

Teaching Mathematics through Dialogue Method: An Innovative Practice for Holistic Education at Elementary School Level

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Abstract: Dialogue is very different from the practices commonly seen in many classrooms in which teachers put questions and students have to answer them. In dialogue teaching interactions can be occur in the context of whole class, group or one on one learning activities in which the child has to build understanding of the concept, explore ideas and practice thinking through his different type of expressions of the concepts leading them towards holistic development. The present study was concerned with teaching Mathematics through the dialogue method of teaching. It is an innovative practice designed for interactive classroom learning at the elementary school level for the holistic development of the children. Holistic education emphasizes the integration of all aspects of learning aiming intellectual, emotional, social, physical and spiritual development. It realizes the meaning and purpose of human life in the society in this modern era. The study is qualitative and participant observation method was used to collect the data. One class was selected conveniently and the dialogue method was practiced for one month. The achievement of the student participants taught through dialogue method was compared with the achievement of the same student participants taught through traditional method. The results of dialogue method were found better than the traditional one.

Key Words: Dialogue, 6 cycles, elementary, learning.

I. INTRODUCTION

Dialogue is a written or spoken conversational exchange between two or more people. It is associated with the Socratic dialogue in the West, developed by Plato, the first extant author in whose works is closely associated with the art of dialectic. It is a narrative, philosophical or didactic device, the antecedents are also found in Indian literature, for an example, Rigvedic dialogue hymns and the *Mahabharata*. Philosophical treatments of dialogue emerged from thinkers including Mikhail Bakhtin, Paulo Freire, Martin Buber and David Bohm in the 20th century. These thinkers articulated dialogue as a multi-dimensional, dynamic and context- dependent process of creating meaning. Etymologically, the term Dialogue emerges from the Greek word: dialogos which means conversation. The roots of dialogos are (i) Dia (through) and (ii) Logos (speech, reason etc.). Latin took over the word as dialogus.

There are two terms mainly used in any conversation namely: (i) monologues and (ii) dialogues. The main difference between monologues and dialogues is in the main thought, in dialogue this thought is introduced and directed to everyone. The message or thought sent to others is packed in some kind of emotions, which requires two-way communication in the dialogue. This connection is established between people in dialogue; it is always organized and carried out with a purpose. In education, dialogues are always used and because they are basic teaching methods. Its aim is to gain or rebuild new

knowledge and to establish or verify previous knowledge. Because of addressing the idea to someone and causing his reaction, exchange of opinions and discuss the talks, it makes possible to get to the truth, to the knowledge on the subject. It is the didactical value of dialogue. The best example of dialogue implementation lies in bought traditional and modern teaching methods (Lakatos, A. and Boros, A., 2011). Dialogue teaching deals with lengthy interactions between a teacher and a student or group of students in a context of collaboration and mutual support. Dialogue is very different from the practices commonly seen in many classrooms in which teachers put questions and students have to answer them. The dialogue teaching interactions can be occurred in the context of whole class, group or single learning activities in which the child has to build understanding of the concept explore ideas and practice thinking through his expressions of the concepts. True dialogue requires the developing efforts towards others, consequently facilitates and meaningful interaction between people and cultures. Students usually have to construct their own meaning to what they are taught regardless of how clearly teachers or books explain the texts. Dialogue expects that the participants will grow in understanding and may decide to act together with common goals. The concept of dialogue has held a central place in ancient Indian views of education ever since the teachings of Indian Saints and Rishis.

II. REVIEW OF RELATED STUDIES

It is obligatory as well as desirable to scan the related literature with a view to place the conspectus of the research investigation on sound lines. The survey of related literature facilitates to have an idea to what extent the problem has to be exported and whether the evidence provided is adequate enough or not? Moreover, the survey of the related studies gives assistance in farming the objective laying out the research design and locating the necessary data. The last but not least use of the related studies is to justify the theoretical foundation. Therefore, the researcher has made effort to explore a virgin field of research by undertaking the research problem.

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The studies related to the present study were reviewed to find the gap. The researcher reviewed the studies through internet. The existing research that are directly or indirectly related to the present study, have been reported as below:

Marchel, C. A. (2007) conducted a study on leaning to talk/talking to learn: teaching critical dialogue and found that critical dialogue skills are of particular importance for work with diverse students and their families. He suggested four steps of teaching critical dialogue as define process and steps, stumbling blocks, modeling and guided practice in small groups with critical incidents. The use of critical dialogue has tremendous potential in teacher education. The students can learn to use and come to value it in their collaborations with peer groups or classmates.

Qiong, L. and Yujing, N. (2009) found that expert teachers tend to use analytical and comparative questions more frequently to detect students' mathematical reasoning. Students and teachers work together to determine the answer to a question and the dialogue in the classroom takes place in a way that students present an answer, the teacher and the other students question the answer, and then the students explain the answer. On the other hand, a novice teacher often tends to give students hints, or utilize simple questions to jog the memory. The novice teacher recognizes students' logic but does not incorporate them into his/her teaching. In this case, the teacher becomes the sole judge for the appropriateness of the answers and the typical dialogue in the classroom occurs in a way that the teacher asks a question, students answer, and the teacher comments.

Scott, C. (2009) studied dialogue in the classroom and concluded that for teachers to succeed at applying dialogic methods where these are appropriate depends upon collaborative work in teams of teachers, within the context of support from school leadership. Robin Alexander suggests that the process should be a two stage one: first 'get the ethos right' by making classroom talk collective, reciprocal and supportive. Once this has been mastered the more challenging aspects of classroom dialogue can be added to the repertoire of professional practices.

Torres, R. and Ruiz-Escalante, J. A. (2011) found in their study that the participants perceived dialogue as a teacher-directed

process and adhered to cooperative learning strategies based on paired-conversations, but failed, in most cases, to extend or initiate teacher↔student or student-student critical dialogue.

Ehiobuche, C.; Tu, H-w and Justus, B. (2012) studied dialogue as tool for teaching and learning of entrepreneurship. They concluded that dialogue as a means of teaching and learning is like the rebirth of Socratism. It has demonstrated several advantages over other methods of teaching and learning by standing out as a reciprocal and mutual platform for learner and teacher's intellectual gains. In the since that the individual instructor can gather ideas and experience from the student, analyze their experience and allow for everyone to participate in the process.

It is found after the review of the related studies that no study has been conducted on Science teaching through dialogue method in Himachal Pradesh. So, the present study has been chosen by the researcher taking into consideration the need and importance.

Dialogue Cycles:

There are six cycles in the dialogue method of teaching and 6×2×6 formula was adopted. First '6' means there are six rules which are as follows.

1. **Sitting in a Circle** means all the participants have to sit in a closed circle facing towards each other.
2. **Speak in Own Language:** The participants are free to speak in their own language in which they feel comfortable to communicate their ideas.
3. **Flexible Timing:** There is no fix timing for the participant to express his/ her ideas.
4. **All are listeners:** All the participants are listeners and all are speakers at different situations of their turn.
5. The topic is **main agenda** of the dialogue.
6. The **conclusions** or **outcomes** of the dialogue are **dynamic**.

'2' in the formula means there are two general tools which are used during the dialogue method. These are used at any time in dialogue and described as follows.

1. **IQ:** It means instant questioning. The participants are free to put question to the speaker immediately during dialogue if they feel any confusion or want to know more about the concept.
2. **CCC:** It belongs to Compare, Contrast and Create. The participants have compared their ideas with the ideas of others, see the difference and create something new from the discussion.

Last '6' refers to six cycles of the dialogue method as follows:

1. **Readiness Cycle:** It is the first cycle. The participants are to get ready for the process of dialogue.
2. **Title cycle:** Every participant has to share his/ her title of the topic to the rest of the participants of the group.
3. **Methodology Cycle:** Every participant of the group has to discuss his/ her methodology of the topic. The content matter of the topic and sources of getting information about the topic are discussed and shared with the whole group.
4. **'I' Outcomes Cycle:** In this cycle the participants has to share his/ her learning outcomes of the topic.

5. **'We' Outcomes Cycle:** All the outcomes are shared and new outcomes 'we' outcomes are drawn during this cycle.
6. **Reflection Cycle:** What, why and how of the topic is discussed between all the participants of the group in this last cycle.

Holistic Education: Holistic education emphasizes the integration of all aspects of learning aiming intellectual, emotional, social, physical and spiritual development (Fig. 1). It realizes the meaning and purpose of human life in the society in this modern era.

According to Murthy (2013), "The basic conception of education is that it is a source of illumination, a vehicle of transformation of the individual psychologically, intellectually and even morally. Knowledge and wisdom are the culminating points of education. Knowledge gives illumination and wisdom leads to enlightenment".

Sri Aurobindo said, "Education to be complete must have five principal activities of human beings – the physical, the vital, the mental, the psychic and the spiritual".

Mahatma Gandhi has emphasized the fact that, "Education means all-round development of a child in his body, mind and soul".

Article 26 (Para 2) of the Universal Declaration of Human Rights states, "Education shall be directed to the development of human personality and to the strengthening of respect for human rights and human freedom".

Thus, holistic education is essentially a democratic education concerned with both individual freedom and social responsibility. The main objectives of education are the development of a culture of peace for sustainability and ecological literacy and for the development of humanity's inherent morality and spirituality. The idea is to offer the students (i) a skill set and (ii) an inspirational set of values to live by and to help them to achieve a 'Balanced and Ethical Material Life'; and to contribute to 'Nation Building'. This will form the 'Holistic Development' of the student.

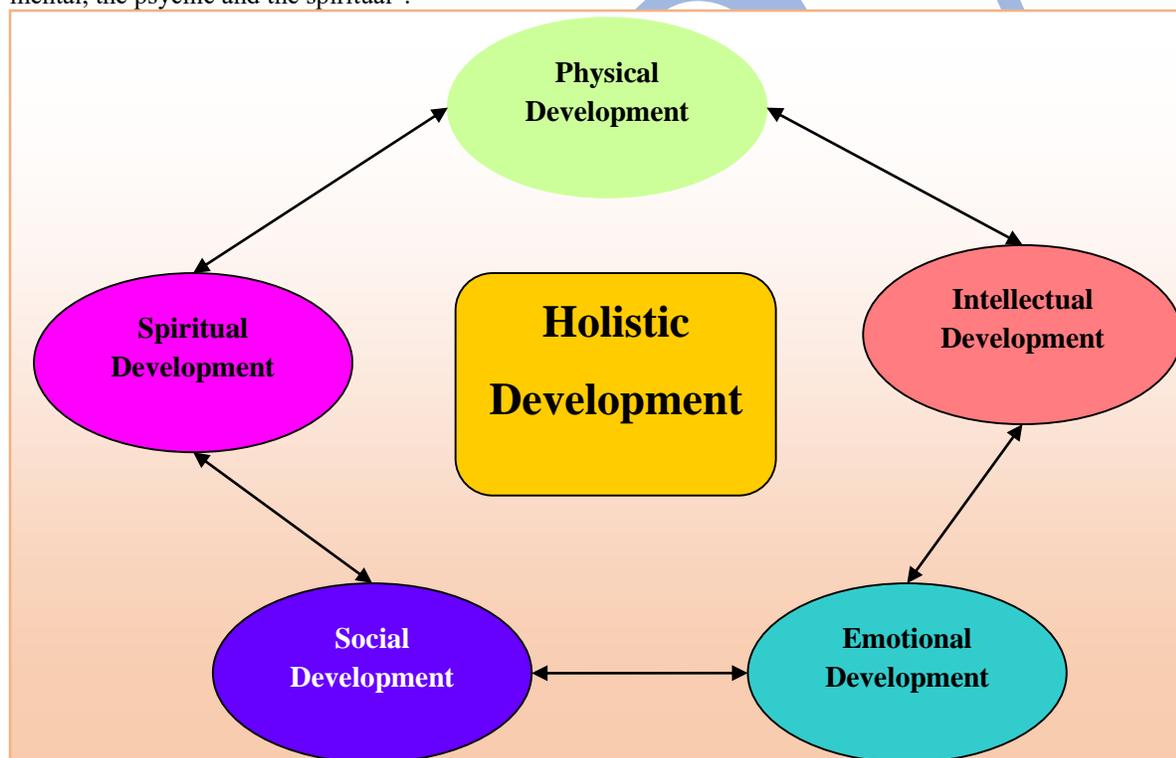


Fig.1I: Holistic Development of the Child including its aspects.

III. RESEARCH QUESTIONS

1. Whether the students involved in the learning process or not?
2. What is the achievement level of students' with respect to the selected chapter?
3. Whether the students completed the dialogue steps or not?

Objectives of the Study:

1. To check the involvement of students in the learning process leading to holistic development.

2. To study the achievement level of students' with respect to the selected chapter.
3. To check the status of completion of dialogue steps by the students during learning process leading to holistic development.

Methodology: The descriptive research method was used in the present study.

Place of Study: The study was conducted in Govt. High School, Nerti Distt. Kangra, Himachal Pradesh, India.

Type of Study: Community based qualitative study.

Duration of the Study: One month, 01.05.2016 to 30.05.2016.

Sampling: The study has been conducted at the elementary school level consisting of classes 6th to 8th. The class 8th was selected purposively to conduct the present study. There were 13 students in the class 8th and all were included in the sample. The Mathematics subject was selected purposively and two units ‘Chapter No. 2 ‘Linear Equations in One Variable’ of text book was selected for traditional teaching method and Chapter No. 13 ‘Direct and Indirect Proportions’ was selected for teaching with dialogue method.

Procedure of Data Collection: The participant observation method and self constructed achievement test for the selected units of text book of Mathematics for class 8th was used to collect the requisite data. The researcher has trained the selected student participants of selected class in 20 working days for applying the dialogue in their learning process. The training was given when one or two teachers were not present in school. Sometimes, the extra periods were also arranged before school hours when it was felt necessary. The dialogue method was applied to teach the unit of text book of Mathematics when the researcher was quite confident to practice it with student participants. The Chapter number 2 ‘Linear Equations in One Variable’ of text book of Mathematics was taught through traditional method and a test was taken to check the achievement of the students in the end. Then, the other lesson number 13 ‘Direct and Indirect Proportions’ of text book of Mathematics of same class was taught with dialogue method and again a test was taken to check the achievement of the students in the end. Both the achievement tests consists of 10 Multiple Choice Questions of one mark each and 10 short answer type questions each of two marks following the pattern of KUAS (Knowledge, Understanding, Application and Skill, ratio of weight age 30:30:20:20). There were total 20 questions for total marks 30 in the achievement test. The difference in the achievements reflected the quality of the output.

The aspects like co-operation, emotions, intellectuality and morality were observed by the researcher which leads to the holistic development of the children.

Analysis: The outcomes of the observations made were recorded categorically and tabulated as follows.

Objective 1: To check the involvement of students in the learning process leading to holistic development.

The involvement of the student participants in the learning process is recorded by the researcher by participant observation method. The participants were well prepared by the researcher for the using the dialogue method in Mathematics learning in the classroom. During the traditional teaching normally 20-25% students were not involved in the learning process for the whole time of the class. But, the results were opposite in the case of dialogue method of teaching and learning in the classroom situation. The observation outcomes of the involvement of the student participants in the learning process during both modes of learning are given in Table no. 1 as follows.

Table No. 1: Outcome of the Observation of the Involvement in the Learning Process

Traditional Teaching		Dialogue Method	
Chapter No. 2: Linear Equations in One Variable		Unit 13: Direct and Indirect Proportions	
Involved	Not Involved	Involved	Not Involved
9	4	13	Nil

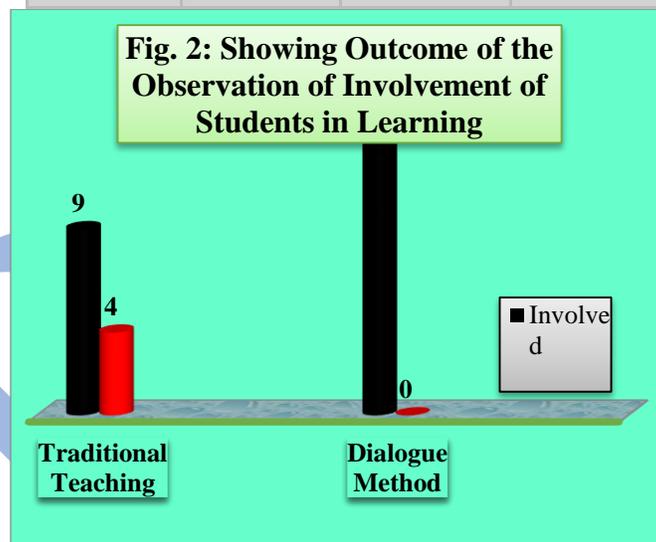


Table I and Fig. 2 shows that all the students were involved in the learning process during teaching through dialogue method and 4 students were looking outside the classroom usually during the traditional teaching. The dialogue method of teaching was found better in the normal classroom teaching-learning process. It was also observed during the learning process that students were co-operating each other emotionally and intellectually. It shows that the method is leading them to the holistic development.

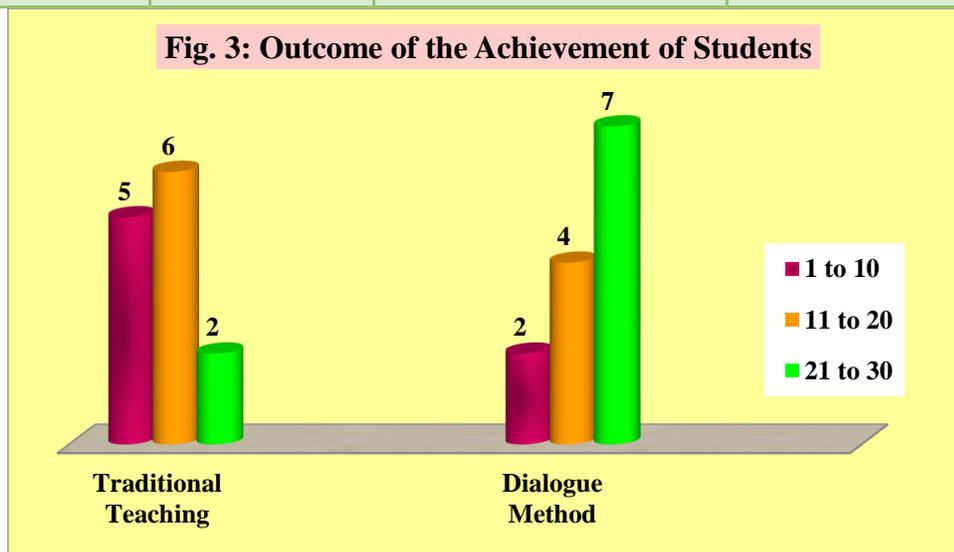
Objective 2: To study the achievement level of students' with respect to the selected chapter.

The learning of the students is reflected in their achievement. The better achievement leads to intellectual development of the students which is one of the aspects of the holistic development. As discussed earlier 20-25% students are found non attentive during the traditional classroom teaching method. Obviously they have very chances to score better in the achievement tests. But, in the case of dialogue method of learning all the student participants involved in the learning process the chances of scoring better are supposed to be better than the traditional teaching. One hour time was given to students for the achievement test. The achievement test was evaluated by the researcher himself in both the cases. The outcome of the achievement tests of the student participants in both the modes of teaching and learning is given as follows.

Table No. 2: Outcome of the Achievement of the students

Sr. No.	Range of Marks Scored out of 30	Traditional Teaching	Dialogue Method
		Unit 2: Linear Equations in One Variable	Unit 13: Direct and Indirect Proportions
1.	1-10	5 Students	2 Students
2.	11-20	6 Students	4 Students
3.	21-30	2 Students	7 Students

Fig. 3: Outcome of the Achievement of Students



It is clear from Table no. 2 and Fig. 3 that the achievement of the students was better while the teacher taught through the dialogue method than traditional teaching. In the traditional teaching method only 1 student could get the marks 26 (between 21- 30) whereas 6 students were found in this range. Five students were found in the starting range (between 1-10) of marks in their achievement for traditional teaching whereas only 2 students were found in this range for dialogue method. Hence, it is observed that students achieved better when taught with dialogue method as compared to traditional teaching method.

Objective 3: To check the status of completion of dialogue steps by the students during learning process leading to holistic development.

It was also observed by the researcher that all the students completed the cycles of the dialogue method. Some confusion in the mind of the student participants was observed during the steps 5 and 6. The student participants were facing difficulty to merge the 'I' outcomes with 'We' outcomes and reflection of the concept in the end. But, the students found very interesting to learn with this new method of teaching. They participated in the leaning process with their heart and mind as observed which leads them to holistic development.

IV. CONCLUSION

Dialogue was found as an elusive component of the Mathematics lessons observed. We found during observation that participant students did not make a clear distinction between dialogic conversations and cooperative learning strategies. The participants of this study perceived dialogue as a teacher-directed endeavor as observed by the researcher. But, as far as achievement and involvement of the participant students is concerned, the outcome of the dialogue method of teaching was found better than the traditional teaching. It shows their better intellectual development leading to holistic development. Stanford, G. A. (2012) advocated the peer to peer teaching in Mathematics to involve the students actively in the learning process in real classroom situations. He stressed that this is an active learning method that encourages students to discuss Mathematics topics, develop questions about the material, and work in teams to learn new information. The dialogue method is supported by instant questioning (IQ). Kubli, F. (2005) supported the dialogue method by describing that teachers can support students effectively by addressing them as producers of a meaningful picture of the world by learning through dialogue. It can be concluded in the end that dialogue method keeps the students busy in learning process

and encourages to create something new every time. The deep involvement in the learning process helps to increase the interest of the students to know more and more about the concept or phenomena under study. This method of teaching should be encouraged in the other subjects also. The students felt themselves as the part of the learning process.

References:

- [1]. Ehiobuche, C.; Tu, H-w and Justus, B. (2012). Dialogue as Tool for Teaching and Learning of Entrepreneurship. ASBBS Annual Conference: Las Vegas, USA in February, 2012, pp. 300-309. Retrieved from <http://asbbs.org/files/ASBBS2012V1/PDF/E/EhiobucheC.pdf> on 05/05/2015.
- [2]. Kubli, F. (2005). Science Teaching as a Dialogue – Bakhtin, Vygotsky and some Applications in the Classroom. *Science and Education*, Vol. 14, Issue 6, Kluwer Academic Publishers, pp. 501-534. Assessed from <http://link.springer.com/article/10.1007%Fs11191-0004-8046-7> on 12/01/2016.
- [3]. Lakatos, A. and Boros, A. (2011). Effective Teaching Methods for Knowledge Transfer Importance. Presented in International Conference of Management, Knowledge and Learning. Pp. 455-464. Retrieved from <http://issbs.si/press/ISBN/978-961-92486-3-8/papers/ML11-50.pdf> on 05/01/2016.
- [4]. Marchel, C. A. (2007). Learning to talk/talking to learn: teaching critical dialogue. *Teaching Educational Psychology*, Vol. 2.1, Spring. Retrieved from <http://files.eric.ed.gov/fulltext/EJ817746.pdf> on 05/05/2015.
- [5]. Qiong, L. and Yujing, N. (2009). Dialogue in the Elementary School Mathematics Classroom: A Comparative Study between Expert and Novice Teachers. *ERIC*, Vol. 4, No. 4, pp. 526-540. Retrieved from <http://eric.ed.gov/?id=EJ860733> on 14/01/2016.
- [6]. Renne (2011). 4 Simple methods for Teaching Elementary Science. *Methods and Philosophies*. Retrieved from <http://simplehomeschool.net/elementary-science> on 05/01/2016.
- [7]. Scott, C. (2009) Talking to learn: Dialogue in the classroom. *The Digest, NSWIT*, 2009 (2). Retrieved Month DD, YEAR, from <http://www.nswteachers.nsw.edu.au> on 15/12/2015.
- [8]. Stanford, G. A. (2012). Teaching Techniques for Science Teachers. *EduNova, Innovations from Leading Education Experts*, USA. Retrieved from <http://www.edu-nova.com/teaching-techniques-for-science-teachers.html> on 10/01/2016.
- [9]. Torres, R. and Ruiz-Escalante, J. A. (2011). Critical dialogue: Perspectives and Practices of Three bilingual Elementary Science Teachers. *Journal of Border Educational Research*, Vol. 10. Pp. 70-83. Retrieved from [\[tamui.tdl.org/jber/index.php/jber/article/viewFile/7192/6437\]\(https://jber-ojs-tamui.tdl.org/jber/index.php/jber/article/viewFile/7192/6437\) on 10/01/2016.](https://jber-ojs-</div><div data-bbox=)

- [10]. <https://en.wikipedia.org/wiki/Dialogue>