IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 20, Issue 8 Ser.11 (August. 2021), PP 01-12
www.iosrjournals.org

The Importance of Logical Thinking Ability of Secondary Level School Students in South Delhi

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Abstract
The technology of organizing the process of developing logical thinking skills of elementary school pupils is the great challenge. Every moment in school the teacher is facing the development of logical thinking of students, the level of formation of which largely determines consciousness, the efficiency of mastering the foundations of sciences, the ability to navigate independently in an ever growing volume of information, apply existing knowledge to the maximum benefit, create the most favourable conditions for acquiring new knowledge and to communicate it to others. The development efficiency will increase if we implement the psychological and pedagogical conditions and mental ability and intelligence for the development of logical thinking with scientific reason and understanding the basic fundamental knowledge and concepts in the course curriculum and also the extra curricular activities for development of mental psychology that flourish in not only in academic but also the in the home of younger students with the help of innovative technologies. The essence of the concepts of "logic", "thinking", "logical thinking", "and logical thinking of junior pupils", "innovative technologies" is considered. The logical thinking of younger school children is the ability to use simple logical actions by students to form a full-fledged learning activity, which includes the ability to: highlight and hold a learning task; independently find and learn common ways to solve problems; adequately evaluate and control yourself and your activity; own reflection and self-regulation of activity; use the laws of logical thinking; own and use different forms of generalization, including theoretical ones.

Keywords: *Development of logical thinking among students, elementary class, , technology, creativity, interest, personality , intelligence*

Date of Submission: 10-08-2021 Date of Acceptance: 25-08-2021

I. Introduction

We know that Education is recognized as a key factor in promoting sustainable development in the concept of international education by 2030 and defined by international organizations and countries around the world: " having a deep foundation of knowledge, developing logical, creative and critical thinking of pupils, teachers and students, developing cooperative skills and interests and friendship among students and growing the capability to use their knowledge and develop moral behaviour and character for future upliftment of intelligence to develop the intelligence and application in future life and also in love with in the study, sports and outside extra curricular activities. This is why it is important to use advanced learning technologies in the education system, including primary education, and to develop students' logical thinking skills. Today, the world focuses on research in the development of logical, independent, creative, critical thinking in students, with a focus on research aimed at collaborative activities, taking into account the age and psychological features of students. This approach aims at introducing effective forms and methods of teaching, including the formation of life skills in primary school pupils, based on the needs of an individualized learning strategy, the development of logical thinking through teacher student interaction, and the development of logical thinking in elementary school pupils.

The Mechanism of gradually development of logical thinking with intelligence in designing courses and representation in very student friendly easy way by introducing of innovative technologies in this process needs to be improved. As a result of wide-ranging reforms in the education system of India was adapted Strategies of Movements, that helps to introduce advanced pedagogical and informational technologies into the educational process, gives the opportunities to expand quality education in primary education, also enables the development of one's conscious in a rapidly changing globalization. In this regard, it is important to study the content and mechanisms of formation of pedagogical cooperation and the features of primary education as part of the task of further improving the system of continuous education, as well as creating conditions for the support and realization of the creative and intellectual potential of the young generation.

II. Defination of Logical thinking

Logic, which is known as the discipline that examines the structure of knowledge and distinguishes correct and wrong reasoning, is also known as the tool of correct thinking. Logical thinking is seen as the key to the processes of mental reservation and complex problem solving. Logical thinking constitutes one part of problem solving. In other words, logical thinking is one of the sub-stages of problem solving. For this reason, it can be thought that people who can solve complex problems have sufficient logical thinking and reasoning abilities. Developing logical thinking, questioning and evaluation processes is realized during the teaching of problem. Logical thinking is one of the ways used in acquiring advanced mental activities. Thus, this ability is an application level activity which depends on the knowledge and comprehension level of the objective's cognitive area stages. We use logical thinking in evaluating an idea, information and our experiences. Our logic comes up with results related to the topic we are interested in, and then it puts them into the memory (One of the cognitive skills which influence the academic success of students is the logical thinking ability. Logical thinking ability refers to an individual's ability to solve a problem by using mental operations or his ability to reach principles or rules by making certain generalizations or abstractions. This ability has become one of the most dealt-with subjects of the studies in the field of education Students in the concrete operations stage can use logical thinking abilities in solving concrete problems. In the abstract operations stage, these students reach the level of adults in terms of logical thinking. This ability refers to an individual's ability to solve a problem by using mental operations or his ability to reach principles and rules by making certain generalizations or abstractions Seen in this way, logical thinking abilities require advanced behaviour. Logical thinking process means getting the ideas, facts and results of a problem, and to put them in a successive order. Logical thinking prevents a child saying "I don't know, this is too difficult" This ability enables him to comprehend better, and to reach the solution on his own by thinking more thoroughly. It is possible to see in literature several studies from various fields on logical thinking. In their study, applied a Logical Thinking Test to a group, and found that there is a meaningful difference between male and female students, which is in favour of male students by teaching by study sheets has a positive effect on logical thinking abilities In another study, it is concluded that the logical thinking levels of prospective teachers show differences according to their gender, field of study in high school, and the level of the class they attend to. Gender and logical thinking abilities are among the factors that affect students' attitudes towards positive sciences and their comprehension of positive sciences. In survey we find logical thinking ability is the primary factor that affects students' self-sufficiency and their accomplishment in science. In addition, it is emphasized that logical thinking ability has an important place in teaching scientific concepts. Moreover, there are studies which show that there is a positive relation between the logical thinking abilities of students and their comprehension of positive sciences (As can be seen above, it is clear that logical thinking, which has a wide range of applicability in various fields, has an important place in the field of mathematics. Topics that are built upon each other get stored in the mind only when they are comprehended separately and only when one constructs a relationship among them. Thus, necessary arrangements should be done in bringing in and developing these abilities. In the final analysis, logical thinking ability is not inherited but is learned.

Logical thinking ability, as has been discussed in several studies in literature, is one of the most important cognitive abilities which influence the success of students. The aim of this study is to develop a scale to determine the logical thinking abilities of prospective teachers. The development process consists of two phases, namely, pre-study and validity-reliability studies.

III. Materials And Methods

The most detailed theory of thinking is contained in the works of S.L. Rubinstein. In his opinion, "Thinking - is an increasingly complete and multifaceted mental restoration of an object and reality, based on sensory data arising from the influence of the object." In modern psychology, thinking is understood as "a process of cognitive activity of a person, characterized by a generalized and indirect reflection of reality; the highest form of creative activity ". The concept of "Thinking" includes the concept of "logical thinking", and they relate to each other as a kind to a species. In short we can say that the ability of development of logical thinking in the not only education system but also socially the continuous learning psychological concepts.

Logical thinking is defined as "a type of thinking, the essence of which is to operate with concepts, judgments, and conclusions using the laws of logic" [1]. This refers to the classical two-valued formal logic, although people's thinking does not have to be based solely on it.

Logical thinking, which is also called in the broad sense of the word discursive, presupposes a logical transition from one particular concept to another. It differs significantly from the intuitive, cognizing the world by contemplation and establishing the truth by direct discretion without proof. Logical thinking is a type of thinking, the essence of which is in operating with concepts, judgments, inferences based on the laws of logic, comparing and correlating them with actions or the totality of mental logically valid actions or thinking operations associated with cause-and-effect patterns that allow matching existing knowledge with a view to

descriptions and transformations of objective reality. The ability to think logically includes a number of components: the ability to navigate the essential features of objects and phenomena, the ability to obey the laws of logic, to build their actions in accordance with them, the ability to produce logical operations, consciously arguing them, the ability to build hypotheses and derive consequences from these premises, etc. Therefore, according to her opinion logical thinking includes a number of components: the ability to determine the composition, structure and organization of the elements and parts of the whole and focus on the essential features of objects and phenomena; the ability to determine the relationship of the subject and objects, to see their change in time; the ability to obey the laws of logic, to discover patterns and trends on this basis, build hypotheses and derive consequences from these premises; the ability to perform logical operations, consciously arguing for them. The component of the state standard, which was developed taking into account the main directions of modernization of education is focused not only on the knowledge, but primarily on the activity component of education which allows to increase the motivation of learning, to realize to the greatest extent the child's abilities, capabilities, needs and interests. Therefore, it is no coincidence that one of the main goals at the stage of general education is the development of cognitive activity of students, their mental processes. Thinking is a creative cognitive process that generalizes and indirectly reflects the relation of objects and phenomena, the laws of the objective world. But the development of logical thinking is impossible in principle without knowledge of the characteristics of psychology of primary school age. All this is necessary in order for the child to successfully finish elementary grades, to study successfully in middle school, i.e. it is necessary to help him in the development of his mental processes, the formation of mental functions. In any psychological and pedagogical literature not given consensus on when children have the ability to form and develop logical operations. In modern psychology, there are two main directions in the study of the emergence and development of logical structures of thinking in children. The first of them is related to the works, age boundaries (stages) of the formation of logical structures that reflect the spontaneous process based on spontaneous mechanisms of development of children's intelligence. These mechanisms are the main factor determining the successful mastery of logic. We can say that learning takes on different meanings, depending on what period of development it falls on. In order to be successful and not to be formal, education and teaching must adapt to the current level of development. These authors believe that the appearance of logical operations in an individual's experience is determined by the transfer of knowledge and logical experience in communication and training. In this case, intellectual activity should act as a subject of special assimilation in the learning process, the leading role of education as the main stimulus for development is substantiated and indicates the illegality of the contrast between the development of psychological structures and training. Psychological and pedagogical studies of scientists have proved that basic logical skills at an elementary level are formed in children, starting from 5-6 years of age. However, almost all presented works are aimed to develop individual components of logical thinking in communication and structure. In this regard, a contradiction arises between the need for the structural formation of logical thinking and the lack of effective things to put them into practice. Questions of the development of logical thinking of primary school students in the learning process were considered is the greatest challenge in modern upcoming generation . Logicalal algorithmic culture of students in the process of teaching mathematics in primary school. Features of the formation of logical thinking methods in six-year-old children are considered here. The school teachers points out to the need for a special formation of logical thinking techniques, emphasizing the exclusive role of logical knowledge and skills in teaching the young generation. The role of training the development of logical thinking and the main methodological provisions for the education of the logical culture of students. By the way, the issues of logical literacy of students are still under the hot discussion nowadays. Long-term observations show that, in the thinking of senior students one can find drawbacks similar to those observed in untrained children: focusing on random signs that are currently the most "vivid", undifferentiated parameters of the studied objects, inability to respond to a given the question is to give a definition to some concept, the great coherence of the specifics of the proposed material, insensitivity to contradictions, the pressure of everyday explanations over the logic and etc.

Thus, it is obvious that in the practice of the modern school (the traditional teaching system) there is a serious problem: the system of logical preparation of students does not meet the requirements of the time. We see the main reason for this state of affairs in the created contradiction between the existing potential opportunities for the logical development of students, the need for society for creative specialists with deductive thinking skills, and the low implementation of these opportunities in the established practice of schools, traditionally oriented mainly to the content and volume of knowledge gained, and not on the formation of means and methods of mental activity. The analysis of psychological and pedagogical literature and special studies on the problem of the development of intellectual abilities in general and logical thinking has showed that the most active in psychological research are questions of the nature and mechanisms of the formation of mental processes and weaker issues of pedagogical influence on their formation, the problem of methods, meanings, content in the present and future conditions. These data shows that in primary school age that it is necessary to carry out focused work on teaching children the basic techniques of mental activity. A variety of psychological and pedagogical exercises can help in this.

IV. Methodology

4.1 Pre-study In the pre-study phase of the scale, first of all, Logical Thinking Abilities tests in literature were examined. One of these scales is Logical Thinking Ability Test (LTST) which is developed by Tobin and Copie (1981) and translated and adapted into Turkish by Geban et al (1992). The test comprises of a total of 10 questions in the categories of proportional thinking, controlling the variants, probabilistic thinking, relational thinking, and associated thinking. Another logical thinking ability test was developed by Norman (1997). This test was designed specifically to measure logical thinking abilities in chemistry topics . Another test one can come across with in literature was the Logical Thinking Group Test developed by Roadrangka et al (1982) and it was translated and adapted into Turkish by Aksu et al (ÇÕEÕk, 2006). In this study, the items in the aforementioned tests in literature were examined, and items related to the geometry knowledge of prospective mathematics teachers were written, hence a new scale was developed. This scale measures the abilities of defining the variants, checking them, the ability to draw relations, measuring probability, interpreting graphics, and the ability to transform numerical expressions into graphics. In the test, there are 20 questions related to these abilities. Each of these questions was prepared two-dimensionally. In the first dimension, there are 5 items related to the answer of the question, and in the second dimension, there are statements that students will give related to the explanation students for their given answer. Below is given a question related to the determining the students' ability of drawing relations. An example as a question of the determining the ability of drawing relations The developed test was presented to the opinions of an expert in the field and the measuring-evaluation experts, and in the light of the suggestions they have made, it was finalized.

4.2. Study Group : The study consists of the students of the department of Mathematics Teaching at schools in India. In this group there are a total of 150 students, 80 of which are female and 60 of which are male prospective mathematics teachers.

4.3 Analysis of the Data : After the pilot application of the test, the obtained data was analised in ITEMAN (an Item Analysis Program for Tests), and as a result of this analysis, two items were taken out of the test. The test was finalized with the remaining 10 items. For the second dimension of the finalized test, the solution of the explanations of students who gave the correct answer was written in the option belonging to the right answer, and the explanations of the students who gave the wrong answer were written in other options according to their frequency.

4.4 Validity of the Scale: To determine the validity of the scale, an expert's opinion was asked. For the expert opinion, two experts in the field and one measuring-evaluation expert was referred to. Thus, the proof for the validity of the scope of the test was provided. Item analysis was made for the scale, which was corrected in the light of expert opinion.

4.5 Reliability of the Scale: The reliability of a measuring tool is sign of its ability to measure the features it sets out to measure. There are several techniques available to determine the reliability level of a scale. It is necessary to take into consideration the nature of points, the assumption about the scale, conditions of research and its aims when deciding on which technique to use the relation which is similar to the one between the weight of M and N is given in which option? A) The volumes of two cylinders which have the same height and the base radius of which are 8 and 11 cm, respectively. B) The volumes of two spheres whose radius are 3 and 5 cm, respectively. C) The squares of two triangles which have the same height and the base length of which are 29 and 6 cm, respectively. D) The squares of two squares whose side lengths are 3 and 5 cm, respectively. E) The squares of two rhomboids whose base lengths are the same and the heights of which are 3 and 5 cm, respectively. M N 5 cm 3 cm. According to this, the scale has a high level reliability. Other concepts which will be examined after the item analysis result are the difficulty and distinguishing indexes of the items. Since the item difficulty index is the ratio of those who answered the question correctly over the total number of participants, it is the signifier value that shows the percentage of people who answered the question correctly. In this respect, as the item difficulty index approaches 0, the item gets more difficult, and as it approaches 1, the items gets easier. The fact that the item difficulty index is 0,50 shows that the question is of medium difficulty . When the item difficulty index of each item was examined, two items were taken out of the scale since their distinguishing indexes were below 0,30. Difficulty values of the rest of the items were determined to be ranging between 0,30 and 0,65. According to this, we can say that many of the items in the scale are of medium difficulty. It is required that the items in a test should be able to distinguish between item and the ones that have the required qualities and the ones that do not have these. This quality of items is called item distinguishing ability index, and at the same time, it is called the item validity coefficient since it reflects the measuring objective of the item . We may

define the items with a 0,40 or higher item distinguishing ability indexes are very good. It was observed that the item distinguishing ability indexes of the items in the scale range between 0,36 and 0,72. According to this, we can say that the item distinguishing ability of this scale is very good.

V. The development of logical thinking in primary school in India

In this age of childhood the education plays the most important and special role and developing the thinking skills of a child in primary school. In this during this period, a transition is made from visual-figurative to verbal-logical, conceptual thinking, which gives the child's mental activity a dual character: concrete thinking, connected with reality and direct observation, that is already subject to logical principles, but abstract, formally logical reasoning is still not available. Without the logic of thinking, that is like without the ability to correct concepts (define, classify, etc.), judgments, conclusions and evidence. The purpose of pedagogical activity is to ensure positive dynamics of the development of logical thinking in the learning process of pupils of class 1-4.

To achieve this goal it is supposed to solve the following tasks: 1. Creating a system of exercises that contribute to the development of logical thinking; 2. Classification and description of practical tools that a teacher can use to develop logical thinking 3. To implement the tasks, a set of methods were used: 4. Theoretical analysis of scientific literature 5. Monitoring the activities of students in the classroom and after school hours; 6. Application of a system of exercises that contribute to the development of logical thinking; 7. Conducting psychological and pedagogical diagnostics; 8. Pupils questioning and testing. The development of logical thinking is inseparable from the formation of performing skills. The more versatile and perfect the skills of schoolchildren, the richer their imagination, the more real their design, the more complex mathematical problems they solve. In order to develop logical thinking of young schoolchildren, it is necessary that he gains experience and curiosity, in miniature repeat the path of mankind in cognition, satisfy the emerging needs in overcoming difficulties, solving problems. Education needs to be built taking into account the interests of students associated with their life experience, this will give much better results than training based on remembering and accumulating a simple amount of knowledge. A student begins to think and reason logically when he encounters difficulties, the overcoming of which is of importance to him. Tasks for the development of the ability of comparing Comparison is a mental operation consisting in comparing objects and phenomena, their properties and relations with each other and thus revealing a community or difference between them. Comparison is characterized as a more elementary process with which, as a rule, cognition begins. At the initial stages of familiarization with the surrounding world, various objects are recognized primarily by comparison. Any comparison of two or more objects begins with a comparison or correlation of them with each other, i.e. begins with synthesis. In the course of this synthetic act, an analysis is made of the compared phenomena, objects, events - the allocation in them of the general and the different. The composition of this technique includes the following basic operations: 1. The selection of the features of the subject. 2. The division of the selected features into essential and nonessential. 3. The selection of signs that are the basis of comparison. 4. Finding similar and different features of objects, the implementation of incomplete comparisons. 5. The conclusion of the comparison. Showing the object (cube, ball, pencil, apple, ruler, etc.), we proposed to name the signs (properties) of the object. Children called 2-3 signs, and then experienced difficulty. Then we proposed to compare this item (cube) with a group of other items (apple, cotton wool, glass, weights). When comparing with an apple, the guys noticed that the apple is round in shape, and our cube has corners; when comparing with cotton, we noticed that the cube is hard, and the cotton is soft, etc. We found more and more new properties (signs) of the cube. By analogy, we compared other objects and found all their signs. To consolidate this skill, I used the game "Guess the subject". Instruction is that, the called student goes to the board and turns his back to the class. The teacher shows the children the subject. Students do not name the subject, but highlights its basic properties. The called student must recognize the subject. Or the teacher lists the properties of the subject, and the students name the subject. When the guys learned to distinguish the properties of objects when comparing them with other objects, I started to form a concept of common and distinctive features of objects. They suggested comparing 2, and then 3 subjects (book and notebook, pencil, triangle and ruler, etc.). In the process of comparison, we learned to find common and distinctive features. For the further development of this technique, a series of tasks was carried out: "Identical, different in two", "Identical, different in three", "Identical, different in four". Task: Talk about the shape, taste, colour of the apple, watermelon. Task: Name the time of year according to the specified criteria. A cold wind blows, there are clouds in the sky, and it often rains. Vegetables are harvested in the village. Birds fly away to warmer climes. The day is getting shorter. Task: highlight the two words that are most significant for the word in front of the brackets: a city (a car, a building, a crowd, a bike, a street) a river (a shore, a fish, mud, water, a fisherman) a game (players, a chess, tennis, rules of punishment) a hospital (a garden, a doctor, a radio, a hospital, premises) Task. To name the common signs of objects: cats - dogs an apple – a watermelon, a fire tree, a pine tree, a birch-an aspen. Task. Name common features; name the distinguishing features: a fork-a spoon, a table-a chair, a window – cloth - cloud. Task. To

name an object that has the following features: have 4 sides and 4 angles. Task. What are the similarities and differences in the tasks consisting with combining many objects or phenomena on some common basis. During the generalization in the compared objects - as a result of their analysis - something common is highlighted. These properties common to various objects are of two types: 1) common as similar features and 2) common as essential features. Task. Name a group of words as a common word: January - February - March - June a table – a sofa – a chair Task. Call a group of numbers a common word: a) 2; 5; 6; 9 , 12; 38; 57; 72 Find the equations among the following entries write them out and solve them: $20 + x > 60$, $90 – 6 = 84$, $62 + x = 99$ like this. Task. What common word can be called the following words? 1. Nouns, Pronouns, Adverbs, Adjectives, Prepositions and Verbs 2. a, b, c, v, n 3. a table, a sofa, an arm-chair, a chair 4. Monday, Sunday, Wednesday, Thursday 5. January, March, June, September. 5. The synonym, antonym , homonym and phrasal verb and group verbs , the concept of tense present, past future and the learning of gender male, female and the pronunciation of words in easy way, ability to develop formation of sentence speak in local and English language and develop their intelligence and moral character and also learn the education with sports and games in schools and outside like as playing football, cricket, volleyball, badminton tennis, and take participate in the school and social cultural functions like in drama, recitation, singing music and go as you like etc.

VI. The role of teacher in development of Logical thinking among students

The thinking aim to describe teachers' beliefs and to understand and explain how and why the teachers' practices emerge and develop. Research has examined how teacher behaviour influences student behaviour and student achievement scores. A strong relationship between teachers' educational beliefs and their planning, instructional decisions, and classroom practices needs to be initiated from class 1 at the beginning stage of childhood. The findings about the relationship between teacher beliefs and practices of teaching could be used by teachers themselves, teacher educator, school administrator, policymakers, and curriculum designers. There are different views about the concept of beliefs. These depend on the point of view of theorist or researcher. Since the 1970s, research has tried to classify the concept through a multi-dimensional system. For example it consists of discrete sets of inter-related concepts in subjects. They include beliefs in the category of representations, or cognitive maps of the external world which serve as mediators for experiencing and responding to reality. This conception of beliefs fits with the notion of beliefs as personal knowledge, personal pedagogies and implicit theories.. However, research indicates that teacher behaviours are not always consistent with their beliefs. A growing body of research asserts that teachers' beliefs should be studied through a framework aware of the influence of culture [5], so are constantly situated in a physical setting as the school, the classroom, the community, or curriculum. One common conclusion in the literature about teachers' beliefs is that changing is a complex, perhaps even, mysterious, process [10] and that powerful teacher education programs are needed to impact beliefs [15]. Teachers' beliefs appear to be static [16], resistant to change [7], and are generally not affected by reading and applying the findings of educational research [9]. However, some researchers have noted that reflecting on practice can change beliefs. Logical l thinking, as the ability to involve in meaningful, self-regulatory judgment, is generally recognized as an essential skill for the knowledge and most educators would agree that learning to think critically is one the most desirable goal of formal schooling. This means not only thinking about important problem concerning disciplinary areas but thinking about the political, ethical and social challenges in everyday life.

VII. Logical thinking in school children

Logical thinking is categorized into two academic disciplines: philosophy and psychology. It is also referred a third logical thinking area within the field of education. The philosophical approach focuses on the hypothetical logical thinker as someone who is e.g. inquisitive in nature, open-minded, flexible, understands diverse viewpoints [2]. The cognitive psychological approach focus on how people actually think versus how they could or should think under ideal conditions [4] and to define critical thinking by the types of actions of behaviours critical thinkers can do and shows a list of skills and procedures performed by critical thinkers [3]. It is included in the educational approach.[5] . Their taxonomy for information processing skills, especially the three highest levels (analysis, synthesis and evaluation) are frequently considered as representation of critical thinking. The educational approach is based on years of classroom experience and observations of student learning but the frameworks in this field have not been tested as firmly within either philosophy or psychology [11]. Many researchers working in the area of logical thinking is to view the cognitive processes of young children as trying to gain knowledge from the teachers. Following the stages of development, young children are incapable of formal operations which are required for critical thought. In spite of more recent research has found that young children engage in many of the same cognitive processes that adults do, that means that there is a place for logical thinking in the lower elementary curriculum [5]. Kennedy [5] refers although critical thinking ability appears to improve with age, even young children can benefit from critical thinking instruction. We can say that logical thinking instruction at the primary school can include teaching student to e.g.: value

reason and truth; be open-minded; respect others during discussion; be willing to see thinks from another's perspective. A large number of logical thinking researchers confirm that Students are expected to acquire these skills as a natural consequence of engaging with the subject matter [9]. A second way to teach thinking skills involves direct and explicit instruction in thinking skills as a separate course, where logical thinking skills and abilities are bring out outside the context of specific subject matter and this approach is the most common in the Italian context. A third approach combines elements of both the general and subject specific approaches and in their meta- analysis . It is found that the mixed approach had the largest effect-sizes on student's skills and dispositions. The authors also found that if educators receive special training in teaching critical thinking the course curricula have the largest effect. Successful interventions may require development for teachers specifically focused on teaching logical thinking [3].

VIII. Teachers belief on teaching logical thinking

Teacher educational researchers have in the past two decade demonstrate an increasing interest about some aspects of teacher cognition and their relationship to practices in the classroom [1][2]. Researchers often classify teacher beliefs either behaviourist or constructivist. That dichotomy is useful in terms of categorize beliefs but maybe is simplistic. Theories of learning such as constructivism are so diverse that it is questionable whether we can possibly categorize sets of beliefs in terms of a behaviourist/constructivist dichotomy We may say some teachers consider teaching as a process of knowledge transmission, others as a process to guide children's learning or as a process of developing social relationships. He also distinguishes beliefs of teachers based on their experience and pre-service teachers start with control-oriented belief systems that emphasize the importance of maintaining order and good discipline and guiding the activities of the children. During training, these attitudes become more liberal and child-centred. However, when teachers enter full-time teaching, they once again revert to a control-oriented belief system. Many teacher educators are incorporating teaching methods founded on constructivist theories of learning in their courses and programs [14]. It is recognize that teachers frequently teach as they were taught based on years of observing their own teachers [4]. Traditional views of teaching science, learning science, and the nature of science, originated these views of their own school science experience to develop constructivist ideas about teaching and learning. Some researchers have noted that reflecting on practice can change beliefs. As an example changing beliefs during an in-service programme about problem-solving with a group of teachers in grades 3 for 10 months. Focussing on groups, interviews, and observation were used in this programme to capture emerging beliefs and behaviour changes were documented throughout the year.

IX. Beleifs on Intelligence

Intelligence is one of the most valued psychological attributes that has relevance not only for teachers, parents, students and the educational system in general but also for people, as fundamental human ability. There seems to be no doubt on the importance for psychology in general and for everyday behaviours in social and professional interaction. The consensus on intelligence ends when it tries to defining it and to find its origin. Various definitions of intelligence have appeared and the intelligence theories are one the most laboriously researched psychological constructs in the past one hundred year [8]. Intelligence is a relevant argument because students' implicit beliefs about intelligence can influence their beliefs and behaviours [2], [9] and these intelligence beliefs have been found to be related by teachers' conceptions of intelligence [4]. As a result, teachers needs to give importance on intelligence that could influence their teaching approaches and interactions with their students. Suppose you are asked to agree or disagree with the following sentences: You have a certain amount of intelligence and you really cannot do much to change it, Your intelligence is something about you that cannot do much to change it, and You can learn new things, but you cannot really change your basic intelligence. If you are agree with these sentences, you are affirming entity theory. This means that human intelligence is limited and fixed. On the other hand, you can reject these propositions, displaying an incremental theory approach to human intelligence. Incremental theory. If there is a firm relationship between teachers' views of intelligence and student's views of intelligence, then the need for teacher to support malleable beliefs about intelligence and ability is decisive to encouraging developing learners. Student's implicit beliefs about the nature of intelligence and ability are important factors affecting their motivation and achievement [12]. Students who believe that intelligence can be change is more likely to ascribe to mastery or learning-oriented goals [12]. These students believe they can improve their intelligence through effort, learning, persistence and strategies. When teachers interact with students in the classroom, they make judgements concerning student's intelligence and abilities [41]. Teachers' judgments, in accordance with their implicit views of intelligence and ability, can influence their classroom practice, their relationship with students, and students' self- perceptions e.g. [40]. Additionally, a school's culture can be influenced by these conceptions of intelligence and ability. Oakes et al. [42], noted several aspects of conventional views of intelligence which may contribute to trace and influence teachers' classroom practice, including that intelligence is an innate, fixed entity; intelligence is unidimensional;

intelligence can be explained by racial and cultural difference. They argued that teachers who embraced these conceptions of intelligence and ability will reduce their perceived responsibility for student's learning.

X. Tasks for development of intelligence and ability to establish patterns

There are given a series of numbers. 1. Mark the features of the series and write the following number: 29; 11; 14; 8 … 2. Find the pattern and insert the missing number: 57 16 41 36 21 15 48 3. Tasks for the development of the ability to classify Task: the words are given: lemon, orange, pear, raspberries, apple, mangoes , plums, coconuts, guavas, pineapples and other fruits. 4. Task: words are given: table, cup, chair, plate, cupboard, teapot, sofa, spoon, stool, chair, pan., pen , pencil, rubber , ink . 5. Task: Underline the names of the furniture with one line, the name of the dishes with two lines. 6. Task: find out the similarity and characteristics among words are given: mandarin, apple, potato. 7. Tasks : for the development of the ability to determine the relationship between objects of the genus-species type 8 Task: from the list of words, select utensils: a cup, a table, a plate, a jacket, a bedside table, a hat, a scarf, a saucepan, a coat, a frying pan, a dress and a chair, table . 9. Task: from the list of words, select shoe items: doll, ball, shoes, and pencil case, briefcase, pen, slippers, bear, deer, notebook, top, and designer.

Students' Level of Thinking Based on analysis of the data, we found that the average of students' level for Problem Solving is 3.48 and it shows that most of the respondents are extremely more than average in their Problem Solving. In the meantime, the average students' level for Logical Thinking is 3.04 and it shows that most of the respondents are more than average in Logical Thinking. In contrast, the average students' level for Cognitive is 3.53 which are almost good. The result is illustrated in Table 3. The highest score for Problem Solving, Logical Thinking and Cognitive is 5.00. The lowest scores for Problem Solving, Logical Thinking and Cognitive are 1.33, 1.33 and 1.67 respectively. There are 5 (3.42%), 1 (0.68%) and 3 (2.05%) number of students scored 5 for Problem Solving, Logical and Cognitive respectively. The students who scored highest in Problem Solving are different with Logical Thinking and Cognitive. There are 3 (2.05%), 2 (1.37%) and 1(0.68%) number of students who got lowest score in Problem Solving, Logical Thinking and Cognitive. The result is illustrated in Table 4. Table 3. Students' Level of Thinking – Average, Highest and Lowest. Level Type of Thinking (Mean Score) Problem Solving Logical Thinking Cognitive Average 3.48 3.04 3.53 Highest 5.00 5.00 5.00 Lowest 1.33 1.33 1.67 Table 4. Students' Level of Thinking – No. of Students and Percentage. Level Type of Thinking Problem Solving Logical Thinking Cognitive No. of Students % No. of Students % No. of Students % Highest 5 3.42 1 0.68 3 2.05 Lowest 3 2.05 2 1.37 1 0.68 5.2. On-Going Assessment and Final Exam Result Total marks for on-going assessment (OGA) were 70% which consisted of laboratory exercises, quizzes and tests. The average mark for OGA was 51.69%. The number of students, who scored 5 either Problem Solving or Logical Thinking, was 4 people. However, there was 1 student who scored 5 in Problem Solving but did not managed to get over the average mark. Overall, out of 146 students, there were 77 (53%) students who scored more than the average mark. Meanwhile, 47% students scored less than the average mark. As for final exam (FE), the total marks were 30% which consisted of two sections, objectives and structure. The average mark for FE was 20.80%. There were 3 out of 4 students that scored 5 in Problem Solving or Logical Thinking, managed to get marks more than the average mark. Overall, there were 73 (50%) students managed to get marks more than the average mark. However, there was only one student, who scored 3.5 in Zaid Mujaiyid Putra Ahmad Baidowi et al. / Procedia - Social and Behavioral Sciences 90 (2013) 914 – 922 919 Problem Solving and 4.0 in Logical Thinking, failed the course due to attitude problem. The students' performance in both on-going assessment and final exam can be illustrated in table 5 and table 6. Table 5. Students' Performance for On-going Assessment and Final Examination. Level OGA (70%) FE (30%) Highest 64.41 28.95 Average 51.69 20.80 Lowest 30.12 6.30 Table 6. The Students Scored more than Average Marks for On-going Assessment and Final Examination. Description More than 51.69 out of 70% More than 20.80 out of 30% No. of Students 77 73 % of Students 53 50

XI. Analysis and results

Experiments aimed at developing logical thinking in elementary school students using innovative methods were conducted with the 3rd and 4th form pupils. In total, 606 pupils participated. During the experiment the lessons were conducted in the following areas: - Developing skills in working with specialized dictionaries to build logical thinking through innovative strategies; - Creating a collaborative environment; - Teaching them to express themselves freely; - Building communication skills; - To give students the skills to work independently. Experimental work was carried out during the lessons of the subjects of Native language, and Mother Tounge.,Natural Science and Reading. During the experiment, it was mainly aimed at exploring a system designed to generate logical thinking in students through innovative strategies such as Creation of envelope with paper,, making box with pitchboard in student teacher friendly learning way. During the experiments the experimental groups were trained according to the recommended methodology. The reading in the control classes continued with the traditional methodology. All research data was recorded in special

registers and processed by statistical data. During the lessons, special attention was paid to the development of logical thinking skills for junior high school students. It presented a set of tasks from interactive methods to form logical thinking through the Pin board method. The students were able to think logically in three areas when completing the presented tasks. In this case, the familiar situations in which students are familiar with the situation have created a tendency to think logically. Such texts aroused great interest among the readers and raised many questions. As a result of the training, the students gained reflexive actions. Students have developed the skills of independent thinking, problem understanding and understanding. Students used dictionaries to comprehend the meaning of words that were difficult to understand. For this reason, we also used the method of dealing with complex texts during the experimental work. For this purpose, texts were selected taking into account the learners' interests. In later stages of the experiment, tasks were consistently complicated. The aim was to observe the extent to which students' logical thinking skills were included. In the process, an attempt was made to ensure the subject-to-subject relationship. The fourth-graders were divided into small groups, each of which sought to master the learning material independently. Strong collaboration has been established between the teacher and the students, and the team spirit has grown. Such trainings have contributed to the activation of the cognitive process and the expansion of students' opportunities for communication and each student has the opportunity to think logically. Thus, the lessons learned using innovative methods have enabled students to develop logical thinking skills, to express their thoughts freely, to gain information, to work in a team, to strengthen their position in the group, to defend their ideas. In the course of the research, the development of logical thinking in elementary school students was related to the development of their common knowledge. This is achieved through innovative teaching methods, strategies that encourage students to think logically, and the implementation of specially selected tasks into the learning process. If at the beginning of the pilot study the level of logical thinking in elementary school students was slightly lower, by the end of the study, these indicators were slightly increased (Table 1). Table 1 Indicators of the ability of elementary school students to demonstrate logical thinking skills in practice Criteria and indicators of students' ability to demonstrate logical thinking skills in practice of the class 1-4-form pupils Experimental-testing shows us the low, medium, high level of knowledge of pupils and school students in primary school.

Since the observed value of the statistical criterion is greater than the critical value of a = 0.05 reliability and the significance of the hi-square criterion is based on the validity of the research hypothesis. Attention was drawn to the extent to which the properties of the sampling objects differ from each other in the criteria used to determine the effectiveness of logical thinking in elementary school students. The smaller is the importance of logical reasoning during the experiment, the greater is the degree of accuracy. However, this opportunity was limited to what could be achieved in practice. For example, when a reliability level of 0.05 was chosen, the accuracy was $0 = 1- \alpha = 1-0.05 = 0.95$. As a result of the samples and selections, to improve the efficiency of the research, the original objective properties of the objects were achieved as much as possible. The results of the pilot work were observed on the high, medium and low evaluation criteria. In the control group, the highest rate was 56% at the end of the experiment and 95% in the experimental group. That is, the rate of formation of logical thinking in the students of experimental groups is almost more for 2.3 times. In the analysis of the results of the pedagogical experiment, mathematical and statistical methods were used, based on the results of the questionnaires with the students on the level of logical thinking in elementary school pupils. We tried to show the results at the beginning and at the end of the experiment in the following tables.

TABLE 1. Indicators of the ability of elementary school students to demonstrate logical thinking skills in practice

Criteria and indicators of students' ability to demonstrate logical thinking skills in practice	1-4-form pupils		
	Experimental-testing		
	Low	Medium	High
The level of knowledge of pupils	33	32	40
Basic knowledge and understanding of the content of the study subjects	44	27	38
Levels of students' spiritual and moral development	46	39	47

TABLE 2 Formation of logical thinking in primary school pupils (at the beginning of experiment)

Experimental group (Class 1-4) 1-Selection				Control group (Class 1-4) 2- Selection			
X	High	Medium	Low	Y	High	Medium	Low
H=152	45	66	43	H- 153	43	69	49

Table 3 Level of logical thinking in elementary school students (in the end of practice)

Experimental group (Class 1-4) 1-Selection				Control group (Class 1-4) 2- Selection			
X	High	Medium	Low	Y	High	Medium	Low
H=148	80	45	27	H- 153	59	56	38

From the above tables, it is important to remember that the baseline state of thinking of primary school pupils was slightly lower than that in the control groups. At the end of the study, pupils tried to properly describe the knowledge and concepts that would help them to develop logical thinking skills. Logical thinking was formed using the Pin board and Insert methods to accelerate pupils' performance of the tasks. According to our observations, pupils' logical thinking through innovative strategies was increased by 17 percent.

Table 4 Indicators of the development of logical thinking skills in primary school pupils

Indicators of the formation of logical thinking	Class 1-4 forms		
	Experimental-testing		
	Low	Medium	High
Analyzing expressed opinion	15	45	57
Summarizing	17	40	54
Comparing	12	42	49
Classifying	11	45	46
Summarizing, proving	17	51	44

XII. Discussions

We can also find the term logical thinking in educational policy documents that underline the inclusion of thinking skills in curricula and academic education systems. Studies on teachers' beliefs about teaching and learning have showed the influence of these beliefs on teachers' practices in the classroom and the achievements of the student. Researchers on teachers' beliefs about intelligence have demonstrated the influence of different views of intelligence on teachers' classroom practices too. A considerable amount of research can be found concerning the role of beliefs in teaching scientific subjects but not much about other topics. In spite of the general agreement of the importance to teach students to think naturally. The relationships between different aspects of beliefs (e.g. about intelligence, or learning or teaching) and classroom practices. The purpose of my study and my research is to examine the role that beliefs play in teaching logical thinking in primary school. Logical thinking has been an important issue for many years. It is generally agreed that by learning only a content-based curriculum, children cannot become better thinkers able to give reasons for their conclusions, to think flexibly and creatively, to solve problems and make good decisions. I think teachers' beliefs about learning and intelligence can explain the difference in the use of thinking activities in the classroom. In India studies and interest about teachers' beliefs are quite recent and there are specific studies about logicial thinking activities is gradually growing and coming in primary school.

In geometry teaching, the importance of visual perception and multidimensional thinking is undeniable. Thus, it is necessary to include such exercises through both curricular and extracurricular activities to improve these abilities. The aim should be to make scientific concepts more clearly understood, and then to enable the cognitive processes to follow through these concepts. Teaching via concept-map-supported simulation method is more effective than traditional teaching methods for students to comprehend scientific concepts. It is revealed the positive influence of project-based teaching on logical thinking ability, and backed her findings with several studies that can be found in literature. According to this, choosing the appropriate method or methods would be an important step in developing logical thinking abilities related to geometry classes. The scale developed within this study can be developed more by taking into consideration different dimensions and different fields. Moreover, with the development of this and similar scales that target the cognitive sphere, these abilities can be observed and they can discover new ideas.

XIII. Conclusions

We set the goals of learning and education at school : 1. the development of logical thinking of students 2. the level of formation of which largely determines consciousness 3. the efficiency of mastering the foundations of sciences 4. the ability to navigate independently in an ever-growing volume of information 5. to apply existing knowledge to the maximum benefit; to create the most favourable conditions for acquiring new knowledge and to communicate it to others. 6. the development of efficiency will increase if we implement the psychological and pedagogical conditions for the development of logical thinking of younger students with the help of innovative technologies. 7. the essence of the concepts "logic", "thinking", "logical thinking", "logical thinking of young schoolchildren", "innovative technologies" has been considered. 8. the logical thinking of young school children is the ability to use simple logical actions by students to form a full-fledged learning activity, which includes the ability to: highlight and hold a learning task; independently find and learn common

ways to solve problems; adequately evaluate and control yourself and your activity; own reflection and self-regulation of activity; use the laws of logical thinking; own and use different forms of generalization, including theoretical ones. 9. studying the influence of innovative technologies on the development of logical thinking of the lower grades.

Finally we can conclude that the application of innovation in the lessons greatly simplifies and makes the process diverse. Using innovative technologies, primary school children more easily absorb educational material and increase the level of logical culture. The formation of logical thinking skills in primary schoolchildren requires a number of didactic features and pedagogical and psychological peculiarities. It is advisable to establish and introduce a system of learning tasks that encourage students to think logically in the context of the primary education process. The development and implementation of didactic projects that promote the development of logical thinking in primary schoolchildren and the development of logical thinking as well. Pupils were given a system to develop logical thinking through different strategies and their specific areas successfully. The use of innovative technologies that encourages early thinking and independent thinking in the learning process helps the primary pupils to develop logical thinking and enables them to achieve the expected effectiveness in this area. The results of the experiment showed the validity of the research hypothesis by justifying the effectiveness of the methodology used in the pedagogical process aimed at forming logical thinking of primary schoolchildren. The initial hypothesis showed that it is possible to achieve logical thinking of primary school children by expanding their general knowledge and intellectual level with creative and good works and projects on surveying among school children among different primary schools of Class 1-4 in India.

XIV. Recommendations

To develop logical thinking in primary school children, it is necessary to accomplish the followings: 1. The content of elementary education curricula of primary education should be integrated into teaching strategies, instructional tasks and innovative approaches aimed at developing students' logical thinking skills in accordance with state educational standards. 2. The encouragement and motivation of building more primary schools a in villages and recruiting teachers in schools and providing grant s and school development funds for students in academic also non academic purposes that needs to come from the effortless attempts from Ministry of Public Education for spreading education, literacy specially among village students so that they are not deprived from primary basic education the curriculum of the subjects like Reading, writing requirements for creating their mental concepts in paragraphs, essays , short stories, summaries and learning grammars , languages , also mother language that aims to develop logical thinking of pupils in primary education should be reflected in government education

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Priyanka Deb Sett. "The Importance of Logical Thinking Ability of Secondary Level School Students in South Delhi.'' *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 20(08), 2021, pp. 01-12.