort by the teachers to critically examine their teaching-learning environment, study the aberrant behaviour of students and comprehend the underlying forces. Students' feedback in this connection is also important. Research for solving day-to-day problems existing in our classrooms is one essential component that is missing from our school system today. The basic purpose has been trivialized to classroom teaching, completion of syllabus and high performance in examinations. Those students who match the expectations in this regard are promoted while little or no effort is made to encourage those who lag, hence they are left behind.

Issues of indiscipline in class, truancy, disrespect for teachers, mockery of students with exceptionalities, conflicts and attractions among students of opposite gender and similar other issues are very common in schools. These are, however, usually considered as phases that diminish with the complexities of higher classes and maturity of students, so they remain unattended. Some other concerns like students' disinterest in a subject, inadequate subject knowledge at a particular level, poor performance, fear of specific subjects or topics and the like are perceived by teachers but poorly attended. The main reason stated by teachers in general is that as they have to complete the syllabi on time, they cannot deviate much from their path of subject matter delivery. Besides, they complain that all their energy is drained with tasks of preparing continuous and comprehensive reports of students, correcting their copies and conducting co-curricular activities for them. There is a dearth of teachers at all levels in almost all the private and public schools. In some schools, teachers have to take classes for six to seven periods continuously. This makes them behave like machines carrying out their mundane work without enthusiasm. In public schools, teachers are often entrusted with non-academic tasks, which take them further away from their students whose future lie in their hands. In case of transfer of a teacher, the seat remains vacant for a long duration. As such, there remains no teacher to teach the students. All these have a negative impact on students' learning. Some teachers try to resolve the aforesaid issues but mostly in the cognitive domain. The skill, attitude and value domains, which constitute the essence of education, are completely ignored. In the name of class management, teachers scold, abuse and sometimes even thrash students, so that it

controls them and acts as a deterrent to others. This practice is a severe threat to our education system. The innocence, frailties and sometimes their major exceptionalities stay unrecognized and unattended, which may negatively affect the personality of students as youths and adults.

'In order to improve a system we have to understand it, accept it and slowly mend it'. This has a bearing on the system of schooling as well. In the era of revival of humanitarianism, in order to attain paradigm shift in the teaching-learning processes and educational settings of today, the teachers have to be an integral part of the school education system. They have to be keen observers and ardent researchers. They must not complain but perceive problems and search for their effective and long-lasting solutions. In this context, the role of teacher education institutions is significant as it is here that the prospective teachers are educated. Hence an important part of the curriculum has to be the integration of theory with practice. As teachers probe into the lives of students, they have to be trained about the scientific steps to do so. Besides, they have also to be trained about the ways and means with which they can perceive day to day problems emerging in school settings and carrying out studies to solve them. This is what we call 'Action Research'.

In the Department of Education, Patna Women's College, every year the B.Ed. students collaborate to undertake Action Research Projects under the supervision of their teachers. Depending upon the nature and source of the problem, they carry out their Action Research Projects either in practice-in-teaching schools or in the department. They identify a problem or an issue, collect baseline data, plan and execute an action programme and draw inferences from them, within the constraints of time and resources. This helps them to develop professionally and become more enthusiastic about their future roles.

The research findings of some of the Action Research Projects of Session 2013-14 and Session 2014-15 have been presented in this second volume of EduTimes.

It gives us great pleasure to share the findings of the research projects with the larger community. We hope that the journal will be widely read and appreciated. We welcome any suggestion or constructive comment that will help to improve the quality of the journal.

Dr. Sister Marie Jessie A.C.

Dr. Upasana Singh

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Activity Based Teaching for Improving Hindi Vocabulary

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Abstract

Words are like relatives and friends, the more you engage with them, the more you know them. This study tries to develop a non-traditional way of teaching Hindi vocabulary to improve the expressions of the students in Hindi. The researchers devised some game-like activities that can be used for recreation as well as for improving language skills of the students. They tried to develop measures that improvised the collection of useful words of the students to express their ideas more meaningfully. The effectiveness of the measures were evaluated by a pre-test and post-test research and found to be useful. The activities developed by the researchers were conducted at three schools for Classes VII, VIII & IX. The activities tried to engage the knowledge, understanding and application domains of learning. This research also exposed a number of weaknesses of the teaching practices at the government schools and sets a stage for further enquiry in the field.

Keywords: *Activity based learning, Hindi vocabulary, Government schools.*

Introduction

Words are ideas. To learn a new word is to learn a new idea. The ideas well-learnt construct schemata (according to a psychological theory). The schemata are what we perceive of ourselves and the world around. When things are perceived in mind, they are in terms of words, visuals, aural codes and lived experiences. The significance of teaching vocabulary cannot be emphasised more. In Bihar, an eastern Hindi speaking state, teaching of Hindi is a complex task. First of all, there is a general apathy towards learning Hindi. Second, the significance of Hindi in learning other subjects is yet to be understood by the majority of the people. Third, there is a general lack of well-devised tools to develop the various aspects of Hindi Language and Literature.

Teaching of Hindi in government schools is mostly a joyless affair. Most of the time the teacher and the students resort to the question-answer method without going through the text. The most serious impact of this situation is the lack of adequate vocabulary for the students to express their ideas. This can be marked by the fact that when students are asked to write an essay or letter or paragraph, most of them depend on their memory to write them. Their 'creative' presentations are generally a bad copy of some essay books or passports. To change the situation, it was necessary to focus on texts and create interest by telling stories, role-playing and by finding other ways to engage with the text.

The students of Patna Women's College went to different government schools for their Practice-in-Teaching. Action Research was also a part of the activities they had to conduct in those schools. The students (many of them were themselves product of Government Schools) went prepared to conduct an action research on this topic.

Three groups of students (All of them were students of the Hindi Method.) who opted to research on this topic were sure that they would find this problem among the students. But they were asked to discuss with the subject teachers regarding their research. They had to visit the schools with an unstructured open-ended interview schedule and report to their supervisor.

Significance of the Study

Several researches have suggested that vocabulary is enormously important to learners' development, especially in reading. There are many studies that have found that children with larger vocabularies have higher school achievement in general (Smith, 1941, cited in Beck, McKeown, and Kucan, 2002, cited by Duke and Moses, 2003) and higher reading achievement in particular (Anderson and Freebody, 1981; Graves, 1986; Stahl, 1998). In fact, people with larger vocabularies even have higher IQs (Bell, Lassiter, Matthews, and Hutchinson, 2001; Hodapp, and Gerken, 1999)

Planning for the Research

The researchers got the names of the schools and classes for their practice-in-school teaching one month before the start of teaching. The researchers started preparing for their action research project. One group was assigned a Girls' Middle School operating at a central location in Patna and the other a Co-ed Middle School. The third group got to teach in a Government Girls' Senior Secondary School. The researchers at the Middle schools decided to conduct the research on the Class VII & Class VIII students, while the researchers who were allocated Senior Secondary School decided to study on the Class IX students. The B.Ed. students visited their respective schools to enquire about the current

status of the syllabus and the portion they had to teach. They also conducted an interview with the subject teacher. The main questions were: What kind of creative writing did they do at the school? And how often was it conducted? Did the students answer in their own language? What were generally the topics of essays the students answered in their examination? Answers were more discouraging than expected. One of the middle school teachers reported that during the period they had the full strength (when most of the teachers were present in school and not allocated any non-school related duties like census, election etc.), they did not "waste" time on essay or letter writing. It was generally when they were short of teachers, they asked students to read an essay from an essay book and write on the same topic. That students mostly answered them based on their recapitulation of the read essay. The teachers also reported that, due to several non-teaching duties, they had to expend a good part of their duty days outside the school. When they were free to teach, they tried to complete the things by focusing on the important portions of the course in view of the examination. The researchers told the subject teachers in their schools about their plan to conduct activity based classes to improve the uses of Hindi vocabulary for expressing ideas. The teachers welcomed the idea and said that such activities were conducted only when the students from Patna Women's College came for teaching. But they also warned that they should not give too much time to it and teach from the textbook so that it would help the students in their examination.

Based on their feedback on the questionnaire, the supervisor agreed to let the students conduct the research on this topic and advised them to focus all their activities around the words selected from the textbook of the students. It was also decided to use or build upon the activities suggested at the end of the chapters of the books to mitigate the apprehension of the subject teachers. The supervisor asked the students to formulate the objectives and hypothesize the expected outcomes. The students were also guided to construct a set of tools to administer pre-test and post-test.

Objectives of the Research

The objectives of the research were to:

1. Develop a non-traditional way of teaching Hindi vocabulary to improve the expression of the students in Hindi.
2. Devise game-like activities that can be used for recreation by the students.
3. Improvise the collection of useful words of the students to express their ideas more meaningfully.

Action Hypothesis

The hypothesis of the research was :

H_1: If activity method of teaching Hindi vocabulary is used, the students improve in understanding the meanings of words and their usage.

To state in statistical terms, the null hypothesis was :

H_0: There is no significant difference between the achievement score of pre-test and post- test of the students of respective classes, after the activity method of teaching Hindi vocabulary is used.

Preparation of Tools

The impact of the research was decided to be measured by achievement tests. The pre-test and post-test were planned to be conducted based on the teaching material itself. For preparing the tool, the following criterion was followed:

The researchers selected 150 items distributed among 5 categories from each of the Classes i.e. VII, VIII& IX. The respective groups of researcher sought permission to pre-tryout the questionnaire on students of the Classes VI, VII & VIII of a private and reputed school of Patna. It was thought to take students of a lower class assuming that their level would match with the level of the students of the government schools. The difficulty level of each item was analysed.

The items were related to synonyms, antonyms, compounding of words and sentence formation. The content of the achievement test was validated by the supervisor for testing vocabulary of the students of the secondary level.

At the beginning of the practice-in-school teaching, a pilot study was conducted by administering the questions on three groups of 30 students each from Classes VII, VIII, IX in government schools different from the schools, where the research was to be carried out. After some adjustment in the test items, the achievement test was finalised.

Finally two sets of 50 questions distributed among 5 categories were selected based on the following criteria:

Table : 1: Difficulty level of the questionnaire

Difficulty Level	No. of Questions
80-100	40%
60-80	30%
40-60	20%
20-40	10%

Preparation of Content for Teaching

The preparation of teaching content was a challenging task. There were a number of things to be finalised:

a. Total number of the words to be taught

b. Total number of days for conducting the action programme

c. Content for teaching

d. The action programme with diversity of activities

On the basis of the feedback of the subject teachers, it was decided that the number of words to be taught for each 35 minute class would be 10 to 15.

It was also decided that the total number of days would be 10, i.e. 10 classes of 35 minutes each.

The groups were asked to identify the teaching content for each of the classes and brainstorm to find some innovative ways of teaching the content. They also had to prepare a separate lesson programme for each of their classes. It was also decided that after each class, the effectiveness of the activity would be evaluated by the group and the same would be reported to the supervisor.

Identification of Innovative Activities

The researchers were excited about devising innovative method of teaching vocabulary. After brainstorming they identified the following activities to be adopted by the researching student teachers for teaching:

a. Designing and solving a crossword

b. The traditional Antarakshari (A popular game based on the last letter of the word, song or poem)

c. The possession fight among the genders (A new game suggested by the supervisor to teach the necessary changes in sentence according to the change in possessor's gender)

d. One line definer of the characters of the stories from the textbook of respective classrooms.

e. Jumble words

Members of the group were made in-charge of the activities, so that each one had at least one activity to supervise while the others had to assist her.

Initiation of the Action Programme at the Schools

It was decided by the entire group to initiate the Action Programme at least after a week. The student should be given proper time to be comfortable with the new teachers. The researchers also needed time to identify the section of the Class where they could conduct their action programme.

The practice-in-teaching at schools was started on 1st October, 2014. After three days of class teaching, the researchers from one of the Middle Schools worriedly called the supervisor. They reported that more than 70% of the students had a very unsophisticated level of pronunciation. They were worried that whether they should ignore the spelling errors of the students when marking the pre-test and post-test response sheets. The Senior Secondary School group was then consulted and it was reported that among the Senior Secondary School students also the problem was widespread.

It was a new challenge, a serious one. There was only a half merit in teaching new words when the students pronounced and wrote wrongly. (In Hindi the alphabets and signs (Matras) are pronounced as they are written. If the pronunciation of a word is wrong it is most probably written with mistakes). After discussion among the researchers and the supervisor, it was decided to add a pronunciation session in each of the classes and the researchers were told to teach pronunciation to complete their lesson.

Table 2: Day-to-day action programme and feedback

Day	Action Programme	Feedback (if any)
1.	Pre-test	Researchers at one of the Middle Schools administered the test without giving any reason for the test. The students were apprehensive about an unannounced test. At the other school, it was announced that "We are starting a special 10 days class to improve your Hindi Expression and this test will tell us from where and what we need to start." The students were also told about the process. They were to be informed about the chapters on which the next day activity was to be based.
2.	Jumble Words "Garbarjhala"	The students enjoyed it. To the dismay of researchers (a one of the Middle Schools) the students took special taste in pleasure pronouncing the words in their jumbled form.

Day	Action Programme	Feedback (if any)
3.	The Possesson Fight among the Gender "Meri Pencil"	Students enjoyed it thoroughly. They loved the experience of speaking in the language of opposite gender.
4.	Antarakshari (The last letter game) (New word starting with last letter)	One student at the Senior Secondary School reportedly said, "I used to play this when we (siblings) were younger." The researcher, seeing it an opportunity to promote her cause, said, "You can play them again at home", only to be disappointed by the answer "Now we all are busy with TV."
5.	Antarakshari (Opposite words)	The students were divided into 3 groups to pass on the questions if unanswered. The researchers were at a fix when they found that the group asking question did not know the answer. They marked zero to all of them. But it happened many times and dampened the motivation of the students. At the Senior Secondary School also it was the same case.
6.	Antarakshari (Parallel words)	On the basis of the previous experience the researchers decided to change their strategy. This time, the students had to make a sentence with a parallel in meaning to the given word.
7.	Making Crosswords Varga Paheli (Simple level) (5x5)	It was the most successful among all the activities. Some students had seen crosswords in newspapers but, none of them had ever tried to solve one. It was a demystifying experience for them.
8.	Making Crosswords (Simple level) (7x7)	The students learnt to use a Hindi dictionary. They used the dictionary definitions for giving hints for the crossword.
9.	Making Crosswords (Difficult level) (11x11)	The students were excited but they felt a bit of difficulty in designing them.
10.	One line definer of the characters from the story "Mujhe Pahachano"	It was announced as a competition with a prize. Some of the students had read all the stories. The students had to identify a character on the basis of the provided hints.
11.	Post Test	Post test was conducted peacefully, though some of the students (at Senior Secondary School) complained that they were not told beforehand.

Evaluation of the Action Programme

The researchers were excited about their innovative way of study. They felt that it can make them good teachers of Hindi. They were also motivated by the feedback from the Principal of the school, who had herself got a good feedback from the students about the programme.

Data Presentation

The total number of enrolled students of Class IX, section D at the Senior Secondary School was 43. The researchers had chosen this section after viewing the Attendance Register. They found that, though the number on roll was not the highest, yet the attendance in the section was relatively better. At the Middle Schools also the absenteeism was a big problem. There was an additional problem. It was quite difficult to hold the students at the school after the Mid Day Meal. If they were held as captive audience it was very difficult to maintain the discipline in the classroom.

Table 3 : Attendance status of the students

Name of the School	No. of Enrolled Students	Average Attendance (during the Action Programme)	No. of Student's Data Used in Study
Middle School I	47	21	13
Middle School II	53	30	31
Senior Secondary School	43	16	10

Results of the Pre-Test and Post-Test

Figure 1: Density graph of the Middle School I

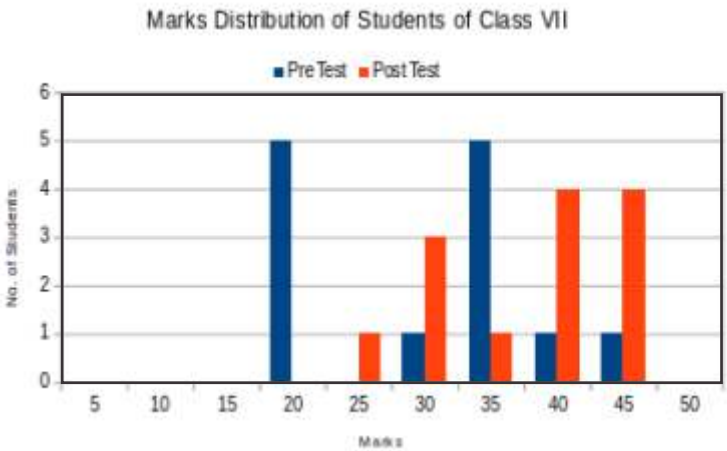


Figure 2: Density graph of the Middle School II

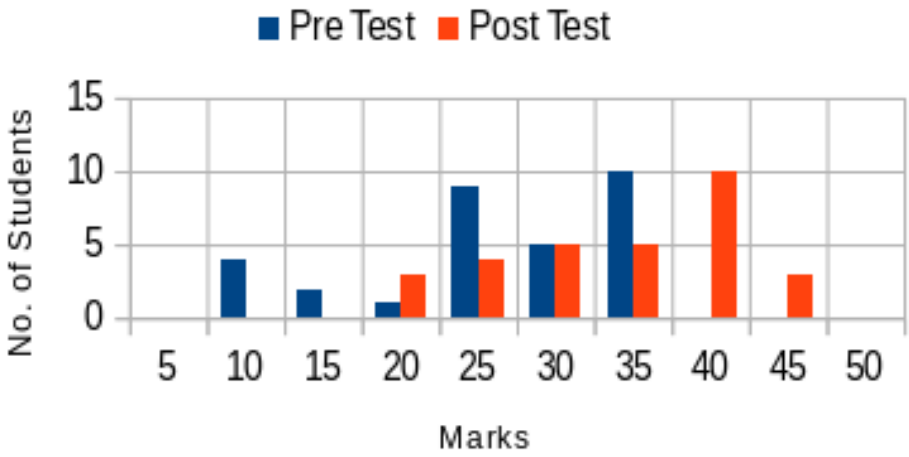


Figure 3 : Density graph of senior secondary school

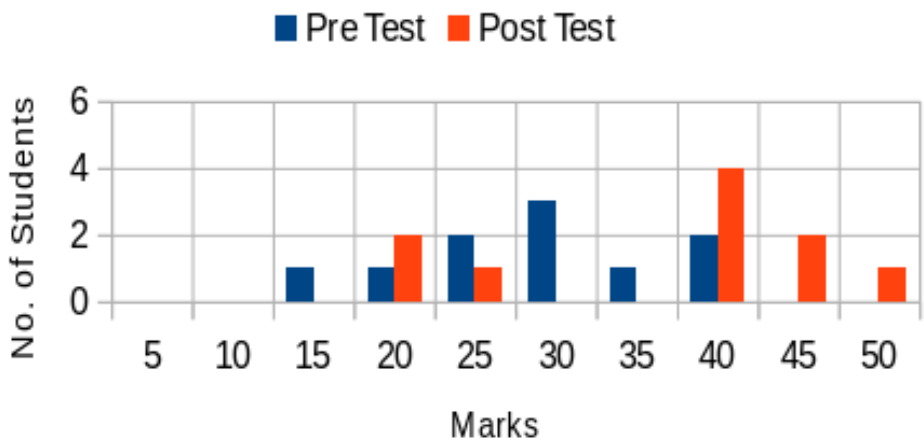


Table 4: Summary of the data from three schools

School	Range		Standard Deviation (Population)		Mean	
	Pre-test	Post Test	Pre-test	Post Test	Pre-test	Post Test
Middle School I	16 - 41	23-42	8.54	6.56	29.9	34.7
Middle School II	6 - 35	15-41	8.27	7.19	23.6	30.7
Sr. Secondary School	11 – 37	17-45	7.60	9.51	25.5	34

Figure 4: Box plot of the middle school

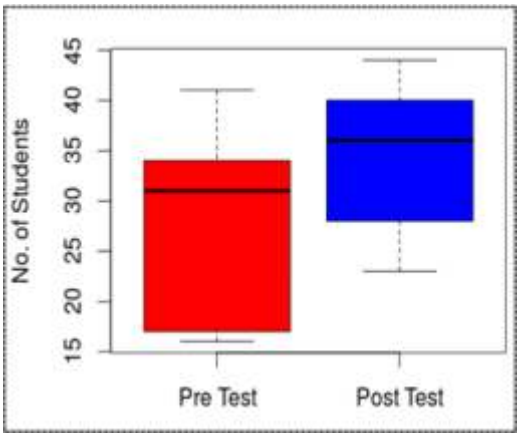


Figure 5: Box plot of the middle school

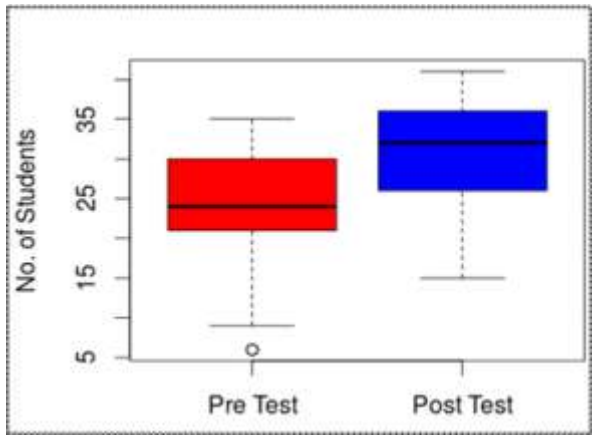
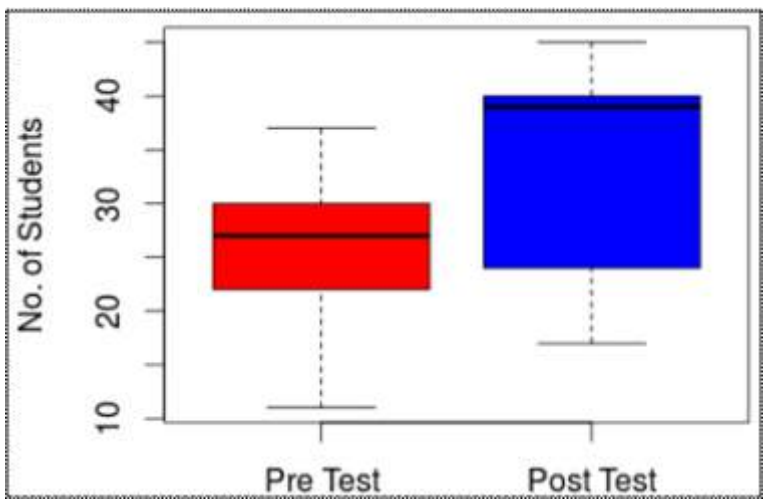


Figure 6: Box plot of the senior secondary school



As clearly seen from the density graphs (Figures 1,2 & 3) the data was not normally distributed. Hence, a non parametric test, Wilcoxon signed rank test was used. For the generalisation of the data for their specific class, rank test was used for approximation with z-score.

Table 5: Result of the Wilcoxon Test with continuity correction and their respective z-scores

Name of School	Wilcoxon signed rank test (V)		Rank Test		z-Score approximation table	
	V	p-value	Statistic (z - Score)	p-value	Larger Area/ z-score value	Smaller Area/ z-score value
Middle School I (Class VII)	90	0.001033	2.339741/	0.001033	0.9904 / 2.34	0.0096 / 2.34
Middle School II (Class VIII)	465	1.74e-06	3.179205	0.0007384	0.9993 / 3.20	0.0010 / 3.20
Senior Secondary School (Class IX)	52	0.007185	2.084297	0.001252	0.9484 / 2.08	0.1040 / 2.08

Discussion of the Results

The null hypothesis of the research was

H_0: There is no significant difference between the achievement score of pre-test and post-test of the students of respective classes.

In the analysis of all the three groups, the researchers found that the true location of the change is greater than 0.

For the Middle School I (Class VII) the result of the test was V = 90. From the table, the *Critical Values for the Wilcoxon Signed Ranks Test Statistics* for paired values (n = 13) was found to be **17 for a two-tailed test at 0.05 level.** For a one-tailed test, the value has to be doubled that is 21x 2 = 42. The calculated value was **90** which was far above the mark.

Hence, the difference was greater than zero. For approximation with a larger sample, a z-score was calculated. The result approximated with the larger area 0.9901, which shows that it can be considered to be significant at 0.01 level of parametric scale.

For the Middle School II (Class VIII) the result of the test was V = 465. From the table, the *Critical Values for the Wilcoxon Signed Rank Test Statistics,* the critical value for paired values (n = 31) was **147 for a two-tailed test at 0.05 level.** The required value for the sample was 147 x 2 = 294 which was far less than the achieved value for the sample. For approximation with a larger sample, a z-score was calculated. The result approximated with the larger area 0.9990, which shows that it can be considered to be significant at 0.001 level of parametric scale.

For the Senior Secondary School (Class IX) the result of the test was V = 52. From the table, the *Critical Values for the Wilcoxon Signed Ranks Test Statistics* for the paired values (n = 10) was **8 for a two-tailed test at 0.05 level**, so the required value for a one-tailed test is 8 x 2 = 16. The calculated value was **52**, which was much higher. For approximation with a larger sample, a z-score was calculated. The result approximated with the larger area 0.9484, which shows that it can be considered to be significant at 0.10 level of parametric scale.

The concept of a non-directional method of teaching vocabulary is not a new one. It has been used successfully by many other researchers. The researchers tried to engage three domains of knowledge, understanding and application through activities. The main idea was to engage the students with the content. The same chapters were used for participating in various activities. The researchers have stressed “the need to provide many repetitions of the words, and ways of making these repetitions meaningful”. (Anders and Bos, 1984, as quoted by Schwartz and Raphael, 1985) “The foremost means which skilled readers determine the meaning of unknown words is through the use of context clues” (Alexander, 1983; Nagy and Anderson, 1984, as quoted by Schwartz and Raphael, 1985, pp. 15).

Beck, Perfetti, and McKeown (1982) developed a program to teach about 100 words to fourth graders. The instruction attempted to develop the fluent level of word knowledge necessary to promote comprehension. The results of the study suggested that the instructional method was successful and that the learning and that learning words well can influence the comprehension of test and can bring about some improvement in general word knowledge and comprehension. (cited by Beck and McKeown, 1983)

In the study, students were engaged in four types of activities:

Recalling of known words (Jumble Words, The last letter game)

Application of rules for deforming words according to the change in gender (The gender fight)

Defining the words (Crosswords)

Describing situations (Identify the character)

Engaging students in defining words has been identified by many of the researchers as an effective way of improving vocabulary of the students.

Limitations of the Research

The greatest limitation to the action programme was absenteeism of the students. A number of students at Middle Schools and Senior Secondary School, despite the persuasion of the researchers, were irregular to the class. The teacher of the school suspected that either they were pursuing study at some private school or were engaged somewhere else.

Even in pre-test and post-test scores the researchers had to discard many responses as they were not paired. The absenteeism must have affected the performance of the students who did not pursue the classes.

The achievement scores of all the students showed positive changes that the students were underexposed to their potential of vocabulary learning capacity. This in a way inflated the results of the research.

The less number of usable data at Middle School I and Senior Secondary School creates a doubt about their applicability for the whole class.

Conclusion

Words are like relatives and friends, the more you engage with them, the more you know them. This study has suggested some ways to engage the students with the words. It has been an enlightening experience for both the researchers and the students. Many of the researchers adopted elements from the activities for their home assignments and classroom activities. For the students, it may be a short-term experience as the teachers at the government school were not very enthusiastic in adopting these in their practice, though they appreciated the activities.

The study has exposed a number of facts regarding the teaching of Hindi in government schools. The teaching of Hindi is not oriented towards developing language skills. The language teachers are more oriented towards question answer method of teaching. Students do not have any chance to develop a taste for literature and develop a desire to speak decent Hindi. The research can provide a base for further enquiry (experimental and quasi-experimental) into the topic.

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Improving the IT Skills of the Student Teacher for Preparation of Digital Module and CAI

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Abstract

This article is an attempt to evaluate the process of peer teaching in learning ICT skill. Though we did not seek to pose it as an alternative of formal training, but we emphasized that the peer teaching method could impart a basic level of working skills to the students who had no exposure of ICT before. We also found that with this basic level of training the talent of the students could be roped in preparation of the digital content. The results showed that with the help of these practices, the mean value of the self reported skills of peer taught students was pushed up from 34 to 47 which was a substantial gain. Even though this was a beginner group and further improvement in their skills might be much slower, yet it showed a means to give a boost to the students' morale by giving them more scope for leading their learning.

Keywords: *Computer Assisted Instruction, Information and Communical Technologies, Peer teaching.*

Introduction

With the integration of digital technology in day-to-day life, it is obvious that the teaching-learning process has to respond in certain predicable ways. The first issue in this is to train people in basic skills of using technology and learning to use it in responsible way. The second more complex issue is to modify the technology of education according to the

potential applications of the popularising technologies. In the world of teaching-learning, the digital technology has a potential for a creative disruption, if the teaching community could embrace the possibilities of the new technology for scaffolding the learning of the students. The technology has a potential to fill the absence of the teachers for individual attention, for student paced learning. It also has the scope for large-scale real-time evaluation of students' learning for quicker response to the emerging needs of the students.

It is with this perspective that the Department of Education, Patna Women's College planed to introduce its student teachers to the skill of digital content making. There had been a number of challenges in introducing it. First of all, among the admitted students, there were some who had too limited exposure to the use of computers. The rest of the students had widely varied digital skills. The main curriculum did not have the ICT component for practical training. The institution did offer an optional add-on course on ICT for Teaching-Learning Skills with an additional fee.

The second significant challenge was the variations in subject knowledge of the students. There were some students who did not have the understanding of the subject matter to reproduce it in a creative way and they might end up in copying the book content in a digital format. The third challenge was that there was a general lack of enthusiasm for the assignment. Most of the students perceived it as a lesson plan in addition to the lesson plans they made on paper with the only difference that they had to do it using technology with which they were not very familiar.

The fourth issue was that the B.Ed. students were not a homogeneous group. They were divided by their chosen method specialisations, that itself was based on their graduation subjects. Though there were interactions and collaboration across disciplines, but when it came to the assignments the students followed their subject group peers. Thus a diverse social groups and intellectual cultures were in existence among the 100 students. Accordingly, the action plan had to be diversified and multi-channeled.

Over these, there were some general problems:

Many of the student teachers felt that it took too much of time to learn an ICT skill while they could learn a number of new concepts in the main papers in a short duration of time.

Many of the students had no access to computers, except the computer lab provided by the institution and the busy schedule of the B.Ed. course did not allow them to learn the skills.

There were some students who lacked in confidence to learn the operations of a computer.

There was a number of students who did not see any direct benefit of learning the skill. They were not aware of the benefits of the ICT and were not enthusiastic about it.

Most of the students did not have an opportunity to get an effective training in computer operations.

The most significant challenge was that most of the students did not want to change the teaching-learning practices they were acquainted with (lecture method), or use digital content for additional support for their teaching style. The school they were to do practice-in-teaching did not provide an opportunity to use the new methods. Hence they saw no point in devoting time for the new skill.

These points of challenges were based on observation and informal discussions by the researchers and demands an inquiry in itself, but the focus of the study was on finding an effective way of providing skills of ICT to the students.

Significance of the Study

The central importance of the teacher in the use of technology was first identified by Cuban (1986) when he wrote about teachers as 'gatekeepers' and the level of discretion they have in deciding whether or not to use technology in their classroom – no matter how strongly this might be mandated (Tyack & Cuban 1995).

Writing almost 25 years ago, at the dawn of the 'age of personal computing', Cuban criticised the historic failure of schools, education authorities and technology companies to consult teachers in the design and choice of technology. He argued that enhanced take-up of digital technologies would only result from adopting technologies that could work within the everyday realities of the classroom.

He wrote that "Since the mid nineteenth century the classroom has become home to a succession of technologies (e g, textbook, chalk-board, radio, film, and television) … Yet the teacher has been singled out as inflexibly resistant to modern' technology, stubbornly engaging in a closed-door policy toward using new mechanical and automated instructional aids …Seldom did investigators try to adopt a teacher's perspective or appreciate the duality of continuity and change that marked both schools and classrooms" (Cuban 1986, pages 2, 6).

Many of the research have revealed that encouraging teacher to use digital content for teaching learning involves more than developing their competency in the technical

aspects of using technology. “In fact, educational research have been some what naïve in presuming that the right combination of training, technology and opportunity for 'reflective practice' will some how result in high levels of teacher take-up” (Bore & Wright 2009; cited by Gaffeny, nd). Research show that it is more socio-cultural aspect that influence the take-up of the digital technology. This study seeks to explore the possiblities of developing a socio-cultural environment of learning the ICT skills by using peer teaching and collaborative group studies for enhancing the ICT skills.

Review of Literature

Reviewing of literature revealed that the social conditions for using ICT is most important factor for motivating the non-skilled students to learn the skill. As Mulkeen (2003) explains, “Teachers' knowledge, skills and attitudes developed through their personal experience of schooling as students, their pre-service training, their participation in subsequent professional development and their day-to-day work and interactions with colleagues and other members of their school communities, have a significant influence over their classroom use of digital technologies.” Hence the culture of the institution to institutionalise the use of digital content is very important.

Developing teacher capability involves attention to both intrinsic and extrinsic dimensions. The intrinsic dimension is concerned with understanding and appreciating the teachers' world and the multi-dimensional nature of their work (Orlando 2009), and how to identify changes in their thinking and behaviour (Lim, Lee & Hung, 2008); while the extrinsic dimension is focused on the external influences on the teacher (Levin & Wadmany 2006). Examples of the intrinsic conditions required for teachers to consider using technology are that the teacher must believe that using technology will support the achievement of higher level goals while not causing disturbances to the achievement of other higher level goals; and she or he has or will have sufficient ability and resources to use technology (Zhao & Cziko 2001; Runyon & Semich 2002). On the other hand, examples of extrinsic factors include availability of technical and funding support, and computer access (Mumtaz 2000).

In light of these studies, the present research focused on the creating a social cultural environment conducive of promoting skills of ICT.

Objective of the Research

The objective of the research was to :

O_1: study the effectiveness of the peer teaching and collaborative learning for enhancing ICT skills.

O_2: identify the general problems and motivation of the student teachers in developing digital contents.

O_3: identify the status of skills for making CAI and digital module based teaching across subject methods.

Hypothesis

For the first objective two null hypotheses were created. The first was

H_{01}: There is no significant difference in the skills of ICT of the students in pre-test reported level of skills and and post-test reported level of skills.

The second hypothesis was :

H_{02}: There is no significant difference in the skills of ICT of the students who received training through a formal program of ICT and the students who were peer taught the skills required for digital content designing.

For the other two objectives qualitative and quantitative measures had been applied.

Research Design

The research was designed as a simple one sample pretest-posttest research based on a self reporting Likert type scale for quantifying the level of skills in required technological and cognitive skills. Though the main focus of the action research was on the ICT skills but the other skills required to make Presentation based short modules and CAI was also collected to overview their status. The items of the questionnaire required the students to report about their perception of their label of difficulty in specific digital skills. They had to report it on the basis of the hands on session.

Besides the quantitative data, two additional sources of data were also used for complementing and triangulation. Since the students were the participants of the process, they were asked to observe the main problems faced by the researchers of their group. An additional open ended questionnaire was also prepared to gauge the

individual feedback. Thus, there were three sources of data:

Likert type scale for measuring ICT skills

Feedback on the experiences of making CAI and presentations (From randomly selected five from each of the methods)

Unstructured observation (Naturalistic observation) report by the method subject leaders

Preparation of Tools

A Likert type scale for self reporting the level of skill for operating the identified software technologies was prepared by the researchers. It was approved by three experts including the supervisor for its content validity. Ten student evaluators were given the questionnaire to report their perception of the questions. On the basis of their feedback, many complex and technical terms were substituted with simpler words.

The scale had three parts: The first was about general information relating to their skills for operating computer and application software that is used for making CAI and Digital Module. The other two parts were specific to the required cognitive skills and software manipulation for making CAI and digital module. Each student had made a digital module and a CAI.

A feedback form was also developed to record their experiences and challenges of creating digital content across different methods.

Action Plan

The first step was the selection of suitable technology for creating digital content. The meaning of digital content here referred to the preparation of self learning material (Computer Added Instruction CAI) and flash based digital module that could be used with interactive boards in the class. It was decided that the preparation would be done in MS Powerpoint. It would be converted into flash modules. Hence the software to be taught to the students was MS Powerpoint.

The second important issue was groupings of the students. The students were divided by their selected methods. They had to choose from two groups of subjects that became their Method I and Method II. The division of students was as follows:

Table 1: No. of students in each of the methods

Subjects	No. of students	Subjects	No. of students
Hindi	44	History	22
English	23	Geography	7
Mathematics	14	Civics	20
Biological Science	18	Economics	24
Physical Science	26	Total	198

Students were of two types on the basis of their exposure to the ICT. The first group was of those who either had some exposure to ICT or a formal degree in ICT before joining the B.Ed. Course, or had opted for an add on course on ICT based teaching learning offered by the Department of Education, PWC.

The action plan was of two phases. In the first, a period of 10 days was marked for training by the supervisor for constructing CAI and e-content. The programme was as follows (Table 2):

Table 2: The workshop schedule for e-content and digital module

Days	Topic	Remarks, if any
Day one	Orientation to digital content development	Exposed to the concept of digital content with the message that it is different from mere digitalisation of the written content
Day two	Why should I select this topic?	Criterion for selection of topic for presentation and CAI. Writing objectives.
Day three	Telling Tale: The language of presentation and CAI	How to write in talking language?
Day four	Chunking the content	How much is sufficient?
Day five	Asking to learn	Using formative questions to lead learning

Day six	Structure for CAI	Linear and branched CAI
Day seven	Sources of content	Google-ing for subject-specific content graphics and videos
Day eight	Basic structure and functions of MS Powerpoint	--
Day nine	Adding graphics and videos to powerpoint	--
Day ten	Tips for typing in unicode Hindi	Activating additional language (Hindi) in Windows XP and 7

In the 2nd phase, the students were to start their planning and creating CAI and digital module. The students who had a BCA or One year Diploma in Computer Application were identified to conduct the hands-on session for the students who did not have the ICT exposure. They had to conduct sessions on the following:

Hands-on the basics of Powerpoint: typing, saving and formating

Hands-on the inserting picture, videos and table

Searching the net and content sharing

Besides the students had to work in groups and help each other. It was strongly advised that each student had to work on his/her project themselves, it was not to be delegated in any condition.

Since the researchers also had to create digital content, they were made leaders of their respective methods. They had to coordinate group activities and overview the designing of the content in their respective methods.

Initiation and conduction of the Action Programme

The action plan was initiated with the administration of the pre-test questionnaire. A period of three months was given to the students to prepare the content and present it in the stipulated form. The students were exposed to the process of preparing the content by the supervisor through a 10 hour workshop in spread of ten days. Hands on sessions were conducted by

the peers. It was not mandatory for all. Nine groups comprising a total of 37 students formally requested to use the computer lab for conducting and participating in hands-on sessions.

The student could select topics from their respective subject from any of the classes from Class V to Class XII. This duration was to coincide with the practice-in-teaching at schools. This was intensional as the students have to engage with the school level content during this period.

Evaluation of the Action Programme

The ten days workshop period was well taken. The students were excited and enjoyed participating in the programme. Some of the students wanted some specific reading material relating to the topics. They were referred to different source books. But they found difficult to read them. They formulated their groups according to their distribution across practice-in-teaching schools and reported to their leaders.

The period of the research and content designing was intensionally kept during the period of practice-in-teaching at schools as it was reasonably thought to be suitable for content designing, but it was found that this period was not suitable for the research. It was very hard to monitor the individual efforts by the students. Most of the students were in a state of performance anxiety throughout the period. Many of them were too anxious about the classes they have to take at the practice-in-teaching schools. It has reduced their attention to their assignments which had a much lesser value in terms of marks percentage.

Many of the students did work hard to overcome initial inhibitions to make Powerpoint slides and used their group resources to construct their assignments.

Data Presentation

The data was processed by arithmetical and distributive statistical measures.

Some of the summaries are given here. Table 3 presents the percentage distribution of the students for each of the questions. In general it shows a good level of acomplishment for most of the skills.

Table 3: Percentage distribution of students for specific questions (approximated to far nearest whole)

Digital Module and CAI skill Questionnaire (Post-test)						
IT related skills (Percentage of students)						
		Very easily	Easily	Difficult	Very difficult	Cannot do myself
1.	Typing skills	24	25	22	4	24
2.	Insert pictures	32	51	13	1	3
3.	Animation	22	39	34	3	2
4.	Exploring extra resources	19	58	21	2	0
5.	Collecting digital resources	15	66	16	3	0
6.	Inserting hyperlink	42	31	24	3	0

Digital Module specific skills (Percentage of students)

		Very easily	Easily	Difficult	Very Difficult	Cannot do myself
1.	Finding content	25	58	15	1	1
2.	Developing content	14	57	26	3	0
3.	Organising in proper layout	13	58	26	3	0
4.	Simplifying and communicating language	11	61	26	2	0
5.	Relating to real life	8	68	22	2	0
6.	Selection of topic	18	65	17	0	0
7.	Determining difficulty level of content	9	44	47	0	0

CAI specific skills (Percentage of students)

		Very easily	Easily	Difficult	Very difficult	Cannot do myself
1.	Questions according to topic	19	61	20	0	0
2.	Determining difficulty level of questions	9	61	20	0	0
3.	Selection of distractors	16	48	35	1	0
4.	Responding explanation of wrong answers	13	57	27	3	0

The skills were also scaled on 0 to 4 points. The mean score of IT-skill was 18.10 where the highest score was 24. For presentation skill, it was 17.23 for the maximum score of 24 and for CAI-skill it was 11.43 when the highest score was 16. A summary of data of the digital module and CAI questionnaire is given below:

Table 4: Summary of ICT skills of the students (Post-test)

	Mean	Sd	Skew	Kurtosis	Se
IT-skill	18.10	3.65	-0.96	2.53	0.37
CAI-skill	11.43	2.06	0.21	-0.09	0.21
presentation	17.23	2.73	0.25	0.48	0.27

Results and discussion

Objectives and hypothesis

Objective O_1

One of the objectives of the research was to

O_1: Study the effectiveness of the peer teaching and collaborative learning for enhancing ICT skills.

For the first objective two hypotheses were created.

Hypothesis one

The first hypothesis was :

H_{01}: There is no significant difference in the skills of ICT of the students in pre-test reported level of skills and post-test reported level of skills.

Table 5: Summary of ICT skills of the students (Pre-research post-test)

	Mean	Med	Sd	Skew	Kurtosis	Se
Pre-test	34.14	46	10.5	0.56	-0.47	1.09
Post-test	46.66	33	7.1	0.00	0.81	0.74

The result of the t-test was as follows:

Scores on self reported skill score of the students after the research (post-test) (M = 46.66, SD=7.1) were higher than before the research (pre-test) (M = 34.14, SD = 10.05), $t(184) = 9.5$, $p < 0.001$.

Two sub-hypotheses were also created :

H_{011}: There is no significant difference in the skills of ICT of the students with formal training of ICT in pre-test reported level of skills and post-test reported level of skills.

H_{012}: There is no significant difference in the skills of ICT of the students who were peer taught in pre-test reported level of skills and post-test reported level of skills.

Table 6: Summary of ICT skills of the students (pre-research post-test)

	Number	Mean	Med	Sd	Skew	Kurtosis	Se
Trained Preresearch	32	46.03	46.0	6.80	0.38	-0.31	1.13
Trained post-test	32	49.84	49.5	6.40	0.57	-0.61	1.20
Peer taught pre-test	61	27.90	28.0	5.49	-0.01	0.89	0.89
Peer taught post-test	61	44.98	45.0	6.92	-0.16	-0.43	0.70

The results of the t-test was as follows:

Sub-hypothesis H_{011} : Pre-test scores on self reported skill of the students who got some prior training in ICT (M = 46.03, SD = 6.80) were higher than their post test scores of self reported skills (M=49.84, SD = 6.40), $t(31) = 6.86$, $p < 0.001$.

Sub-hypothesis H_{012} : Pre-test scores on self reported skill of the students who were peer taught (M = 44.98, SD = 6.92) were higher than their post test scores of self reported skills (M = 27.90, SD = 5.49), t(60) = 24.49, p < 0.001.

The results of the hypothesis and sub-hypotheses clearly indicated a successful endeavour on the part of the students in learning ICT with the help of their peers. It was further needed to evaluate the scores of peer taught students with their trained peer to get a complete picture of their development.

Hypothesis two

The second hypothesis was :

H_{02}: There is no significant difference in the skills of ICT of the students who received training through a formal program of ICT and the students who were peer taught the skills required for digital content designing.

To test this hypothesis, Weltch two sample t-test was used.

Table7: Description of the data of the two groups

	Number	Mean	SD	Median	Min	Max	Skew	Kurtosis	SE
Trained	32	49.84	6.40	49.5	39	64	0.57	-0.31	1.13
Untrained	61	44.98	6.92	45.5	24	61	-0.16	0.89	0.89

The result of the t-test was as follows:

Scores on self reported skill scale of the students who got some prior training in ICT (M = 49.8, SD = 6.40) were higher than than for the students who were peer taught (M=44.98, SD=6.92), t(68) = 3.38, p < 0.001, Under Welch adjustment for inequality of variance, the degree of freedom was adjusted from 91 to 68.

The result was not surprising even though with the level of motivation and participation of students during the workshop and afterwards has marked a different impression. In general, only a few students had shown discomfort in learning new skill of software. Yet, as the result shows that even for a small set of skills required for developing a Powerpoint presentation the formally trained students were in superior level of confidence and skills.

Objective O_2

The second objective of the research was to

O_2: Identify the general problems and motivation of the student teachers in developing digital contents.

For this objective the report by the method subject leaders was used. This shows

some common problem across the method subjects. Prominent among them were lack of knowledge about subject matter, lack of IT skills, lack of interest and motivation. It is summarised in the following table.

Summary report of the observation by the method subject leaders

The group leaders were asked to note their observations regarding the problems of each of the members of their group in making CAI or presentation. Table 7 provides a summary of their observed problems faced by students of different methods.

Table 8: Summary of the observation by the method subject leaders

Sl. No.	Method	Observed problems
1.	Hindi	Problem in Hindi typing; Lack of knowledge of content; Lack of knowledge of computer applications.
2.	English	Lack of Computer knowledge; Not interested in preparation of presentation; Lack of basic understanding of IT skills; Difficult subject matter; Not sufficient time given for the preparation of the presentation.
3.	Mathematics	Lack of proper knowledge regarding the topic; Lack of knowledge about operating PowerPoint.
4.	Biological Sci.	Lack of proper knowledge regarding the topic; *Lack of interest in making the CAI; Unable to access internet.*
5.	Physical Sci.	No concern about the mental level of the students; Lack of experience in IT.
6.	History	*Problem in the development of the content; Lack of interest in making the CAI; Unable to access internet.*
7.	Geography	*Unable to operate the computer; Less knowledge about Microsoft Powerpoint; Problem in the development of the content; Lack of interest in making the CAI; Unable to access internet.*
8.	Civics	*Problem in the development of the content; Unable to access internet.*
9.	Economics	Less knowledge of the content; Less knowledge of computer skills; Unavailability of sufficient sources for the content development

Objective O_3

The third objective of the research was to

O_3: Identify the status of skills for making CAI and digital module based teaching across subject methods.

While Table 3 and 4 summarised the scores of different skills relating to presentation and CAI. Their overall skills has also been calculated to visualize the present status of skills. Table 9 shows their skills across the subjects. Table 10 is a list of problem faced by student in preparing their content. *The score shows that only the students of mathematics were most confident in preparing their content.*

Table 9: Summary of Feedback form

Sl. No.	Methods	Very easy	Easy	Difficult	Very difficult	Can't do
1.	Hindi	18%	56%	24%	2%	-
2.	English	27%	55%	17%	1%	-
3.	Mathematics	64%	22%	12%	1%	1%
4.	Physical Science	18%	17%	65%	-	-
5.	Biological Science	-	33%	67%	-	-
6.	Geography	-	34%	66%	-	-
7.	Economics	22%	48%	28%	2%	-
8.	Civics	18%	62%	20%	-	-
9.	History	14%	64%	22%	-	-

Table 10: Feedback by students about the problem faced by specific topics

	Topic of the digital module	Sources	Problems faced
1.	Simple present tense	Text book	To insert the pictures and to give appropriate examples
1.	Articles	Text book and Internet	To insert the picture and development the concept
2.	Adverb	Textbook and Internet	To maintain level of students and to find suitable examples and pictures.
3.	Degrees of comparison	Text book and Internet	To find suitable examples and pictures related to the topic and to keep the level with the students.
4.	Gender	Text book and Internet	To proceed with the content and dividing it and also in arranging the slides.
5.	Types of triangles	Text book, Internet	Inserting animation
6.	Cylinder	Text book and Internet	Inserting flash images
7.	Perimeter of plane figures	Textbook and Internet	Inserting symbols
8.	Profit & loss	Text book and Internet	Inserting animation, Lack of typing speed
9.	Fractions	Text book and Internet	Simplification of the matter
10.	Soil	Book, Internet, Data Book.	Inserting pictures and hyper linking.
11.	Agriculture	Books, Internet and friends.	In making wrong pages, development of questions and hyper linking
12.	Land transport	Books and internet	Slow typing, hyper linking and content development.
13.	Sectors of Indian economy	Economics book, websites, Pratiyogita Darshan	In creating hyperlink
14.	Green revolution	Economics book, websites, Pratiyogita Darpan	In giving options to the questions
15.	Commercial crops	Economics books, websites	In giving options to the questions
16.	Unemployment	Books of Bharti Bhavan, N.C.E.R.T., educational websites	In finding suitable content and pictures related to it
17.	Globalisation	Books, websites	Creating hyperlink, and framing questions

Discussion

In recent time the researchers have shifted focus from the needs of individual learners (effective motivational tasks or activities, and acquisition of explicit meta-cognitive learning strategies) to a broader view of affective and contextual factors that contribute to developing learner perspectives, capacities and scope for independence. These factors include

> students' beliefs about their capabilities, and their views about what is worth learning, including volitional strategies to sustain effort (Corno, 2001)
>
> domain-specific knowledge (Perry, 2002),
>
> peer pressure influence on motivation and effort (Sullivan, McDonough & Prain, 2005),
>
> possible co-regulatory strategies modelled by teachers to support learning (Hadwin, Wozney, & Pontin, 2005), and
>
> the broader classroom organisation of learning experiences (Boekaerts & Cascallar, 2006), including appropriate “material resources” (Prosser & Loxley, p. 21).

We saw these components active in our process of research. This practice made the students quite aware of what ought to be learn in ICT and in their content matter. It make them more confident. As many of tables above shows the students had an understanding of what they lack, where and what kind of help they need.

Limitation of Research

Some part of the project could not be monitored. For example, the quality of the group activities could not be evaluated. They vary according to the capabilities and skills of the volunteers assigned to the group. Even the learning of the students after the workshop conducted by the supervisor was not evaluated.

Conclusion and Application

The application of this reseach is far and wide. First of all, it gives a glimpse of the effectiveness of the process of ICT training in the Department of Education, Patna Women's College. The process of peer teaching in learning ICT skill though not an alternative of formal training, it does impart a basic level of working skills to the students without any exposure of ICT and their talent can be roped in preparing of the digital content. Our results have shown that with the help of these practices the mean value of the self reported skills of peer taught students had been pushed up from 34 to 47 which is a huge gain. Though this is

a primary gain and further improvement in the skills will be much slower, yet it shows a means to give a boost up to the students marale by giving them more scope for leading their learning. This experiment can be applied to other aspects of teacher education also like micro teaching and simulation. Sadly this research also underline an unresolved problem of teacher education that is the lack of content knowledge among many of the students.

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Improving Effectiveness of Morning Assembly in Promotion of Values among the Students of Class VIII

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Abstract

In modern age of science and technology, when social, moral, cultural and spiritual values are decaying, it is necessary that education should be value-oriented. Only value-oriented education can stimulate individual and social welfare. Although value education is both a parent and a school responsibility, school, due to its institutionalized nature, has to take the major responsibility. School plays, a significant role in developing values among children. The morning assembly especially plays a vital role. That is perhaps the only time during a day when all the students and teachers assemble at a common place. School assemblies have a subtle, educative and enriching purpose. The present paper aims at improving effectiveness of morning assembly in promotion of values among students of Class VIII. A pre-test was conducted to find out the effectiveness of assembly in promoting values. On the basis of the result of the pre-test, demonstration and practice of the appropriate ways of conducting assembly were given by the researchers. After 15 days of regular practice, a post-test was conducted. Analysis of the post-test revealed the impact of an intervention period on the promotion of values among the students.

Keywords: *Value based activities, Morning assembly, Student participation.*

Introduction

Values are guiding principles that shape our outlook, attitudes and conduct. They give a direction to life and thus bring joy, satisfaction and peace. In philosophical contexts, values

are those standards or code for conduct conditioned by one's cultural tenets and guided by conscience, according to which a human being is supposed to conduct himself and shape his life patterns by integrating his beliefs, ideas and attitudes to realize cherished ideas and aims of life (**Gupta, 1986**).Values add grandeur to life. One might say that any human activity, thought or idea, feeling, sentiment or emotion, which promotes the self-development of an individual, constitutes a value (**Pathania, 2011**). A value system is the backbone of the society. Values vary from one society to another and from time to time. But, every society conforms to certain moral values, and, these values are accepted by all the societies, as global values.

The National Curriculum Framework, 2005, reverberated the vision of education where values are inherent in every aspect of schooling. The framework expresses the need to reaffirm our commitment to the concept of equality amidst diversity, mutual interdependence of humans to promote values that foster peace, humaneness and tolerance in a multi-cultural society. The need of value education has not been emphasized only in India but its need is also being felt all over the world. There are four pillars of learning mainly learning to know, learning to do, learning to live together and learning to be (**International Commission on Education, 1996**).

Over the past two decades, colleges and institutions have devoted energy and resources to a wide range of educational programmes and initiatives designed to promote character, value and behaviour in their students (**Dalton and Crosby, 2010**). The school as an institution encourages the learning of certain values. The everyday incidents of school life offer innumerable opportunities to show students the importance of these values. In this regard, school assemblies play an important role. They are the most important element of the school curriculum. The school assemblies are perhaps the only time during a day when all the students and teachers assemble at a common place. They have a subtle, educative and enriching purpose. However owing to a number of reasons this purpose is getting diluted and what we are left with is mere pomp and show.

In ancient India, during the Gurukul system of education, community life was a fundamental part of education. The teacher and student fraternity used to meet at the time of common prayers and meals, which resulted in greater bonding. However, in modern times, assemblies have taken an embellishing look. Things are made up and showcased with little spontaneity and quality. Very often, only selected students tend to take charge of the assemblies and generally it's not 'everybody's affair'. Generally, the focus is more on mechanical aspects such as maintaining silence, standing in perfect queues, routine check

of clean nails and uniform; it is seldom interactive, dynamic, and fun-filled and thus fails in its very purpose of inculcating right values among the students. Due to lack of time, conducting morning assembly has just become a formality for some schools. Also repetition of similar prayer songs and lack of value based activities lead to monotony. As a result the students lack interest and participate half heartedly. The similar problems related to morning assembly were identified by the researchers during their practice teaching in a private school of Patna affiliated to Bihar School Examination Board (BSEB).

Thus, in order to overcome the above said problems the present study was undertaken under the formal title, **'Improving Effectiveness of Morning Assembly in Promotion of Values among the Students of Class VIII.'**

Significance of the Study

Assembly is a vital part of an ordinary school day. It is an important instrument, through which a school can create positive ethos and promote value-based education. It is a common forum which can be used to express and reinforce the code of conduct expected both from teachers and students, to make the students and teachers understand the philosophy of the school and to live by it and to instill a feeling of communion. The given study finds out the reasons of disinterest among students towards existing patterns of morning assembly. It also helps to improve the effectiveness of morning assembly by making it livelier and engaging. It further helps in promoting right values among students through value-based activities.

Probable Causes

Researchers found that, although morning assembly was a part of the school curriculum, it was being conducted in a monotonous and mechanical way. Besides singing of prayer songs (which also lacked variety) and the National Anthem, emphasis was mainly on making school announcements regarding the daily work or the school routine. They felt that the assembly needed to be more interactive, wherein opinions were sought and the audience was engaged spontaneously. Moreover, activities like simple physical exercises, narration of inspirational stories or incidents from life of great men, motivational skits etc. rarely took place. Thus, the very purpose of inculcating values among students was hardly being served through it. Keeping this in view the short duration of morning assembly (approximately half an hour per day), the researchers initiated an effort to make assembly a vital and significant tool towards promotion of values among the students.

Action Hypotheses

Before initiating their programme, the researchers framed certain action hypotheses which are given below:

H_1: If the students are taught variety of prayer songs, it will help in preventing monotony in the assembly.

H_2: If the students are acquainted with different value based activities, it will help in promotion of values.

H_3: If the students practice assembly according to a given format, it will improve its effectiveness.

Research Method

The method of study incorporated the following:

Sample

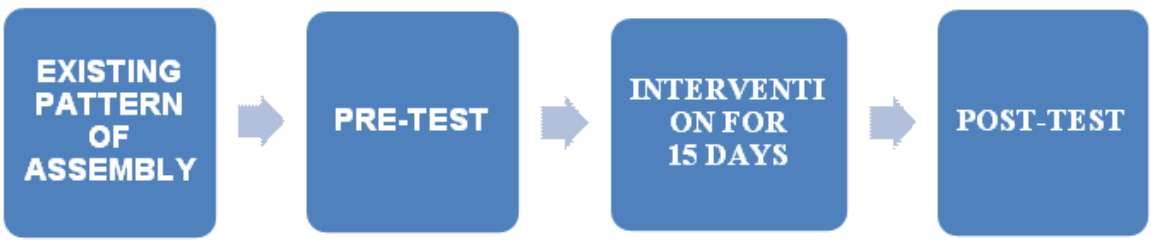
Students of Class VIII of a private school of Patna constituted the sample of the study.

Data Collection

Pre-test and Post-test were designed by the investigators to collect the data. For this, a close-ended questionnaire was developed to know the students' feedback regarding existing patterns of assembly. It consisted of 17 items. The scores of the questionnaire were compared and t-value was calculated to find out the effectiveness of the morning assembly.

Research Design

Figure 1: Action Programme



Action Programme

A **pre-test** was conducted by the researchers in which the students were asked to give their feedback on the existing pattern of assembly through a close-ended questionnaire.

Intervention

The researchers taught the students, a variety of prayer songs, both in Hindi and English. They were also acquainted with different action songs.

The researchers taught various value based activities such as short inspirational stories/ incidents from lives of great men, simple physical exercises, motivational skits, quiz, role play etc.

The students were divided into small groups (5 students in each group).They were allotted different value based themes(as mentioned in Table1).

The researchers oriented the students with a new format of assembly. Few minutes of yoga/physical exercises followed by value-based theme development, reflection, prayer and prayer song/action song, activity, reading news and thought for the day, national anthem and finally the daily announcements constituted the new pattern of assembly. Each group was given rigorous practice before they actually conducted the assembly. They were also trained in effective speech patterns, use of correct grammar, handling of microphone etc. The errors committed by students were pointed out and corrected simultaneously and feedback regarding the day-to-day performance was provided by researchers to each group.

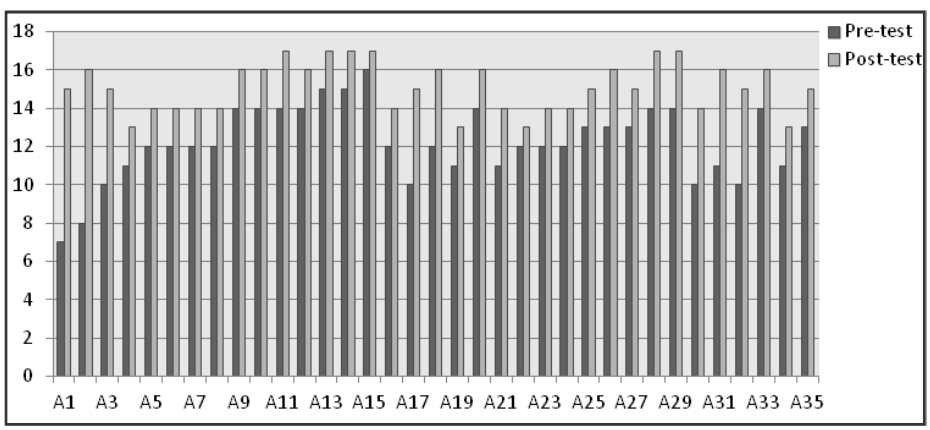
Post-test

After 15 days, a post-test was conducted to determine the effectiveness of the assembly in the promotion of values among the students. The students' feedback was evaluated and scores were calculated thereafter to arrive at the final conclusion.

Evaluation of the Action Programme

The effectiveness of the action programme can be analysed by comparing the scores obtained by the students in pre-test and post-test, which is depicted in the following figure:

Figure 2: Pre-test and Post-test scores of the participants



Description: X-Axis –No. of Students; Y-Axis –Scores of students' views

As we can see from figure 1, the students have scored better in post test than in pre test. The students show interest in the morning assembly after the intervention.

Table1: Values promoted among students through value based assembly and the level of participation of students

S. No.	Theme of the Assembly	Activity	Value	Level of participation of students
Day 1	The power of faith	Story telling	Devotion	low
Day 2	Smiling your way through	Role-play	Cheerfulness	moderate
Day 3	Service to man is service to God	Story telling	Service	moderate
Day 4	Keep the flag flying	Quiz	Patriotism	high
Day 5	I can do!	A game of price tags	Self-respect,self-confidence	high
Day 6	Celebrating nature	Puppet-show	Respect for environment	high
Day 7	All are equal	Quiz	Equality	high
Day 8	Love your parents	Story telling	Love, respect	high
Day 9	Failures are stepping stones to success	Quiz	Determination	high
Day 10	Try a little kindness	Role-play	Courtesy	high
Day 11	Be Positive	Story	Optimism	high
Day 12	I make a difference	Role-play telling	Self-respect, compassion	high
Day 13	True friendship	Role-play	Friendship	high
Day 14	Tomorrow begins with today	Puppet-show	Punctuality, Regularity	high
Day 15	A bouquet of flowers	A Game on cooperation	Fellow-feeling, cooperation	high

Results and Discussion

The results and discussion based on the evaluation of action programme are mentioned under each hypothesis as given below:

H_1: If the students are taught variety of prayer songs, it will help in preventing monotony in the assembly.

Songs offer a change from routine classroom activities. As stated by Lo and Fai Li (1998), learning English through songs also provides a non-threatening atmosphere for students, who usually are tense when speaking English in a formal classroom setting. Correctly chosen, traditional folk songs have the dual motivating attack of pretty tunes and interesting stories, plus for many students- the added ingredient of novelty (Hill, 1999).The students can become bored by repeatedly listening to a narration or dialogue as they attempt to understand the meaning of new words or phrases in context. In contrast, listening to a song over and over again can seem less monotonous because of the rhythm and melody (Purcell, 1992).

Therefore, to internalize the essence of prayer and noble thoughts among the students and prevent monotony in the assembly**,** the researchers taught the students, different prayers songs both in the Hindi and the English languages. The meaning of each song was explained to them. Through drill exercise, the songs were learnt by heart. The students were also taught various value based action songs. This made their learning joyful as well as enriching.

Observations

It was observed that students started taking interest in the assembly. The students became more disciplined and their level of participation increased.

Thus, this action hypothesis was accepted.

H_2: If the students are acquainted with different value based activities, it will help in promotion of values.

The consciousness of values must permeate the whole curriculum (not just value course), formal or non-formal, starting with assembly, the curricular and co-curricular activities, the celebration of festivals, work experience, team games and sports, subject clubs, social service programmes etc.(Munir and Aftab, 2012) . For hundreds of years folktales, myths, legends, and fables have been used to provide guidance on behaviour and morality, and can be used to teach valuable lessons about social behaviour (Cartledge & Kiarie, 2001; Cullinan, & Galda, 1998).Thus, to unfold, promote and exhibit social, cultural, economic and human values among students, the researchers incorporated various value-based activities in the assembly, such as, narrating short inspirational stories/ incidents from lives of great men, simple physical exercises, motivational skits, celebration of some of the important national and international days, quiz etc. Various activities related to value based themes are clearly mentioned in Table 1. These not only aided in promotion of values (as mentioned in Table1) but also helped the students in realizing the importance of value education in their day to day life. Also, students who participate in co-curricular activities not only do better academically than students who do not but also develop other facets of their personalities in the process. Self-esteem, self-confidence, social cooperation, and leadership skills are just a few of the cognitive factors that are affected. Co-curricular activities allow students to blend aspects of their academic learning into personal actions (Allison 1979).

Observations: It was observed that the students became more disciplined and punctual. The absenteeism among the students reduced and they started taking initiative in participating as well as conducting value based activities.

H_3: If the students practice assembly according to a given format, it will improve its effectiveness.

With the due consent of school authorities, the researchers a made a little modification in the existing pattern of the assembly. A few minutes of yoga/physical exercises followed by value based theme development, reflection, prayer and prayer song/action song, activity, reading news and thought for the day, national anthem and finally the daily announcements constituted the new pattern of assembly. The researchers gave sufficient practice to students in conducting assembly according to the new format. They were also trained in effective speech patterns (this included voice tone, pitch, pace, appropriate pauses and grouping of words, use of correct grammar and so on), handling of microphone etc. This was practiced regularly for 15 days. The errors committed by students were pointed out and corrected. The effort of the researchers was highly appreciated by the school authorities as the students participation increased during the assembly.

To statistically test the significance between the means of pre-test and post-test, a null hypothesis was framed.

H_{03}: There is no significant difference among the students' views before and after the assembly

To ascertain the difference between pre-test and post-test, t-value was determined.

Table 2: Mean and standard deviation of the scores in Pre-Test and Post-Test and t-value

No. of students	Pre-test		Post-test		d*f*	t-value
35	Mean	Standard Deviation	Mean	Standard Deviation	34	3.64*
	12.23	1.96	15.11	1.30		

**p < 0.01 level, significant*

From Table 2 we can easily make out a difference in the average of the scores in the pre-test and the post-test. The mean of the scores obtained in post-test was 15.11(±1.96), which was more than that of pre-test i.e. 12.23 (± 1.30) and the calculated t-value (3.64) was highly significant at 0.01 level. Hence, the null hypothesis was rejected and it was established that there was significant difference among the students' views before and after the intervention. This shows improvement in effectiveness of morning assembly among students.

Limitations of the Study

Due to the paucity of time, the present study was limited to the following-

1. The participants of this study were from a single school.
2. Only 35 students of Class VIII were included in the study.
3. The results relied totally on the feedback of the students through a close-ended questionnaire.
4. The duration of observation was just 15 days.

Conclusion

School assemblies have a subtle, educative and enriching purpose. The educators should incorporate value based themes, activities, songs etc. in assembly so as to promote right values among students. The study leads to the conclusion that value-based assembly enables to preserve, protect and propagate healthy tradition/practices, culture and thoughts. If each day different prayer songs/action songs are sung during assembly, it will prevent monotony. Few minutes of yoga/physical exercises followed by value-based theme development, reflection, activity, reading news and thought for the day etc. if regularly practised during the assembly, help in promotion of values among students, thereby leading to its effectiveness. Besides this, the study was limited to 35 students from a single institution; further study can be undertaken using respondents from other educational institutions across the country for more conclusive database. The findings of the research can be used as reference to conduct other such examples in the related area.

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Improving the Concept of Mensuration through the Game 'Measure Mania' among the Students of Class VIII

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Abstract

The knowledge of fundamental processes of mathematics and the skill to use them are the preliminary requirements of a human being in any society of the modern time. One cannot lead his daily life activities very well without the basic knowledge of mathematics. As mathematics is becoming important day by day, the attitude of the students towards the subject is decreasing. Most of the students dread mathematics. One of the branches of mathematics is mensuration, which deals with the measurement of geometric magnitudes, such as, areas of surfaces and volumes of solids. This action research project is designed to improve the concepts of mensuration through the game 'Measure Mania' among the secondary school students. Pre-test, post-test experimental design was adopted. 30 students of Class VIII of a CBSE affiliated private school of Patna constituted the sample of the study. The pre-test was conducted to identify the problems encountered by the students in learning mensuration. After analysing the results of pre-test and having a discussion with the subject teachers, the researchers found that conventional methods of teaching, the reluctant behaviour of the teacher to use math manipulatives, absence of ICT facilities and mathematics laboratory etc., are some of the factors which make the subject dull and uninteresting and cause phobia among the students. Then the researchers planned an intervention of 15 days, in which the students were made to play the game 'Measure Mania'. The findings of the post-test established that gaming approach impacted a lot on students' understanding of the concept of mensuration. By experiencing mathematics in a playful manner, students' fear for the subject disappeared and they gained confidence in their own

abilities. It was recommended, among others, that the mathematics teacher should always use relevant games in teaching mathematical concepts and school administrators should provide local games that could facilitate meaningful learning of mathematics.

Keywords: *Mensuration, Game, Measure mania.*

Introduction

Mathematics is an indispensable part of human civilization. It pervades all spheres of life. In this universe, hardly a person can be found who is beyond the use of mathematics. It is needed by every individual in his/her day-to-day and life-long planning. Rahman and Amoo (2004) have noted that the importance of mathematics lies in its utility in day-to-day interactions. Even the most ordinary person uses mathematical calculations when he buys things from the market, collects his wages, returns loans etc. It means that some knowledge of mathematics is absolutely essential to everybody whether he or she is a labourer, farmer, housewife, artisan, shopkeeper, vendor, salesman, clerk, accountant, driver, cleaner, tailor, washerman or engaged in any other occupation. Thus, mathematics is an unavoidable practical utility in every one's life.

The importance of mathematics is not restricted to the development of the individual alone. It has contributed a lot to the development of modern society. It is the logical language for expressing ideas, shapes, quantities, sizes, order, change and dynamism in the system, and for explaining the complexities of modern society in the business, economic, academic, engineering and medical settings (Moore, 2005). It is considered as the bedrock of all scientific and technological advancement for human development (Harbor-Peters, 2000). Ogunkunle (2007) stated that the widespread utility of mathematics in scientific and technological applications has made mathematics education a key predictor of scientific competitiveness. Because of the importance of this knowledge in every facet of life, the acquisition of skill and understanding of mathematical computation, and its application to the solution of everyday problems, is the primary objective of mathematics teaching in schools.

Despite the inevitable importance of mathematics in day-to-day life and scientific and technological advancement of the nation, the attitude of the students' towards the subject is not encouraging. Kolawale and Oluwatayo (2004) stated that the knowledge of mathematical concepts with the corresponding knowledge of their application to real life seems to be deteriorating. It is more often translated into their inability to handle figures effectively. The situation becomes more serious when the figures are related to abstract areas like mensuration in mathematics.

Mensuration refers to that branch of mathematics which deals with the measurement of geometric magnitudes, such as areas of surfaces and volumes of solids. It is a practical branch of mathematics. It forms the building blocks of engineering and technical graphics. It is also of great importance to other branches of science, such as, astronomy, mechanics, technology etc. Mensuration is divided into two parts: namely plain mensuration and solid mensuration. Plain mensuration deals with the measurements of perimeters and areas of plane figures like polygons. Solid mensuration deals with the measurement of surface areas and volume of solid figures such as cube, cuboid, sphere, cone, cylinder etc. Thus, mensuration is the core component of mathematics as it concerns measuring, calculating and estimating length, areas and volumes, as well as the construction of three dimensional objects.

While correcting the academic work of the students of Class VIII of a private school of Patna, the researchers found that many students avoided the problems of mensuration. Even if they attempted the problem, they committed silly errors and arrived at wrong solutions. The researchers were curious to know the reason. They discussed with the subject teacher and got the reply that students didn't do their homework, so their performance was not up to the mark. Were the students not performing well because of the reason given by their subject teacher? Or was the teacher not teaching for learning to take place? Was the teaching method used by the teacher developing a distaste for the subject among the students? These are some of the questions, which motivated the researchers to carry out the study. Hence, the present work **'Improving the Concept of Mensuration through the Game 'Measure Mania' among the Students of Class VIII'** was structured, assuming that the gaming approach will enhance the students' understanding of the concept of mensuration and their dislike for the subject will disappear.

Significance of the Study

The main objectives of mathematics education in schools is the mathematisation of the child's thought processes i.e. to develop critical thinking, analytical thinking, logical reasoning, decision-making, problem-solving and the ability to handle abstractions. Such objectives are difficult to achieve only through verbal and mechanical methods, as these methods give importance to speech, text-books and teachers and not to the learners. The teachers, who use these methods, derive satisfaction only by presenting mathematical rules to the pupils and making them memorize them. Some teachers use another verbal method i.e. explanation, assuming that the mental structure of a child is the same as that of an adult. Explanation leads to a series of logical reasoning. The students at the initial steps try to

grasp the logical reasoning but gradually the gap is created between the explanations transmitted by the teacher and those received by the students, which lead to poor understanding on the part of students and develop fear for the subject. This fear can be dissolved only by creating a culture of enjoying mathematics. When students enjoy, they feel relaxed, which helps them to learn mathematical concepts easily and increase their self confidence.

Playing games are the best source of enjoyment. This action research project would provide an opportunity to the students to learn the concepts of mensuration through a method that is centred on playing games. Games allow the students to work at their own pace. Thus, the study would provide learning opportunities for a variety of learning styles and abilities. The attitudes of the students would shift from disliking the subject to actually enjoying it. They would develop confidence in their own mathematical abilities. The engagement level of the students would increase. They would learn to work in a cooperative setting, which is essential for their careers. Their ability to articulate mathematical thinking and to solve the problems accurately would increase. Moreover, the study would help the teachers and the school administrators to understand their responsibilities in the school and out of the school to encourage and sustain positive attitudes of the students towards mathematics.

Probable Causes

By collecting and analyzing the work samples of the students of Class VIII, the researchers assessed the quality of their work and their acquired knowledge of the concepts of mensuration. This also served as an indicator for their engagement level in the teaching-learning process. Examining and assessing the work samples and through observation and interviews, the researchers got to know students' feelings towards the subject. The students experience mathematics as a burden, especially mensuration, because of its abstractness. They find it boring and uninteresting. They have a fear of the subject. They mug up the solutions to pass the examination. Probable causes for such distaste may be the abstract nature of the subject, conventional methods of teaching, reluctance on the part of the teachers to use math manipulatives, absence of ICT facilities and mathematics laboratory, lack of individual attention and no connection of the subject with the lives of the students.

Action Hypotheses

The probable solutions to the causes were formulated by the investigators. They have been mentioned below as action hypotheses:

1. If the teacher teaches the concepts of mensuration through games, the students will start liking the subject.

2. After completing the blackboard work, if the teacher walks around in the classroom to help the students with their work, the students' ability to solve the problems with accuracy will increase.

3. If the teacher solves three or four problems from the assigned homework and shows them to the students as example, they will complete their homework regularly.

Research Method

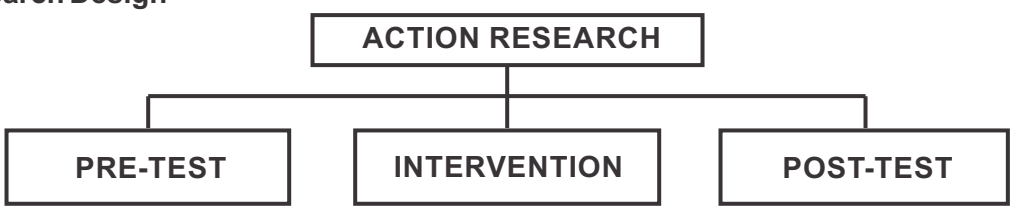
Sample

30 students of Class VIII of a CBSE affiliated private school of Patna for the academic session 2013-2014, constituted the sample of the study. The students were mostly from the neighbouring area of the school, belonging to different socio-economic backgrounds. In the school, the students study mathematics everyday for one or two periods (nearly about 40 minutes to 1 hour 20 minutes). To practice at home and to maintain regularity, homework is given to them. Besides, some of the students take tuitions, where they study mathematics along with other subjects for one hour everyday. These are the fractions of the day, where they spend time to solve mathematical problems.

Tools for Data Collection

Pre-test and post-test were designed by the researchers to collect the data. The tests included objective as well as subjective type questions. Both the tests were of 50 marks each and carried 10 objective and 10 subjective type questions. The questions were not the same in the pre-test and the post-test but the level of questions was kept the same in both the tests.

Research Design



Action Programme

The elements of the above research design have been spelt out in the form of an action programme given below:

Pre-test was conducted to ascertain the level of students' acquired knowledge of the concepts of mensuration before the treatment.

Intervention

Once the pre-test was taken and data was analysed, intervention was carried out to overcome the problems that emerged in the results of the pre-test. The details are as given below:

Measure Mania

The researchers organized the game 'Measure Mania' for the students' in which a series of activities were planned for them. The following steps were used:

- All the activities were related to different topics of mensuration. Initially, the activities were conducted in groups. The intention was to remove the hesitation and ensure the engagement of non-participants also. With time, the students' were made to perform individually.
- First day, the activity was 'Conversion of units'. After orientation about the activity, the students' were given measuring tapes. They had to measure the windows of the classroom in metres and convert it into centimetres. The students worked in groups of 4-5 members each and arrived at solutions. After that, they were given the task to convert other units also: like millimetre to centimetre, decimetre to millimetre etc.
- Second day, the activity was 'Calculation of the area of a rectangle'. The students had to measure the length and breadth of the rectangular objects present in the classroom such as blackboard, top part of the benches and desks, faces of duster, geometry box etc. and calculate their areas. This was also a group activity.
- The activity for the third day was 'Calculation of the area of a square'. To conduct this activity, the researchers brought some square objects. The students were asked to measure the sides of the square objects and calculate their areas.
- On the fourth, fifth and sixth days also, the activities were related to plane figures and all these were group activities.
- From the seventh day, individual activities started. Now, the activities were related to solid figures e.g. Calculation of surface area and volume of cube, cuboid, cylinder, cone etc.

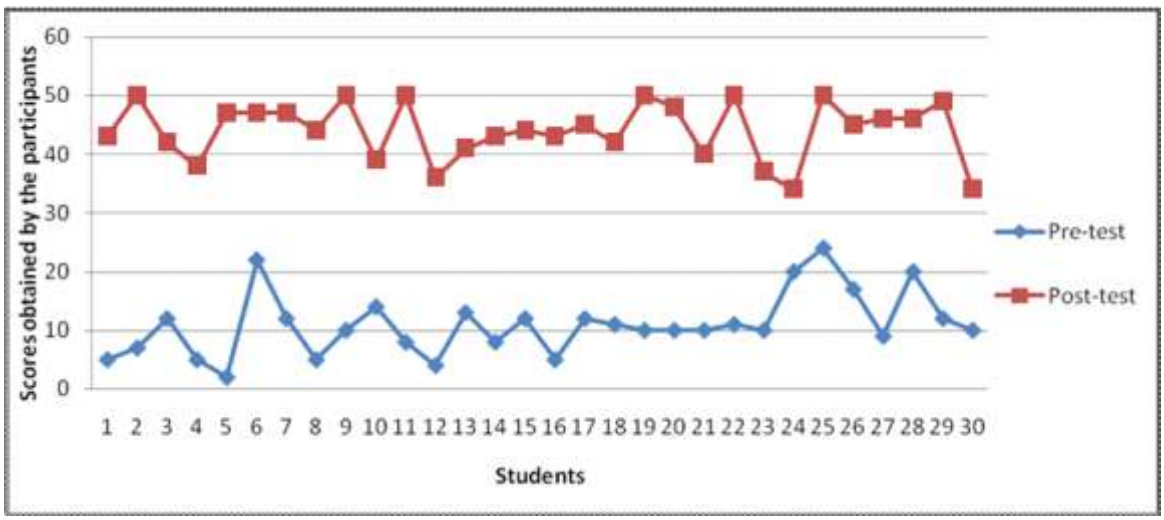
- During the activities, the students were given solid objects and they had to find out surface area and volume of those objects.
- These activities continued for 15 days.
- Activities performed in the school alone were not sufficient to improve the concepts of mensuration among the students. Practice of application of rules and formulae was needed at home also to maintain regularity and to develop a habit of independent working. Therefore, homework was given to the students to supplement classroom teaching.
- Checking and correction of homework was done regularly by the researchers to ensure that mistakes and faulty processes did not get fixed in their minds.
- The researchers performed the role of supervisor during the activities.

Post-test was conducted to determine the improvement in students' understanding of the concept of mensuration, as a result of the intervention of the last 15 days.

Evaluation of the Action Programme

The success of the action programme can be determined by comparing the scores obtained by the participants in pre-test and post-test, which is shown in the following graph.

Figure 1: Scores obtained by the participants in pre-test and post-test



It is clear from the above line graph that students have shown improvement in their performance, as they have scored better in the post-test than in the pre-test.

The improvement in the performance can be clearly seen by the table given below, showing the mean and standard deviation of the scores obtained by the participants in pre-test and post-test.

Table 1: Mean of the scores obtained by the participants in pre-test and post-test

	Pre-test	Post-test
Mean	**11**	**44**
Standard Deviation	**5.33**	**4.92**

The mean of the scores obtained in post-test is 44 (± 4.92), which is four times greater than the mean of the scores obtained in pre-test i.e. 11 (± 5.33). This improvement in the performance shows enhancement in students' conceptual understanding of mensuration.

Result and Discussion

H_1: If the teacher teaches the concepts of mensuration through games, the students will start liking the subject.

Educational research indicates that the most valuable learning occurs when students actively construct their own mathematical understanding, which is often accomplished through games (Seefeldt & Wasik, 2006, p. 250). Figure 1 shows that gaming approach had a positive impact on students' learning as their performance improved a lot. Thus, this action hypothesis was established.

The result is consistent with the earlier studies which indicate that games in schools can be useful in solving problems based on mensuration (Central Board of Secondary Education CBSE, 2005; Nwoke & Nnaji, 2011, p. 14)

H_2: After completing the blackboard work, if the teacher walks around in the classroom to help the students with their work, the students' ability to solve the problems with accuracy will increase.

When individual attention is paid to the students, they feel secure and develop a positive relationship with the teacher. This positive relationship encourages students to discuss their problems freely with the teacher (Kujur, Thakur, Peter & Roy, 2014). In this study also, the researchers moved around in the classroom, went to the place of each student and paid individual attention to them. They helped the students with their work and corrected their mistakes in front of them. The students, in turn, developed a sense of responsibility and worked upon their mistakes. In this way, their ability to solve the problems with accuracy

increased, which is reflected through Figure 1 and Table 1. Thus, this action hypothesis was established.

H_3: If the teacher solves three or four problems from the assigned homework and shows it to the students as example, they will complete their homework regularly.

It is an admitted fact that practice makes a man perfect. To practice the application of rules and formulae and to supplement the classroom teaching, a reasonable amount of homework was assigned to the students. The researchers used to solve three to four problems from the assigned homework and show it to the students as examples because better learning takes place when learners see, hear and read an example simultaneously. In order to go from abstract to concrete, a path must be created by supplementing the newly learned concepts with examples (Swan, 1995, p. 468). The present study also proved that explanation, supplemented by examples, motivated the students to complete their homework. It is evident from Table 1, that this exercise was helpful for the students in learning the concepts of mensuration. Thus, the third action hypothesis was also established.

Limitation

The study had some limitations, which are mentioned below:

The study looked only at a non-probability sample of 30 students of Class VIII of a private school of Patna. So the results cannot be confidently generalized to any larger group, such as all secondary school students, without further investigation.

The test papers used in pre-test and post-test, consisted of 20 questions only, which was not sufficient to reflect the actual level of improvement in students.

The intervention period was only of 15 days.

Conclusion

Young people learn a great deal about the world through occupying themselves in recreational activities, and games are the most important source of recreation and enjoyment (Cavanagh, 2006, p. 46). The present study also proved that the gaming approach had a considerable impact on students' understanding of the concept of mensuration. By experiencing mathematics in a playful manner, students' fear for the subject disappeared and they gained confidence in their own abilities. Besides making the concepts enjoyable, taking a round of the classroom and correcting the work of the students at their places by the researchers, gave the students a sense of responsibility and helped

them to solve the problems with accuracy. Children learn most of the skills and abilities by imitating their teachers. In this study also, solving three or four problems from the assigned homework and showing it to the students as examples, motivated them to complete their homework regularly. The outcomes of the study are useful for mathematics teachers. The teachers should welcome and accept the use of games in the teaching and learning of mathematics in schools. They should constantly expose the students to various games that are related to mathematical concepts taught in the classroom. Present study has implications for teacher training institutions also. They should ensure that teacher trainees are provided with enough opportunities to master the principles behind the development of games and their uses. This will ensure the training of pre-service mathematics teachers to use games for teaching and learning of mathematics.

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Improving Students' Expressions in Hindi through Storytelling

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Abstract

The purpose of this study was to improve students' ability to use correct expression while reading and writing in Hindi. Action Research was conducted on 30 students of Class X. A pre-test was taken in order to identify the problems faced in the usage of correct expressions, as part of the first phase of the study. After that, the researchers taught the students the correct use of expressions at the correct places by means of dialogue writing, story writing and reading practice. Then a post-test was conducted to analyze improvement among the students. Data revealed that students improved their efficiency of expression and this practice also enhanced their writing and reading skills in the Hindi language.

Keywords: *Errors in the use of expressions, Hindi reading and writing, Storytelling.*

Introduction

Language is essentially a means of communication. Communication of ideas may be achieved through listening and speaking, as well as through reading and writing. Communication is a learned activity. Any form of communication (expression) is productive and helpful. Effective communication depends on effective self-expression. Self-expression in language is a display of individuality, whether it is while speaking, writing, or reading. Thinking creatively, giving expression to ideas, and communicating those ideas, are not only indispensable to all artistic endeavours, but also enhance traditional academic pursuits, stimulate effective problem-solving and foster originality in new areas.

It has been observed that most of these students today lack the ability to express themselves creatively. They are not sure about how to access their own creativity and

inspiration. Sometimes they know what they want to say or do, but are unable to express themselves, in other words, they feel ill-equipped in their expression of something. This may lead to poor academic performance. Expression of self in any language depends on the command over the language and on the ability to put forward thoughts with clarity, both in verbal and written forms. Unfortunately, it is seen that students are inept at expressing themselves correctly, even in Hindi, which happens to be their first language. It goes without mention that it is the lack of practice that hinders the individual's expression rather than the lack of language. As Thompson and Wyatt have rightly said (cited in Bhatia 2006*) "… the power of expression in a language is a matter of skill rather than of knowledge; it is a power that grows by exercise, not merely by knowing meaning or rules."(pg.114).* Therefore, we are justified when we say that ability to express will become stronger when the students practise. This can be adequately done with the help of storytelling.

Storytelling has long been a part of our culture, and also one of the oldest means of human communication. The ancient art of storytelling is especially well-suited for student exploration. No special equipment beyond the imagination and the power of listening and speaking is needed to create artistic images. A well expressed narrative catches the fancy of a listener, making him attentive and inquisitive. A heightened imagination further leads to creativity and out-of-the-box thinking. Storytelling involves audiences (children and adults) emotionally and helps them develop a positive attitude towards the learning process in the language. Words, phrases and expressions used in the context of a story are comprehended better. As teachers, there is a need to recognize its value as a pedagogical tool (Farrell & Nessel, 1982).

Story presentation helps children experience the world as a whole, makes lessons captivating and meaningful, stimulates imagination, and assists metaphoric fluency and articulation (Groenou,1995). Storytelling is the means to illustrate information, explain abstract concepts and connect ideas to their applications in a new situation (Kuyvenhoven, 2005). Regular use of the Word Weaving techniques (storytelling) improve children's fluency and imagination when they create a story based on one they hear, and may help them remember and retell stories (Farrell & Nessel,1982). Hence, this art of storytelling helps children improve their ability to express themselves in any language.

In India not much work has been done regarding teaching through stories in Hindi. This research makes an effort to recognize the role of storytelling in improving the ability of the students to express them better. So the research work has been taken up with the formal title **'Improving Students' Expression in Hindi through Storytelling'**

Significance of the Study

This study on the use of stories as a pedagogical tool to improve expression was carried out to identify the problems of the students and provide them with a solution. In the Hindi language, reading, writing, and speaking skills are the most important skills. These skills of expression supplement the student or a speaker in his/her endeavour to be understood correctly and enhance his/her performance. Sadly enough, the emphasis of the teacher in a language class, is not to help students to express themselves, but to complete the syllabus and prepare the students to answer the examination. No attention is given to equip the students with better ways to express themselves, either in spoken or in written form. This attitude leaves the students in a pathetic situation, where they can express themselves with neither clarity nor wise creativity. Students are not exposed to any form of drill or practice to improve their skills. This leads to lack of clear expression, lack of continuity in reading as well as in writing, emphasis on unnecessary description, faulty pronunciation and lack of understanding of the use of punctuation marks. This study uses storytelling, story writing, story reading, drama and acting and discussion method as tools to provide opportunities for practice and enhance the skills of expression.

Probable Causes

In the course of teaching in a public school of Patna as teacher trainees, the researchers found that students possessed very poor ability to express themselves while reading the text in the class. Their essay writing was very poor and lacked creativity; they were not able to express themselves well while participating in discussions in the class. The probable reasons for such poor performance could be the lack of clear expression, lack of continuity while reading, emphasis on the wrong places while reading, stress on unnecessary description while writing, no proper use of punctuation marks and faulty pronunciation. Besides, lack of interest on the part of the teacher in the use of good teaching techniques may be another possible reason for such lack of expression on the part of the students. The teacher gave neither time nor interest to improve the expression of the students through model reading and guided essay-writing. The whole focus of the teacher and the students in Class X is towards the board examination, which usually takes place in the month of March. Therefore the teachers are under pressure to complete the prescribed syllabus ahead of time and hence not much consideration is given to other aspects of good education. Another cause for this deficiency could be that the students focus on memorising the answers from the book, instead of framing the answers in their own words.

Action Hypotheses

In the light of their observation on the above mentioned causes, the researcher outlined certain action hypotheses to sort out the research problem. The hypotheses were:

H_1: If the teacher asks the students to read a story loudly and also narrate one story daily in the class, with correct pauses, the students will learn the use of right expressions.

H_2: If the teacher asks the students to write a story in the form of dialogue, using proper punctuation marks, the students will learn to use right expressions at the right places, while writing.

H_3: If the teacher involves the students in a discussion on the elements of the story, such as protagonist, other characters, time and region, and also on their shortcomings, the students will improve their expressions.

H_4: If the teacher does model reading in the class using correct expressions, the students will become aware of the uses of correct expressions.

Research Methodology

Sample

A group of 30 students of Class X of a public school constituted the sample of the study. Hindi and value education classes of the school were the only opportunities for them to be exposed to correct expressions in the language.

Tools for Data Collection

Pre-test and post-test were designed by the investigators to collect the data. Both the tests were subjective in nature and carried 20 marks. In the tests, a story had to be written by the students. The purpose was to assess their expression while writing. In order to evaluate their expression while reading, the students also had to read out a story. This was done both for the pre-test and post-test. The stories used for pre-test and post-test were not the same.

Research Design

Action Programme

Pre-test was conducted by the researchers by making the students read a story aloud and also write a story.

Intervention

- While teaching in class, the researchers did the model reading and commented on how to pause on the different punctuation marks and also on how to keep in mind the time and region in order to give proper meaning and expression to the text.
- The researchers gave practice of reading with expression and also of appropriate use of punctuation marks.
- The researchers also helped the students to practice proper delivery of dialogue.
- The students were involved in discussions, so that they became aware of their shortcomings while reading or narrating stories.
- The students were given practice in writing stories in narrative form as well as in dialogue.
- Notebooks were evaluated and the students were made aware of their mistakes in writing.
- This exercise was practised regularly for 15 days.

Post-test was conducted after intervention, to check their improvement.

- To evaluate the expression of the students while writing, tests were conducted on narrative story writing as well as on dialogue writing.
- In order to evaluate the improvement in expression while reading, the students were evaluated on the five components of reading i.e. phonemic awareness, phonics, reading fluency, vocabulary development, reading comprehension strategy.

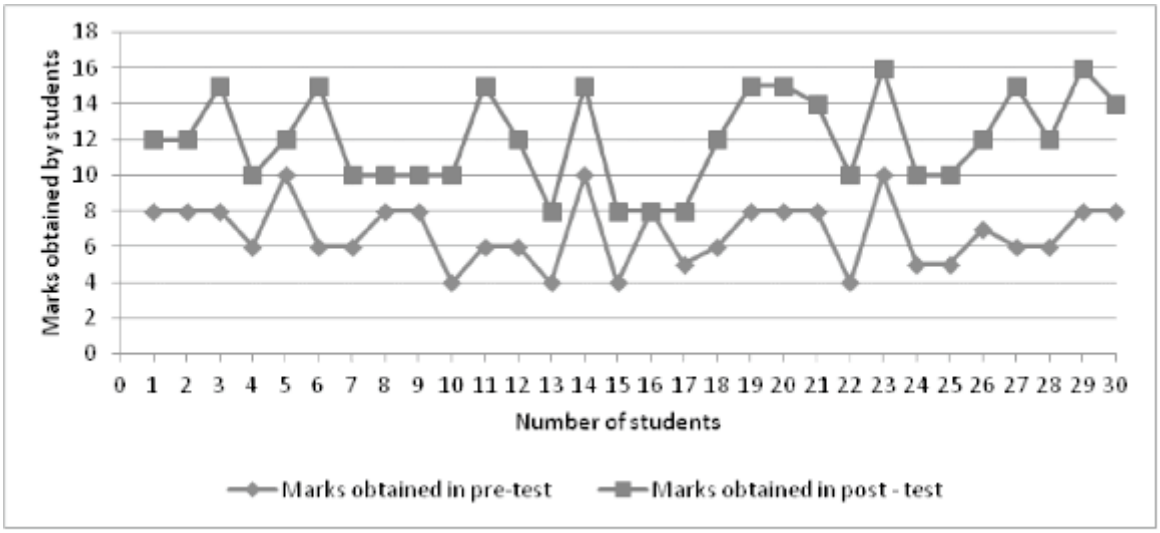
Evaluation of the Action Programme

The effectiveness of the action programme was analysed by comparing the scores obtained by the participants in pre-test and post-test, which are reflected in the following tables and graphs.

Table 1: Mean and standard deviation of the marks obtained by the participants in pre-test and post-test

	Pre - test	Post - test
Mean of the obtained marks	6.8	12.03
Standard deviation of the obtained marks	1.78	2.61

Figure 1: Marks obtained by the participants in Pre-Test and Post-Test reading



On analysing the Graph in Figure 1, we find that students improved in their expressions while writing Hindi stories as they scored better in the post-test than in the pre-test.

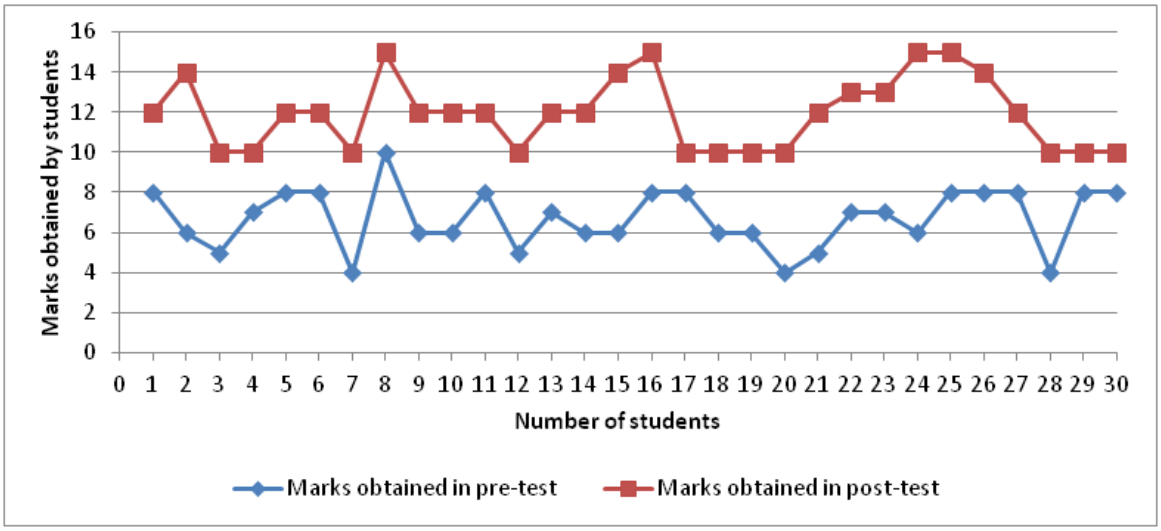
The improvement in the performance can be clearly seen in Table 1, showing the mean scores obtained by the participants in pre-test and post-test.

The mean scores of the marks obtained in the pre-test was 6.8, while that of the post-test was 12.03. This was almost double of the mean of the scores obtained in the pre-test. The difference in the two mean scores of (5.23) shows the improvement in students' expressions while writing Hindi stories. The table also shows that the standard deviation of the scores of the pre-test was 1.78, while that of the post-test was 2.61. With almost double mean in the post-test and increase in the standard deviation, showing a more heterogeneous performance after the intervention, affirms that the intervention was effective, leading to positive and desirable changes in the students.

Table 2: Mean and standard deviation of the marks obtained by the participants in pre-test and post-test

	Pre - test	Post - test
Mean of the obtained marks	**6.7**	**11.93**
Standard deviation of the obtained marks	**1.48**	**1.79**

Figure 2: Marks obtained by the participants in pre-test and post-test in reading



On observation of Graph in Figure 2, it is revealed that students improved in their expressions while reading Hindi stories as they scored better in post-test than pre-test.

In Table 2, the better performance can be clearly seen. The mean score obtained in the post-test was 11.93, which was much higher than that of pre-test i.e. 6.7. The difference in the mean scores is 5.23, and this shows definite improvement in students' expression while reading Hindi stories. The standard deviation of the pre-test scores was 1.48 and that of the post-test was1.79. This shows that in the post-test the students showed more varied performance. The increase in the mean is indicative of an increased standard deviation, both of which establish that the students showed improvement in their reading capacities.

Result and Discussion

This section presents the results of the action research in the light of the various action hypotheses:

H_1: If the teacher asks the students to read a story loudly and also narrate one story daily in the class, with correct pauses, the students will learn the use of right expressions.

The exercise of reading stories aloud with correct pauses and expressions was practised regularly for 15 days. The students showed improvement in their performance through this exercise. The data presented in Table 1 and Table 2 show enhancement in the scores of the students. Thus, this action hypothesis was established.

H_2: If the teacher asks the students to write a story in the form of dialogue using proper punctuation marks, the students will learn to use right expressions at the right places, while writing.

The activity of writing stories in the form of dialogue, using proper punctuation marks, as well as in narrative form was practised at regular intervals for 15 days. The students again showed an improvement in their expressions' through this practice. The marks obtained by the students as shown in Table 1 and Table 2 clearly show enhancement. This action hypothesis has also been established.

H_3: If the teacher involves the students in a discussion on the elements of the story, such as, protagonist, other characters, time and region, and also their shortcomings, the students will improve their expressions.

Children in the adolescent age group enjoy learning '…*when they are allowed to share and discuss ideas'…and when their affective and cognitive capabilities are challenged*…' (Beamon, 2001). They love to do things when they are given guidance and feedback about their work. Learning takes place when their personal initiative is encouraged and they are permitted to delve deep into the content through direct, meaningful and relevant involvement (Crawford, 2007). Therefore, it was important for the teacher to engage the students in a discussion of the elements of the story and the importance of the use of correct expression. This activity of discussion was carried out in the class at regular intervals for 15 days. The students identified the protagonist, the different characters, time and region in which the story was set. The students were also made aware of their shortcomings and given tips for improvement. This helped the students to improve their expression, which is evident from Tables 1,2 and Figures 1, 2.

H_4: If the teacher does model reading in the class using correct expressions the students will become aware of the uses of correct expressions.

Students learn through imitation. Thus, it was expected that the teacher's model reading would bring awareness among the students about the use of correct expressions. During

the action programme, model reading was done and comments were made on the right expressions in the context of the text. This helped the students to show an improvement in the use of correct expressions, which is evident from Tables 1,2, and Figures 1,2. Thus, this action hypothesis was also established.

Conclusion

The study leads us to conclude that repeated and conscious practice results in improvement of performance and the learners acquire permanence of the materials to be retained, making the use of the language habitual, unconscious and automatic. After repeated practice for 15 days, the students have shown improvement in the use of right expression in the right place. The repetition that the students are exposed to, should have its source in someone that they admire. Then, the child picks up most of the skills and abilities. In this study too, students acquired the knowledge of using correct expressions at the right places, in the context of the text by imitating their teacher. These research findings open the doors for better and interesting pedagogical methods in the teaching of Hindi and other languages for the teachers in schools.

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Improving the Concept of Balancing Chemical Equations, through Games among Students of Class VIII of a Government School in Patna

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Abstract

Chemistry or Chemical Science is referred to as the central science, as it bridges other natural sciences like physics, geology and biology. The concepts and principles in Chemistry range from concrete to abstract. Many students of Chemistry find certain concepts difficult to comprehend. The major reason why students have problems with these concepts is their abstractness. One of the common problems confronted by students at secondary level in Chemistry is balancing chemical equations. An action research titled '**Improving the Concept of Balancing the Chemical Equations through Games among Students of Class VIII of a Government School in Patna'** was undertaken by the teacher trainees during their practice teaching. Firstly, a pre-test of the students was conducted on 30 students of Class VIII of a government school of Patna. Through the pre-test their weak areas were identified and then accordingly intervention was carried out. Through a gaming method the basic rules and methods of balancing the equation were taught to the students in three phases i.e. initial phase, intermediate phase and final phase. The main objective was to involve the students in the learning process through games, so that the class becomes interactive and interesting and ultimately improve their concepts of balancing chemical equations. A post-test was conducted after this, in which a remarkable improvement was observed.

Keywords: *Chemical symbol, Chemical formula, Chemical equation, Gaming.*

Introduction

Every material in existence is made up of matter, even our own bodies; Chemistry as a branch of Science is involved in the study of this matter. Chemistry studies the composition, structure, properties of matter. It is mainly concerned with atoms and molecules and their interactions and transformations. In Chemistry, the involvement of electrons and various forms of energy in photochemical reactions, oxidation-reduction reactions, changes in phases of matter, separation of mixtures and preparation and properties of complex substances are studied.

To understand the concepts of Chemistry is a challenge for most of the secondary school students, as the topics are generally related to or are based on the structure of matter, an abstract concept to comprehend. The matter is made up of atoms and molecules and it is difficult for the students to visualize them as actually existing and draw them correctly. According to Taber (2002), Chemistry commonly incorporates many abstract concepts, which are central to further learning in both Chemistry and other sciences. These abstract concepts are important because further concepts or theories cannot be easily understood if these underpinning concepts are not sufficiently grasped by the student (Zoller, 1990; Nakhleh, 1992; Ayas & Demirbaş, 1997; Coll & Treagust, 2001a; Nicoll, 2001). This factor hampers their ability to comprehend different abstract concepts of chemistry.

From the point of view of students, the different problem areas are the most basic topics of Chemistry, like the mole, periodic table and atomic structure, organic chemistry, writing chemical formulae and balancing of chemical equations. The secondary school students generally show limitations in their ability to write balanced equations, to interpret the symbolic representations used in equations, and to solve problems based on equations. Students appear to struggle to construct the forms of mental, model and conceptual representations needed to understand and comprehend the actions of the unobservable entities, such as, atoms and molecules, which are involved in chemical equations (Garnett et al, 1994).

A chemical equation is only a symbolic representation of a chemical reaction. It is the story of some chemical reaction. A chemical equation is not only the shorthand writing of the chemist, but it should be a mental picture of an actual reaction. They also tell how much of each substance is involved in the reaction (Risteski, 2008). As a chemical equation is the language of chemistry and once chemical equations have been introduced into a course of study, it is often assumed that students understand this representational system. But many

of the difficulties in learning Chemistry are related to chemical equations. In balancing equations, it is important to understand the basic concepts of balancing chemical equations, which includes identification of atoms, atomic number and valency of atoms, difference between a coefficient of a formula and a subscript in a formula.

In the teaching of Chemistry, several competencies are expected of the teacher, in order to teach these complex concepts to the students. Some of the competencies include ability to use appropriate instructional strategies in teaching. As one of the teaching devices, the gaming method has been found to be useful, as it helps the chemistry teacher to attain maximum achievement of students in their learning tasks.

Gaming method helps in motivating students' learning, makes students utilize the knowledge learnt in an active manner, increases students' critical thinking and decision-making skills, enhances students' retention of what they have learnt, leads to personal growth, cooperation, judgment, decision-making and problem solving abilities. Calhoun (1980) is of the opinion that games are enjoyable and interactive and learners respond naturally to this type of learning dynamic. If learning is to occur, students must be motivated to learn.

The researchers during their practice teaching found, at a government school of Patna, that the students were lacking understanding regarding the basic concepts of Chemistry. They also reported that most of the students were not interested in the subject and could not comprehend simple concepts of balancing chemical equations. So, in order to develop interest among students in Chemistry and help them in balancing the chemical equations and an action research titled '**Improving the Concept of Balancing the Chemical Equation through Games among Students of Class VIII of a Government School in Patna'** was undertaken by the researchers.

Significance of the Study

School education aims at enabling students to understand their life. Chemistry is one of the most important branches of science, which helps the learners to understand the chemical phenomena of everyday life processes. In the conventional way of teaching Chemistry, the students are passive learners and, hence, face difficulty in grasping the concepts of the subject. Gaming method creates a playful learning environment, where the students actively participate in the teaching learning process. This study is intended for teachers of Chemistry, who aim to bring about improvement in the concept of balancing chemical equations through games among students of secondary classes. The study will help the

teachers in making the teaching learning process enjoyable and interactive, so that the learners respond actively. The gaming method increases student engagement and enthusiasm and, thus, this study will recommend how to playfully teach them the concept and method of balancing chemical equations.The study promotes the use of gaming method in the teaching of Chemistry, which is based on the principle of learning by doing. Learning by doing is imperative in successful learning, since it is well proved that the more the senses are stimulated, the more a person learns and the longer he/she retains.

Probable Causes

While teaching in a government school of Patna, the researchers found that the students were not able to solve simple problems of writing and balancing the chemical equations. They were having difficulty in understanding the simple rules and methods of balancing chemical equations due to inadequate conceptual understanding of the subject. The probable causes could be the improper teaching methods of the teachers, who can make chemistry vivid and understandable to attract the interests of the students. The other causes could be the inability of the students to identify the symbols and valencies of the elements and also in differentiating between atomic number and valency.

Action Hypotheses

Once the probable causes were identified, the researchers framed certain hypotheses to find out solutions to these causes. These action hypotheses are given below:

H_1: If the teacher uses the gaming method to explain the concept of balancing the chemical equations, then the students will be able to solve the problems based on balancing chemical equations in a better way.

H_2: If the teacher uses the gaming method for drill and practice of problems on balancing of chemical equations, it will help to remove the simple mistakes made by the students on that topic.

Research Method

The present study, entitled 'Improving the Concept of Balancing the Chemical Equation through Games among Students of Class VIII of a Government School', was conducted under the standard guidelines of scientific study. To achieve the objectives of the present study, that is basically an action research, an appropriate methodology was planned. The investigators followed the steps of selection of sample and tool, administration of tool and collection and analysis of data.

Sample of the Study

30 students of Class VIII belonging to a government school of Patna for the academic session 2013-2014 constituted the sample of the study.

Tools of the Study

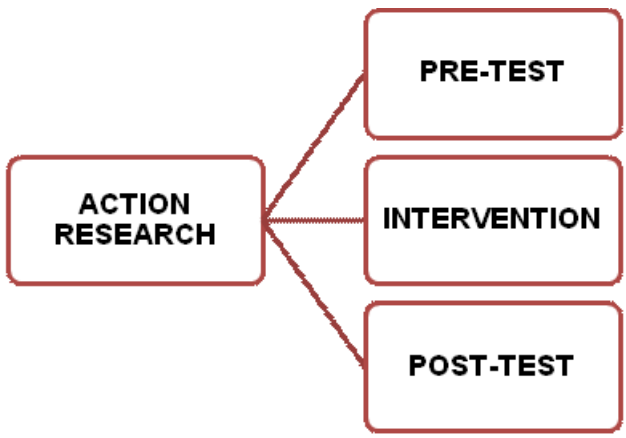
For the collection of relevant data, pre-test and post-test were constructed by the investigators. Both the tests were objective type tests based on problems of balancing the chemical equations. The test consisted of 20 questions of 1 mark each.

Scoring

The test was scored with the help of handmade scoring key: 1 mark was given for each correct answer and 0 for the wrong answer.The total marks of each student were calculated.

Research Design

Figure1: Research Design of the Action Programme



Action Programme

First of all, a pre-test was conducted on all the students of Class VIII. The students were found weak in balancing the chemical equations.

An action programme in three phases was planned, which were the initial phase, intermediate phase and final phase.

Initial Phase

In the initial phase, the students were taught the basic concepts required to teach the concept of balancing the chemical equations.

On the first day of the initial phase, the students were taught about the symbols of various elements with the help of thermocol cut-outs. Thermocol cut-outs of various shapes of the symbols of the elements were prepared. They were pinned on the body of the researchers. One by one, they came to the front of the class and through role play told about themselves.

On the second day the students were taught about the atomic structure of elements with the help of coloured plastic balls and plastic straw. The atomic structures of the elements were demonstrated to the students with the help of the balls and straw.

On the third day they were taught about the valency of elements with the help of colourful paper cuttings. Paper cuttings of different shapes and numbers were prepared. The symbol and valency of an element were made of one colour. The symbols and numbers were distributed in the class. The students of one colour were told to come together. Thus, the concept of valency was taught to the students.

Intermediate Phase

In the intermediate phase, the rules and method of balancing the chemical equations were taught to the students.

On the first day of the intermediate phase, the students were taught regarding the compounds with the help of hand puppets. The students prepared puppets of different compounds. These hand puppets explained about themselves in the class. In the next class, a quiz was conducted for practising the same and providing motivation to the students.

Then, with the help of colourful blocks, the students were taught how to write chemical formula of chemical compounds. Colourful blocks with symbols and numbers were prepared by the researchers for teaching about chemical formulae.

Puzzles were used to help students identify the compounds in the next class. The students were given problems based on them for drill and practice.

Students were taught about chemical equations with the help of colourful blocks in the next class of the intermediate phase. On a chart, the researchers pasted the colourful blocks and taught about chemical equations.

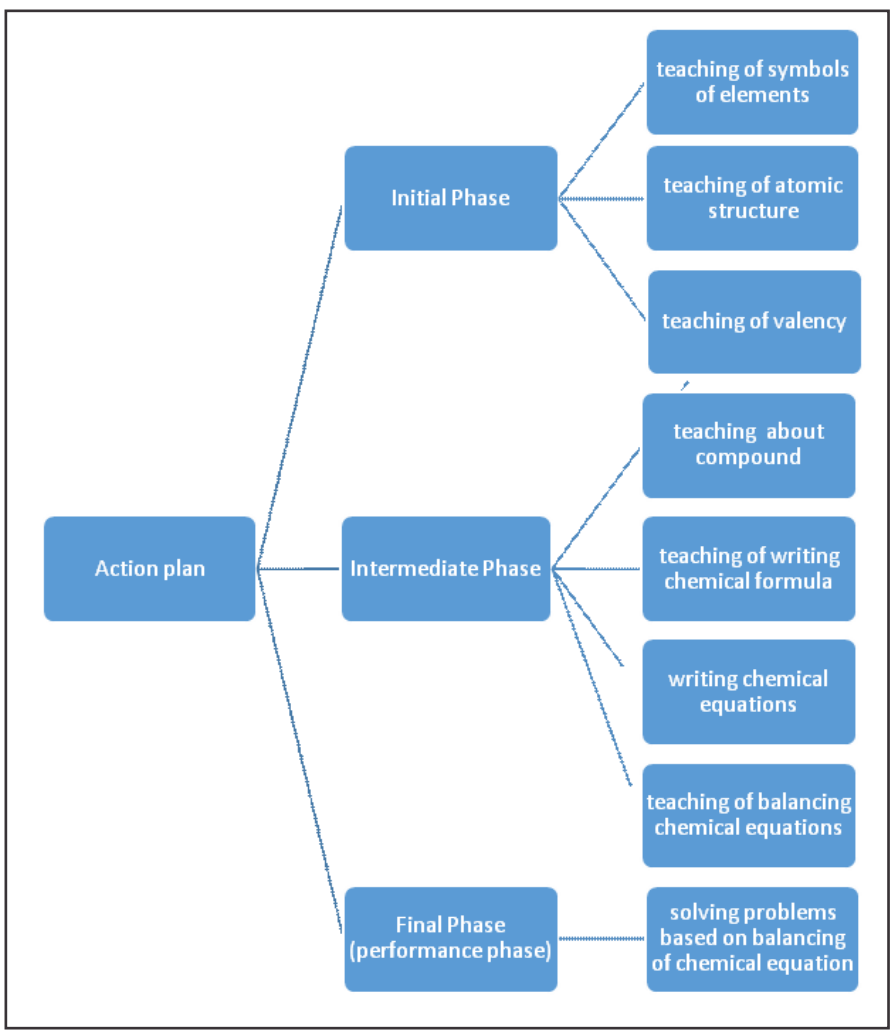
Final Phase

The final phase was the evaluation phase.

In the final phase, which is also known as the performance phase, the problems on balancing of chemical equations were practised with the help of different paper cut-outs. The students were told to prepare paper cut-outs of different symbols of different colours and bring them to the class for the next two days. Different problems were given to the students which led to drill and practice of the concept.

At last, a post-test after 15 days to check the improvement was conducted and growth of those students was observed.

Figure 2: Diagrammatic Representation of the Intervention Period

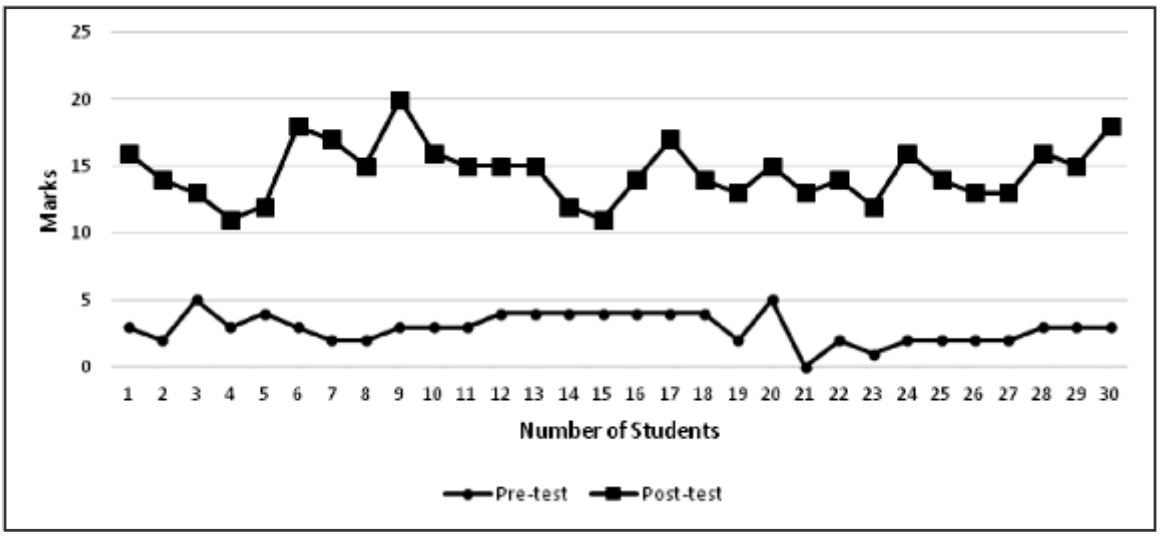


Evaluation of the Action Programme

After collecting data, the investigators took the following steps: Checking the test paper, summarizing the data in tabular form and finally interpreting the results or converting data into statements.

Observation of Tests

Figure 3: Marks obtained by the participants in Pre-test and Post-test



After examining the above table and graph, we come to the conclusion that students have shown remarkable performance in balancing the chemical equations in the Post-test.

The improvement in the performance can be clearly seen by the table given below, showing the mean scores and standard deviation obtained by the participants in pre-test and post-test.

Table 1: Mean and standard deviation of the marks obtained by the participants in Pre-test and Post-test

	Pre - test	Post – test
Mean of the obtained marks	**2.93**	**14.57**
Standard deviation of the obtained marks	**1.14**	**2.14**

The mean score of the marks obtained in post-test is 14.57, which is almost five times the mean score of the marks obtained in pre-test i.e. 2.93 The difference in the mean scores (11.64) shows the improvement in students' performance in solving the problems based on balancing of chemical equations.

Result and Discussion

H_1: If the teacher uses the gaming method to explain the concept of balancing the chemical equations, then the students will be able to solve the problems based on balancing chemical equations in a better way.

Use of gaming methods like house competition, quiz, identify the cut-outs, solving the riddles, hand puppets, role play were done during the intervention period. The intervention period was executed in three phases, in which step by step the basic concept, rules and method of balancing the chemical equations were taught to the students. During the intermediate phase, active participation by the students was observed by the researchers. The students showed higher level of cognitive development as they could reason out, analyse, synthesize and balance chemical equations correctly. The researchers observed that, during drill and practice, the rate of committing mistakes by the students reduced to a great extent. The results of the post-test also supports this hypothesis, as the students showed a remarkable difference in solving the problems based on balancing of chemical equations which is reflected in Table 1, where the mean score of post-test (14.57) is almost five times the mean score of pre-test (2.93).

H_2: If the teacher uses the gaming method for drill and practice of problems on balancing of chemical equations, it will help to remove the mistakes of the students.

During the final phase, the researchers gave the students several exercises based on chemical equations for practice. These exercises were based on the concepts of valencies of the elements, chemical formulae and balancing the equations. The researchers clarified the doubt of the students and provided them sufficient time for revision. This exercise stimulated the students to balance the chemical equations correctly, which is also evident from Table 1 and thus supports this hypothesis.

Limitation of the Study

Due to the paucity of time, the present study was limited as:

Only 30 students of Class VIII were included in the study.

Class control was difficult due to over-excitement of the students.

Only 20 questions were asked which might not have been able to bring to light the actual level of improvement in students.

Regularity of students in school was a big hurdle for the researchers in improving the concept because one concept leads to another concept. If one concept is missed then the students may have difficulty in understanding the next concept.

Conclusion

A significant improvement was seen in the performance of the pupils in the post-test. Students started taking keen interest in studying Chemistry and made very few mistakes in balancing the chemical equations. The students' participation increased to a considerable level. They were able to write and balance chemical equations correctly. Use of blocks, puppets, paper cut-outs as teaching aids and displaying them in class helped in attracting the attention of the students. It helped them in learning the symbols and valencies very rapidly. Regular drill and practice during the final phase stimulated the students to balance the chemical equations correctly. As the researchers tried to clear the concept of balancing chemical equations through the gaming method, it made the students active and the teaching learning process became interesting. It helped students to understand the concept clearly in a better way. Thus, through this action research, the researchers have tried to improve the concept of balancing chemical equation so that students enhance their command over the topic. Thus, it can be concluded that teaching through the gaming method is useful for students, as it results in better retention, understanding, and better appreciation of what they have learnt. The researchers found improvements in terms of balancing the chemical equation. The success was due to the quality intervention strategies that were put forward. This study reveals that arousing interest in the subject, chemistry, is essential for reducing their error while balancing the chemical equations. Different techniques and methods should be adopted by the teachers to create interest in the students of different subjects. Thus, teachers should be encouraged to adopt gaming methods as an innovative technique, as it helps in enhancing students' performance.

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Impact of Instructional Media on Students' Interest for Learning Civics

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Abstract

Today, the education system becomes irrelevant, unless we bridge the gap between how students live and how they learn. Technological advancement has transformed the lives of the people. Schools must adapt to the changing conditions to thrive. The present study investigated how the teachers' use of instructional media impacts the learners' interest and performance in the school subject, Civics. Pre and post-tests design and teacher observation were adopted to record changes in interest in learning Civics during a two-months study period. The study contends that the manner in which students are taught Civics today eventually has a negative impact on the goal of Civics teaching to make students vibrant and active citizens. In order to make Civics teaching-learning interesting and to involve students in the learning process, teachers need to employ instructional media in the study of Civics. There is also a need that students have some hands-on experiences in matters which are directly related to the basic concepts of Civics and to their active engagement in the democratic process.

Keywords*: Instructional media, Students' interest, Civics teaching.*

Introduction

Through Civics, students develop their understanding of the world. They learn about other people and their values in different times, places and circumstances. They also develop the understanding of their environment and of the process of its evolution. As they mature, their experiences broaden, using wider contexts for learning, while maintaining a focus on the historical, social, geographical, economic and political changes that have shaped the

country. Students learn about human achievements and about how to make sense of changes in society in the light of conflicts and several environmental issues. With greater understanding, comes the opportunity and ability to influence events by exercising informed and responsible citizenship.

Students' participation in teaching Civics will:

develop their understanding of the history, heritage and culture of their country, and an appreciation of their local and national heritage within the world.

broaden their understanding of the world by learning about human activities and achievements in the past and the present.

develop their understanding of their own values, beliefs and cultures and those of others.

develop an understanding of the principles of democracy and citizenship through experience of critical and independent thinking.

explore and evaluate different types of sources and evidences of Civics learning.

learn how to locate, explore and link periods, people and events in time and place.

learn how to locate, explore and link features and places locally and further globally.

engage in activities which encourage enterprising attitudes.

develop an understanding of concepts that encourage enterprise and influence business.

establish firm foundations for lifelong learning and for further specialised study and careers.

We all know that teachers at all levels utilize a variety of instructional media to enhance the quality of their lessons. Instructional media in this context refers to the quality of these media to directly impact the quality of teaching. Knowing the ways to find the best instructional media is a valuable skill for a teacher to have. The importance of instructional media or educational resources is to improve students' knowledge, abilities, and skills to monitor their assimilation of information and to contribute to their overall development and upbringing. It

also clarifies important concepts to arouse and sustain students' interests, give all students in a class the opportunity to share experiences necessary for new learning, help make learning more permanent.

The Perceived Problem

During practice-in-teaching, the researchers found that the students were not paying much attention in their Civics class. It was observed that students found Civics a boring and uninteresting subject. It was a challenge for the researchers to make the class interesting and more interactive. The researchers assumed that use of instructional media would make the class joyful for the students and they would pay attention in the class. So, they undertook the action research with the formal title **'Impact of Instructional Media on Students' Interest for Learning Civics'.**

Literature Review about the Importance of Instructional Media

Effective teaching of any subject does not only stimulate students' interest in the subject, but also increases their achievement in the examination. To achieve an effective teaching-learning process, there is need to use effective instructional media. Appropriate Instructional media increase the effectiveness of different teaching materials or apparatuses which a classroom teacher employs to facilitate his or her teaching for the achievement of the stated objectives. According to Agun (1992), instructional media are helpful to the teachers and students and maximize learning in various areas. The use of instructional media in teaching of Civics is very important, because they provide a concrete basis for conceptual thinking, motivate people to learn and capture pupils' imagination, if used correctly (Ajalla, 1997). The importance of instructional media in teaching and learning of Civics, especially at the primary and junior secondary schools, has a considerable effect on the development of intellectual skills on the students.

Instructional media having educational inputs are of vital importance to the teaching of any subject in the school curriculum. White (2000) was of the opinion that the use of instructional media would make discovered facts glued firmly to the memory of students. Before that, Servey (1981) said that a well-planned and imaginative use of visual aids in lessons should do much to banish apathy, supplement inadequacy of books as well as arouse students' interest by giving them something practical to see and do and, at the same time, helping to train them to think things out themselves. Servey (1981) suggested a catalogue of useful visual aids that are good for teaching Civics i.e. pictures, postcards, diagrams, maps, filmstrips and models. He said that selection of materials which are related to the basic

contents of a course or a lesson, helps in depth understanding of such a lesson by the students, in that they make the lesson attractive to them, thereby arresting their attention and thus, motivating them to learn. He suggested a catalogue of aids which could be used to teach Civics. He advocated the use of pictures, which help children in grounding their thoughts and feelings. He said that pictures are used as alternatives to real objects when it is impossible to show students the real objects.

It is also very vital to have sufficient and adequate human resources in terms of teacher quality for teaching of all the subjects in the school curriculum. Without the teachers as implementing forces, the goals of education can never be achieved. Suitable textbooks, qualified teachers, libraries which are adequate should be provided for schools. Scarcity of these will put a constraint on the educational system in responding more fully to new demands. In order to raise the quality of education, its efficiency and productivity, better learning materials are needed. Killen (2006) also stressed the importance of having appropriate personnel plan and adequate physical facilities to support educational effort.

Instructional media refers to textbooks, library acquisitions, supplemental materials for classroom use, and any other instructional media, including electronic resources, used for formal or informal teaching and learning purposes. The primary objectives of instructional media are to deliver, support, enrich and assist in implementing the educational programme. The other objectives are to:

enrich and support the curriculum, taking into consideration students' varied interests, abilities, learning styles, and maturity levels.

stimulate growth in factual knowledge, enjoyment of reading, literary appreciation, aesthetic values, and societal standards.

present various sides of controversial issues, so that students have an opportunity to develop, under guidance, skills in critical analysis and in making informed judgments in their daily lives.

represent many ethnic, religious, and cultural groups and their contributions to the national heritage and world community.

provide a wide range of background information that will enable students to make intelligent judgments in their daily lives.

Significance of the Study

The use of different instructional media maximizes learning and retention of information. Instructional media by all means are an assurance that students across the globe are

instilled with the capabilities to relate to situations practically and learn to implement the theoretical aspects of education in their lives. The conventional methods of teaching that have been practiced ever since the beginning, focus mainly on text-books, lectures, and teachers and not on the learners, which, in the long run, affects the intellectual and reasoning capacity of students. On the contrary, instructional media focus more on enhancing the imagination and creativity of students and also develop a clear understanding of the subject. The present study will help to bridge the gap of miscommunication, which mostly tends to occur between the students and the teachers due to verbal communication. The study will also provide assistance to the teachers for efficient use of instructional media to enhance the interest of the learners in Civics. for efficient use of instructional media to enhance the interest of the learners in Civics.

Probable Causes

The pre-test results and observation of the teachers revealed lack of interest and understanding of the students in this subject, Civics. The findings indicated that the students were averse to learning the subject Civics and did not consider it as an important subject. As such, they did not pay attention in the class. Lack of innovative methods used by the teachers to teach the subject made the class very dull and monotonous. Therefore, teacher trainees attempted to teach the subject using innovative modern technologies to make the students interested in Civics, give importance to the subject and indicate its worth in the in present day-to-day lives.

The researchers analysed the difference in the conventional method of teaching and the modern method with the use of instructional media. The study was conducted on the students of Class VIII. In the process of teaching, they realised that students' level of interest in Civics was low, the probable causes for the same could be perceived as the 'filch' nature of the subject, conventional method of teaching and reluctance of teachers to use modern technological methods of teaching.

Action Hypotheses

The researchers developed certain hypotheses as a remedy to the outlined causes:

- **H_1:** f the students are given the opportunity to discuss any topic in a group, they will enthusiastically participate and show interest in the subject.
- **H_2:** If audio-visual aids are used while teaching, students will understand the topic clearly and relate it with their day-to-day lives.
- **H_3:** If hand-outs, charts and models are constantly used in the teaching-learning process, students will be more interested and alert in the class.

Research Method

Sample

32 students of Class VIII of a CBSE affiliated private school of Patna for the academic session 2013-2014, constituted the sample of the study. The students were mostly from neighbouring areas of the school and belonged to different socio-economic backgrounds.

Tools for Data Collection

Pre-test and post-test were designed by the researchers to collect data. The tests included objective as well as subjective type questions. Both the tests were of 50 marks each and carried 10 objective and 10 subjective type questions pertaining to the concept of Civics. The questions were not the same in the pre-test and the post-test, but the level of questions were kept the same in both the tests.

Action Programme

In the light of the outlined probable causes and proposed hypotheses, the researchers formulated an action programme, the steps which are given below:

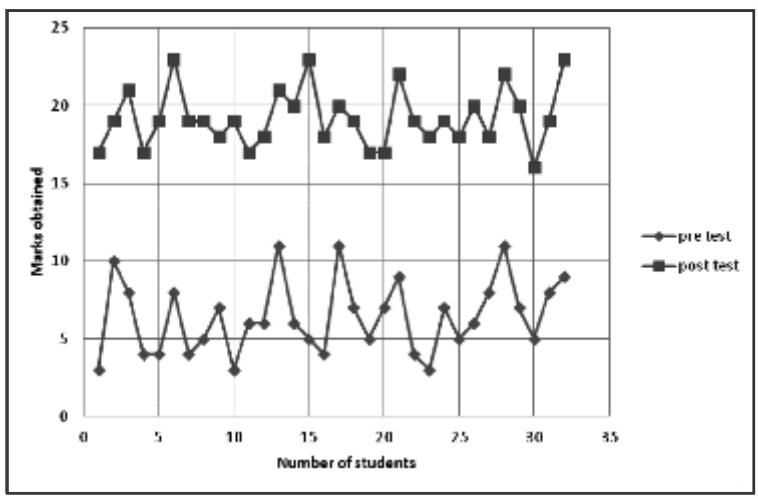
- **Pre-test** was conducted to ascertain the level of students' acquired knowledge regarding different topics of Civics. Besides, interest level of the students was determined through observation of students' participation in the class and discussion with their subject teacher.
- **Intervention**
    - The researchers used different instructional media such as audio-visual aids, charts, models etc to generate interest among the students towards Civics.
    - Different topics of Civics were given to the students to prepare for a group discussion. The topics were Democracy, Fundamental Rights, Election, etc.
    - The students were sorted in groups of four and each group was given a different topic for discussion. After a while, the student representatives from each group were called, one at a time and were given 10 minutes time each, to present their opinions with proper facts and figures as instructed by the researchers. Surprisingly, most of the groups came up with great enthusiasm and showed keen interest in the topics.

- Students viewed a visual relating to Civics and infered what they thought happened before the visual, during the visual and also what may have happened next. Students drew or creatively wrote their own 'before and/or after' scenes. This developed their capabilities of reasoning and proved to be very beneficial as every student analysed the scenario differently as a result of which multiple sides of a single topic emerged in the class.
- Hand-outs relating to topics of Civics were distributed in the class and various models and charts relating to the same were shown to the students. On being asked to verbally explain their understanding, students showed great interest in even those topics which were earlier considered boring to them.
- The researchers performed the role of supervisors during the activities.
- **Post-test** was conducted to determine the improvement in students' understanding of the different topics of Civics. Improvement in the interest level of the students was ascertained through observation of students' participation in the diverse activities and post activity discussions.

Evaluation of the Action Programme

The success of the action programme can be determined by comparing the scores obtained by the participants in pre-test and post-test, which is shown in the following graph.

Figure 2: Scores obtained by the participants in Pre-test and Post-test



It is clear from the above line graph that students showed improvement in their performance as they scored more in post-test than in pre-test.

The improvement in the performance can be clearly seen in the table given below, showing the mean and standard deviation of the scores obtained by the participants in the pre-test and the post-test.

Table 1: Mean of the scores obtained by the participants in pre-test and post-test

	Pre-test	Post-test
Mean	**6.44**	**19.22**
Standard Deviation	**2.38**	**1.89**

The mean of the scores obtained in post-test is 19.22 (±1.89) which is around 3 times greater than the mean of the scores obtained in pre-test i.e. 6.44 (±2.38) This improvement in the performance shows enhancement in students' interest and understanding of Civics.

Result and Discussion

The result and related discussion have been presented below:

H_1: If the students are given the opportunity to discuss any topic in group, they will enthusiastically participate and show interest in the subject.

When the students were given the opportunity to discuss a topic in groups, they showed keen interest in studying different topics of Civics, so that they could actively participate in the group discussion held in the class. In this regard, Adeyemi (1992) found that scores of the students in the reflective approach were statistically different from and better than those of the students of the lecture approach method after the post-test, so in the process of teaching, the educator should use approaches which promote activities involving diverse and effective instructional media. This would help in broadening the students' scope of thinking about these topics and also help them assimilate different ideas with their fellow mates and discuss them further for deeper understanding.

H_2: If audio-visual aids are used in the class, students will understand clearly the practical aspect of the topic along with the theory.

Audio-visual sessions helped the students to develop their own sense of imagination and

creativity. They helped them to understand and judge the topic independently before seeking help from anyone. Once these audio visual techniques started being implemented, students eagerly waited for the Civics class and this can be seen in Table 1 exhibiting remarkable improvement in the post-test as compared to the pre-test scores.

H_3: If hand-outs, charts and models are constantly used in the teaching-learning process, students will be more interested and alert in the class.

When supplement any materials other than text books were given to the students, they became more interested and put in more effort to understand the topics from different sources beyond the book knowledge. The charts and models when provided to the students describing the related topics, helped them visualise the topics more practically and accurately and this visual art created a long lasting image in their minds, which is very important for persistent knowledge that doesn't fade with time.

Teachers observed that when different instructional media were used while teaching Civics, the students' participation increased. They showed keen interest in the topics dealt. The class discussions were followed by different thought-provoking questions from the students. They actively participated in the activities related to the subject. They came up with novel ideas related to individual projects based on the day-to-day issues of civic life. Thus, the above mentioned observations made clear that instructional media helped in increasing the students interest in Civics.

Limitations

The study had some limitations, which are mentioned below:

- The study looked only at a non-probability sample of 32 students of Class VIII of a private school of Patna.
- The intervention could not be an elaborate one, due to paucity of time and resources.

Conclusion

Civics, being one of the most important subjects in our curriculum is lagging behind and is most often neglected. It becomes very monotonous to teach or learn using conventional methods of education. The future of the world, which is being shaped in schools, cannot attain heights if there is lack of knowledge of democracy, fundamental right and duties and many such basic topics of Civics. Hence, there is a vast scope of incorporating teaching

techniques, involving instructional media, in institutions which attract and sustain the interest of students. It not only helps in a better understanding but also develops the strength of reasoning and creativity among the students. The results of this study support the notion that the level of interest in learning Civics can increased through the incorporation of appropriate and effective instructional media. The present study has proved that using techniques, such as, group discussions, audio- visual aids and models, charts and hand-outs, students actively come out of their boredom shells and participate in learning and personality enhancement.

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Improving the Skill of Solving Numerical Problems in Physics among the Students of Class VI by Correcting Errors in Conversion of Units (S.I. and C.G.S.) and in Putting Wrong Units

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Abstract

Science has been and will continue to be a subject of tremendous importance to humanity. It underlies many of the day-to-day occurrences of our lives as well as plays a very significant role in the technological development of both developing and developed nations of the world. Physics, with its explanation of matter and energy is also called the fundamental science that is crucial in understanding the world around us, the world inside us and the world beyond us. Physics involves laws, principles, and formulae. These all are applied to solve numerical problems in Physics. Unless one can solve these problems, we cannot say that he or she has understood the theory. Numerical problems in Physics form the crux of the subject because of their direct bearing on our daily lives.

The researchers during their practice-in-teaching in a private school of Patna observed that the students of Class VI comprehended the theoretical concepts of Physics but they lagged far behind in their ability to apply their knowledge and understanding of theory in solving numerical problems. The researchers took this weakness of the students as their research problem and conducted an action research. This research paper is the outcome of their endeavour and aims at improving efficiency of solving numerical in Physics among students of Class VI. To accomplish this task, a pre-test was conducted to find out the difficulties faced by the students in solving numerical problems. After 15 days of regular practice in solving numerical problems, a post-test was conducted to analyze the impact of the intervention.

Keywords : *Physics teaching , Numerical problems, GRASP method.*

Introduction

Science, as a study of nature is universal and has no confines. Today, science is indispensible for our lives and has revolutionized it in every possible way. During the seventeenth century, the modern science of Physics emerged and gradually the theoretical framework of Physics comprising the laws, principles and theories of Physics became entrenched as a major tool of understanding the natural phenomena and our existence. Physics is also called the fundamental science as all other sciences derive their explanations from the laws, principles and theories of Physics. Many prominent physicists have significantly contributed to the build-up of this fascinating field of study that explains the world around us in every imaginable form. The study of Physics contributes in advancing knowledge of the natural world and technology and aids in explaining the phenomena of other natural sciences which have tremendous bearing on the growth of our economy. Post-independence, all the major commissions and education frameworks in India have emphasized the study of Science as a compulsory subject till the secondary classes, mandated recruitment of qualified teachers to teach them and endorsed inquiry-based learning as the most effectual way of linking students to Science. Similarly, National Research Council, Washington D.C., in their report, have well documented, "*Student learning of Science depends on teachers having adequate knowledge of Science"* (2007, p 296). This means that Science is more than a body of knowledge, it is a method of investigating the laws behind natural occurrences with a positive frame of mind and as such the role of teachers in science teaching is utmost important. When the science teachers are comfortable with both the content of science and the processes through which scientific knowledge is generated, validated and transacted, they are able to create individuals with scientific temper. Every science teacher hears this complaint from students that they understand the concepts but cannot apply them practically to solve problems. This is more so for Physics teachers as numerical problems are integral part of Physics. So, the question that emerges here is that whether the students actually have a thorough understanding of Physical Science concepts and if so, why do they face difficulty in solving numerical problems? Physics concepts and principles are essential to understand the conceptual representations of physical systems, events and processes. As such, effective problem solving in Physical Science needs a good understanding of these concepts and principles. (Mestre, 1994; Redish & Steinberg, 1999; Reif, 1986, 1995a). According to Ormrod (2004), a problem has three fundamental components, viz. the information provided or an initial

state (the givens), a desired final state (the goal), and means to get from the initial state to the end state, (the operations) (Ormrod, 2004). In many schools the focus of teaching Physics is more on understanding the chapters, remembering theories, principles, laws and formulas rather than solving numerical problems. Because of that students are capable of solving numerical problems which are either directly formula based or given in their textbooks but are unable to solve difficult and out of textbook numericals. Students find difficulty in conversion of units, mathematical calculations, writing the notations in Physics, deciding the proper formula etc. Physics makes use of the language of mathematics to describe the functioning of natural phenomena. The two subjects are linked with each other. Hence, it is vital to understand a concept of Physics in terms of equations and relations of Mathematics. Students must understand that the formulae used Physics are a meaningful description of physical laws or phenomena and not just a meaningless collection of Greek symbols and alphabets. So if the students realize the importance of formulas in the first place, they will soon understand the problem and can proceed to use the necessary mathematical tools for solving numerical problems. In order to solve numerical they have to focus on the following five questions: What is the problem? What am I supposed to find ? What information do I have to use? What principles are applicable? Have I encountered the problem in a similar situation? How should I apply the available information to solve the problem? Is my solution sensible?

It is with this theoretical background that the researchers undertook an action research when they went for practice-in-teaching to a private school of Patna affiliated to Council for the Indian School Certificate Examinations (CISCE). They observed that the students had theoretical knowledge of the concepts, laws and principles of Physics but many of them were not able to use it for solving numerical problems based on them. They made mistake mainly in the conversion of units and put wrong units while solving the numericals. When investigated minutely, they found that the problem was that the students did not possess the basic knowledge and skills of conversion of units. They focused their study on the students of Class VI as they planned to start from the basic level and conducted their study under the formal title, **'Improving the Skill of Solving Numerical Problems in Physics among the Students of Class VI by Correcting Errors in Conversion of Units (S.I. and C.G.S.) and in Putting Wrong Units'**.

Significance of the Study

Numerical problems are indispensable part of Physics learning. Problem solving is one of the finest ways to involve students in the higher order cognitive operations of analysis,

synthesis and evaluation. Solving numerical problems provides tremendous opportunities to the students to master the concepts learnt. They also help students to visualize the application of the physical laws and principles in the context of their day to day activities. This is vital to develop interest in the subject, study it exhaustively so as to contribute productively in the field of natural sciences in future. According to Sherin (2001), successful Physics students are those who understand complex formulae in basic terms.

The significance of the study lies in its intention to find out the difficulties faced by the students in solving numerical problems and remove them so that the students' understanding of the concepts of Physics can be enhanced.

Probable Causes

On the basis of their day-to-day observation of the academic involvement and behaviour of the students, interaction in the classroom and correction of their notebooks, the researchers found that the probable causes for such errors could be lack of interest in the subject, weak reasoning and problem solving ability of the students, low understanding of the rules of conversion of units, lack of practice on the part of students or improper teaching methods adopted by the teachers. One or a combined effect of these causes may be responsible for their mistakes in solving numerical problems correctly.

Action Hypotheses

From the probable causes, the most relevant action hypotheses that were chosen to solve the problem were:

H_1: If the teacher teaches the students the conversion of units and the use of proper units for a particular physical quantity, the students will grasp it.

H_2: If the teacher solves the numerical problems on the blackboard in front of the students by talking about unit decisions, the students will become aware of the proper use of units for the physical quantities.

H_3: If the teacher asks the students to do numerical practice every day of a given set of numerical problems by taking into account the appropriate use of units, the students will stop making mistakes while attaching units.

Since the design was pre-test post-test design, it was imperative to determine the significance of difference between the two tests to observe the impact of the intervention. The hypothesis proposed in this context was:

H_4: There is a significant difference between the pre-intervention and the post-

intervention performance of the students.

The corresponding null hypothesis was:

$H_{04:}$ The pre-intervention and post-intervention performance of the students does not differ significantly.

Sample Studied

The study was conducted on 45 students of Class VI of a private school of Patna affiliated to the Council for the Indian School Certificate Examinations.

Design of the Study and Tools Used

A pre-test post-test design was used to conduct the research. The pre-test comprised of 10 numerical problems that required conversion of units, arranged in increasing order of difficulty. The post-test also comprised 10 numerical problems based on conversion of units arranged in increasing order of difficulty. In both the pre- and the post-tests, there were 20% questions below average difficulty level, 50% questions of average difficulty level and 30% questions of above average difficulty level. The content coverage was kept the same in both the tests.

Action Programme

An appropriate two-week long action programme as given below was devised to conduct the research.

Action taken	Procedure and tools
1. Pre-intervention test	Researchers administered a pre -intervention test of numerical problems . The items of the test were teacher-made and 10 in number.
2. Intervention Teaching of GRASP method	In order to help the students to improve upon their problem solv de sign was planned in which the students were taught to solve numerical problems based on the 'GRASP' method.
	The students solved numerical problems consciously keeping in mind the steps of 'GRASP' method
3. Post-intervention activities	A post -intervention t est was conducted after the implementation of the intervention The test comprised questions similar to the questions in the pre -intervention test. Students' responses to the questions were collected, marked and analyzed.
4. Data analysis	To ensure simple ana lysis of data for the study, the researchers calculated mean of the scores obtained b y students in pre -test and post-test and found out the difference of the post-test mean and pre-test mean which came out to be 1.31.

The GRASP Method

The researchers used the GRASP method which is very effective to enhance the problem solving skill of students. They used this method to foster the numerical problem solving skills of the students included in the study. The method as used by the researchers is described below:

G: (Given):

Write down all given (pieces of information) including units.

Making sure all units are in the same form (i.e. cm/m/km/).

R: (Required):

Write down the required variable (s).

Re-read the problem; write down what needs to be found / solved.

Determine and write down the formula (e) that needs to be used to solve this problem.

A: (Analysis):

Analyze the problem / situation.

Draw any necessary pictures / diagrams.

Write / label diagram (if any) with given information.

Include unknown / required information**.**

S: (Solution):

Solve the problem based on steps of the 'Required'/ 'Analysis sections.

Use equation determined in 'Required'.

Include all units.

P: (Paraphrase):

Summarize the answer.

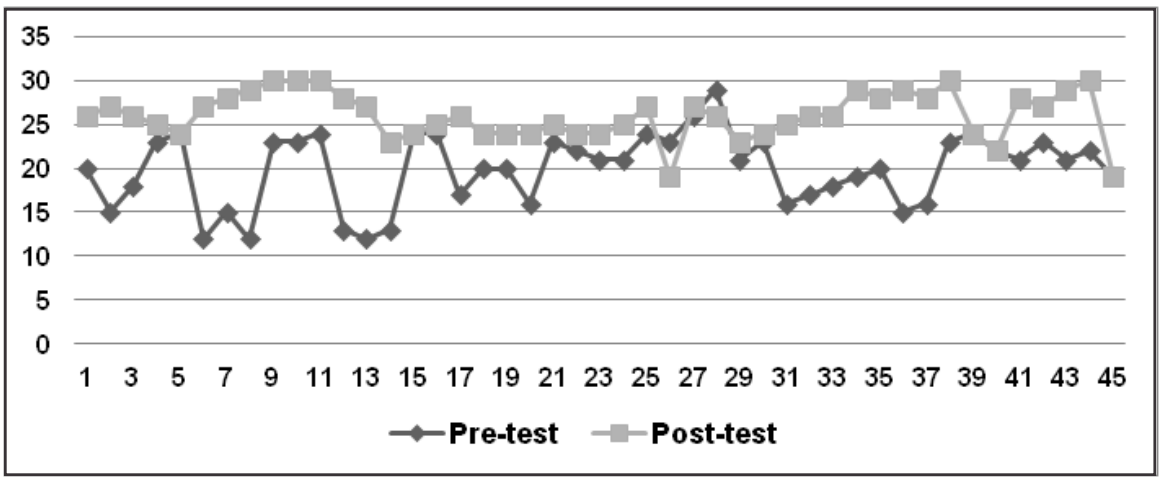
Use proper units.

Include all details needed to answer the question.

Evaluation of the Action Programme

The study revealed that after the intervention, student's efficiency of solving numerical in Physics improved considerably (which is depicted in the Figure 1). This was evident from the fact that they presented their class works and home assignments promptly and they made no mistakes at the time of practice and drill work. It appeared that the students had developed interest in solving numerical problems of Physics since they could remember the rules of conversion of units and steps of solving numerical problems. Students who once feared solving Physics problems now asked for more exercises and assignments after the lesson was taught.

Figure 1: Comparison of marks scored in the pre-test and the post-test



Results and Discussion

H_1: If the teacher teaches the students the conversion of units and the use of proper units for a particular physical quantity, the students will grasp it.

A unit of measurement is definite magnitude of a physical quantity, defined and adopted by convention or by law that is used as a standard for measurement of the same physical quantity.

While solving the numerical problems of Physics, all the variables are in the same system of units. The analysis of the relationship between different physical quantities by identifying their fundamental dimensions (such as length, mass, time and electric charges) and units of measure (such as miles vs. kilometers, on pounds vs. kilograms vs. grams) is necessary.

The researchers taught the students about units, base units and derived units. Thus they taught the students about assigning the units properly. The significance of the international system of units was explained to them. They were taught to check the units before substituting the values in the formula while solving the numerical problems.

Observation

It was observed that students started taking interest in the subject Physics, particularly in solving numerical problems since they could remember the rules of conversion of units and steps of solving numerical problems.

H_2: If the teacher solves the numerical problems on the blackboard in front of the students by talking about unit decisions, the students will become aware of the proper use of units for the physical quantities.

Solving numerical problems on the blackboard provides clarity in understanding the concepts. It also provides visual impact of the matter which is being conveyed verbally by the teacher. It presents holistic picture of content, provides variety and draws attention of the pupils to the relevant points.

First of all, the researchers explained the steps of the 'GRASP' method on the blackboard and then used it by giving examples of how to use it in order to improve the efficiency of numerical solving by the students. Then they were made to solve numerical problems based on this method.

Observation

The students started taking initiative in participating as well as raising their own problems. They presented their class works and home assignments and they made no mistakes at the time of practice and drill work in the class

H_3: If the teacher asks the students to do numerical practice every day of a given set of numerical problems by taking into account the appropriate use of units, the students will stop making mistakes while attaching units.

It is based on laws of learning i.e. laws of exercise. Drill and practice is a behaviourist aligned technique in which students are given the same materials repeatedly until mastery is achieved. The researchers provided them various materials and self-made worksheets for this purpose.

Observation

Due to regular practice, the errors made by the students gradually reduced and they solved numerical problems with greater accuracy.

H_4: There is a significant difference between the pre-intervention and the post-intervention performance of the students.

The corresponding null hypothesis was:

H_{04}: The pre-intervention and post-intervention performance of students does not differ significantly.

The results have been displayed in Table 2 given below:

Table 2: Significance of difference between pre-test and post-test

	Mean of scores	N	Std. deviation	Std. error mean	t	df	Sig. (2-tailed)
Post-test	26.02	45	5.16	.77	7.92	44	.000
Pre-test	19.93						

The above table depicts the difference between the pre-intervention and the post-intervention performance (SD=5.16) t (44)=7.92, p<.000. of the students, significantly in favour of the post-intervention performance. Thus the null hypothesis was rejected. This means that the students were able to solve more numerical problems correctly after they were taught to solve them using the 'GRASP' method for two weeks.

Limitations of the Study

The difficulty in solving numerical problem exists at all levels of school education. But due to paucity of time, the study was restricted to the students of Class VI only. So the significance of the study at higher levels could not be determined.

Another difficulty in conducting the study was absenteeism on the part of the students. Since the study involved all the students, absenteeism led to the repetition of classes which was difficult for the researchers to manage as they had to teach their lessons during their practice-in-teaching. The post-intervention test also had to be postponed several times due to absenteeism.

Conclusion

To get a comprehensive knowledge of Science is of utmost significance. Unfortunately the teachers do not want to take extra effort and train the students in specific skills related to understanding the subject thoroughly. The skill of problem solving, particularly numerical problem solving in the Physical Sciences is one such skill which is often neglected. This often results in trivialized understanding of concepts without gaining the ability to apply it in specific life situations. It was observed in the study that if the students were taught to solve numerical under proper guidance following a sequence of steps, students not only made less mistakes in solving them but also developed a positive attitude towards the study of the subject. The learner-centric paradigm shift cannot be effective in our schools unless the teachers come out of their conventional ways of teaching and involve the students in the teaching-learning process. This can take place in a step-wise manner in which the teachers have to build the capacity of the students so that they take the initiative of their learning as they grow. In the study, the researchers fostered the numerical solving skills of the students in this step-wise manner adopting the 'GRASP' method and teaching them through drills and practice. This method can be further used in Public Schools and at higher levels of school education to see its impact of the academic achievement of the students.

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