Challenges in Adopting a Constructivist Teaching Approach in a School

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Abstract

The adoption of constructivist approach marks a paradigm shift in school education in India and is still in its early stages of implementation. We need to overcome a number of challenges in its smooth implementation over a large mass of children to attain a quality education for all. The present paper is based on a qualitative academic research and has studied a constructivist school setting in order to understand some of its challenges in implementation in the classroom. It argues how some of the impediments in its smooth application come from the larger curricular structure itself and the limitations posed by syllabus, subjects, timetable and the classroom itself and why it is necessary to restructure our basic curricular components in order to provide a more supportive curricular environment for constructivism to flourish.

Introduction

Constructivism has become one of the popular approaches discussed in education today. It suggests a departure from the behaviourist ways of teaching, which promoted learning through a teacher directed method and prescribed particular behaviour on children ignoring their own thought processes. Constructivism on the other hand, has emerged as a child-centered approach in education to find how children create meaningful understanding of environment and construct their own knowledge and how learning can take place in a more interactive manner rather than a teacher dominated way.

The word 'constructivism' itself is new to many teachers and using

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constructivist methods is a novel practice for those who have been following the traditional methods since years. The present paper analyses constructivism from the point of view of its application and understanding the strategies and methodology adopted by teachers for applying it into teaching practice. It is based on a qualitative research study conducted for M. Phil in 2014 on a formal school named 'Shishuvan' in Mumbai City.

Shishuvan private school, have received a top rank in Mumbai east zone by Hindustan Times survey 2014. It is affiliated to the ICSE board and tries to provide innovative learning opportunities to children in curricular as well as co-curricular areas. Its philosophy on education and learning clearly shows the elements of constructivism, though it does not use the word specifically. Its website writes— "Shishuvan believes that every learner comes with a curriculum of her/his own. The school is an environment in which learners find the support for their learning. We trust and respect this purpose and provide the resources for the same, thereby keeping the onus of learning on the learner. We enjoy nurturing our students' curiosity, applauding their willingness to apply themselves in establishing and honing their skills." (Philosophy: Shishuvan, n.d.)

The ICSE board also follows the recommendations on curriculum given by the NCF, 2005. Thus, the school attempts to follow the principles of constructivism. However, to determine whether the teaching in the school could be termed as constructivist, the researcher conducted initial visit and observed classroom teaching of the subject of science. The following parameters were used to find if the teaching could be termed as constructivist.

1. School philosophy promotes constructivist learning among children.
2. Teacher does not impose ready-made knowledge on children and identifies and values student's prior knowledge while teaching.
3. Shows an interactive learning environment between teacher and student in the classroom aimed towards allowing children to express their own views and opinions.
4. Teacher uses questions, arguments, examples, experiments and other activities for developing scientific conceptions among children.
5. Uses textbooks and other reading materials framed on a constructivist approach.

While in practice it is difficult to find an ideal constructivist teaching environment, and the author does not claim 'Shishuvan' to be so, it was selected since it was found that its teachers made sincere efforts towards the same as will be elaborated further in the paper.

The main objective of the research was to understand the constructivist teaching practices in the classroom and what challenges are faced by the teachers in following them. The secondary objective was therefore to know the conceptual understanding of constructivism of the teachers since that would shape their teaching practices.

The researcher selected the students of grade 6th to 8th and data was collected through classroom observation of the subject of science and interviewing the five science teachers and eighteen randomly selected children, six from each grade. Only the subject of Science was decided to be selected considering the time constraints with the researcher. However, the findings can represent other subjects in many aspects. The following chart shows the topics covered during classroom observation.

Based on the classroom observations and interaction with the teachers and students, the paper presents its arguments primarily based on the challenges identified in teaching. Each challenge shows how it arises from a rigid curriculum structure which is still based on behaviourist principles such as the rigidity of syllabus, division of subjects and class as a mechanism to teach children that remains unchanged even in the constructivist tradition leading to some core impediments for practicing constructivist teaching and challenges to the teachers.

Understanding Constructivism and Constructivist teaching

Constructivism as we know is not a theory of teaching but is originally an epistemology which is a part of philosophy dealing with knowledge to find out what the nature of knowledge is and how humans gain

Table 1: Classroom Observations

Sr.No.	Class	No. of classes observed	Topics Taught during classroom Observations
1.	6	11	Magnetism, Simple Machines and Motion
2.	7	13	'Movement in Living Organisms', 'Adaptation' and 'Acid, Bases and Salts'
3.	8	Biology: 3 Classes	Circulation in Human Body, Functions of Roots, Diffusion and osmosis
		Chemistry: 4 Classes	Electrolysis of water, reaction of metals with acids
		Physics: 4 Classes	Pressure Integrated Learning (IL) Theme: Water
		Total: 11	
	Total Classes	**35**	

knowledge and understand the world around them. Since an epistemology is closely related to knowledge and how people learn, it has found its way through the education discourse.

In brief, constructivism is a view of knowledge recognising it not as a collection of 'truths' to be transmitted or discovered but as "emergent, developmental, non-objective, viable constructed explanations by humans engaged in meaning making in cultural and social communities of discourse" (Fosnot and Perry, 1996). Constructivism believes that knowledge is not something passively received by an individual, but the learner actively interacts with the environment while creating the knowledge.

Teaching based on constructivist principles assume different ways of instructional methods than based on behavioural principles. While there are no set of established methods or rules of using constructivism for teaching (Osborne, et al 2003) we can list some of the basic characteristics of constructivist teaching. For example, as given by Fosnot and Perry 1996, it rejects knowledge being transmitted to learners through symbols and that learners can incorporate exact meanings as transmitted by the teacher or that whole concepts can be divided into discrete sub-skills or that learning can be gained out of context. Instead a constructivist view of learning suggests an approach to teaching that "gives learners an opportunity for contextually meaningful experience through which they can search for patterns, raise questions, model, interpret and defend their strategies and ideas" (Fosnot and Perry, 1996). The teacher no more remains an autocratic knower directing the learner, as an ignorant and controlled subject following what the teacher says. Constructivist teaching on the other hand asks to understand the prior understandings of children on the topic before designing further teaching strategies. In fact, understanding the prior conceptions of children is one of the most crucial steps in designing further instructions. Teachers here assume a role as a facilitator and learners take on more ownership of the learning process. The classroom is characterised by open dialogue and interactions between children and teacher and there is a free flow of ideas among learners.

There has been considerable research on the various challenges and dilemmas faced by teachers in teaching through a constructivist approach. Windschitl (2002) has divided these challenges which is termed as dilemmas, into four parts— conceptual dilemmas that deal with challenges arising out of the teacher's inability to gain a conceptual understanding of the philosophy, pedagogical dilemmas that arise out of the challenges faced in framing teaching strategies according to the philosophy, cultural dilemmas dealing with teacher's inability to go beyond the traditional

cultures of teaching and learning and political dilemmas arising out of the resistance teachers might face from important stakeholders in the school in using the constructivist methods. The researcher has attempted to identify and relate these dilemmas in the present study.

Constructivism in Shishuvan

Through the in-depth interview with the science teachers, it was found that the teachers had very limited understanding of the term 'constructivism' and it was honestly accepted by them. They were not introduced to much of this concept during their teacher training during B.Ed. neither they went through any in-service training on constructivist methods to be able to understand the philosophy in detail. However, through their years of teaching experience, they understood the importance of promoting children's own thoughts and experiences in order for a better learning. For example, while interviewing Namrata[1] teacher said, "I feel that when I derive it [learning] from the child, I have achieved something and the child has understood." While Mansi teacher says, "If they don't know, I just probe them, probe them to give the answer and take them closer. 'See, what if it is like this', then they say, 'yeah'. When you relate in that way, they themselves imagine and that will be in their mind forever."

Thus, they did try to apply constructivist principles knowingly or unknowingly while teaching. They believed that long term learning can happen only if the children try to understand things by themselves. If they only gave them the readymade knowledge, they would forget easily. This was also visible in their teaching. They used lots of activities for teaching not just to explain concepts but to generate thought processes among children through relevant questioning and scaffolding on the activities. While in some instances teachers followed didactic methods of teaching, in many other they used methods that can be termed as constructivist. The research could study these constructivist practices of the teachers to understand about the application of constructivism. The teachers however, did not specifically follow different constructivist methods such as inquiry method, project method, problem-solving, conceptual change, etc. The researcher could observe a mix of these approaches applied unconsciously. Therefore, they were not studied specifically but were broadly termed as constructivist. Table 2 provides a brief profile of the five science teachers.

[1] Pseudonyms used for all teachers

Table 2: Teachers' Profile

S.N	Name*	Age/ Gender	Qualification	Subjects taught	Classes taught	Years of Experience
1.	HemaK	28/F	MSc. B.Ed.	Science, Geography	7th to 10th	6
2.	Rashmi B	31/F	BSc. B.Ed.	Science, Computer, EE, Marathi	8th to 10th	9
3.	MansiR	34/F	BSc. B.Ed.	Chemistry, Biology, Geography	8th, 9th, 6th resp.	1
4.	ArtiS	27/F	MSc. B.Ed.	Science, EE	6th and 7th	5
5.	NamrataT	26/F	BSc. B.Ed.	EE, Biology	6th, 8th and 9th.	5

*Pseudonyms; EE = Environmental Education

The research tried to identify what factors prevent teachers from effectively applying constructivist methods in the classroom which are discussed below.

Challenges in the application of constructivism

The challenges which the research have brought forth tell us how the original nature of application of constructivism is in classroom and how the curriculum structure and its basic components such as the subjects, their syllabus, division of children into classes, time-table, etc. create impediments in its smooth application. The challenges identified in such a process of knowledge construction in a classroom are as follows.

The Emergence of Alternate Topics outside Syllabus

The research came across this as a major phenomenon of constructivist teaching where during the teaching of a certain topic as per the syllabus, the teacher is required to enter into other topics which may not be the part of the main syllabus. Though this depicts positive aspect of constructivism, it becomes a pedagogical challenge if not addressed in a proper manner.

A teaching session is generally focused on one particular topic. The teacher has a lesson plan set up for the same having defined learning outcomes for the session related to the main topic. The teacher facilitates the learning in order to achieve the outcome. However, it was observed that a teaching session not based on directly transferring of knowledge but

valuing children's thought processes leads to emergence of new topics outside the teacher's teaching plans. Activities or discussions focused on a certain topic many a times ask to shift to topics that may or may not be related to the main topic under study. Some of such instances observed are described here.

During the topic on 'Movement among Living Organisms' in standard 7th when the children were shown various videos of living organisms such as earthworms, amoeba, paramecium, hydra, etc., their curiosity was triggered and they used to bombard the teacher with many questions. However, most of the questions were beyond the main topic of 'Movement' for which the video was shown. Some of the questions on them are as follows—

How does it digest? Where is it found? Where are tentacles? Why are they expanding and contracting? I think they are breathing or what. They look like eyes, do they have nucleus?

Some of the teacher-student interactions in the classroom went as follows—

Student 1: What does it eat?

Teacher: Dead and decaying matter— algae, insects, etc.

S1: Does all micro-organism feed on dead, but?

S2: Do they eat 24 X 7?

S3: What are those dots?

T: Vacuoles, they are used to store water, food.

S4: Does amoeba have DNA?

T: Of course, it has nucleus so it has to have DNA.

S4: Can we kill it?

T: How? We can't see it.

S5: What is its actual size?

T: I don't know, it is measured in micro-meters, I think.

S6: Are they harmful when they come in contact?

T: It depends on what kind of bacteria it is.

The above instance which is only a small part of the class period shows the curiosities of children about a certain novel topic in the class. And, it also shows the limitations of the teacher to address each question in detail and she has to stick to the main topic which was 'movement' in the above case. The above conversations and questions of the children have a deep potential of covering a wide area of knowledge if built up on the same. However, since the teacher has to adhere to the given syllabus they have to be addressed only in brief. On the other hand, it was observed that the teacher selected and did probing of only those questions or responses of children which lied under the topic the teacher took and ignored the rest, most probably since probing them would lose track of the topic.

Such examples show how the syllabus which guides the teaching-learning process, also dominates the process and restricts the learning to only one direction. A minute observation of the classroom teaching brings up such examples more and more. This is so common

for the teacher that ignoring the emerging new topics outside of the syllabus is often unconscious. The researcher discussed about this with the teachers. According to a teacher,

"We want to do, and we would love to listen to children's questions and answering them, but somewhere we are also tied up with completion of syllabus and curriculum so we sort of restrict ourselves."

Thus, addre ssing such out of topic responses does not always interest the teacher at large and they fall under the domination of the curriculum. A teacher who was willing to address such out of topic responses said how her fellow teachers ask her to concentrate on the syllabus or else it won't complete on time. A political dilemma can be seen here at function. Classroom observations of that teacher indeed showed how she allowed to build on most of the student responses which posed time constraints on her.

This is more so in case of constructivist method than the traditional behaviourist methods since constructivism allows children's thoughts to flourish. So, there are huge chances of emergence of new topics to arise. It shows how the construction of knowledge takes place in a non-linear pattern. It's a major dilemma— How does a teacher interact with such a dynamic nature of knowledge construction that easily breaks the walls of a syllabus.

The Challenge for Integration of Curriculum

As discussed, though the teacher goes with a particular topic to teach in the class, the classroom processes often demand to go beyond the topic. These topics often go beyond the subject. Topics don't just emerge within one topic but can jump from biology to a physics one quite easily. For example, in a biology topic on movement in animals, the teacher taught about how the body of a fish thin at front and broad at the sides which allows smooth movement in water. Similarly, birds have wings allow them to fly. The teacher explained it in short how the difference in pressure on top and bottom of the wings give a lift to the bird. Here the child needs to understand the physics of the shapes, air and water pressure, etc. to understand it fully. The teacher couldn't go deeper in the physics aspects of the topic since they are generally done separately during physics classes. This produces breaks in continuity of learning content. Further, a teacher also shared how while showing a documentary about Africa and Nigro and their slavery in olden days, they learn about racism that raises ethical or value concerns of liberty and humanism. Thus, value education becomes another outcome from a geography topic.

However, the syllabus and division of knowledge into distinct subjects, doesn't promote such kind of integration beyond a certain point. What the school alternatively did is

that it tried to achieve this through adding an Integrated Learning (IL) subject which is a theme-based integration where subjects such as Science, Maths and Environmental Education or Physics, Chemistry and Biology are taught based on one particular theme. For example, in the eight class, one such theme was 'Water', which was being studied from a physics, chemistry and biology point of view.

However, as explained earlier, the complexity of how topics can be related is quite great and the teaching methods based on a common theme still are far from dealing with integration in the above sense. Thus, the present curriculum on one side stopped the natural integration taking place and on other side it tried for integration at a very superficial level.

Providing Individualised Construction of Knowledge

While the explosion of questions and student ideas were seen in a constructivist classroom, it is obvious that it becomes practically impossible for the teacher to reach to each child's ideas. Sometimes important conversations among students take place during group activities which do not reach the teacher. For example, this short dialogue between two students during the activity of making a temporary magnet out of an iron rod was important and observed by the researcher, but couldn't reach the teacher.

Student 1: Why are iron fillings not sticking in between? [i.e. middle of the rod]

Student 2: No, it will stick only sideways [i.e. the ends of rod]

The above observation of the students reveal that magnetism is stronger at the ends than in the middle. This fact was not mentioned in their book or brought forward by the teacher since the topic was essentially about making temporary magnets and content on properties of magnet were part of another lesson plan. A further discussion on this observation would certainly have added to the understanding of children on the topic. In another similar instance, during an activity of making temporary magnets through electro-magnetism, a child discovered the copper wire is getting hot which he shared with his group. It was also missed in the larger group of the class. Many such discussions and discoveries among children neither reach the teacher nor probably to the researcher during the classroom observations due to class size of around 36 children. This shows that a constructivist classroom needs far more management skills and preparations in order to utilise the emerging learning opportunities in the class.

A constructivist classroom therefore, cannot be managed and structured the way a traditional classroom is. The above scenario

suggests the helplessness of the teacher in promoting construction of knowledge at an individual level which can be distinct and unique from the collective. In constructivism, where knowledge is seen as individually constructed, how do we then handle this individuality in a curriculum where common class is the structure, is a big challenge.

Challenges Shared by the Teachers

While the above mentioned challenges are often overlooked by the teacher, there are some other challenges in a constructivist classroom shared by the teachers themselves.

Managing the classroom

Since methods beyond lecturing are used for better learning experience in a constructivist classroom and children cannot be just seen as sitting at one place with their mouth shut, it asks for better management on the part of teacher and also a lot of patience. It was often observed that activities or discussions within children groups many times create a lot of chaos though it was a part of the lesson plans. Forming smaller groups, distributing materials, giving instructions, addressing their difficulties, etc. indeed requires a lot of skills of the teacher. At times the teacher had to raise their voice, though they tried to be as respectful to children as possible. This was also shared as another challenge by teachers.

As said by a teacher, 'There are days when we do activities and they just don't cooperate and they lose control of themselves. So that gets difficult for us. The throat is like this because of this.' This can become a demotivating factor to practice such methods according to research by Lord (1998) who found that biology teachers did not use student-centered constructivist methods because of the hassle it creates while incorporating it into the daily instructions. He further says that, 'there is so much time lost establishing student groups and handing out the cooperative group materials that half the class period is lost' (Lord, 1998).

Such a method which requires high motivation of teachers, is necessary to notice since it requires providing right atmosphere and support to the teachers in order to perform best and keep up the motivation. A teacher who doesn't receive the required support from the school and burdened with other responsibilities cannot adopt constructivist methods.

Maintaining students' interest

This was seen as one of the common responses shared by the teachers which also show a positive aspect of teaching. If we really want learning to be effective and deeper among children and emerge through their active involvement, it is first necessary that children are motivated in the class. If the children are not interested, no amount of teaching would benefit them and they would not open up

with their ideas. This was clearly understood by the teachers and they rightly used a lot of techniques to keep up the children's interest in the class.

Teachers used a lot of hands-on activities not just as part of teaching a topic but also generate interest among children. For example, a teacher once asked children to bring black chart paper, colours, cotton and other odd things. Using these materials the children had to make a bone structure of hand on the chart paper using cotton and spray painting. On asking about the objective of such activities she said, "Since, only PPTs and teaching becomes boring and I could see that during teaching, there has to be an element of 'fun' and 'hands-on' activity apart from audio-visual that I use. Since, we cannot use experiments as such in these [biology] activities, I try to make it innovative in this way."

She sometimes also took circle games or showed exciting videos out of the topic in the classroom during the middle of the topic finding that the children are losing interest. Mansi teacher also shared that when children are not attentive in the class and engage in talking and laughing among themselves she finds herself responsible for maintaining their interest. Thus, keeping up children's interest was shared as indeed one of the challenge for them. If children do not show the required motivation, it would be really difficult to encourage thinking and discussion based on the topics and would significantly spoil any kind of constructivist learning.

As ICSE board offers to choose subjects between science and commerce from class ninth, teachers say that many of them had made their mind in taking subjects in class eight. So, those who want to take commerce feel that they don't want to learn science as anyways they are not going to do it later and want to go into business. So, this becomes another reason for losing interest in the subject. Teachers in spite of that tried to generate interest among them by explaining how science is necessary and the integral part of their life.

Another important factor shared by a teacher that reduces the interest especially of the older children in classes ninth and tenth is the increase in academic burden. She says somehow the essence of learning is gone, 'Though we do try that by activities discussion, and we keep the learning atmosphere alive.'

This shows a reducing level of intrinsic motivation to learning among students in higher classes.

Conclusion

The present research analysed the various challenges arising in the smooth implementation of constructivism. It shows how the inherent nature of learning in classroom is originally unpredictable and unsystematic or 'non-linear' which is more evident in a constructivist method and how the

present nature of curriculum which is essentially 'linear', restricts such learning to take place. What it leads to is pressure on teachers who has to constantly balance between the curriculum demands and, at the same time, allow construction of knowledge to take place among students. The linear curriculum does not support the non-linear nature of constructivist learning. It suggests an inherent contradiction between the two; the curriculum structure and its philosophy, which leads to challenges at different levels in the teaching-learning process.

The present structure of the curriculum is originally a behaviourist one, which as Benjamin Bloom says, involves pre-planning a curriculum by breaking the knowledge content into component parts and sequencing them based on their complexity (Fosnot and Perry, 1996). It takes the form of syllabus, dividing knowledge into subjects and children into classes. The teacher is responsible for its transmission (or facilitation) and there is assessment of learning taking place. Such a behaviourist framework framed for the traditional approach has almost remained the same for the constructivist approach. This is more evident when even teachers do not recognise when the approach changed from behaviourist to constructivist since the larger structure remains almost the same even when the philosophy is turned upside down.

This paper argues that in a constructivist paradigm, it is difficult to approach knowledge by dividing it into discrete subjects and topics and thereby making a linear syllabus and follow a classroom mode of teaching all children. The problems in doing so have come up through this research.

As Windschitl (1999) warns, constructivism cannot be inserted into a curriculum as a set of discrete and isolated instructional practices, rather it has to be seen as a culture – a set of beliefs, norms and practices that constitute the fabric of school life itself that is very distinct from the traditional practices. Our rigidity to the behaviourist curriculum is evident in our structure and there is a need to rethink on the same.

This asks for a further research to study the patterns in constructivist learning in classroom and connections between knowledge areas. It cannot be termed as totally 'unpredictable' or 'unsystematic'. It should help to design a newer organising principle which considers the dynamic nature of constructivist learning.

The findings and analysis however does not mean that learning in the present curriculum structure was inefficient. Though the present research did not study the learning outcomes in detail, the general observation showed that it was far better than a traditional method and overcame problems such as rote learning to a great extent. The methods also gained positive

feedback from the children as well. What it actually argues is that the efforts and motivation required to achieve it are multiplied in order to overcome its contradictory nature and still shows limited application. This becomes problematic when the aim is to spread it across the country considering the reality of schools in India where the motivation of teachers many a times is so low that even the routine teaching does not take place, not to talk about using innovative methods. What it should not lead to is an implementation in selected few *elite* schools as commented by authors such as Akhtar (2005), who are capable to employ skilled teachers. If we don't want this to happen, it urgently asks for reorienting the curriculum structure for the smooth application of constructivism.

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