STUDY OF INDICATORS ON ACIDS AND BASES

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There is a paradigm shift in the traditional role of teachers as well as students in *Constructivist Science Classroom.* The teaching methods used in traditional classroom is based on objectivist view of knowledge which is grounded on the assumption that knowledge is objective, universal and complete and can be transferred from head of the teacher to the head of student. Whereas, in constructivist classroom, the role of teachers' shift from *transmitter* of knowledge to *facilitator* of knowledge. Hence, the role of students changes from *knowledge gainer* to *knowledge constructor.* By taking this approach forward, the same concept was taught in two sections of Class VII. One was considered as the control class of 34 students, where students were taught by chalk and board method and the other one as the constructivist class, where students learnt by doing experiments themselves. In control class the students were taught about the use of indicators on acids and bases by lecture method. They were taught that the colour of an acid and a base changes when an indicator was added. This was done by drawing a table on the blackboard. The definition of an indicator was taught and the students memorised it. In the other class, the teacher was like a facilitator. The class was divided into groups and the material, i.e., an acid, a base and indicators like china rose, phenolphthalein and turmeric was given in test tubes which were distributed to the students. Here the students performed hands-on experiment and saw the change in colour of an acid and a base by using various indicators. By doing hands-on experiments students were able to relate better with the concepts given in the book as the visual impact had a far much better impression.

Fussing with definition: Definition is an integral part of science, therefore, this strategy works beautifully in helping the students understand the key words involved in the definition and help them know it correctly without memorising it. The students were given key words related to the concept and they themselves came up with the definition of indicators. The students were able to evolve the definition themselves by using a constructivist strategy which is given above. When the students performed hands-on experiments the concept was understood very well and the impact was far better. The analytical data was also done which indicated that for every question asked the graph was much higher in the class where constructivist approach was used.

Key words: *Indicators; china rose; phenolphthalein; turmeric; fussing with definition.*

Introduction

"If you want to build a ship, then don't drum up men to gather wood, instead give orders and divide the work. Rather, teach them to yearn for the far and endless sea".

Antoine de Saint – Exupery

There is a growing body of evidence which demonstrates that students' learning of scientific concepts can be improved as a result of implementing research based teaching sequences. In this paper, some of the approaches taken to design and evaluate such sequences offer an alternative perspective which is based on the concept of learning demand and a social constructivist perspective on learning. A variety of teaching methods and their combinations have proved effective in the Constructivist Approach to Learning. One cannot single out a right instructional method for a particular lesson. Often within the same lesson, a particular method will flow into another. The selection of appropriate method/s varies with the students and their associate attributes. Various effective strategies recommended for the constructivist approach in facilitating

learning of science are: Graphic Organisers, Collaborative and Cooperative Learning, QASP, Fussing with the Definitions, etc.

Graphic organisers are valuable instructional tools, which convert complex and disorganised information into easily understood, meaningful displays. They help teachers and students organise ideas and concepts. They are flexible and endless in application. Using a graphic organiser, teachers can represent the entire overview of an issue or a problem and also a closer view of any aspect of it. Graphic organisers are of several types and their usefulness stretches across all disciplines and topics.

Another strategy used was 'Fussing with definition'. So, this strategy worked beautifully in helping the students understand the key words involved in the definition and help them know it correctly and sequentially without memorising it. So, in this paper, I have explained how various strategies used in constructivist approach helped students understand the concept and the teacher is rather not teaching but facilitating to understand a concept.

Material Used: Chalk and blackboard, test tubes, indicators like china rose, phenolphthalein and turmeric, acids, bases

Method and Procedure

1. In control class the students were taught about the use of indicators on acids and bases by lecture method. They were taught that the colour of an acid and a base changes when an indicator was added. This was done by drawing a table on the blackboard. The definition of an indicator was taught and the students memorised it, as shown in the picture below.

2. In the other class, the teacher was like a facilitator. The class was divided into groups and the material, i.e., an acid, a base and indicators like china rose, phenolphthalein and turmeric was given in test tubes which were distributed to the students. Here the students performed hands-on experiment and saw the change in colour of an acid and a base by using various indicators. By doing hands-on experiments students were able to relate better with the concepts given in the book as the visual impact had a far better impression, as shown in the picture.

3. *Fussing with definition*: Definition is an integral part of science. So this strategy works beautifully in helping the students understand the key words involved in the definition and help them know it correctly without memorising it.
4. The students were given key words related to the concept and they themselves came up with the definition of indicators. The students were able

to evolve the definition themselves by using a constructivist strategy which is given above.

Following questions were asked in the control class and the in the class where constructivist approach was used (Experimental Class), respectively.

Q1. What change will you observe if

(a) 'china rose' is added to an acid?

(b) 'phenolphthalein' is added to an acid?

(c) 'turmeric' is added to an acid?

Q2. What change will you observe if

(a) 'china rose' is added to a base?

(b) 'phenolphthalein' is added to a base?

(c) 'turmeric' is added to a base?

Q3. An indicator which is obtained from a flower gives pink colour, if added to a liquid. Is this liquid an acid or a base?

Q4. An indicator which is usually used in our kitchen for cooking gives red colour, if added to a liquid. Is this liquid an acid or a base?

Q5. Two test tubes 'X' and 'Y' filled with acid were taken and two different indicators namely 'A' and 'B' were added to the test tubes. 'A' was added to 'X' and 'B' was added to 'Y'. It was found that there is no change in the colour. Which indicator do you think is added? Identify the two indicators.

Q.6. State the definition of an acid.

Q7. State the definition of a base.

Q8. State the definition of an indicator.

Results and Discussion

Table 1

Number of students who answered correctly in both the classes is shown in the table

S. No.	Control Class (Total students 36)		Experimental Class (Total students 36)	
	Number of students participated	% of students	Number of students participated	% of students
1 (a)	25	69	35	97.22
1 (b)	28	77.7	34	94.44
1 (c)	30	83.3	34	94.44
2 (a)	30	83.3	35	97.22
2 (b)	26	72.22	35	97.22
2 (c)	28	77.78	34	94.44
3	15	41.67	30	83.33
4	12	33.33	32	88.89

5	8	22.22	30	83.33
6	25	69.44	36	100.00
7	28	77.78	36	100.00
8	29	80.56	35	97.22

The table above, clearly indicates the responses from the students. The responses were more accurate in the experimental class as compared to the control class.

Conclusion

When the students performed hands-on experiments the concept was understood very well and the impact was far better. It helped the students in developing a positive change, build scientific attitude ad provide a natural way of learning. The analytical data was also done which indicated that for every question asked the graph was much higher in the class where constructivist approach was used.

References

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