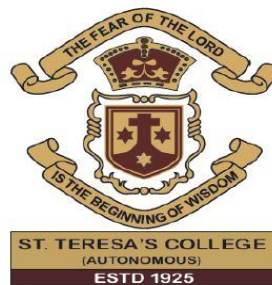


GENERATING INTEREST IN ACADEMICS BY HARNESSING MULTIPLE INTELLIGENCE

Dissertation submitted to

ST.TERESA'S COLLEGE (Autonomous)

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Affiliated to

MAHATMA GANDHI UNIVERSITY

**In partial fulfillment of requirement for the
AWARD OF THE DEGREE OF MASTER OF SCIENCE IN
HOME SCIENCE (BRANCH A) CHILD DEVELOPMENT**

By

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April 2019

CERTIFICATE

This is to certify that the project work titled "**Generating Interest in Academics by Harnessing Multiple Intelligence**" submitted by Ms. SUSHMITHA S KAMATH in partial fulfillment of the requirements for the award of degree of Master of Science is a record of original work done independently by her under my supervision and guidance.



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DECLARATION

I (Sushmitha S Kamath), do hereby declare that this dissertation entitled "Generating Interest in Academics by Harnessing Multiple Intelligence" submitted to the Mahatma Gandhi University in partial fulfillment of the requirement for the award of the degree of Master of Science in Child Development is a bonafide record of work carried out by me independently at the Post Graduate Department of Home Science, St.Teresa's College(Autonomous), Ernakulam, under the guidance and supervision of Smt.Dr. Dhanya N , Assistant Professor in Home Science. I also certify that I have not copied from any other books or journals or other articles or dissertations of similar nature. I further certify that no part of this record has been formed the basis for the award of any other degree or diploma.

Place: Ernakulam

Date: 12.04.2019



Sushmitha S Kamath

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“My heart praises the lord because he has done great things for me”

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CHAPTER 1

INTRODUCTION

‘Anything worth teaching can be presented in many different ways .These multiple ways can make use of our multiple intelligences.’

-Howard Gardener

The theory of Multiple Intelligences(MI) which was developed by Psychologist Howard Gardner in the late 1970s and early 1980s, proposed that individuals possess eight or more intelligences. Individuals draw on these intelligences, to find solutions to their problems (Gardner,1983).The eight identified intelligences are linguistic intelligence, logical-mathematical intelligence, spatial intelligence, musical intelligence, bodily-kinesthetic intelligence, naturalistic intelligence, interpersonal intelligence, and intrapersonal intelligence (Gardner, 1999).Gardner later suggested that existential and moral intelligences may also be worthy of inclusion (Smith and Mark,2002).

Each child in the society has his own interests, liking and way of understanding. Every child learns differently. The preferential way in which each child absorbs, processes, comprehends and retains information vary because they possess different intelligences, environment and prior experiences. There is a misconception in our society that to reach heights, one should have a high Intelligence Quotient (IQ). People think IQ is the potential asset that help learning and in turn will produce an optimum ability. But in reality, it is a low predictor of intelligence as it only measures an individual’s linguistic- verbal and logical-mathematic abilities. An individual with a strong verbal ability maybe does not have interpersonal ability to agree with other people, to develop networks, to communicate, to resolve a problem and to appreciate others. Maybe he or she does not have intrapersonal skill to overcome and learn from a failure to reflect on him/herself and motivate him/herself. Some students are not much creative and innovative to see the future to anticipate a unique problem. This is the most important skill needed to succeed in any profession (Lewin,2008). IQ hence is not the only factor which determines one’s success, other factors also have an effect on it (Harefa,2009).

The schools emphasize on the linguistic- verbal and logical-mathematic abilities in children which is why skills and talents of many children are left unnoticed. Teaching children by harnessing their multiple intelligence is very important. As individuals do

not possess all the intelligence in the same strength, intelligences which are dominating would influence the way they learn and interact with the environment. Teaching children by harnessing their multiple intelligence allows them to successfully participate in classroom learning. There is every chance that a child with unknown capabilities are left unnoticed, which otherwise could be utilized for the betterment of the family/society in future.

There is a need for identifying children's distinct and predominant multiple intelligences and feed them with the requisite style of learning process to cull out the maximum potential available in them. As each have a unique blend of intelligences (Gardner,1999), identifying the distinct and predominant multiple intelligences would also help in modifying and increasing the less developed intelligences. If all children had the same kind of intelligence, then it would have been easier for the teachers to teach; as, just one method of teaching would be effective. Assessments can also be made in the same way and that would be fair. Since children have different kinds of intelligences and strengths – some good in thinking spatially, some good at language, some very logical, education which treat every child the same way would be the most unfair education. If a curriculum which identifies children's distinct and predominant multiple intelligences and teach them based on it is available, it will be a blessing for numerous children. The conventional approach of teaching must be changed. Conventional teaching is the teaching which only stresses on the intellectual intelligence. So far, the students who are called the ones with a high IQ are only those with a high logic-mathematic intelligence and verbal intelligence. This would make it difficult for the students without a high logic-mathematic intelligence and a high verbal intelligence to reach heights. Here comes the importance of a teacher.

Yalmanci and Gozum (2013) stated that Gardner's MI theory has two important advantages in education. First, it paves the ways for planning the education program in such a manner that students realize their potentials and move to gain their desires. Second, it makes it possible for the educators to reach students who are more active because learning would be more attractive in a condition that learners are trained through the use of these intelligences.

A teacher can support children and can bring the best out of them. A teacher can identify the areas of interests in his/her students and develop their love for learning. Gardner's theory of multiple intelligences provides a venue for identifying the different abilities and talents of students. The teacher needs to help children develop their

multiple intelligences. They will be able to identify the multiple intelligence of children and so will be able to take classes based on the multiple intelligence theory. Teachers will be able to identify the multiple intelligence of students in multiple ways. One of the means is by allotting time for cultural activities in the class. Another way is by providing assignments and projects. It can be known even by conducting exhibitions. Knowledge about children's interest in extra-curricular activities might help teachers to teach appropriately.

Children might lose interest in academics if taught by giving dry lectures and by providing boring worksheets. It would also diminish their motivation to learn. Therefore the teacher's lesson plan should include a variety of activities that are related to various types of intelligences (Carlin, Salazar & Cortes,2013). For example, for children with verbal-linguistic intelligence, teachers can use various teaching strategies like making students write poems, making them to read aloud, play word games, teaching through stories ,oral presentations, conducting debates etc. Teaching children using diagrams, maps, visual puzzles, mind mapping, patterns, videotaping etc would be beneficial for children with good visual intelligence. Teaching so, would increase academic performance of the child as well as help the child choose a field of study, in terms of higher education, which will in turn lead to a successful life. Once the multiple intelligence of the student is identified, the strengths and weaknesses of the children can also be found and hence it would be easy for teachers to nurture their needs and can help them to develop a sense of accomplishment and self-confidence.

Implementing Interest centers in all schools would help generate interest for children in academics. Interest centers are areas within the classroom where children with similar intelligence are grouped together to encourage better learning through specific activities. Interest centers gives children the opportunity to make choices from a variety of materials that teachers provide to address developmental skills (DiCarlo and Vagianos, 2009). Children can choose the material with which they want to learn. Traditionally, teachers gave importance on assessing what children learn and not on how they learn. Implementation of interest centers might create interest, curiosity and enjoyment washing off boredom associated with learning. The interest centers are also called learning centers or activity centers which provide children various learning experiences and activities which are clearly defined, different, and easy to see (Norris, Eckert & Gardiner,2004). Children would be more energetic and enthusiastic at interest centers as they find all the activities are of their interest. By using MI Integrated

Lesson-Plans, students become smarter in numerous ways and they become aware of their unique intelligence profiles and of their peers as well.

These days, both parents are working and children feel lonely at home and turn into unwanted activities. They become game and internet addicts. Even the 2 year olds are now exposed to screens. Children become anxious, sad and even depressed when unable to access internet and won't have friends or develop intimate relationships with others. They lose interest in academics too. Implementing an after school programme, giving importance to the interest centers would help engage children in various activities which could help bring positive changes in them. It helps in increasing their self confidence .Each child is unique and so they have unique brain structure and learning style. The Multiple Intelligence Model Approach would be beneficial for children as it will provide an environment where they feel happy and safe. Learning becomes enchanting. Children won't feel much stressed or tensed about studies. Great improvement can be seen in academics as every subject will turn out to be their favourite because multiple intelligence theory can be applied to all the subjects. The theory of multiple intelligences is also beneficial for adult learning and development. Helping adults to find their multiple intelligences would give them a chance to choose the right profession. Many people work in areas where they are unable to make use of their most highly developed intelligences and as a result are not able to excel in their job. The theory of multiple intelligences act as a tool to help adults look at their lives, find out their interest and abilities.

The benefits of teaching children through Multiple Intelligence theory can hence be listed as one, students who perform poorly on mathematics and writing and who are not interested in academics will turn on to learning when classroom experiences give importance to arts, sports and musical activities.

Secondly, they will get opportunities for authentic learning based on their needs, interests and talents. They will become more active and involved learners. Parental and community involvement would increase as it is very much needed for the child's holistic development. Students develop their strength which helps in increasing their motivation to do things and hence an increase in their self-esteem can be observed.

Relevance of the study

The present study is intended to generate interest in academics by harnessing multiple intelligence. Even today, schools follow the traditional method of teaching which focuses on the verbal- linguistic intelligence and the logical-mathematical intelligence. If we can develop ways of teaching and learning by making use of all the intelligences in children, we can increase the possibilities for student success. Students will produce their best work as their interest towards academics increase. The self esteem of students increases as they see their achievements and understand the importance of creating their best quality work. Students turn to be curious and feel learning as an enjoyable and interesting activity. Finding out children's distinct and predominant multiple intelligences and providing them with the requisite style of learning process helps to bring out the maximum potential available in them. Such a curriculum is needed. Through the implementation of multiple intelligence theory in classrooms, each child's needs, abilities, aptitude will be catered to. Designing interest centers can help bring good results in children as improvement will be shown in academics as they will take advantage of their distinct MIs and learning styles. Interest centers would also help to develop student's multiple intelligences. Learning, teaching, and assessment through multiple intelligences bring insights into a new form of curriculum. But it is pitiable to note that even after the invention of Gardener's theory, thousands of schools teach in the same traditional method of taking dry lectures and monotonous way of giving worksheets and home works. Most of the teachers, school administrators and others who work with children are unaware of the benefits of teaching using student's multiple intelligences. The schools hinder the opportunity of children to learn in ways harmonious with their unique minds. This study will be focusing on generating interest in students by harnessing multiple intelligence and so they will be moulded into better individuals through a curriculum crafted individually based on learner diversity tapping their best potentials, to make them best citizens.

Aim

- The aim of the study was to develop interest in learning in primary school students using multiple intelligences.

Specific objectives

The specific objective of the study were :

- To identify the distinct and predominant intelligence type of multiple intelligence of selected children (3rd graders).
- To find if there is any gender difference in the multiple intelligence of the selected children.
- To check if there is any difference in the multiple intelligence of children hailing from state and CBSE schools.
- To find out the multiple intelligence of the selected teachers.
- To find out the level of awareness of selected teachers on multiple intelligence.
- To find the attitude of selected teachers towards the implementation of the :-
 - Concept of teaching through multiple intelligence
 - Formation of interest centers
- To formulate activities to teach selected concepts in mathematics on the basis of the predominant multiple intelligence in children.

Hypothesis

The hypothesis set for this study were:

- There is no gender difference in the multiple intelligence of selected children.
- There is no difference in the multiple intelligence of children from state and CBSE schools.
- Teachers don't have knowledge about multiple intelligence.
- Teachers do not have positive attitude towards the implementation of the concept of teaching through multiple intelligence and the implementation of interest centers.

Concepts used in the study

Multiple Intelligence- According to Lynn (2012), Multiple intelligence theory doesn't view intelligence as dominated by a single general ability instead differentiates human intelligence into specific 'modalities'. The model of multiple intelligence was proposed by Howard Gardner in his book "*Frames of mind: the theory of multiple intelligences*". The theory puts forward the fact that all human beings are capable to perceive the world through logical-mathematical reasoning, visual-spatial representation, musical intelligence etc to resolve problems or to create things, an understanding of ourselves and others. But the way in which such intelligences are combined to carry out different tasks, solve problems etc and its strength may vary (Morgen,2013).

CHAPTER 2

REVIEW OF LITERATURE

The review of literature pertaining to the study “*Generating Interest in Academics by Harnessing Multiple Intelligence*” is given under the following subheads:

- 2.1 Types of Multiple Intelligence
- 2.2 Studies Related to Multiple Intelligence
- 2.3 Generating Interest and Achievement in Academics
- 2.4 Gender Difference in Multiple Intelligence
- 2.5 Formation of Interest Centers
- 2.6 Distinct and Predominant Intelligence Type of Multiple Intelligence
- 2.7 Attitude Towards Multiple Intelligence Theory
- 2.8 Evaluation of Literature and Position of the Present Study

2.1 Types of Multiple Intelligence

Howard Gardner, a Cognitive Psychologist from Harvard University, developed the theory of Multiple Intelligence, based on multiple skills and abilities. His theory focuses on the premise that there are different types of talents or knowledge that could help to enlighten a person’s life and respond efficiently to his environment (Gardner, 1993). Intelligence is the capacity to solve problems or to fashion products which are valued in one or more cultural setting (Gardner and Hatch, 1989).

Nine types of intelligence:-

- Verbal-linguistic Intelligence:-It is highly developed verbal skills, the ability to think in words, sensitivity towards sounds, meanings and rhythms of words. People with predominant verbal-linguistic intelligence can become journalists, Lawyers, editors, translators, poets, reporters, teachers, historians, librarians etc.
- Mathematical-logical Intelligence:- It is the ability to calculate, quantify, think conceptually and abstractly. This type of intelligence is usually seen in mathematicians, accountants, engineers, scientists and detectives.
- Musical Intelligence:-It is the ability to produce and appreciate rhythm, pitch, timbre and tone. It is demonstrated by musicians, artists, composers, music teachers, recording technicians, singers etc.

- Visual-Spatial Intelligence: - It is ability to think in images and pictures, to visualize accurately and abstractly. They can be photographers, graphic designers, architects, interior designers, mechanics, navigators, pilots, sailors etc.
- Bodily-Kinesthetic Intelligence:-It is the capacity to manipulate objects, control one's body movements and use a variety of physical skills. People with such intelligence would be good at dancing, acting, crafts, using tools etc and can take up job as a dancer, coach, athlete, actor/actress, massage therapist, magician, mechanic etc.
- Interpersonal Intelligence: -It is the capacity to understand and respond appropriately to the moods, motivations and desires of others. Teacher, therapist, travel agent, child care worker, coach, manager, nurse, physician, salesperson etc exhibit interpersonal intelligence.
- Intrapersonal Intelligence: - It is the capacity to be self-aware and is in tune with their inner feelings, values, beliefs and thinking processes. Entrepreneurs, consultants, counselors, researchers, writers etc have knowledge of their own feelings and are self-motivated.
- Naturalist Intelligence: - It is the ability to recognize and group plants, animals and other objects in nature. This type of intelligence is evident in botanist, chef, environmentalist, landscape artist, sailor, veterinarian, astronomer, zoologist etc.
- Existential intelligence :-The latest discovery, It is the sensitivity and capacity to tackle questions about human existence, such as the meaning of life, why we die and how we got here ,What is our role in the world (Armstrong,2009).

2.2 Studies Related to Multiple Intelligence

Armstrong (1993) gave a layman's guide to the Multiple Intelligences. It contains various practical tests to find one's Intelligences and provided ways to strengthen each intelligence. It had a simple and well ordered way of finding and developing Intelligences. The multiple intelligence theory can be applied in classrooms. Gardner (1995) gave a clear distinction between 'surface' and 'deep' applications of multiple intelligence theory in his article 'Multiple Intelligences as a

Catalyst'. 'Surface' applications means explaining each and every activity in terms of the assumed Intelligences that it involves every child in terms of his or her alleged intellectual strengths or weaknesses. 'Deep' applications of the theory bring about a different way of thinking about children and their education. Concentrating on the child, a 'Multiple Intelligences Approach' entails a careful description of what the child is like intellectually and the planning of an education program suitable for the child.

Bauerlein (2005) provided full support for Gardner's argument after reviewing the theory of Multiple Intelligences. The author says that "the best he can offer is the fact that the theory of Multiple Intelligence has had huge impact on educational thinking and practice all over the world. The first rationale he gives is precisely the compromise that has led researchers in other fields to reject Multiple Intelligences: Educators know that individuals have different intellectual powers and profiles". To call these differences evidence of Multiple Intelligences is another thing. None of the people in fields he cites earlier assert as much. As yet, all we have in favour of different talents being independent mental aptitudes not reducible to a more General intelligence (g) is Gardner's ever-more-defensive insistence that this is so.

Gardner conducted a study-Project Zero's Project Spectrum-to implement in the classroom, based on the multiple intelligences theory. The research was based on the belief that each child exhibits different abilities or spectrum of intelligences. These intelligences are not fixed. They can be enhanced/improved by providing opportunities such as an environment rich in stimulating materials and activities .Asha (2007) says that there are differences among different dimensions of Multiple Intelligences based on locality and socio-economic status and no differences among the dimensions of multiple intelligences based on gender except for linguistic intelligence and musical intelligences from her study on interrelationship of different dimensions of multiple intelligences among secondary school students. The Spectrum approach identifies and values children's individualized abilities(Diaz-Lefebvre, 2004).Gardner and his colleagues created the framework for many multiple intelligences theory-based curricula used today. Many schools integrated the theory of multiple intelligences into their curriculum, in 1998, Project Zero established Project SUMIT (Schools Using Multiple Intelligences Theory) (Project Zero, 2003).

Teachers play an important role in identifying the multiple intelligence of children and in the implementation of Multiple Intelligence theory at classrooms. Cadwalader (2008) carried out a study on 'Are teachers always right: A study of the

accuracy of teachers recognition of students Multiple Intelligences. Based on the students learning needs, teachers make instructional decisions. This study aimed to find the teacher's accuracy in identifying their students' strengths and weaknesses based on Gardner's theory of Multiple Intelligences. The result of the study was that teachers are less than 50 percent accurate when asked to identify student's too strongest and too weakest Intelligences. Multiple Intelligences of Chinese gifted students in Hong-Kong: Perceptive from students, parents, teachers and peers was a study done by David(2004) which identified that across various perspective, Logical-Mathematical intelligences got the highest ratings while Bodily-Kinesthetic and Naturalistic intelligences got the lowest ratings.

From Gardner's Theory of Multiple Intelligences and applications of the Myers-Briggs Personality Type Indicator (MBTI) ,Gershkoff (2005) chose to develop the "Multiple Methods, More Success" paradigm. The reason is that each theory provides a different view of how students learn and also these theories are complimentary. Both the theories can be combined and implemented in a successful manner (Silver et al,2000).

Another researcher, Gault (2009) conducted a study on implementing Differentiated Instructions (DI) in third Grade math classroom. Based on the conclusions that DI appeared successful for math instruction, the recommendation was extended that educators must implement DI in order to enhance students' achievements. Implication for positive social changes are that this study may encourage teachers to implement DI to more effectively serve student learning, early academic achievements and increase chance for success later in life.

A study about preparation and testing of Multiple Intelligences Model was conducted to enhance spoken English at secondary level. The study revealed that the Multiple Intelligences model is more effective than the conventional model for enhancing spoken English at secondary level (Lekshmi,2006). The strategies involving Multiple Intelligence theory are more effective on the achievement in mathematics at secondary level(Krishna ,2004).

The effectiveness and suitability of strategies involving Multiple Intelligence on the achievement of physics by using complete lesson plans ready to be adapted to secondary level was pointed out by Benette (2004). The objective, activities and applications given were as per the principles of Multiple Intelligences and it was found that these strategies are more effective than traditional ways and brought fruitful results.

Implementing multiple intelligence theory among adults is also effective. From a study “Integrating Multiple Intelligences and andragogical principle into a pre-service teacher education program” conducted by Smith (2008), It was found that the experimental group performed significantly better than the control group. The study had a social implication as it provided alternative methods that apply Multiple Intelligences and andragogical model to accommodate adult learners in order to improve both learning outcomes and students satisfaction of the adults in the classroom.

There has been an increase in the number of Multiple Intelligences (MI) studies in Turkey. Studies of the Multiple Intelligences (MI) theory between the years of 1999 and 2007 were analyzed by Saban (2000). Results showed that most studies were done in the form of Master’s Thesis (73.2 percent) with the aim of identifying the effect of the MI theory on Elementary student’s (56.7percent) academic achievement and attitudes towards science (25.8 percent).Vedapriya(2008) conducted a study to find if the age and sex of school students makes significant differences in their Multiple Intelligences by employing survey method. It was found that the variables- age and sex of the selected students make significant difference, except some core Intelligences. Multiple intelligence theory can also be applied in counseling field. Pearson (2015) studied about a Multiple Intelligence Approach to counseling: Enhancing Alliances with a Focus on strength and the study investigated the experience of eight counselors as a result of the introduction of multiple intelligence theory and activities into therapy with adult clients.

2.3 Generating Interest and Achievement in Academics

Lyons(2008) investigated the effect of an integrated music curriculum on human learning, focusing on reading achievement. He believed that music intervention contained many elements of brain-compatible learning and that will positively affect the outcome of reading achievement scores. It was found that integration of music with reading concepts improved the academic scores of elementary students. Bringing music into the class room enabled students to connect ideas being introduced in the music lessons, with concepts taught in their other classes. An improvement in active skills, phonemic awareness, language etc was also observed.

Another research tries to find out whether the teaching activities designed according to the Multiple Intelligence Theory had an effect on the student's success in mathematics and on the permanence of the knowledge learned. A permanence test which observed the behaviors that had to be gained before the subject to be taught, after

the subject and the month after the completion of the subject was given to the experimental group. It was revealed that those who studied in accordance with Multiple Intelligence Theory scored higher than the control group. When t test was done, the t point were determined as 2.55. The findings hence showed that the teaching activities designed according to the Multiple Intelligence Theory had an effect on the student's success in mathematics and on the permanence of the knowledge learned (Temur, 2007).

Baran and Maskan (2011) investigated “Multiple intelligence fields of 11th Grade Students with respect to some variables and physics achievement”. The samples taken for the study were 327 high school students and data was collected through Multiple Intelligences Scale, physics achievement scores and personal information questionnaire. The findings of the study showed that among the study-group students, the mean scores of those attending the Science High School were higher in intrapersonal intelligence, visual-spatial intelligence and mathematical-logical intelligence than the students attending other types of high schools.

When multiple intelligences based units were developed and implemented in classrooms by teachers enrolled in a multiple intelligences graduate course, increased student achievement in history, geography, literature and music was found. The five case studies showed an increase in student engagement and participation among others. In a music unit, students engaged more actively, recalled information for longer periods of time, and used higher level thinking skills to make connections between different musical eras and artists” (Hickey,2004). But Beam (2000) in his study “comparison of the theory of multiple intelligences instruction to traditional textbook-teacher instruction in social studies of selected fifth grade students” found that two modes of instruction were effective in teaching social studies concepts.

An action research which aimed to improve the students’ creative thinking and achievement in learning science through the implementation of multiple intelligences with mind mapping approach showed that (1) the implementation of multiple intelligence approach improved the creative thinking ability and achievement in learning science. The improvement in the students’ creative thinking from cycle I to cycle II was 16.56 percent. (2) The improvement of the students’ achievement in learning science from cycle I to cycle II was 11.46 percent. (3) The response given by students to the implementation of multiple intelligence with mind mapping fell into category positive. Through the implementation of multiple intelligences with mind

mapping, the students felt happy in learning science (Wayan Widiana, Nyoman Jampel, 2016).

Similarly a study was done to investigate the reading ability of science students through study groups and Multiple Intelligences. A sample of 90 science students were chosen for the study. It was found that there was significant difference in the performance of groups taught using study groups and multiple intelligences methods (Owolabi and Okebukola, 2009). Eisa's study focused on assessing the effectiveness of student's multiple intelligence styles in predicting improved reading skills through academic performance. The sample chosen for the study were a group of middle school students, studying in both traditional and Gardner's multiple intelligence style- tutoring program. It was found that the students who studied in the Gardner multiple intelligence style- tutoring program (experimental group), performed better for the academic year than the students who studied using traditional teaching style (control group). Regarding the grades, female students attending private institutions living in suburban areas had greater reading improvement (Al-Balhan, 2010).

Salehi and Gerami (2012) examined the relation between intelligence types and achievement test scores which included grammar, vocabulary, reading comprehension, and idioms. The results showed a low correlation between achievement scores and MIs.

Various studies have found that great achievement could be seen if students are exposed to multiple intelligence. The effect of the Multiple intelligences teaching strategy on the academic achievement was studied by Onika et al., (2008). The results suggested that students exposed to multiple intelligence performed better than those who learned using direct instruction. Another study was done to find out the effect of Multiple Intelligences learning on student achievement. The results revealed that students test scores increased an average of 66.25 percent to 82.25 percent" (Davis, 2004). Improvements were seen in assignment completion, class participation and engagement by the students in learning when taught using multiple intelligence theory (Cluck and Hess, 2003).

A study was conducted (1) to find the secondary school students' multiple intelligences and learning styles, (2) to describe gender differences (3) to find relationship between learning styles and multiple intelligences of the students. The Perceptual Learning-Style Preference Questionnaire (PLSPQ), and Multiple

Intelligence Inventory were the tools used for the study. The analyses revealed that most of the students were tactile and auditory learners with the highest scores in Naturalistic, Visual and Kinesthetic intelligences types. Significant difference in multiple intelligence was shown between males and females and the intelligence types and learning styles had a moderate positive correlation (Sabriye Şener, Ayten Çokçalışkan, 2018).

When the learning style and multiple intelligence type of learners are known, It can help students identify their strengths and weaknesses and learn from them. Self-confidence, self-respect, self-regulation, etc. and positive attitude toward learning can be developed. It is even be helpful for the teachers to lay their goals and plan activities to teach the different intelligence types. The students will have satisfied and happy feeling when they understand the reason behind their learning difficulties (Sabriye Şener, Ayten Çokçalışkan, 2018).

2.4 Gender Difference in Multiple Intelligence

Furnham & Mottabu (2004) studied on the differences in culture and sex between the Egyptian and British university students in self- and parental estimations of IQ using Cattell's list of twenty multiple intelligences. The sample size for the study was 269 students, 151 British (59 male and 92 female) and 118 Egyptian (54 male and 64 female) . Males shown higher levels of multiple intelligences (verbal, aiming, numerical, originality and mechanical abilities) than females. Egyptians had a high belief in sex and race differences in intelligence than the Britishers. But in another study “Problems of education in the 21st century subjective assessments of multiple intelligences among Bosnian and Turkish students”, it was found that there were no statistically significant gender differences in subjective estimates of multiple intelligences(Aydogan and Akbarov,2015).

Gender stereotyping plays a major role in parent’s understanding of their children’s abilities and their multiple intelligences (Furnham et al, 2002b). Research findings reveal that boys and girls have higher level of intelligences in distinct areas. Parents and educators believe that boys have higher ratings of mathematical and spatial intelligences than girls (Furnham and Gasson, 1998). Girls are rated of having higher ratings of interpersonal intelligences (Furnham et al, 2002a).

No significant gender differences in intelligence types was found in a study which involved 144 students (78 female and 66 male) .Only linguistic intelligence showed a variation, but it was not significant (Saricaoglu and Arikan ,2009).A study by

Masoomah (2013) which involved 40 university students whose English levels were intermediate indicated that linguistic, logical, and musical intelligence were more prevalent in females. Significant differences between genders was found only in linguistic intelligence where females showed higher intelligence. On the other hand, many studies have found significant gender differences.

In a study which involved 714 government majors (379 males and 335 females) ,It was found that females rated higher than males in terms of perceived linguistic intelligence, visual/spatial intelligence ,interpersonal intelligence and intrapersonal intelligence while male students rated themselves higher in logical/mathematical intelligence(Shahzada et al.,2011).A study done by Sadeghi (2013) taking 112 female and 138 male university students found that the mean scores of visual and interpersonal intelligence were high in both males and females. However, score for interpersonal intelligence were seen highest in females,followed by visual/spatial intelligence.

Faller and Jubilo's study (2013) found that females possessed the highest musical, interpersonal, and logical-mathematical intelligences while males had the highest body-kinesthetic, logical-mathematical and musical intelligences A study, taking a sample of 140 students, aged 18 to 24 revealed that intrapersonal intelligence, linguistic intelligence, logical-mathematical intelligence and musical intelligences were prevalent among females. Significant differences between boys and girls were observed in linguistic intelligence (Hanafiyeh ,2013).

Loori (2005) conducted a study where the differences in intelligence preferences of both ESL male and female students were investigated. Ninety international students at three American universities were taken as samples for the study. It was observed that there were significant differences between males' and females' preferences of intelligences. Males chose learning activities involving logical and mathematical intelligences and females chose learning activities involving intrapersonal intelligence.

Neto and Furnham (2006) investigated gender differences and the influence of intelligence quotient (IQ) test experience in the self and partner estimation of 10 multiple intelligences. 190 Portuguese students were given a brief questionnaire which was developed on the basis of an instrument used in previous research (Furnham,2001). Three of the 10 self-estimates had significant gender differences. Males believed they were more intelligent than females on mathematical (logical), spatial, and naturalistic

intelligence. Those who had previously completed an IQ test gave higher self-estimates on 2 of the 10 estimates.

Multiple intelligences strategies brings in more success compared with the traditional methodology in acquiring science processes in the area of basic science processes, and it was found that females excel males in attaining these processes(Khataybeh and Al-Bdor,2006). A study shows that males have more logical mathematical and bodily kinesthetic intelligences than females and found positive relationship between the logical mathematical intelligence and the tendency towards Mathematics among tenth standard students(Afanah and Al-Khazendar, 2003).

A study was conducted by Kaur and Chhikara (2008) to examine the multiple intelligence levels of young adolescents and to study the sex differences in the levels. Two hundred samples of the age group 12-14 years from rural area of Hisar district of Haryana state were chosen for the study. It was observed that majority of the respondents had average levels of intelligence for all the nine components of multiple intelligences. Significant differences were observed in the mean scores of boys and girls for linguistic intelligence,logical intelligence, musical intelligence and bodily kinesthetic intelligences. In the case of linguistic and musical intelligence girls took slight lead.Boys were better than girls in logical and bodily kinesthetic intelligence.

Razmjoo (2008) examined the effect of sex on language proficiency and types of intelligences. Tools used for the study were a 100-item language proficiency test and a 90-item multiple intelligences questionnaire .The study was conducted taking a sample of 278 male and female Iranians taking part in the PhD Entrance exam. The data were analyzed utilizing central tendency measures (mean and standard deviation). The data collected were also analyzed inferentially using correlation, regression analysis and independent t-test. The results showed no significant difference between male and female participants regarding language proficiency and types of intelligences.

2.5 Formation of Interest Centers

Most of the MI-based programs are initiated to address three goals:

- To provide opportunities for students across a range of intelligences.
- To provide children opportunities to develop their talents.
- To develop more individualized education by more directly addressing student's cognitive strengths in their curriculum.

There are various approaches and activities which were developed by Viens (1999) to address the above mentioned goals:

- Give wide variety of curricular options, which give opportunities to the teacher and the student to showcase their own strengths and interests.
- Providing different activities or “entry points” to develop their learning skills. An increase in the student’s self-esteem and substantive learning occurs if they are allowed to learn in ways in which they are most comfortable.
- Developing instructional strategies and media based on intelligences. The MI theory helps to analyze and expand instructional practices and the media used.
- Informally evaluating student intelligences in order to develop educational activities. Informal assessments includes observations, student checklists, questionnaires, dialogue journals and intake interviews helps in gaining valuable information about students’ areas of ability.
- Expanding assessment options to allow for students’ use of areas of strength in revealing their learning .

Learning environments must provide opportunities for children to develop their strengths in each intelligence area. Better results can be seen only when students are encouraged to use their strongest area of intelligence (Lash, 2004). Interest centers, also known as, “activity centers,” “learning centers,” and “interest areas” are areas within the classroom where similar materials are grouped together to encourage specific activities or experiences for the students. These areas are well defined, different, and easy to see (Norris, Eckert and Gardiner,2004). Learning centers have a great incidence on the development of students MI (Macías, 2013) as they build a classroom organization which facilitates doing and understanding(Tomlinson, 2000). Students develop activities which help them to explore their own way of learning and can learn based on their needs, interests and talents (Macías, 2013).

Interest centers also provide children the opportunity to become independent,self-directed and responsible. Learning through concrete experiences with real objects help children to excel in academics. Improvement can be evident in social skills too. Through the implementation of learning centers, Individual needs of all children are met. It enables the educator to integrate skills from different academic

disciplines into activities that are meaningful and purposeful to the child. The role of teacher is to build an atmosphere which supports children's self-directed learning. The aim of learning center classrooms is to make children work independently / in small groups with the aids available. The teacher in a learning centre acts as a facilitator (Pattillo et al ,1992).

Learning centers that provide all areas of intelligence should be included in the classroom to allow students showcase their unique intelligence so as to complete the tasks using their specific skills, capabilities and potentials. By providing students the opportunity to exhibit their talents in the classroom ,their learning experience becomes more meaningful . Students show more interest in learning activities when they are encouraged to use their strengths to complete the activities , and hence are more likely to successfully complete it (Lash, 2004).

The Interest Centers provide authentic learning experiences only when they have direct objective, related to the curriculum, meeting the needs of all learners and developing higher order thinking skills in students(Tomlinson, 2000). The National Association for the Education of Young Children (NAEYC) wished to develop a curriculum of active learning organized around learning centers for children of age group 4-8 years (Pattillo et al.,1992).

An action research study which focused on developing the distinct multiple intelligences of English class of fifth graders through interest centers was carried out at a private school in Colombia. The results were that, with the implementation of interest centers, students maximized some of their intelligences. Interest centers not only fostered language learning but maximized students' multiple intelligences. The skills, capabilities and potentials of students improved with the implementation of the project because language learning was supported with musical, visual-spatial, bodily-kinesthetic, interpersonal, intrapersonal, logical- mathematical, and naturalistic abilities as they constitute distinct frames for working on the same verbal linguistic content. As a result boredom in students reduced. There was an increase in self-confidence, interaction, and motivation when practicing and learning English as the teacher was able to organize a variety of contexts, activities and materials which provided students several learning opportunities ,they were an alternative for the teacher to plan lessons that made the language learning tasks more attractive (Dueñas Macías, Fredy Alonso, 2013)

A survey was conducted among the students in the General College, University of Minnesota to find the importance, specifically for developmental educators, of understanding diverse student's use and perceptions of learning centers. Results showed that there was significant difference in the way students from different ethnic backgrounds used the Math Center. SPSS was used to analyze the data. It was also found that there were additional statistical differences in students' responses to the use of the Math Center and students became more confident after using the Math Center by fall semester course grades (Duranczyk, Irene M, Goff, Emily, Opitz, Donald L, 2006).

2.6 Distinct and Predominant Intelligence Type of Multiple Intelligence

A study was done by McMahon (2004) about "the relationship between multiple Intelligences and reading achievement. The tool used was Teele Inventory of Multiple Intelligences. The study inspects the relationship between intellectual preference and reading achievement. Students who got higher scores in logical-mathematical intelligence were more likely to show at above grade level reading comprehension scores when compared with students who got lower scores in logical Mathematical Intelligence." Another study by Firozjael et al., (2013) aimed to find out the relation between MIs, learning behavior, and English learning of English major students. The results showed that the highest intelligence was musical followed by naturalist, whereas the lowest was logical followed by visual intelligence.

Carol and Shafer (2007) studied about the classroom practices of multiple intelligences theory by modeling instruction and the results revealed that students participated in classroom activities that addressed the various intelligences. Logical-Mathematical Intelligence, Spatial Intelligence, Naturalistic Intelligences and intrapersonal Intelligences have significant correlation with science interest at upper primary level says Alex (2013) from his study on the interrelationship among multiple intelligences and science interest :An analytic study on students at primary level.

Kutz and Campbell (2013) did a study taking a sample of 85 athletics students and found that body-kinesthetic intelligence was rated highest, followed by intrapersonal intelligence. Verbal intelligence was the lowest. Shahzada et al.,(2011) involved 714 government major students and found that females rated themselves higher in perceived intelligence than males. The highest intelligence for females was body-kinesthetic, followed by intra and interpersonal intelligences and for males, the

highest was also body-kinesthetic, followed by inter and intrapersonal intelligences. Musical intelligence was the lowest for both genders followed by logical intelligence.

Faller and Jubilo (2013) conducted a study involving 413 engineering students. The results showed that the top three intelligences were logical-mathematical, musical, and body-kinesthetic. The relation between intelligence types and achievement score of 50 university students majoring engineering was examined and it was found that logical-mathematical intelligence got the highest score, followed by interpersonal and body-kinesthetic intelligences. Linguistic intelligence was the lowest in these students (Salehi and Gerami, 2012).

Tsuneyasu, Akutsu and Suzuki (2008) involved 44 Japanese students whose majors comprising technology, international studies, education, and agriculture. The technology majors rated high in linguistics, spatial, and natural intelligence. The international majors had higher scores on each intelligence, compared to other majors, and were mainly high in logical-mathematics, musical, and intrapersonal intelligence. Education and agricultural majors too have similar MI profiles. Yamauchi (2014) studied 25 nursing students and found that the most prevalent intelligence was musical followed by interpersonal, while the least prevalent was logical-mathematical, followed by linguistic intelligence.

2.7 Attitude Towards Multiple Intelligence Theory

Attitude is a psychological construct, a mental and emotional entity that inheres in, or characterizes a person (Perloff, 2016). Key topics in the study of attitudes include attitude strength, attitude change, consumer behavior, and attitude-behavior relationships (Minton and Khale, 2014). Attitude is not an visible behavior; it is an action that prepares a behavior. Therefore, individuals acquire some knowledge about that attitude object. Then they convey it as an emotional reaction, and later turn it into a behavior. Furnham assessed parent and teacher perceptions of children's general intelligence (IQ) as well as their multiple intelligences. No standardized measure of multiple intelligences was used. The researchers simply defined each multiple intelligences and asked the respondent to complete a matrix. No details of the matrix or psychometric properties were reported. The contribution of the proposed study lies in the use of a published inventory with established psychometric properties (Furnham et al., 2002a).

The opinions of Science and Technology teachers teaching at Lapta Yavuzlar Lycée, TRNC, and based on the student's grades in the "Attitude Scale towards Science

and Technology Lesson”, It was found that the attitudes of students towards Science and Technology lesson were highly positive and students had fun in the lesson and they enjoyed learning it. Similarly, students were curious to know more about the subject. Based on the opinions of teachers, the conclusion was reached that students understood “laboratory”, “experiments”, and “scientific environments” when they hear Science and Technology, and they see the lesson as enjoyable and easy to succeed in. It was also found that attitudes of students towards the term “Science and Technology Lesson” was highly positive. According to the opinions of Science and Technology teachers, the conclusion was reached that students watched Science and Technology programs and TV channels, they read published materials in these topics and wanted to do the experiments they read at school, and they wanted to take part in the “Science and Technology Club” of the school for extra-curricular activity (Kemal Akkan Batman & Salih Sarpten, 2013).

Teachers are responsible for understanding the student learning process and they should focus on some tolls that identify student learning styles such as quizzes, the Myers Briggs Type Indicator and Multiple Intelligences(Holliday,2000).Teachers and policymakers in North America respond positively to Gardner’s MI theory (Kornhaber,2001). They believe that the theory reflects the daily experience of teachers, gives them the mental ability to organize the curriculum, think on different ways of assessment and teaching pedagogy and thus, bring out new approaches according to the needs of the students.

2.8 Evaluation of Literature and Position of Present Study

Although several studies have investigated on the predominant multiple intelligence in children, not much research has been done on generating interest in academics by harnessing multiple intelligence. The present study is applicable in today’s world because parents these days are behind hoarding money. They don’t have time to look after their children, enquire into their academics, spent time with them etc. But at the same time they want their children to excel in their academics. Starting up interest centre in every school would help to enhance the potential of children. No much studies are done with an aim to compile interesting activities to teach various concepts of mathematics. Developing activities based on multiple intelligence help children develop a positive attitude towards academics. Learning could become interesting. The

stress level of children would come down. Great improvement in academics could be seen. The worst setback is that majority of teachers are not aware of multiple intelligence, about interest centers and are still teaching using the conventional methods. Hence it is an urgent need to make the society aware of the benefits of applying multiple intelligence theory in classrooms.

CHAPTER 3

METHODOLOGY

In the formulation of a research design the selection of an appropriate research methodology is an important step. Research method may be understood as those methods or techniques that are used for the conduction of research (Kothari,2000).The methodology adopted for the conducting the study “*Generating Interest in Academics by Harnessing Multiple Intelligence*” is given under the following sub-headings :-

3.1 Nature of Study

3.2 Selection of Area

3.3 Selection of Sample

3.4 Selection of Tool

3.5 Conduct of the Study

3.6 Analysis of Data

3.1 Nature of Study

Descriptive method of research was employed for the study. The descriptive method is a quantitative research method which attempts to collect quantifiable information to be used for statistical analysis of the population sample. It is a means of discovering new meaning, describing what exists, determining the frequency with which something occurs and categorising information. Observation and survey methods are often used to collect data (Gall, Gall, & Borg, 2007). In the present study, a booklet containing activities prepared based on the Gardner’s theory of Multiple Intelligence to teach various mathematical concepts was formulated in order to generate interest among children in academics.

3.2 Selection of Area

The areas selected for the study included Thevara, Cochin Corporation, Kaloor, Thammanam, Kakkanad and Edapally. These areas were chosen for the study considering the number of schools following the CBSE and State syllabus, easy availability of respondents and the convenience of the investigator. Eight schools were selected for the study out of which four schools followed CBSE syllabus and the other four followed state syllabus.

3.3 Selection of Sample

The sampling technique used for the study was purposive sampling and simple random sampling. Purposive sampling is also known as judgement, selective or subjective sampling. It is a method which occurs when elements selected for the sample are chosen by the judgement of the researchers. Researchers often believe that they can obtain a representative sample by using a sound judgement, which will result in saving time and money. In non-probability sampling technique, the sample is selected according to the convenience as they are accessible to the researcher (Best and Khan, 2011). A simple random sample is a subset of individuals (a sample) chosen from a larger set (a population). Each individual is chosen randomly and entirely by chance, such that each individual has the same probability of being chosen at any stage during the sampling process, and each subset of k individuals has the same probability of being chosen for the sample as any other subset of k individuals (Yates et al, 2008). This process and technique is known as simple random sampling.

The sample consisted of 500 children (269 boys and 231 girls) studying in 3rd grade of eight different schools namely Sacred Heart CMI Public School, St. Teresa's Cg LP School, St Albert's HSS, Greets Public School, St. Judes E.M.H.S.S, Campion School, Assisi Vidyaniketan Public School and St Marys Up School in Ernakulam district. The sample were obtained by approaching the Principal of the school. The sample of teachers consisted of 70 teachers (both male and female) teaching students of 1st grade to 12th grade of all eight schools.

3.4 Selection of the Tool

The tools selected for the study included a questionnaire to assess the multiple intelligence in children, Self designed questionnaire to find out the level of awareness, perception and attitude of teachers on multiple intelligence, Multiple Intelligence (M.I) Inventory to find out the multiple intelligence of teachers and formulation of a booklet by compiling activities for teaching various mathematical concepts by applying Gardner's theory of Multiple Intelligence to generate interest among children in academics. The tools are described below:

a)Multiple Intelligences(M.I.)Inventory

The Multiple Intelligences(M.I.) Inventory was developed by Walter McKenzie in 1999. The Multiple Intelligences (M.I.) Inventory consists of 9 sections and each section contains 10 statements. The 10 statements of each section are based on each multiple intelligence. The respondent need to complete the sections by placing a "1" next to each statement they feel that accurately describes them. If the respondent do not identify with a statement, he/she must leave the space provided blank. The number of "1"s from each section need to be totalled and multiplied by 10. The scores are to be plotted on the bar graph. Score 80-100 is considered dominant intelligence, 50-70 as moderately dominant and 0-40 as least dominant intelligence. A copy of the same is given in Appendix 1.

b)Questionnaire to find out the level of awareness, perception and attitude of teachers on multiple intelligence

The questionnaire to find out the level of awareness, perception and attitude of teachers on multiple intelligence was a self designed questionnaire. The questionnaire comprised of two sections. The first section dealt with the general information of the respondents like the educational qualification, work experience etc. The second section had questions to find out the level of awareness and perception teachers had on multiple intelligence and their attitude towards the implementation of Interest Centres. A copy of the same is given in Appendix 2.

c) Questionnaire to assess multiple intelligence in children

The questionnaire had 24 statements written in simple language .The statements were obtained from a multiple intelligence survey. Three statements represented the characteristics of a multiple intelligence and if the respondent puts tick mark under Yes for all the three statements, He/she is considered dominant in that particular intelligence .The statements were “I like to write my own stories”, “I like to dance” etc. A copy of the same is given in Appendix 3.

d)Compilation of activities into a booklet

A booklet is a small, thin book that has paper covers and provides information about something (www.collinsdictionary.com).In this study, a booklet was formulated compiling around 60 activities for teaching various mathematical operations like addition, subtraction, multiplication and time concept. The activities were compiled based on the Gardner’s theory of Multiple Intelligence to generate interest among children in academics. The activities were explained in simple language by providing procedures and photographs. A copy of the same is given in Appendix 4.

e)Checklist for evaluation of booklet

The booklet which was formulated by compiling activities for teaching various mathematical operations like addition, subtraction, multiplication and time concept was evaluated by five experienced teachers. The evaluation of the booklet was based on various aspects which include clarity in contents, relevance of the activities, appearance of the booklet, suitability to the target group, organisation of matter, utility and practical application. The scoring was done using a 5 criteria rating scale (excellent, very good, good, average, below average and not satisfactory).A copy of the same is given in Appendix 5.

3.5 Conduct of the Study

The conduct of the study consist of :

3.5.1 Administration of Questionnaires

For collecting the data for the survey, the investigator first met the principal's of each schools and sought permission to conduct the study in their school. The investigator also explained the objectives, aim and purpose of the study. With the principal's permission a day was fixed for each school to meet the subjects to conduct the study.

The investigator met the subjects on the fixed days and explained the purpose of the study and gave an overview of the questionnaire. The questionnaires were distributed to 3 rd graders and the investigator explained each statement to them. The questionnaires to find out the level of awareness, perception and attitude of teachers on multiple intelligence were handed over to the teachers in the respected schools. A week's time was given to each teacher to fill in the questionnaires.

3.6 Analysis of Data

The survey results on the multiple intelligence in children and teachers and the level of awareness, perception and attitude of teachers on multiple intelligence were consolidated and tables were prepared. Percentage analysis and chi-square test was used to interpret the data.

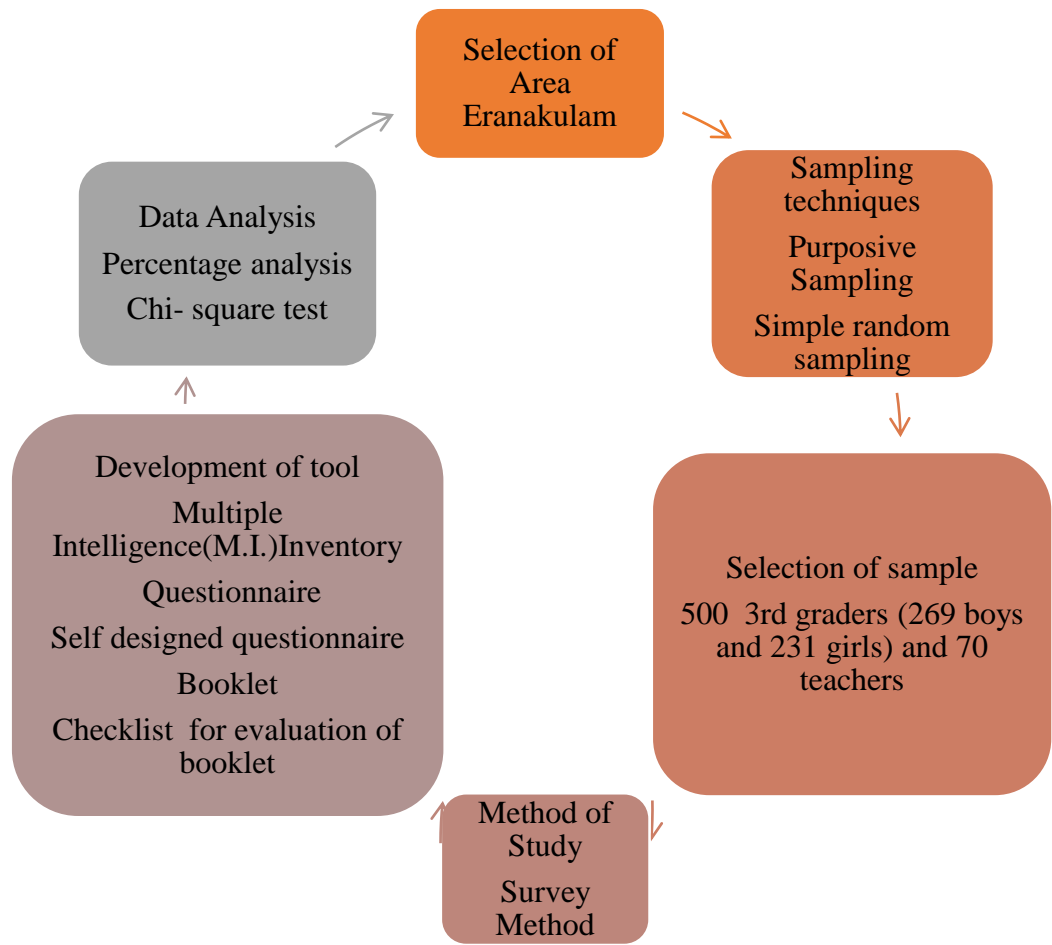


Figure 1
Research Design

CHAPTER 4

RESULTS AND DISCUSSION

The present investigation was undertaken to “Generate Interest in Academics by Harnessing Multiple Intelligence”. The results obtained on analysis of the data along with the discussion are given in this chapter. For the ease of understanding as well as for the convenience, the results are presented in three sections.

4.1. Section 1-General Information of Selected Teachers.

4.1.1 General Information of the Selected Teachers.

4.2. Section 2-Existing Teaching Learning Style in Schools as Opined by Selected Teachers.

4.2.1 Perception of Teachers towards Study Behaviour of Students.

4.2.2 Attitude towards Punishment as a Means to Improve Academics.

4.2.3 System Followed in Schools.

4.2.4 Teaching Style of Selected Teachers.

4.3. Section3- Opinion and Awareness of Selected Teachers on MI

4.3.1 Opinion on Multiple Intelligence Approach.

4.3.2 Awareness of the Concept of Multiple Intelligence among Selected Teachers.

4.3.3 Attitude towards Using Strategies on the Basis of Multiple Intelligence

4.4 .Section 4-The Predominant Multiple Intelligence of Teachers and its Relation with the Subject Taught

4.4.1 Predominant Multiple Intelligence of Teachers

4.4.2 Relation between Teachers’s Multiple Intelligence and Subject Taught

4.5 Section 5- Multiple Intelligence of Selected Children

4.5.1 Predominant and distinct multiple intelligence among children

4.5.2 The Relation between Musical Intelligence and Gender

- 4.5.3 The Relation between Visual-spatial Intelligence and Gender**
- 4.5.4 The Relation between Verbal-Linguistic Intelligence and Gender**
- 4.5.5 The Relation between Bodily-Kinesthetic Intelligence and Gender**
- 4.5.6 The Relation between Interpersonal Intelligence and Gender**
- 4.5.7 The Relation between Logical-Mathematical Intelligence and Gender**
- 4.5.8 The Relation between Intrapersonal Intelligence and Gender**
- 4.5.9 The Relation between Naturalistic Intelligence and Gender**
- 4.5.10 The Relation between Musical Intelligence and Children from State and CBSE Schools**
- 4.5.11 The Relation between Visual-Spatial Intelligence and Children from State and CBSE Schools**
- 4.5.12 The Relation between Verbal-Linguistic Intelligence and Children from State and CBSE Schools**
- 4.5.13 The Relation between Bodily-Kinesthetic Intelligence and Children from State and CBSE Schools**
- 4.5.14 The Relation between Interpersonal Intelligence and Children from State and CBSE Schools**
- 4.5.15 The Relation between Intrapersonal Intelligence and Children from State and CBSE Schools**
- 4.5.16 The Relation between Naturalistic Intelligence and Children from State and CBSE Schools**
- 4.5.17 The Relation between Logical-Mathematical Intelligence and Children from State and CBSE Schools**

4.6 Section 6-Evaluation of Booklet

4.1.1 General Information of the Selected Teachers

The table below furnishes the general information of the selected teachers taken for the study.

Table 1
General information of the selected teachers

It is evident from the table that majority of the respondents (96%) were females .Only four percent were males. Regarding the educational qualification of teachers, twenty four percent were post graduates. Only two percent hadmasters degree with M.Phil.

Table 2 gives the general information of the selected teachers based on the work experience, subject taught and school taught.

Table 2
Work experience related details of the selected teachers

Sl.No	Items	Responses of Teachers	
		N=70	%
1	Work experience		
	• 0-5 years	15	22
	• 6-11 years	21	30
	• 11-15 years	8	11
	• 16 and above	26	37
2	Subject taught		
	• Mathematics	12	17
	• Science	4	6
	• Social	5	7
	• Hindi	7	10
	• English	12	17
	• Malayalam	4	6
	• All subjects	13	19
	• English, Social	6	9
	• English, Science	2	3
	• Moral	1	1
	• Sanskrit	1	1
	• Social, Malayalam	1	1
	• English, Mathematics	1	1
	• Value Education	1	1
3	School		
	• CBSE	29	41
	• State	41	59

The above table reveals that teachers having an experience of 16 years and more were 37 percent and a meagre number of teachers (11%) had 11-15 years of experience. Regarding the subject taught, 19 percent of the teachers taught all the subjects and 17

Sl.No	Items	Responses of Teachers	
		N=70	%
1	Gender		
	• Male	3	4
	• Female	67	96

percent of the teachers taught mathematics and English respectively. A meagre percentage of the teachers (1%) taught moral, Sanskrit, both social and Malayalam, both English and mathematics and value education. It was seen that more than half of

2	Educational Qualification		
	• TTC	12	17
	• Graduation	14	20
	• Post Graduation	17	24
	• Post Graduation, B.Ed	16	23
	• Graduation, B.Ed	10	14
	• Post Graduation, M.Phil	1	2

the teachers (59 %) taught in state syllabus schools and about 41 percent in CBSE schools.

4.2 Existing Teaching Learning Style in Schools as Opined by Selected Teachers

The perception of teacher towards study behaviour of students, the attitude of teachers towards punishment as a means to improve academics, system followed in schools and the teaching style of selected teachers are presented below.

4.2.1 Perception of Teachers towards Study Behaviour of Students

The perception of teachers towards study behaviour of students is portrayed in the following table.

Table 3

Perception of teachers towards study behaviour of students

Sl.No	Items	Responses of Teachers	
		N=70	%
1	All students absorb teaching in the same way		
	<ul style="list-style-type: none"> • Yes • No 	6 64	9 91
2	Approach adopted by teacher if student seems inattentive in class		
	Try to understand whether		
	• subject is not interesting	3	4
	• way of teaching is not interesting	10	14
	• way of teaching is interesting but the subject is not interesting	5	7
• all the above	52	74	

Regarding the perception of teachers towards the study behaviour of students, it was astounding to know that 91 percent of the teachers thought that students do not grasp information when taught in similar fashion and only nine percent of the teachers

believed that teaching students using the same method will help them grasp information.

When students don't listen to lectures or day dream in class, approach adopted by almost three fourth of the respondents (74%) was that they tried to understand whether the subject was not interesting or the way of teaching was not interesting, If the subject was interesting but the way of teaching was not appealing or the way of teaching was interesting but the subject was not interesting. Fourteen percent of the respondents tried to understand whether the way of teaching was not interesting. Seven percent of the respondents tried to understand that the way of teaching was interesting but the subject was not interesting. Very few of them (4%) were concerned to check whether the subject was not interesting.

4.2.2 Attitude towards Punishment as a Means to Improve Academics

The attitude of teachers towards punishment as a means to improve academics was studied and analyzed in the following table.

Table 4
Attitude of teachers towards punishment as a means to improve academics

Sl.No	Items	Responses of Teachers	
		N=70	%
1	Punishing a child improves his academics <ul style="list-style-type: none"> • Yes • No 	3 67	4 96

Table 4 provides information about the attitude of the teachers towards punishment as a means to improve academics. It was interesting to know that 96 percent of the respondents didn't believe that punishments help children excel in academics. This finding is in line with the study conducted by Stratus and Paschall(2000) who reported that children in the United States who were spanked had lower IQs four years later than those who were not spanked. Hence we can conclude that physical punishment is linked to slower cognitive development and it adversely affects academic achievement.

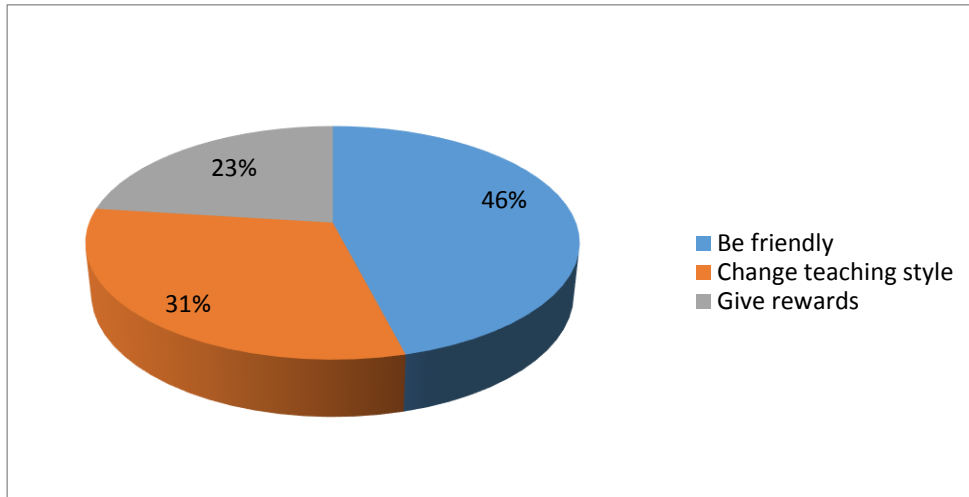


Figure 2
Alternative method used to improve academics

Out of the 96 percent of the respondents, 46 percent believed that being kind and pleasant with children will help them fetch more marks in exams. Changing the way of teaching was chosen as an alternative method by 31 percent of the respondents. There were only 23 percent respondents who thought appreciating the child for his/her good work, giving prizes etc will help improve the child's academics.

4.2.3 System Followed in Schools

The table below discusses about the system followed by teachers in schools.

Table 5
System followed in schools generally

Sl.No	Items	Responses of Teachers	
		N=70	%
1	Opinion of teachers on allotting one hour every week for cultural activities		
	• It is a waste of time as academics are concerned	1	1
	• It is good to find out the interest of children	51	73
	• Students can enjoy	18	26
2	Use aids other than textbook and black board for teaching		
	• Yes	63	90
	• No	7	10

It was interesting to know that nearly three fourth of the respondents (73%) agreed that allotting one hour every week for cultural activities would help identifying the interest of children. Twenty six percent of the teachers thought it would provide an opportunity for the students to relax. A meagre (1%) thought it as a waste of time as far as academics are concerned. It was astounding to know that 90 percent of the respondents taught using variety of aids other than textbook and blackboard.

4.2.4 Teaching Style of Selected Teachers

The teaching style of teachers was studied and is presented in the following table.

Table 6
Teaching style of selected teachers

Sl .No	Items	Responses of Teachers	
		N=70	%
1	Feel that intelligence will be known by providing projects and conducting exhibitions <ul style="list-style-type: none"> • Yes • No 	49	70
		21	30
2	Think that knowledge about children's interest in extracurricular activities can influence teaching style <ul style="list-style-type: none"> • Yes • No 	59	84
		11	16
3	Rate of interest of students to be in class based on teaching styles <ul style="list-style-type: none"> • When taught using different aids • When taught using text and blackboard 	69	99
		1	1

It can be inferred from the above table that nearly three fourth of the respondents (70%) were of the opinion that intelligence of children could be found out by providing projects and conducting exhibitions which was disagreed by 30 percent. Eighty four percent of the respondents believed that knowledge about children's interest in extracurricular activities would influence teaching style but it was sad to know that sixteen percent of respondents didn't believe so.

With regard to the rate of interest of students to be in class depending on the teaching style adopted, it was found that majority of respondents (99%) believed that interest in studies would improve only when students are taught using different aids. There was only one percent of respondents who believed that interest of students to be in class can be maintained even when being taught using the conventional methods. Children get easily bored when taught using the conventional methods. When educators teach in ways that students learn in today's digital age, students are much more involved in the lesson content and are more interested in the information (Lutz, 2010).

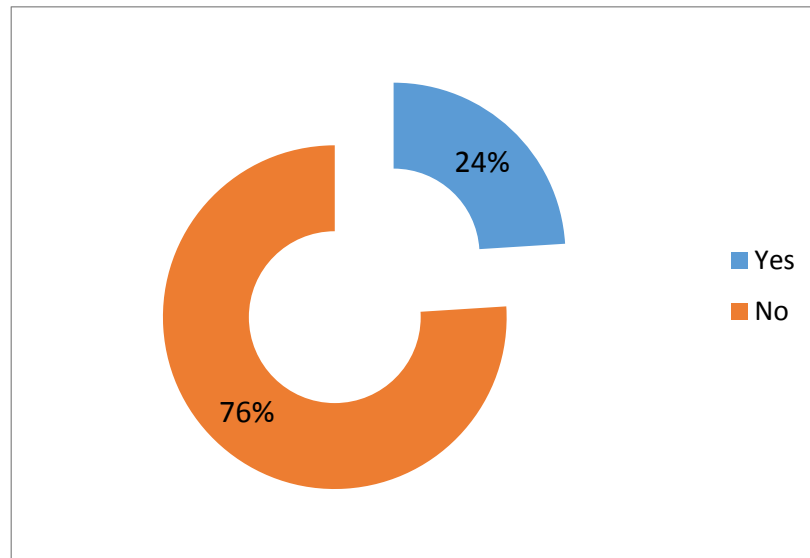


Figure 3
Preference of using aids in similar fashion to every child

Figure 3 depicts the responses of teachers towards their preference of using teaching materials. It was interesting to know that three fourth of the respondents (76%) do not like to use the teaching aids in similar fashion to every child. Only nearly one fourth of them (24%) preferred to use aids in similar manner for every child. Each child is unique and has different predominant type of multiple intelligences. Teachers must teach based on the predominant multiple intelligence of the children to bring good results in them.

4.3 Opinion and Awareness of Selected Teachers on MI

The awareness of the concept of multiple intelligence among the selected teachers and their attitude towards using strategies on the basis of multiple intelligence are presented below.

4.3.1 Awareness of the Concept of Multiple Intelligence among Selected Teachers

Table 7 discusses about the awareness of teachers about the various intelligences and whether they have received any training in multiple intelligence.

Table 7**Awareness of the concept of Multiple Intelligence among selected teachers**

Sl.No	Items	Responses of Teachers	
		N=70	%
1	Ability to think in images and pictures		
	• Verbal-linguistic Intelligence	5	7
	• Visual-spatial Intelligence	62	89
	• Logical-Mathematical Intelligence	3	4
2	Capacity to detect and respond to the moods, motivation and desires of others		
	• Intrapersonal Intelligence	19	27
	• Bodily-Kinesthetic Intelligence	4	6
	• Interpersonal Intelligence	39	56
	• Naturalistic Intelligence	8	11
3	Received training in Multiple Intelligence		
	• Yes	27	39
	• No	43	61

From table 7, it is understood that majority of the respondents (89%) knew that an individual with the ability to think in the form of images and pictures had visual-spatial intelligence. Seven percent of the respondents thought that such individuals had verbal-linguistic intelligence and very few respondents (4 %) thought they had logical-mathematical intelligence.

More than half of the respondents (56%) believed that an individual having the capacity to detect and respond to the moods, motivation and desires of others had interpersonal intelligence. But 27 percent thought it as intrapersonal intelligence, 11 percent as naturalistic intelligence and six percent as bodily-kinesthetic intelligence.

With regard to the training received in multiple intelligence, it was sad to know that only thirty nine percent of respondents got training while sixty one percent of the respondents haven't received any training in multiple intelligence. Teachers must get the opportunity to participate in seminars, workshops etc so that they become more aware about the importance of identifying the predominant intelligence types of children and about the ways of implementing the Gardner's theory of multiple intelligence in classrooms. A study conducted by Linda (2016) found that the familiarity among teachers to Gardner's Multiple Intelligence theory was relatively low.

4.3.2 Attitude Towards Using Strategies on the Basis of Multiple Intelligence

The practicality of applying MI theory in classrooms, the barriers in teaching when MI theory is applied and the preference of the respondents in the implementation of interest centers were studied and is given in the table below.

Table 8
Attitude towards using strategies on the basis of Multiple Intelligence

Sl.No	Items	Responses of Teachers	
		N=70	%
1	Barriers foreseen in teaching when MI theory is applied		
	• Difficulty in making teaching aids	28	40
	• Lack of parental support	13	19
	• Difficulty in identifying the intelligence in child	29	41
2	Practicality of applying MI		
	• Yes	45	64
	• No	25	36
3	Preference of Interest Centers		
	• Yes	60	86
	• No	10	14

Looking into the obstacles in teaching when MI theory is applied, forty one percent of the respondents point out the problem in finding out the predominant intelligence type of multiple intelligence in children. Forty percent of the respondents opined that it would be difficult in making teaching aids for each type of intelligence for each concept because preparing teaching aids would be time consuming .Nineteen percent of respondents felt the deficit of parental support and interest could act as a barrier.

Reviewing the practicality of applying multiple intelligence theory in classrooms, more than half of the respondents (64%) were positive .It was sad to know that 36 percent of the respondents thought it will not be practically possible to implement the multiple intelligence theory in classrooms .It was interesting to know that a majority of eighty six percent of the respondents had a positive attitude towards the implementation of interest centers at schools. Only 14 percent were against it.

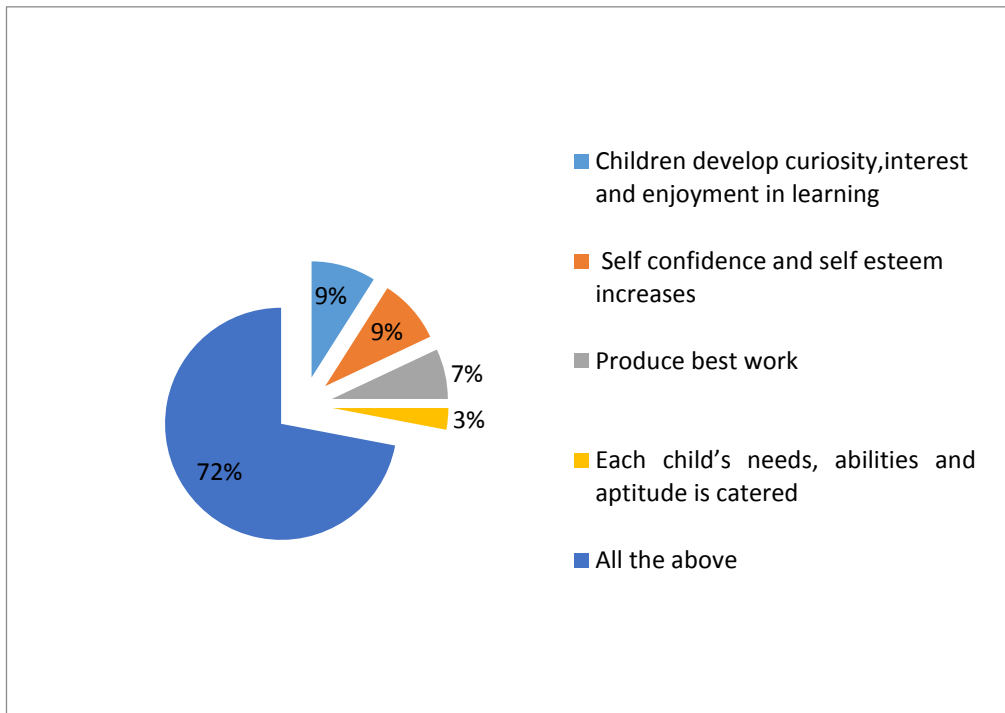


Figure 4

Reason for preferring MI based interest centers

Out of the 86 percent of respondents who preferred the implementation of MI based interest centers, 72 percent believed that the curiosity, interest and enjoyment of children in learning will be improved and the qualities like self confidence and self esteem would develop helping them to bring out their maximum potential by catering to their needs, abilities and aptitude. On the other hand a meagre of three percent thought that only the child's needs, abilities and aptitude could be catered to. Macias(2013) in his study "Development of the Distinct Multiple Intelligences In Primary Students Through Interest Centers" found that Interest centers provided children an opportunity to develop activities that helped them to discover their own way of learning and provided opportunities for authentic learning based on student's needs, interests and talents. All students developed and applied new skills. It helped to build self confidence in children.

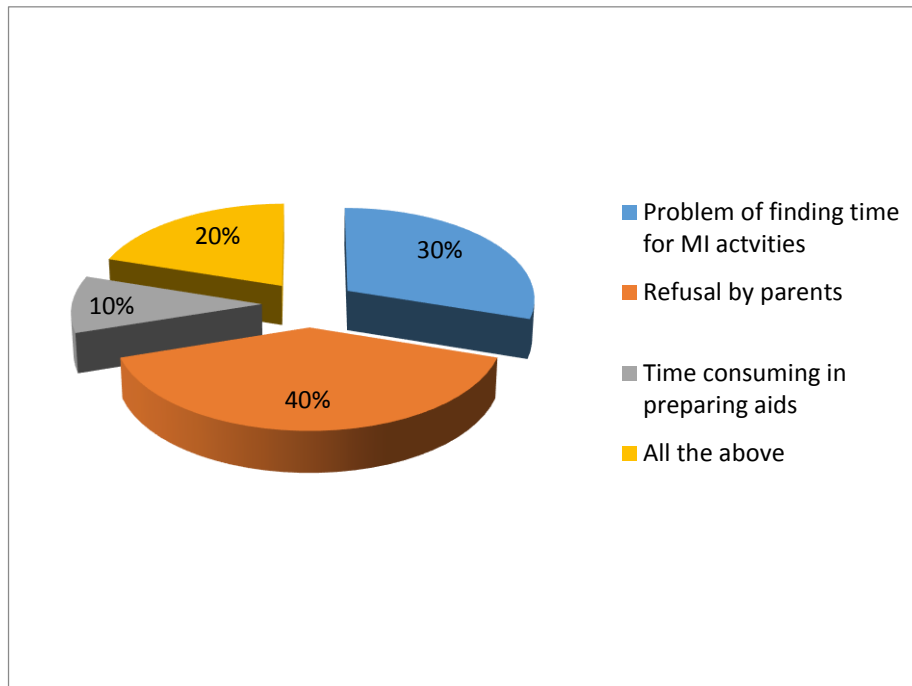


Figure 5
Reason for not preferring interest centers

Among the 14 percent of respondents who did not prefer the implementation of interest centers, 40 percent thought the concept of interest centers won't be accepted by the parents and 30 percent thought that enough time won't be available for the MI activities. Ten percent of the respondents were against the idea of implementing interest centers as preparation of aids was time consuming.

4.4 Section 4-The Predominant Multiple Intelligence of Teachers and its Relation with the Subject Taught

The predominant multiple intelligence of teachers and the relation between teacher's multiple intelligence and subject taught are presented below.

4.4.1 Predominant Multiple Intelligence of Teachers

The distinct and predominant multiple intelligence of teachers was studied and analyzed in the following table.

Table 9
Multiple intelligence of selected teachers

Intelligence	Highly Dominant(n=60)	Moderately dominant(n=60)	Least dominant(n=60)
	%	%	%
Naturalistic	25	53	22
Musical	20	48	32
Logical-mathematical	20	55	25
Existential	28	58	13
Interpersonal	25	48	27
Bodily-Kinesthetic	47	35	18
Verbal-Linguistic	20	38	42
Intrapersonal	35	43	22
Visual-spatial	22	48	30

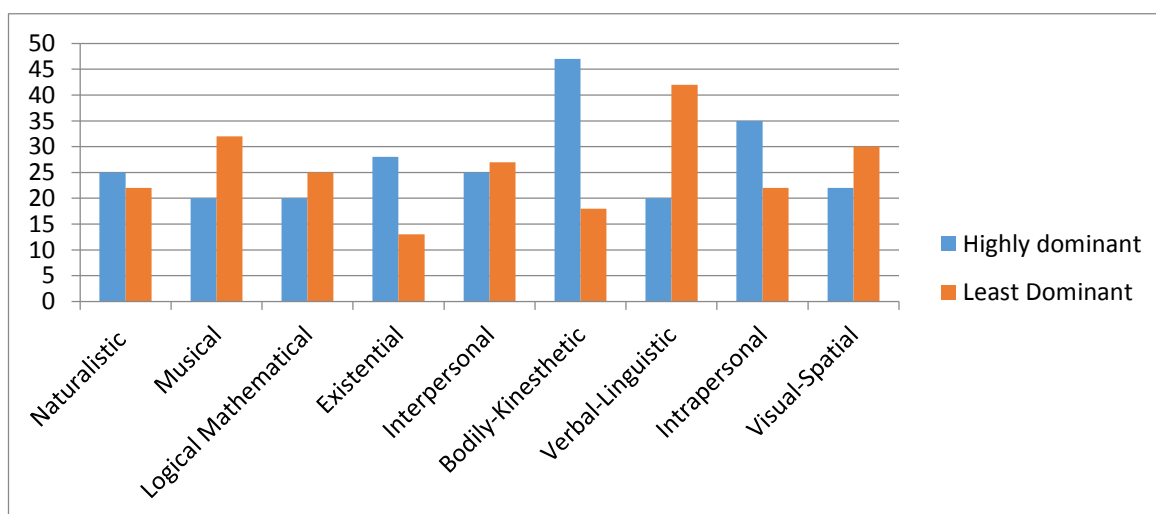


Figure 6
Multiple intelligence of selected teachers

The above table and figure depicts the multiple intelligence of teachers. It was surprising to know that the bodily-kinesthetic intelligence was the most dominant(47 %) among the respondents followed by intrapersonal intelligence (35%) but logical – mathematical and visual-spatial intelligence were seen as the dominant intelligence domain among the pre-service teachers in the study “An examination of multiple intelligence domains and learning styles of pre-service mathematics teachers: Their reflections on mathematics education” (Kemal et al,2011). More than half of the respondents (58%) were moderately dominant in existential intelligence followed by logical-mathematical intelligence (55%) and it was sad to know that the least dominant intelligence seen among the respondents were verbal-linguistic intelligence (42 %) followed by musical intelligence (32%).

4.4.2 Relation between Teacher’s predominant type of Multiple Intelligence and Subject Taught

The relation between teacher’s multiple intelligence and subject taught was studied and presented in the following table.

Table 10
Relation between teacher's multiple intelligence and subject taught

Subject taught	N	Type of Intelligence (%)								
		Naturalistic	Musical	Logical-Mathematical	Intra personal	Inter personal	Bodily-Kinesthetic	Verbal - Linguistic	Existential	Visual-spatial
English	13	15	15	8	31	8	38	15	23	8
Science	4	25	0	25	0	0	50	0	0	0
Malayalam	4	25	25	0	0	25	25	25	25	25
Social	4	25	0	25	25	25	0	0	25	25
Hindi	7	14	0	14	43	29	43	14	29	0
Math	9	0	11	33	44	33	44	11	33	22
English, Social	5	40	0	20	20	40	20	40	20	0
All Subjects	14	50	57	29	57	36	86	36	43	57

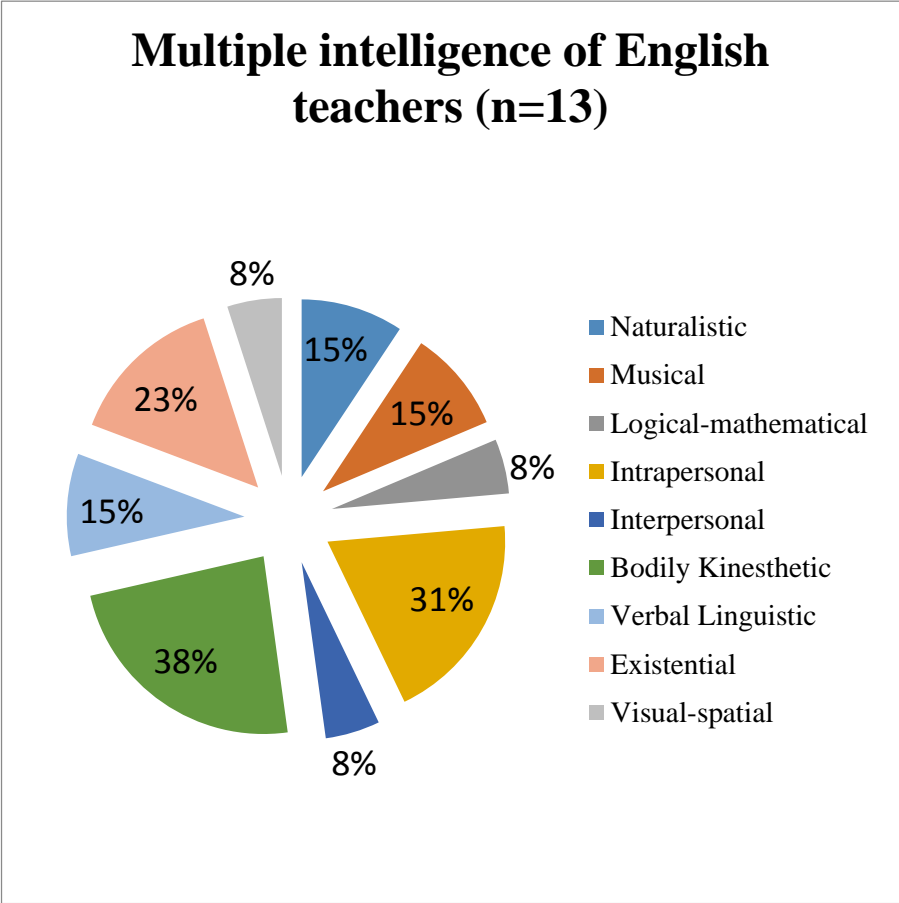


Figure 7
Predominant type of intelligence among English teachers

Multiple intelligence of Science teachers (n=4)

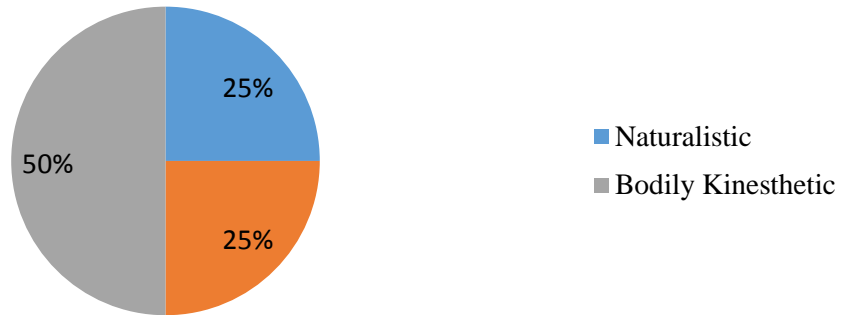


Figure 8
Predominant type of intelligence among Science teachers

Multiple intelligence of Malayalam teachers (n=4)

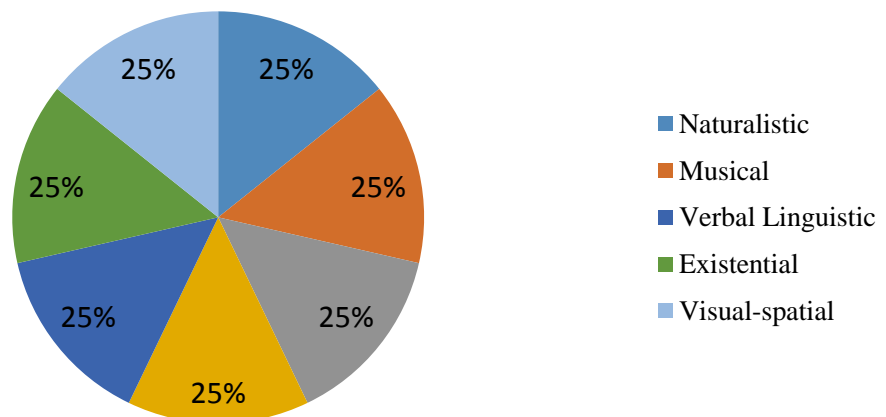


Figure 9
Predominant type of intelligence among Malayalam teachers

Multiple intelligence of Social teachers (n=4)

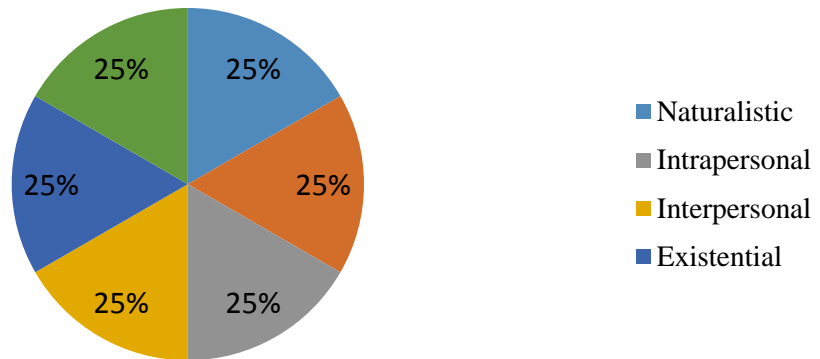


Figure 10
Predominant type of intelligence among Social teachers

Multiple intelligence of Hindi teachers(n=7)

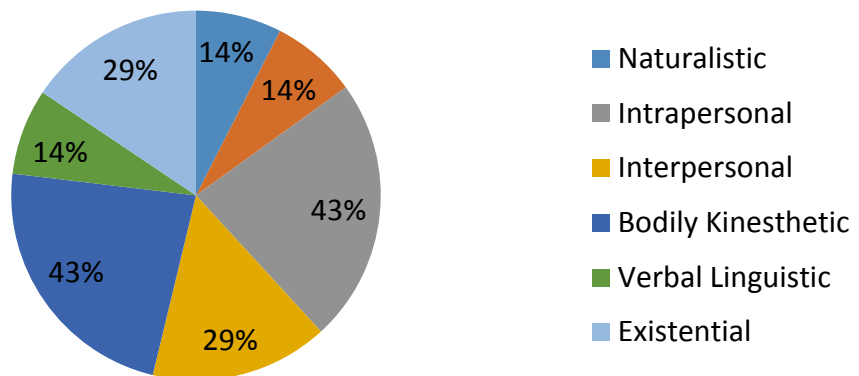


Figure 11
Predominant type of intelligence among Hindi teachers

**Multiple intelligence of Maths teachers
(n=9)**

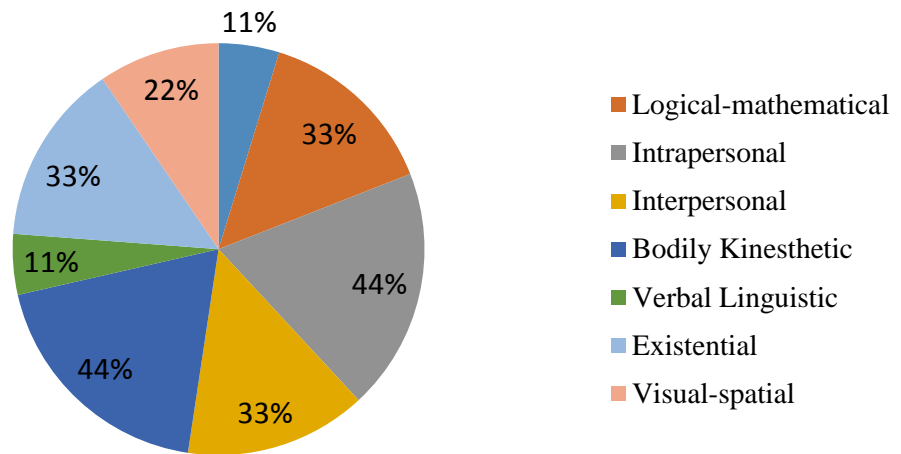


Figure 12
Predominant type of intelligence among Math teachers

**Multiple intelligence of teachers teaching
English and Social(n=5)**

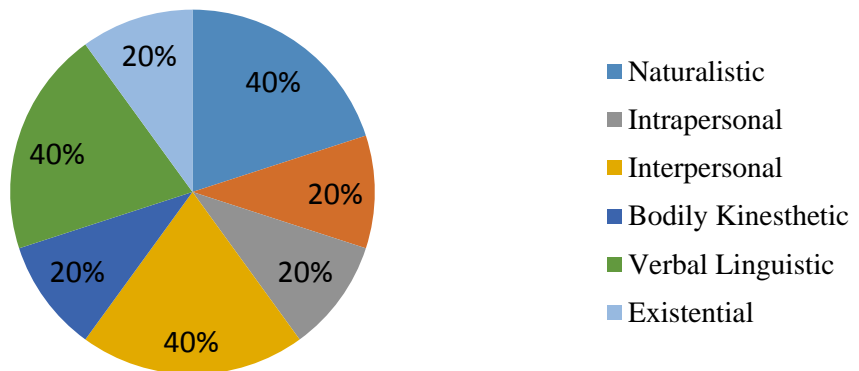


Figure 13
Predominant type of intelligence among teachers teaching English and Social

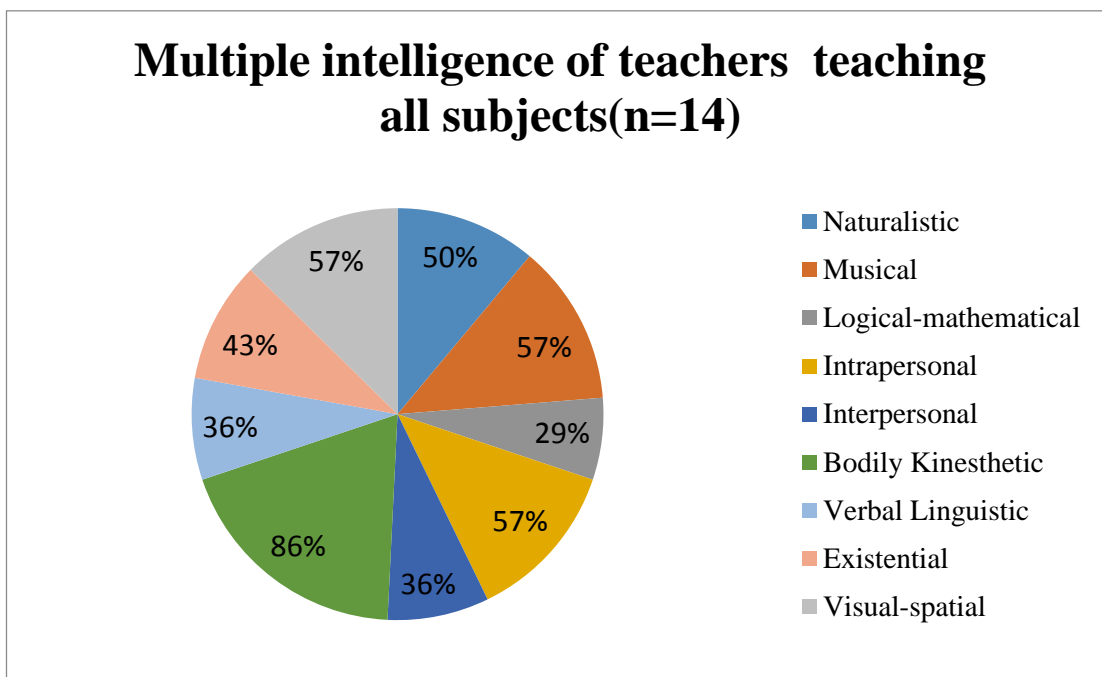


Figure 14
Predominant type of intelligence among teachers teaching all the subjects

The figure above provides us information about the multiple intelligence of teachers and the subject taught. It was found that majority of the English teachers (38%) and Science teachers (50%) had bodily-kinesthetic intelligence as their dominant type of intelligence. It is interesting to know that the teachers who taught Hindi had Intrapersonal intelligence. Teaching could have been better if they had logical-mathematical intelligence. A majority of 86 percent of teachers who taught all the subjects were highly dominant in kinesthetic intelligence followed by musical, intrapersonal and visual-linguistic intelligence as their dominant type of intelligence. Verbal-Linguistic Intelligence was the most required predominant intelligence type in teachers.

4.5. Multiple Intelligence of Selected Children

The predominant and distinct multiple intelligence among children, relation between gender and the various types of multiple intelligence and the relation between the types of multiple intelligence and the children from state and CBSE schools are presented below.

4.5.1 Predominant and distinct multiple intelligence among children

The predominant and distinct multiple intelligence of children from both state and CBSE schools was studied and analyzed in the following table.

Table 11
Predominant multiple intelligence among children

Intelligence (%)	Score(of the respondents in %)							
	State (n=226)				CBSE(n=274)			
	Boys (n=140)		Girls(n=86)		Boys(n=129)		Girls(n=145)	
	1	0	1	0	1	0	1	0
Musical	48	52	64	36	32	68	29	71
Visual-spatial	58	42	49	51	59	41	40	60
Verbal-linguistic	59	41	59	41	51	49	76	24
Bodily-kinesthetic	57	43	77	23	47	53	66	34
Naturalistic	77	22	70	30	64	36	71	29
Inter personal	65	35	65	35	60	40	51	49
Intrapersonal	24	76	21	79	20	80	17	83
Logical- Mathematical	77	23	60	40	57	43	48	52

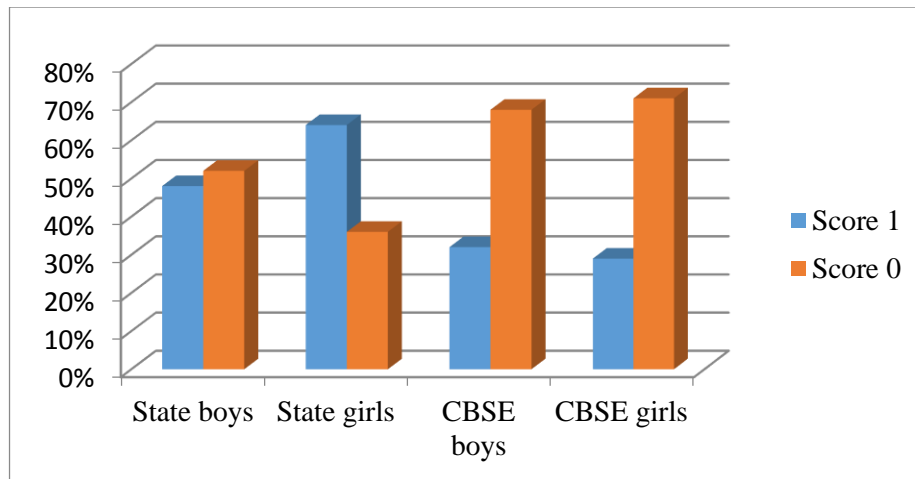


Figure 15
The predominance of musical intelligence among children

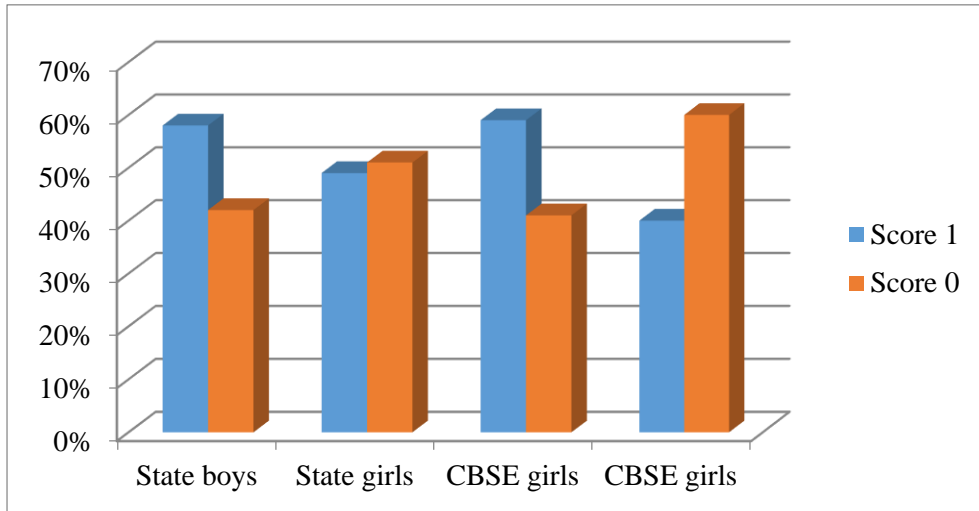


Figure 16
The predominance of visual-spatial intelligence among children

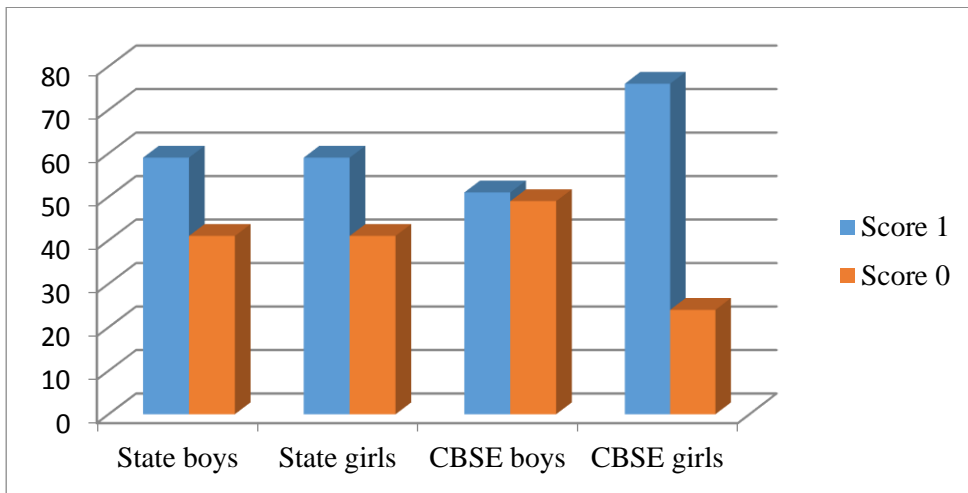


Figure 17
The predominance of verbal-linguistic intelligence among children

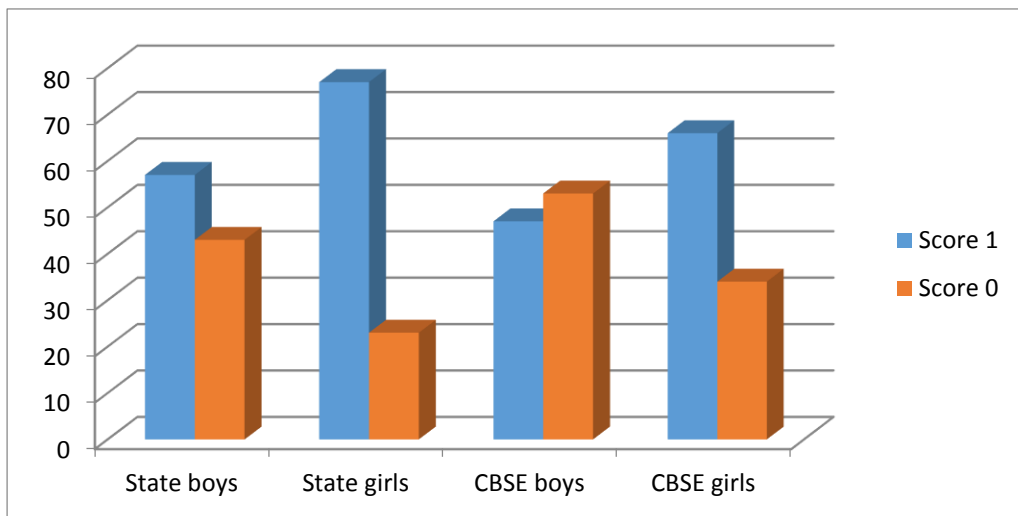


Figure 18
The predominance of bodily-kinesthetic intelligence among children

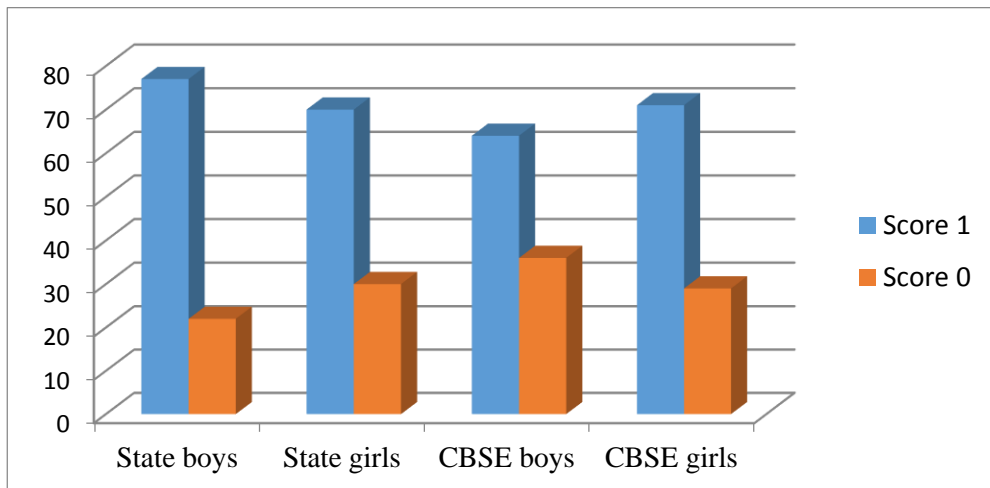


Figure 19
The predominance of naturalistic intelligence among children

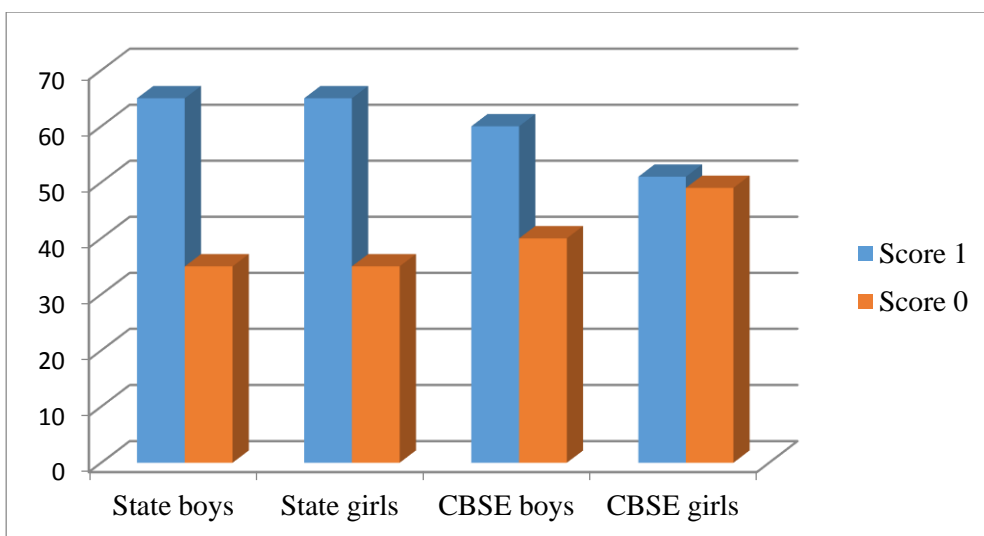


Figure 20
The predominance of interpersonal intelligence among children

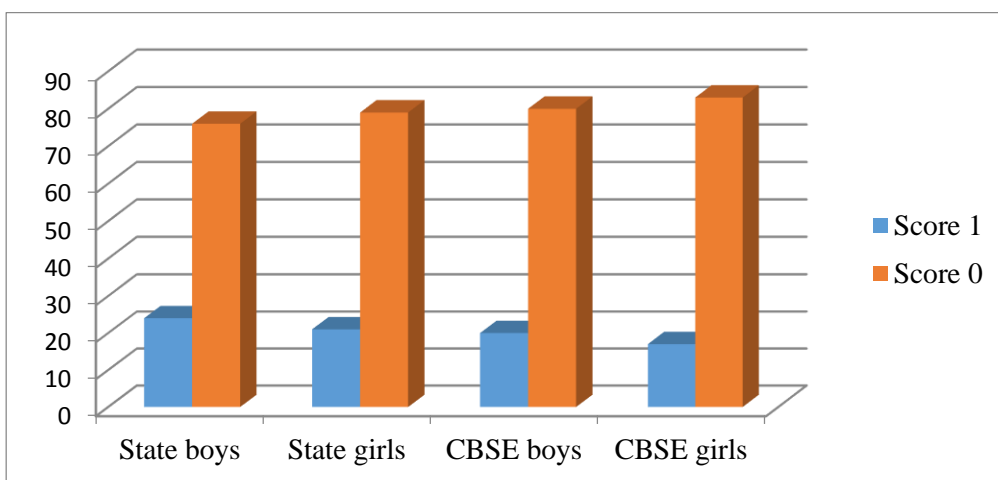


Figure 21
The predominance of intrapersonal intelligence among children

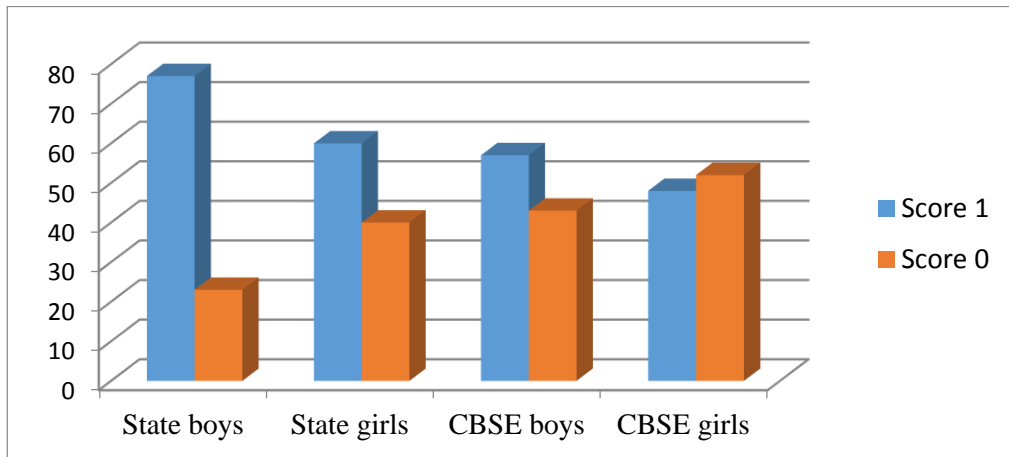


Figure 22

The predominance of logical-mathematical intelligence among children

Regarding the predominant intelligence among children, more than half of the girls studying in state syllabus schools (64%) were dominant in musical intelligence and it was sad to know that 71 percent of the girls studying in CBSE schools didn't had musical intelligence as their predominant intelligence type. Visual-spatial intelligence was dominant among the state syllabus boys (58%) and CBSE boys (59%) when compared with the girls. Verbal-linguistic intelligence was highest among the girls studying in CBSE schools (76%). Seventy seven percent of the girls from state syllabus schools had bodily-kinesthetic intelligence while 77 percent of the boys from state syllabus schools had dominant naturalistic intelligence. Interpersonal and intrapersonal intelligence was least dominant among the girls of CBSE schools (51%). Boys were more dominant in logical-mathematical intelligence than girls. This goes in line with the finding with the study conducted by Vandana and Jiwan (2016). Research has shown that boys and girls differ in analytical thinking. Analytical thinking among boys are high than girls regarding logical- mathematical intelligence.

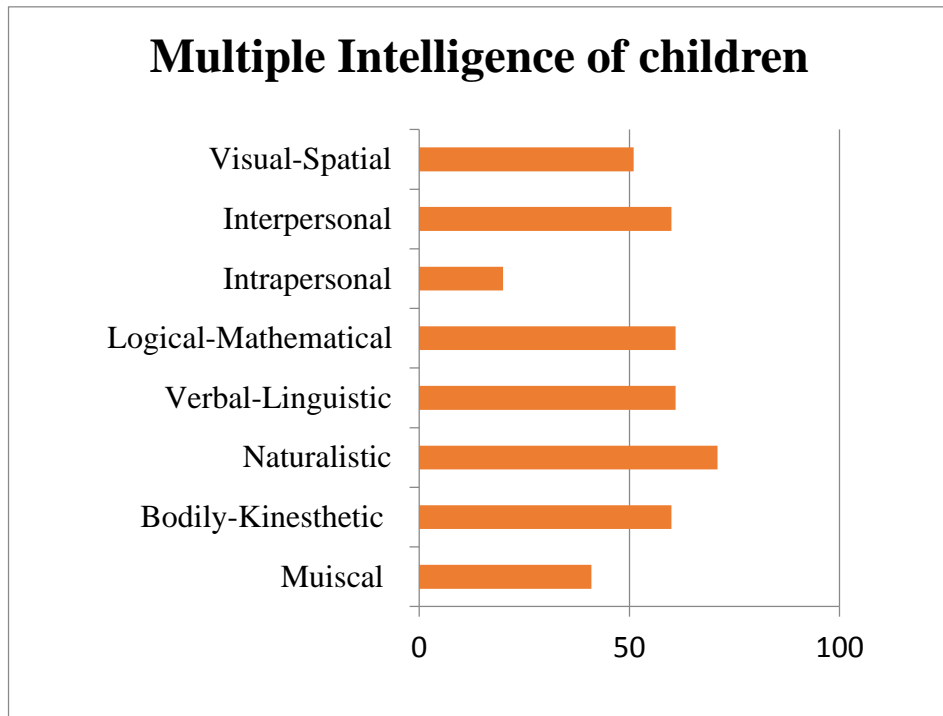


Figure 23
Predominant intelligence type of multiple intelligence

From the figure, it can be inferred that 70 percent of the children had dominance in Naturalistic intelligence followed by verbal-linguistic (62%). Only 20 percent of the children showed dominance in intrapersonal intelligence.

4.5.2 The Relation between Musical Intelligence and Gender

The relation between musical intelligence and gender was studied and analyzed in the following table.

Table 12
Relation between musical intelligence and gender

	Girls	Boys	Total
Dominant	100	157	257
Non Dominant	131	112	243
Total	231	269	500

A chi-square test of independence was performed to examine the relation between musical intelligence and gender. The relation between these variables were not significant. The level of significance was taken at 0.05%.The calculated value found was 0.1744. Since the calculated value is less than the table value, the null hypothesis stating that there is no relation between musical intelligence and gender was accepted. Hence it was found that the musical intelligence and gender are not related.

4.5.3 The Relation between Visual-Spatial Intelligence and Gender

The relation between visual-spatial intelligence and gender was studied and analyzed in the following table.

Table 13
Relation between visual-spatial intelligence and gender

	Girls	Boys	Total
Dominant	97	108	205
Non Dominant	134	161	295
Total	231	269	500

A chi-square test of independence was performed to examine the relation between visual-spatial intelligence and gender. The relation between these variables were significant. The level of significance was taken at 0.05%. The calculated value found was 11.3049. Since the calculated value is greater than the table value, the null hypothesis stating that there is no between the visual-spatial intelligence and gender was rejected and an alternate hypothesis stating that there is a relation between visual-spatial intelligence and gender was accepted. Hence it was found that there is a relation between visual-spatial intelligence and gender. It goes in line with the study conducted by Surbhi and Suraksha (2017), the t- value for visual-spatial intelligence of male and female students were significant.

4.5.4 The Relation between Verbal-Linguistic Intelligence and Gender

The relation between verbal-linguistic intelligence and gender was studied and analyzed in the following table.

Table 14
Relation between verbal-linguistic intelligence and gender

	Girls	Boys	Total
Dominant	161	148	309
Non Dominant	70	121	191
Total	231	269	500

A chi-square test of independence was performed to examine the relation between verbal-linguistic intelligence and gender. The relation between these variables were significant. The level of significance was taken at 0.05%. The calculated value found was 11.3422. Since the calculated value is greater than the table value, the null hypothesis, stating that there is no relation between verbal-linguistic intelligence and gender was rejected and an alternate hypothesis stating that there is a relation between verbal-linguistic intelligence and gender was accepted. Hence it was found that there is a relation between verbal-linguistic intelligence and gender. It goes in line with the study conducted by Aysel and Arda (2009), an analysis of group differences revealed a significant difference between boys and girls in linguistic intelligence ($p < .02$).

4.5.5 The Relation between Bodily-Kinesthetic Intelligence and Gender

The relation between bodily-kinesthetic intelligence and gender was studied and analyzed in the following table.

Table 15
Relation between bodily-kinesthetic intelligence and gender

	Girls	Boys	Total
Dominant	161	141	302
Non Dominant	70	128	198
Total	231	269	500

A chi-square test of independence was performed to examine the relation between bodily-kinesthetic intelligence and gender. The relations between these variables were significant. The level of significance was taken at 0.05%. The calculated value found was 15.5160. Since the calculated is greater than the table value, the null hypothesis stating that there is no relation between bodily-kinesthetic intelligence and gender was rejected and an alternate hypothesis stating that there is a relation between bodily-kinesthetic intelligence and gender was accepted. Hence it was found that there is a relation between bodily-kinesthetic intelligence and gender.

4.5.6 The Relation between Interpersonal Intelligence and Gender

The relation between interpersonal intelligence and gender was studied and analyzed in the following table.

Table 16
Relation between interpersonal intelligence and gender

	Girls	Boys	Total
Dominant	130	169	299
Non Dominant	101	100	201
Total	231	269	500

A chi-square test of independence was performed to examine the relation between interpersonal intelligence and gender. The relations between these variables were not significant. The level of significance was taken at 0.05%. The calculated value found was 2.2167. Since the calculated value is less than the table value, the null hypothesis stating that there is no relation between the interpersonal intelligence and gender was accepted. Hence it was found that the interpersonal intelligence and gender are not related. This goes in line with the finding from study conducted by Jignasa(2016), There was no significant difference of gender on Interpersonal Intelligence.

4.5.7 The Relation between Logical-Mathematical Intelligence and Gender

The relation between logical-mathematical intelligence and gender was studied and analyzed in the following table.

Table 17
Relation between logical-mathematical intelligence and gender

	Girls	Boys	Total
Dominant	122	181	303
Non Dominant	109	88	197
Total	231	269	500

A chi-square test of independence was performed to examine the relation between logical-mathematical intelligence and gender. The relation between these variables were significant. The level of significance was taken at 0.05%. The calculated value found was 10.9019. Since the calculated value is greater than the table value, the null hypothesis stating that there is no relation between the interpersonal intelligence and gender was rejected and an alternate hypothesis stating that there is a relation between logical-mathematical intelligence and gender was accepted. Hence it was found that the logical-mathematical intelligence and gender are related.

4.5.8 The Relation between Intrapersonal Intelligence and Gender

The relation between intrapersonal intelligence and gender was studied and analyzed in the following table .

Table 18
Relation between intrapersonal intelligence and gender

	Girls	Boys	Total
Dominant	42	60	102
Non Dominant	189	209	398
Total	231	269	500

A chi-square test of independence was performed to examine the relation between intrapersonal intelligence and gender. The relation between these variables were not significant. The level of significance was taken at 0.05%. The calculated value found was 1.3010. Since the calculated value is less than the table value, the null hypothesis stating that there is no relation between intrapersonal intelligence and gender was accepted. Hence it was found that the intrapersonal intelligence and gender are not related.

4.5.9 The Relation between Naturalistic Intelligence and Gender

The relation between naturalistic intelligence and gender was studied and analyzed in the following table.

Table 19
Relation between naturalistic intelligence and gender

	Girls	Boys	Total
Dominant	163	191	354
Non Dominant	68	78	146
Total	231	269	500

A chi-square test of independence was performed to examine the relation between naturalistic intelligence and gender. The relation between these variables were not significant. The level of significance was taken at 0.05%. The calculated value found was 0.0116. Since the calculated value is less than the table value, the null hypothesis stating that there is no relation between the naturalistic intelligence and gender was accepted. Hence it was found that the naturalistic intelligence and gender are not related.

4.5.10 The Relation between Musical Intelligence and Children from State and CBSE schools

The relation between musical intelligence and children from state and CBSE schools was studied and analyzed in the following table

Table 20
Relation between musical intelligence and children from state and CBSE schools

	State Syllabus	CBSE	Total
Dominant	122	83	205
Non Dominant	104	191	295
Total	226	274	500

A chi-square test of independence was performed to examine the relation between musical intelligence and children from state and CBSE schools. The relations between these variables were significant. The level of significance was taken at 0.05%. The calculated value found was 28.733. Since the calculated value is greater than the table value, the null hypothesis stating that there is no relation between musical intelligence and children from state syllabus and CBSE schools was rejected and an alternate hypothesis stating that there is a relation between musical intelligence and children from state syllabus and CBSE schools was accepted. Hence it was found that the musical intelligence and children from state syllabus and CBSE schools are related.

4.5.11 The Relation between Visual-Spatial Intelligence and Children from State and CBSE Schools

The relation between visual-spatial intelligence and children from state and CBSE schools was studied and analyzed in the following table

Table 21
Relation between visual-spatial intelligence and children from state and CBSE schools

	State Syllabus	CBSE	Total
Dominant	123	134	257
Non Dominant	103	140	243
Total	226	274	500

A chi-square test of independence was performed to examine the relation between visual-spatial intelligence and children from state and CBSE schools. The relation between these variables were not significant. The level of significance was taken at 0.05%. The calculated value found was 1.5104. Since the calculated value is less than the table value, the null hypothesis stating that there is no relation between visual-spatial intelligence and children from state and CBSE schools was accepted. Hence it was found that the visual-spatial intelligence and children from state and CBSE schools are not related.

4.5.12 The Relation between Verbal-Linguistic Intelligence and Children from State and CBSE Schools

The relation between verbal-linguistic intelligence and children from state and CBSE schools was studied and analyzed in the following table

Table 22
Relation between verbal-linguistic intelligence and children from state and CBSE schools

	State Syllabus	CBSE	Total
Dominant	133	176	309
Non Dominant	93	98	191
Total	226	274	500

A chi-square test of independence was performed to examine the relation between verbal-linguistic intelligence and children from state and CBSE schools. The relation between these variables were not significant. The level of significance was taken at 0.05%. The calculated value found was 1.5207. Since the calculated value is less than the table value, the null hypothesis stating that there is no relation between the verbal-linguistic intelligence and children from state and CBSE schools was accepted. Hence it was found that the verbal-linguistic intelligence and children from state and CBSE schools are not related.

4.5.13 The Relation between Bodily-Kinesthetic Intelligence and Children from State and CBSE Schools

The relation between bodily-kinesthetic intelligence and children from state and CBSE schools was studied and analyzed in the following table

Table 23

Relation between bodily-kinesthetic intelligence and children from state and CBSE schools

	State Syllabus	CBSE	Total
Dominant	146	83	229
Non Dominant	80	191	271
Total	226	274	500

A chi-square test of independence was performed to examine the relation between bodily-kinesthetic intelligence and children from state and CBSE schools. The relation between these variables were significant. The level of significance was taken at 0.05%. The calculated value found was 58.7300. Since the calculated value is greater than the table value, the null hypothesis stating that there is no relation between bodily-kinesthetic intelligence and children from state and CBSE schools was rejected and an alternate hypothesis stating that there is a relation between bodily-kinesthetic intelligence and children from state and CBSE schools was accepted. Hence it was found that there is a relation between bodily-kinesthetic intelligence and children from state and CBSE schools.

4.5.14 The Relation between Interpersonal Intelligence and Children from State and CBSE Schools

The relation between interpersonal intelligence and children from state and CBSE schools was studied and analyzed in the following table

Table 24
Relation between interpersonal intelligence and children from state and CBSE schools

	State Syllabus	CBSE	Total
Dominant	147	152	303
Non Dominant	79	122	197
Total	226	274	500

A chi-square test of independence was performed to examine the relation between interpersonal intelligence and children from state and CBSE schools. The relations between these variables were significant. The level of significance was taken at 0.05%. The calculated value found was 5.0208. Since the calculated value is greater than the table value, the null hypothesis stating that there is no relation between interpersonal intelligence and children from state and CBSE schools was rejected and an alternate hypothesis stating that there is a relation between interpersonal intelligence and children from state and CBSE schools was accepted. Hence it was found that there is a relation between interpersonal intelligence and children from state and CBSE schools.

4.5.15 The Relation between Intrapersonal Intelligence and Children from State and CBSE Schools

The relation between intrapersonal intelligence and children from state and CBSE schools was studied and analyzed in the following table

Table 25
Relation between intrapersonal intelligence and children from state and CBSE schools

	State Syllabus	CBSE	Total
Dominant	52	50	102
Non Dominant	174	224	398
Total	226	274	500

A chi-square test of independence was performed to examine the relation between intrapersonal intelligence and children from state and CBSE schools. The relation between these variables were not significant. The level of significance was taken at 0.05%. The calculated value found was 1.7285. Since the calculated value is less than the table value, the null hypothesis stating that there is no relation between the intrapersonal intelligence and children from state and CBSE schools was accepted. Hence it was found that the intrapersonal intelligence and children from state and CBSE schools are not related.

4.5.16 The Relation between Naturalistic Intelligence and Children from State and CBSE schools

The relation between naturalistic intelligence and children from state and CBSE schools was studied and analyzed in the following table

Table 26
Relation between naturalistic intelligence and children from state and CBSE schools

	State Syllabus	CBSE	Total
Dominant	168	186	354
Non Dominant	58	88	146
Total	226	274	500

A chi-square test of independence was performed to examine the relation between naturalistic intelligence and children from state and CBSE schools. The relation between these variables were not significant. The level of significance was taken at 0.05%. The calculated value found was 2.4946. Since the calculated value is less than the table value, the null hypothesis stating that there is no relation between naturalistic intelligence and children from state and CBSE schools was accepted. Hence it was found that the naturalistic intelligence and children from state and CBSE schools are not related.

4.5.17 The Relation between Logical-Mathematical Intelligence and Children from State and CBSE schools

The relation between Logical-Mathematical intelligence and children from state and CBSE schools was studied and analyzed in the following table.

Table 27

Relation between logical-mathematical intelligence and children from state and CBSE schools

	State Syllabus	CBSE	Total
Dominant	160	143	303
Non Dominant	66	131	197
Total	226	274	500

A chi-square test of independence was performed to examine the relation between logical-mathematical intelligence and children from state and CBSE schools. The relations between these variables were significant. The level of significance was taken at 0.05%. The calculated value found was 17.957. Since the calculated value is greater than the table value, the null hypothesis stating that there is no relation between interpersonal intelligence and children from state and CBSE schools was rejected and an alternate hypothesis stating that there is a relation between interpersonal intelligence and children from state and CBSE schools. Hence it was found that there is a relation between interpersonal intelligence and children from state and CBSE schools.

4.6. Evaluation of the Booklet

Around 60 activities to teach various mathematical operations like addition, subtraction, multiplication and time concept were compiled into a booklet. The activities were compiled based on the eight multiple intelligence. The booklet was evaluated by five experienced teachers. Evaluation of the booklet was done using a checklist. The criteria for evaluation included various aspects like relevance of the activities, appearance, suitability to target group, utility, practical applicability and clarity in procedure. The results of the evaluation are depicted in Figure 24.

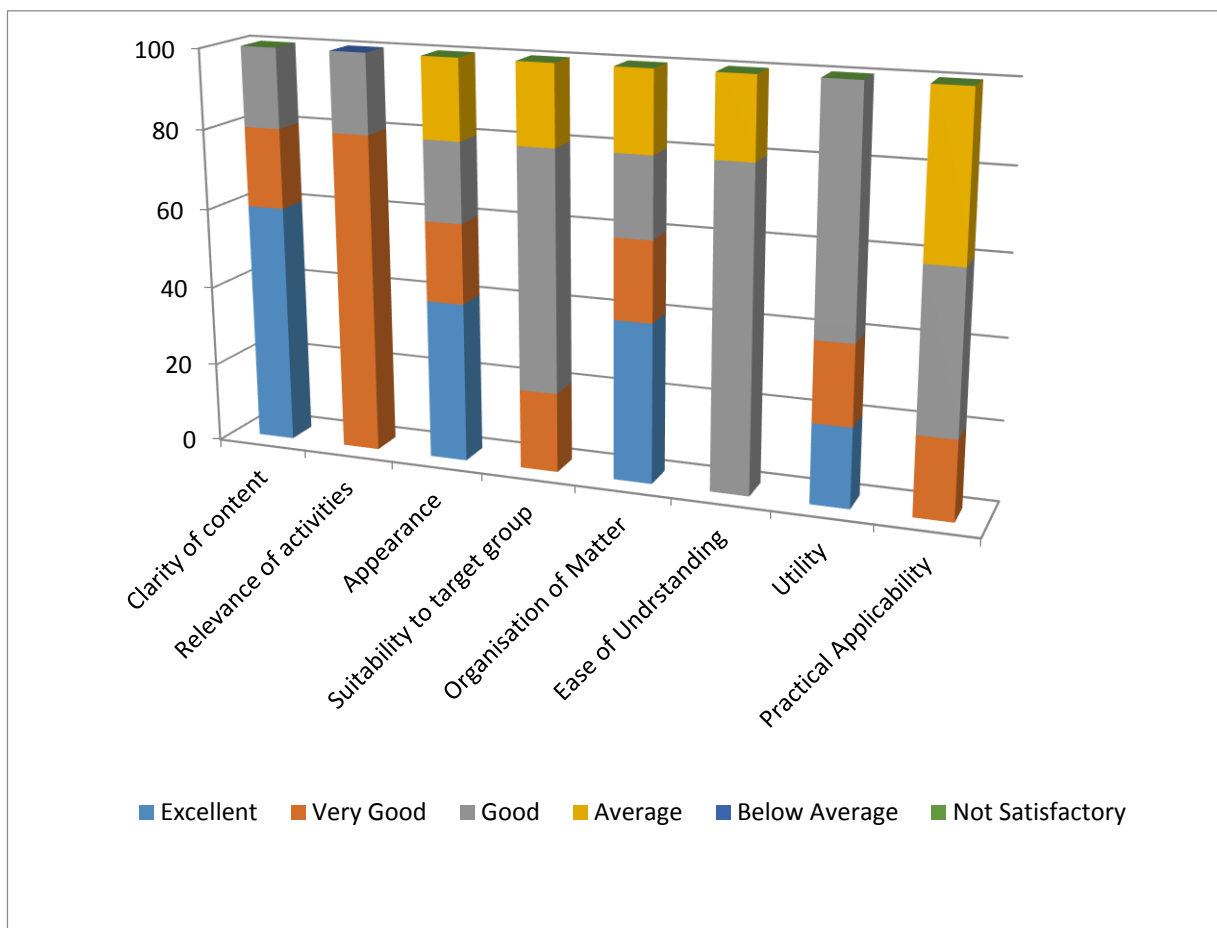


Figure 24
Evaluation of booklet

From Figure 24, it could be observed that the clarity of content was opined as very good by 60 percent of the teachers. Eighty percent of the teachers rated the relevance of the activities as good. While considering the appearance of the booklet, 40 percent of the teachers rated it as excellent.

Regarding the suitability of activities to the target group, 60 percent of teachers opined that the activities were good and suited the age group mentioned in the booklet. The organisation of content was given an excellent rating by 40 percent of teachers. The ease of understanding the activity was evaluated and rated as good by 80 percent of teachers. The utility of the booklet was rated as good by 60 percent of teachers and 40 percent of teachers rated the practical applicability of the booklet as average.

CHAPTER 5

SUMMARY AND CONCLUSION

The study undertaken by the researcher was on “Generating Interest in Academics by Harnessing Multiple Intelligence”. In the present study a booklet was formulated compiling around 60 activities for teaching various mathematical operations such as addition, subtraction, multiplication and time concepts by applying Gardner’s theory of Multiple Intelligence. The area selected for the study was Thevara, Cochin Corporation, Kaloor, Thammanam, Kakkanad and Edapally. The sample for the present study comprised of 500 children (231 girls and 269 boys) studying in 3rd grade and 70 teachers(both male and female) from state syllabus and CBSE schools. The method of sampling adopted was Purposive sampling and simple random sampling. The tools used for the present study were Multiple Intelligence (M.I.) Inventory to check the multiple intelligence of teachers, a questionnaire to assess the predominant and distinct multiple intelligence of children, questionnaire to find the level of awareness, perception and attitude of teachers on multiple intelligence and the implementation of Interest Centers at schools, a booklet containing activities for teaching various mathematical concepts like addition, subtraction etc by applying Gardner’s theory of Multiple Intelligence to generate interest in academics.

Data was collected, consolidated, interpreted and analyzed. The percentage of subjects who gave different responses to general questions was calculated using percentage analysis and the relation between various variables was found using chi-square test. The findings of the study are given below.

Findings

The findings of the present study were as follows :

- Ninety one percent of the teachers thought that students do not grasp information when taught in similar fashion.
- When students don’t listen to lectures or day dreams in class, approach adopted by almost three fourth of the respondents (74%) was that they tried to understand whether the subject was not interesting or the way of teaching was not interesting. If the subject was interesting but the way of teaching was not appealing or the way of teaching was interesting but the subject was not interesting. Very few of them (4%) were concerned to check whether the subject was not interesting.

- Ninety six percent of the respondents didn't believe that punishments help children excel in academics.
- Out of the 96 percent of the respondents, 46 percent believed that being kind and pleasant with children help them fetch more marks in exams.
- Nearly three fourth of the respondents (73%) agreed that allotting one hour every week for cultural activities would help identifying the interest of children.
- Ninety percent of the respondents taught using variety of aids other than textbook and blackboard.
- Nearly three fourth of the respondents (70%) were of the opinion that intelligence of children could be found out by providing projects and conducting exhibitions which was disagreed by 30 percent.
- Ninety nine % of the respondents believed that interest in studies would improve only when students are taught using different aids.
- Majority of the respondents (89%) knew that an individual with the ability to think in images and pictures had visual-spatial intelligence.
- Sixty one percent of the respondents haven't received any training in multiple intelligence.
- Forty one percent of the respondents point out the problem in finding out the predominant intelligence type of multiple intelligence in children as an obstacle in teaching when MI theory is applied.
- More than half of the respondents (64%) were positive about applying Multiple Intelligence theory in classrooms.
- Out of the 86 percent of respondents who preferred the implementation of MI based interest centers, 72 percent believed that the curiosity, interest and enjoyment of children in learning will be improved and the qualities like self confidence and self esteem would develop helping them to bring out their maximum potential by catering to their needs, abilities and aptitude.
- Bodily-kinesthetic intelligence was the most dominant(47 %) intelligence type among the selected teachers.
- Among the 14 percent of respondents who did not prefer the implementation of interest centers, 40 percent thought the concept of interest centers won't be accepted by the parents.

- The least dominant intelligence seen among the selected teachers were verbal-linguistic intelligence (42 %) followed by musical intelligence (32%).
- Majority of the English teachers (38%) and Science teachers (50%) had bodily-kinesthetic intelligence as their dominant type of intelligence.
- A majority of 43 percent of the teachers who taught Hindi had Intrapersonal intelligence.
- Forty four percent of the math teachers had high dominance in intrapersonal and kinesthetic intelligence.
- A majority of 86 percent of teachers who taught all the subjects were highly dominant in kinesthetic intelligence.
- Only a small percentage of teachers had verbal-linguistic intelligence as their dominant type of intelligence.
- Seventy percent of the children had dominance in Naturalistic intelligence.
- Only 20 percent of the children showed dominance in intrapersonal intelligence.
- More than half of the girls studying in state syllabus schools (64%) were dominant in musical intelligence.
- Seventy one percent of the girls studying in CBSE schools didn't have musical intelligence as their predominant intelligence type.
- Visual-spatial intelligence was dominant among the state syllabus boys (58%) and CBSE boys (59%) when compared with the girls.
- Verbal-linguistic intelligence was highest among the girls studying in CBSE schools (76%).
- Seventy seven percent of the girls from state syllabus schools had bodily-kinesthetic intelligence.
- Boys were more dominant in logical-mathematical intelligence than girls.
- Visual intelligence, verbal-linguistic intelligence, bodily-kinesthetic intelligence and logical-mathematic were related to gender among the selected children.
- Seventy seven percent of the boys from state syllabus schools had dominant naturalistic intelligence. Interpersonal and intrapersonal intelligence was least dominant among the girls of CBSE schools (51%).

- Musical intelligence, bodily-kinesthetic intelligence, interpersonal intelligence, logical-mathematical intelligence were related to the children from state and CBSE schools.

Conclusion

The following conclusion can be made based on the present study:-

- Gardner's theory of Multiple Intelligence can be implemented in schools as most of the teachers show positive attitude towards it and as they agree on allotting one hour every week for cultural activities. It would help in identifying the interest of children. Teachers believed that the curiosity, interest and enjoyment of children in learning will be improved. Teachers are aware that the interest of children in studies would improve only when they are taught using different aids. But they are confused about the ways to implement the Gardner's multiple intelligence theory as they haven't received any training related to Multiple Intelligence.

Limitations

- The study was limited to Kochi city, a highly metropolitan urban area and hence the results obtained may not be applicable in rural setting.
- The booklet contains activities that is limited to just one subject.

Recommendation

- The study may expanded to a larger area with a larger sample size to produce accurate and bigger database.
- The multiple intelligence of children should be identified by the teachers.
- Teachers should be provided training on the ways to implement Gardeners theory of multiple intelligence in classrooms.
- Teaching should be based on the Gardener's theory of Multiple Intelligence.
- Interest Centers should be implemented in every school.

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APPENDIX 1
MULTIPLE INTELLIGENCES (M.I.)
INVENTORY

PART I

Complete each section by placing a "1" next to each statement you feel accurately describes you. If you do not identify with a statement, leave the space provided blank. Then total the column in each section.

Section 1

- _____ I enjoy categorizing things by common traits
- _____ Ecological (environmental) issues are important to me
- _____ Hiking and camping are enjoyable activities
- _____ I enjoy working on a garden
- _____ I believe preserving (saving/keeping) our National Parks is important
- _____ Putting things in hierarchies (system of levels) makes sense to me
- _____ Animals are important in my life
- _____ My home has a recycling system in place
- _____ I enjoy studying biology, botany and/or zoology
- _____ I spend a great deal of time outdoors

Total
number of
1's used in
Section 1:

Section 2

- _____ I easily pick up on patterns
- _____ I focus in on noise and sounds
- _____ Moving to a beat is easy for me
- _____ I've always been interested in playing an instrument
- _____ The cadence (rhythm/speed) of poetry intrigues me
- _____ I remember things by putting them in a rhyme
- _____ Concentration is difficult while listening to a radio or television
- _____ I enjoy many kinds of music
- _____ Musicals are more interesting than dramatic plays
- _____ Remembering song lyrics is easy for me

Total
number of
1's used in
Section 2:

Section 3

- _____ I keep my things neat and orderly
- _____ Step-by-step directions are a big help
- _____ Solving problems comes easily to me
- _____ I get easily frustrated with disorganized people
- _____ I can complete calculations quickly in my head
- _____ Puzzles requiring reasoning are fun
- _____ I can't begin an assignment until all my questions are answered
- _____ Structure helps me be successful
- _____ I find working on a computer spreadsheet or database rewarding
- _____ Things have to make sense to me or I am dissatisfied

Total
number of
1's used in
Section 3:

Section 4

- _____ It is important to see my role in the “big picture” of things
- _____ I enjoy discussing questions about life
- _____ Religion is important to me
- _____ I enjoy viewing art masterpieces
- _____ Relaxation and meditation exercises are rewarding
- _____ I like visiting breathtaking sites in nature
- _____ I enjoy reading ancient and modern philosophers
- _____ Learning new things is easier when I understand their value
- _____ I wonder if there are other forms of intelligent life in the universe
- _____ Studying history and ancient culture helps give me perspective

Total
number of
1's used in
Section 4:

Section 5

- _____ I learn best interacting with others
- _____ “The more the merrier”
- _____ Study groups are very productive for me
- _____ I enjoy chat rooms
- _____ Participating in politics is important
- _____ Television and radio talk shows are enjoyable
- _____ I am a “team player”
- _____ I dislike working alone
- _____ Clubs and extracurricular activities are fun
- _____ I pay attention to social issues and causes

Total
number of
1's used in
Section 5:

Section 6

- _____ I enjoy making things with my hands
- _____ Sitting still for long periods of time is difficult for me
- _____ I enjoy outdoor games and sports
- _____ I value non-verbal communication such as sign language
- _____ A fit body is important for a fit mind
- _____ Arts and crafts are enjoyable pastimes
- _____ Expression through dance is beautiful
- _____ I like working with tools
- _____ I live an active lifestyle
- _____ I learn by doing

Total
number of
1's used in
Section 6:

Section 7

- _____ I enjoy reading all kinds of materials
- _____ Taking notes helps me remember and understand
- _____ I faithfully (routinely/always) contact friends through letters and/or e-mail
- _____ It is easy for me to explain my ideas to others
- _____ I keep a journal
- _____ Word puzzles like crosswords and jumbles are fun
- _____ I write for pleasure
- _____ I enjoy playing with words like puns, anagrams and spoonerisms
- _____ Foreign languages interest me
- _____ Debates and public speaking are activities I like to participate in

Total
number of
1's used in
Section 7:

Section 8

- _____ I am keenly aware of my moral beliefs
- _____ I learn best when I have an emotional attachment to the subject
- _____ Fairness is important to me
- _____ My attitude affects how I learn
- _____ Social justice issues concern me
- _____ Working alone can be just as productive as working in a group
- _____ I need to know why I should do something before I agree to do it
- _____ When I believe in something I will give 100% effort to it
- _____ I like to be involved in causes that help others
- _____ I am willing to protest or sign a petition to right a wrong

Total
number of
1's used in
Section 8:

Section 9

- _____ I can imagine ideas in my mind
- _____ Rearranging a room is fun for me
- _____ I enjoy creating art using varied media
- _____ I remember well using graphic organizers
- _____ Performance art can be very gratifying
- _____ Spreadsheets are great for making charts, graphs and tables
- _____ Three-dimensional puzzles bring me much enjoyment
- _____ Music videos are very stimulating
- _____ I can recall things in mental pictures
- _____ I am good at reading maps, atlases and blueprints

Total
number of
1's used in
Section 9:

APPENDIX 2

QUESTIONNAIRE TO FIND OUT THE LEVEL OF AWARENESS, PERCEPTION AND ATTITUDE OF TEACHERS ON MULTIPLE INTELLIGENCE

SECTION 1-PERSONAL PROFILE

1.Name:-

.....

2.Sex :- Male Female

3.Educational qualification:- TTC Graduation PG Diploma
in E.C.E

Others . Please specify

4.Work experience :- 0-5 years 6-10 years 11-15 years 16 years
and above

5.School :- CBSE State

6.Subject taught :-

.....

SECTION II

7.Do you think all the students of your class absorb your teaching in the same way?

Yes No

8.If one of your student seems to be inattentive in the class, what will be your
approach?

I will try to understand:-

Whether the subject is not interesting

The way of teaching is not interesting

- Subject is interesting but the way of teaching is not interesting
- Way of teaching is interesting but the subject is not interesting
- All the above

9. Do you think just punishing a child will improve his academics?

- Yes
- No

If yes, move to question 10. If no, what alternative method do you think is the best to improve his academics?

- Be friendly
- Change teaching style
- Give rewards

10. Do you think parental involvement in child's study can bring results?

- Yes
- No

If no, continue with the next question. If yes, what do you think is the main reason?

- Parents will be more interested in child's development
- At home, child will get more time (individual attention)
- At home, with parents, child gets more freedom.
- Parents will be more aware of the child's intelligence.

11. What is your opinion about allotting one hour every week for cultural activities in the class?

- It is a waste of time as academics are concerned
- It is good to find out the interests of children
- Students can enjoy (Stress reduced)
- Others. Please specify

.....

12. At present, for teaching students, are you using any aids other than blackboard and textbook?

- Yes No

13. Do you prefer to use teaching material in similar fashion to every child?

- Yes No

14. Do you believe that the intelligence of students will be known by providing projects and conducting exhibitions?

- Yes No

15. Whether your knowledge about children's interest in the extracurricular activities influence your teaching style?

- Yes No

16. In your opinion, when do students be more interested to be in class?

- When taught using different types of aids
- When taught using text and blackboard

17. In a classroom, one student might learn best through visual aids, another might be an auditory learner, what might be the barriers in teaching?

- Difficulty in making teaching aids
- Lack of parental support
- Difficulty in identifying the intelligences in children
- Others. Please specify

.....

18. According to you, is it practically possible to understand the multiple intelligences of children and teach according?

- Yes No

19. If a child has the ability to think in images and pictures and is able to visualize accurately and abstractly, what type of intelligence does the child have?

- Verbal-linguistic intelligence Visual special intelligence
- Mathematical-logical intelligence Intrapersonal intelligence

20. If a child has the capacity to detect and respond appropriately to the moods, motivation and desires of others, what type of intelligence does the child have?

- Intrapersonal intelligence bodily kinesthetic intelligence

Interpersonal Intelligence

Naturalistic intelligence

21. Did you receive any training on multiple intelligence before entering teaching profession?

Yes No

22. Do you prefer in the formation of interest centers (areas within the classroom where children with similar intelligence are grouped together better learning through specific activities) in schools?

Yes No

If yes, why?

Children develops curiosity, interest and enjoyment in learning

Self confidence and self esteem increases

Produce best work

Each child's needs, abilities, aptitude is catered

All the above

If no, why?

Problem of finding time for MI activities

Refusal by parents

Time consuming in preparing aids

All the above

APPENDIX 3

QUESTIONNAIRE TO ASSESS MULTIPLE INTELLIGENCE IN CHILDREN

SL.NO	STATEMENT	YES	NO
1	I like to write my own stories		
2	I often listen to music in my free time		
3	I like gardening		
4	I like to do math		
5	I like learning about animals and taking care of pets		
6	I like to read during my free time		
7	I like to help those who need help		
8	I hum and sing many times a day		
9	I like to read maps		
10	It is fun to solve problems that are difficult		
11	I get along well with different types of people		
12	I love to play games involving numbers and logical thinking		
13	I play / would like to play musical instruments		
14	I enjoy outdoor games		
15	Extracurricular activities are fun		
16	Charts, pictures etc help me learn		
17	I enjoy spending time by myself		
18	I love to do projects which involve acting/moving		
19	I like to dance		

20	I like to play alone		
21	I like to play word games		
22	I enjoy studying about earth, nature and weather		
23	I like to take pictures		
24	I am wise		

APPENDIX 4

COMPILATION OF ACTIVITIES INTO A BOOKLET

APPENDIX 5

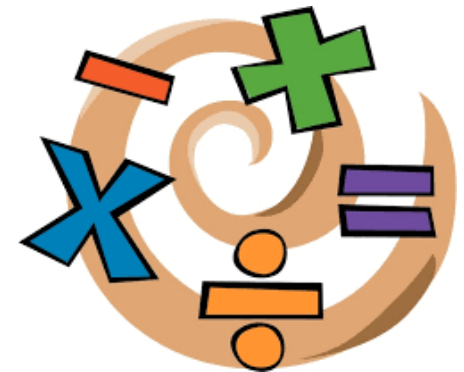
CHECKLIST FOR EVALUATING THE BOOKLET

Kindly rate the booklet on the following criteria. Please put a tick mark (√) on the appropriate rating.

Sl.No	Criteria	Rating					
		Excellent	Very Good	Good	Average	Below Average	Not Satisfactory
1	Content						
2	Relevance of the activities						
3	Appearance						
4	Suitability to Target Group						
5	Organisation of Matter						
6	Ease of understanding						
7	Utility						
8	Practical Applicability						



Compiled By:
Sushmitha.S.Kamath & Dr.N.Dhanya



CONTENTS

Topic	Pg no
• Introduction	
• Types of Multiple Intelligence	
• Multiple Intelligence Chart	
• Activities for children having predominance in Visual-Spatial Intelligence	
1 Addition	
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• Activities for children having predominance in Verbal-Linguistic Intelligence	
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• Activities for children having predominance in Logical-Mathematical Intelligence	
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3 Multiplication	
4 Time Concept	
• Activities for children having predominance in Bodily-Kinesthetic Intelligence	
1 Addition	
2 Subtraction	
3 Multiplication	
4 Time Concept	

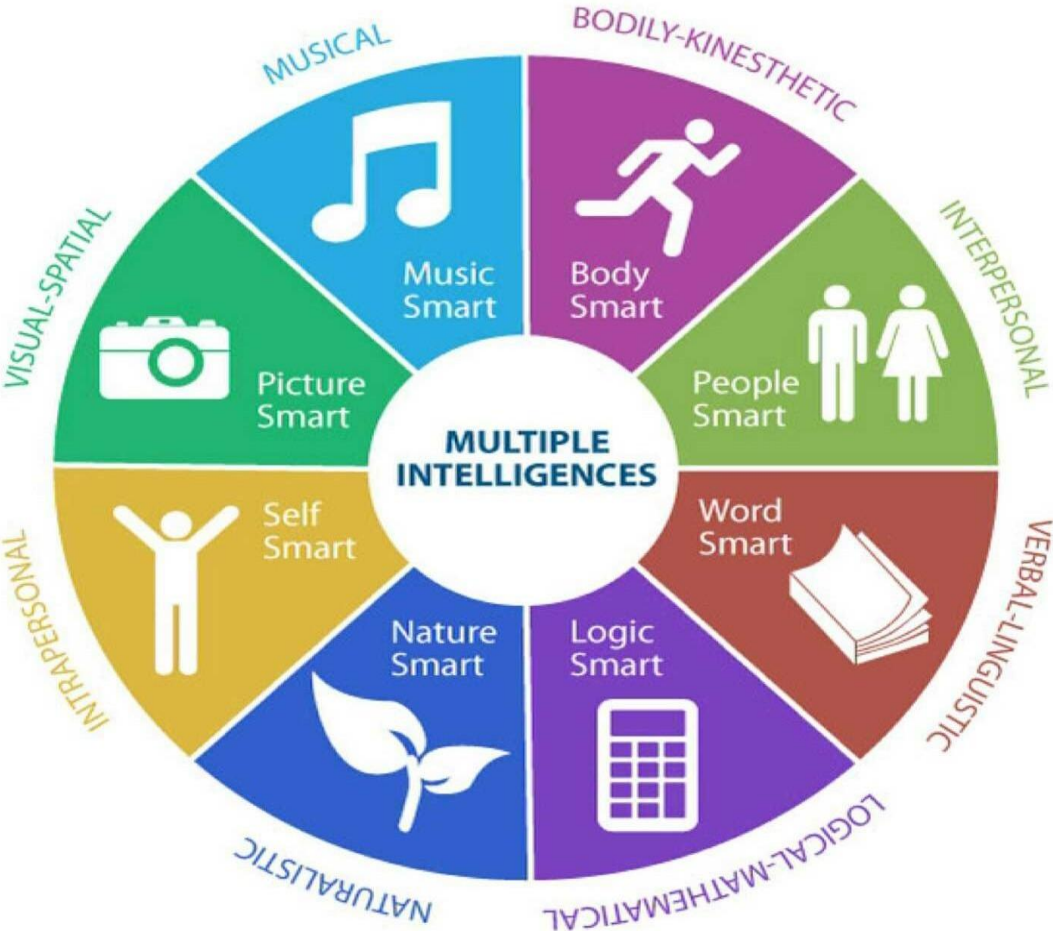
<ul style="list-style-type: none"> • Activities for children having predominance in Interpersonal Intelligence 	
<ol style="list-style-type: none"> 1 Addition 	
<ol style="list-style-type: none"> 2 Subtraction 	
<ol style="list-style-type: none"> 3 Multiplication 	
<ol style="list-style-type: none"> 4 Time Concept 	
<ul style="list-style-type: none"> • Activities for children having predominance in Intrapersonal Intelligence 	
<ol style="list-style-type: none"> 1 Addition 	
<ol style="list-style-type: none"> 2 Subtraction 	
<ol style="list-style-type: none"> 3 Multiplication 	
<ol style="list-style-type: none"> 4 Time Concept 	
<ul style="list-style-type: none"> • Activities for children having predominance in Naturalistic Intelligence 	
<ol style="list-style-type: none"> 1 Addition 	
<ol style="list-style-type: none"> 2 Subtraction 	
<ol style="list-style-type: none"> 3 Multiplication 	
<ol style="list-style-type: none"> 4 Time Concept 	
<ul style="list-style-type: none"> • Activities for children having predominance in Musical intelligence 	
<ol style="list-style-type: none"> 1 Addition 	
<ol style="list-style-type: none"> 2 Subtraction 	
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<ul style="list-style-type: none"> • Reference 	

PREFACE

The theory of multiple intelligences was developed by Dr. Howard Gardner in 1983. Gardner's theory of multiple intelligences provides a venue for identifying the different abilities and talents of students. Gardner proposes eight different intelligences to account for a broader range of human potential in children and adults. Once the multiple intelligence of the student is identified, the strengths and weaknesses of the children can be found and hence it would be easy for teachers to nurture their needs and can help them to develop a sense of accomplishment and self-confidence. Children will get opportunities for authentic learning based on their needs, interests and talents. They will become more active and involved learners. On the whole, a positive energy would be created in children and that will help them to grow and lead a successful life

This booklet contains activities for children to teach various mathematical operations like addition, subtraction, multiplication and time concept using methods suitable to them. The activities mentioned in this book can be applied to children of different age groups by changing the difficulty level of the activities and are prepared with an aim to act as a guideline for teachers to implement the concept of Gardner's MI theory in classrooms. Teachers need to identify the predominant intelligence of children and select the activities appropriately.

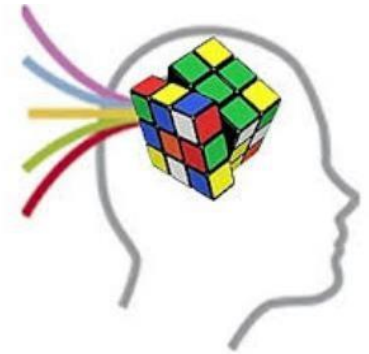
INTRODUCTION



TYPES OF MULTIPLE INTELLIGENCE

- **Visual-Spatial Intelligence**

- It is ability to think in images and pictures, to visualize accurately and abstractly.
- People with predominant visual-spatial intelligence can become photographers, graphic designers, architects, interior designers, mechanics, navigators, pilots, sailors etc.



- **Verbal-Linguistic Intelligence**

- It is highly developed verbal skills, the ability to think in words, sensitivity towards sounds, meanings and rhythms of words.
- People with predominant verbal-linguistic intelligence can become journalist, Lawyer, editor, translator, poet, reporter, teacher, historian, librarian etc.



- **Logical-Mathematical Intelligence**

- It is the ability to calculate, quantify, think conceptually and abstractly.
- This type of intelligence is usually seen in mathematicians, accountants, engineers, scientists and detectives.



- **Bodily-Kinesthetic Intelligence**

- It is the capacity to manipulate objects, control one's body movements and use a variety of physical skills.
- People with such intelligence would be good at dancing, acting, crafts, using tools etc and can take up job as a dancer, coach, athlete, actor/actress, massage therapist, magician, mechanic etc.



- **Interpersonal Intelligence**

- It is the capacity to understand and respond appropriately to the moods, motivations and desires of others.
- Teacher, therapist, travel agent, child care worker, coach, manager, nurse, physician, salesperson etc exhibit interpersonal intelligence.



- **Intrapersonal Intelligence**

- It is the capacity to be self-aware and is in tune with their inner feelings, values, beliefs and thinking processes.
- Entrepreneurs, consultants, counselors, researchers, writers etc have knowledge of their own feelings and are self-motivated.



- **Naturalist Intelligence**

- It is the ability to recognize and group plants, animals and other objects in nature.
- This type of intelligence is evident in botanist, chef, environmentalist, landscape artist, sailor, veterinarian, astronomer, zoologist etc.




- **Musical Intelligence**

- It is the ability to produce and appreciate rhythm, pitch, timbre and tone.
- It is demonstrated by musicians, artists, composers, music teachers, recording technicians, singers etc.



THE MULTIPLE INTELLIGENCE (MI) CHART

Intelligence Area	Is strong in:	Likes to:	Learns best through:
 <p>Verbal-Linguistic</p>	reading, writing, telling stories, memorizing dates, thinking in words.	read, write, talk, memorize, work at puzzles.	reading, hearing and seeing words, speaking, writing, discussing and debating.
 <p>Math-Logic</p>	math, reasoning, logic, problem-solving, patterns.	solve problems, question, work with numbers, experiment.	working with patterns and relationships, classifying, categorizing, working with the abstract.
 <p>Spatial</p>	reading, maps, charts, drawing, mazes, puzzles, imaging things, visualization.	design, draw, build, create, daydream, look at pictures.	working with pictures and colors, visualizing, drawing.
 <p>Bodily- Kinesthetic</p>	athletics, dancing, acting, crafts, using tools.	move around, touch and talk, body language.	touching, moving, processing knowledge through bodily sensations
 <p>Musical</p>	singing, picking up sounds, remembering melodies, rhythms.	sing, hum, play an instrument, listen to music.	rhythm, melody, singing, listening to music and melodies.
 <p>Interpersonal</p>	understanding people, leading, organizing, communicating, resolving conflicts, selling.	have friends, talk to people, join groups.	sharing, comparing, relating, interviewing, cooperating.
 <p>Intrapersonal</p>	understanding self, recognizing strengths and weaknesses, setting goals.	work alone, reflect, pursue interests.	working alone, doing self-paced projects, having space, reflecting.
 <p>Naturalist</p>	understanding nature, making distinctions, identifying flora and fauna.	be involved with nature, make distinctions.	working in nature, exploring things, learning about plants and natural events.

ACTIVITIES TO TEACH VARIOUS MATHEMATICAL CONCEPTS FOR CHILDREN HAVING PREDOMINANCE IN VISUAL INTELLIGENCE

ADDITION

1. FINGER COUNTING BOARD

Materials Required : Chart paper, color sheet , scissors, glue and sketch pen.

Procedure

- Assemble the given materials.
- Take a color sheet and cut out the shape of your palms
- Stick it on the chart paper.
- Write addition questions along with the answers below the palms.
- Teach the child addition by folding the fingers as shown in the figure.

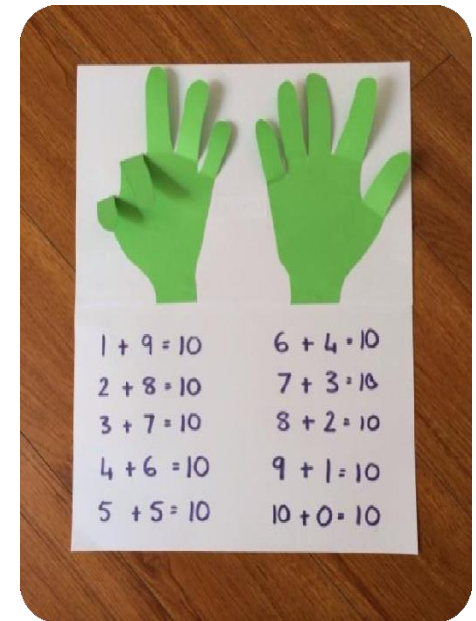
Example :- $5+2$

- Fold 5 fingers of one hand and 2 fingers of the other hand.
- Make the child count the fingers that are folded to find the answer.

2. COLOR ME UP !

Materials Required : Chart paper, pivot, scissors and sketch pens. Procedure

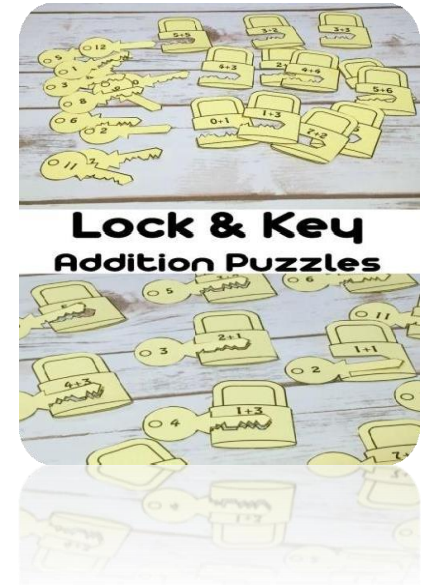
- Assemble the given materials mentioned above.
- Take a chart paper ,draw a circle and split it into 10 parts, each part with a number(less than 10).
- Beside the circle, write + 6.
- Below it write numbers from 1 to 20 and put dots around the number as shown in the figure.
- The child is made to spin a pivot in the circle and ask to add up the number obtained with 6.
- The child is made to draw a line against the number (answer) joining 2 dots as in the figure.



3. LOCK AND KEY GAME

Materials Required : Chart paper, scissors and sketch pens. Procedure

- Cut the chart paper in the shape of lock and key (5-10 required).
- The bit of keys and hole of locks must be different.
- Number on the key (eg:4) should be rightly matched to the lock (eg :2+2) by the child.
- As the game is played by a group of students, the first child who constructs and colors the square wins the game.

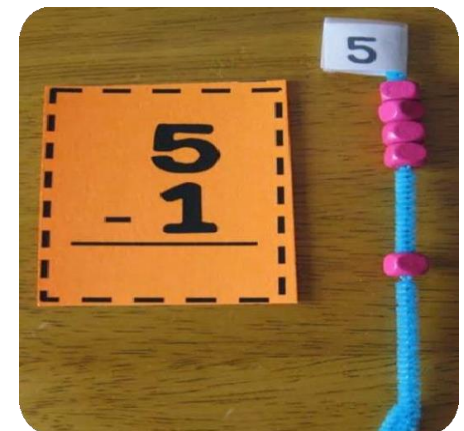


SUBTRACTION

1. MOVE AWAY..!

Materials Required : Color paper,pen,string and beads. Procedure

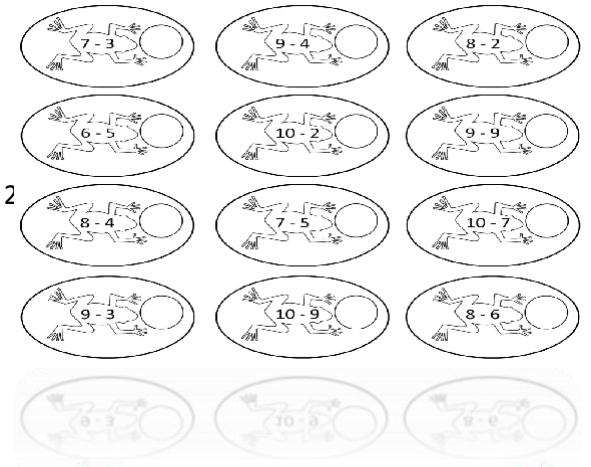
- Write the problem in a color paper.
- For a problem 5-1 ,The child must insert the beads in the string which is equal to the minuend (here 5)and move away the beads that is equal to the subtrahend (here 1).
- The answer should be written down on the color paper.



2. FUN FROG SUBTRACTION

Materials Required : Chart paper ,pen and crayons. Procedure

- Draw frogs and write the problem (eg.9-2) in the middle of the figure.
- Draw bubble beside it to write the answer.
- Make the child write answers in the bubbles and shade the answers from 0 to 1 blue, from 2 to 4 red, from 5-7 green, from 8-9 yellow.



MULTIPLICATION

1 .MULTIPLICATION GRID

Materials Required : chart paper, pen and slider. Procedure

- Write tables from 1 to 12 on a chart paper as shown in the figure.
- Make the child learn the tables by moving the slider.

Slide and Learn™ Multiplication Grid

1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
5	5	10	15	20	25	30	35	40	45	50	55	60
x	1	2	3	4	5	6	7	8	9	10	11	12
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

2. MULTIPLICATION CHART

Materials Required : Chart paper, scale and sketch pens. Procedure

- Write multiplication tables of 1-10 on a chart as shown in the figure.
- Color each column using appropriate colors to make up a pattern.
- Ask the child to read aloud each table multiple times.

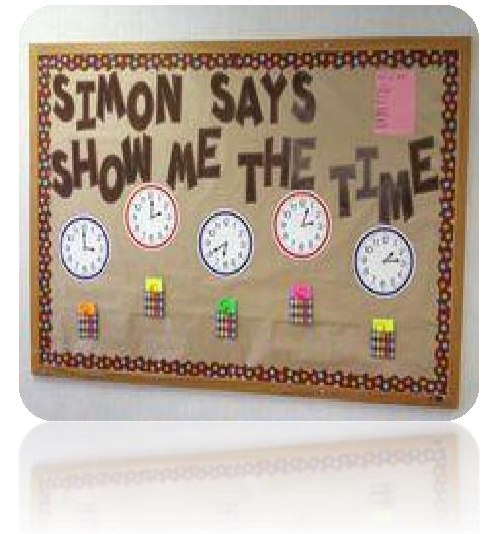
	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

TIME CONCEPT

1. SIMON SAYS SHOW ME THE TIME

Materials Required: A board, chart paper, sketch pens and drawing pins. Procedure

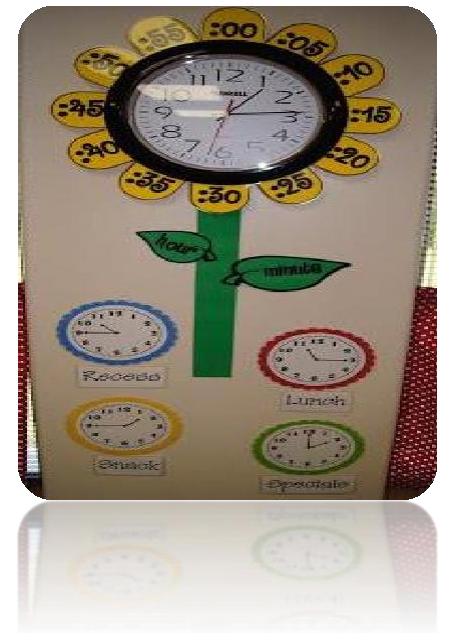
- Clocks depicting different times are drawn on a chart paper and stuck on a notice board using drawing pins.
- The child must point out the time when the teacher tells a time present in the board (example : half past nine, quarter to six etc).



2. TIME MACHINE

Materials Required: Clock, chart paper, scissors, gum and sketch pens. Procedure

- Cut 12 pieces of chart paper in the shape of a petal and write in it the multiples of 5 as shown in the figure.
- Stick the petals around a clock hanging on a wall.
- Draw stem and leaves to make it look like a plant.
- Draw small clocks and stick them below the plant to familiarise the routine timings (example :- 6 a.m- wake up, 7.30 a.m –break fast, 1.00 a.m lunch etc).
- The model must be kept inside the class room .



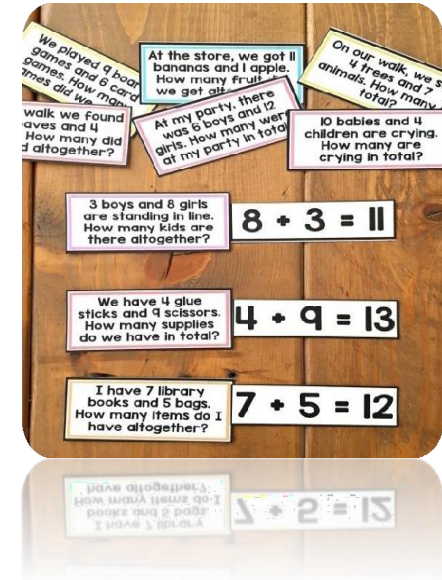
ACTIVITIES TO TEACH VARIOUS MATHEMATICAL CONCEPTS FOR CHILDREN HAVING PREDOMINANCE IN VERBAL-LINGUISTIC INTELLIGENCE

ADDITION

1 .FIND THE ANSWER

Materials Required : Paper strip and sketch pen. Procedure

- Write word problems on the paper strips using sketch pen (eg:10 babies and 4 children are crying. How many are crying in total?).
- Make students read the question and write down the answer on the paper strips.

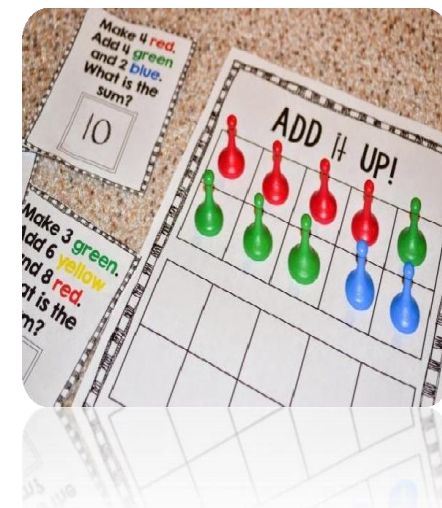


2. ADD IT UP !

Materials Required : Paper cards ,check board and colored pieces.

Procedure

- Write instructions on the paper card (eg :- Make 4 red ,Add 2 blue and 4 green.What is the sum?).
- Make the child read and follow the instructions (place appropriate colored pieces on the check board)to find the answer.



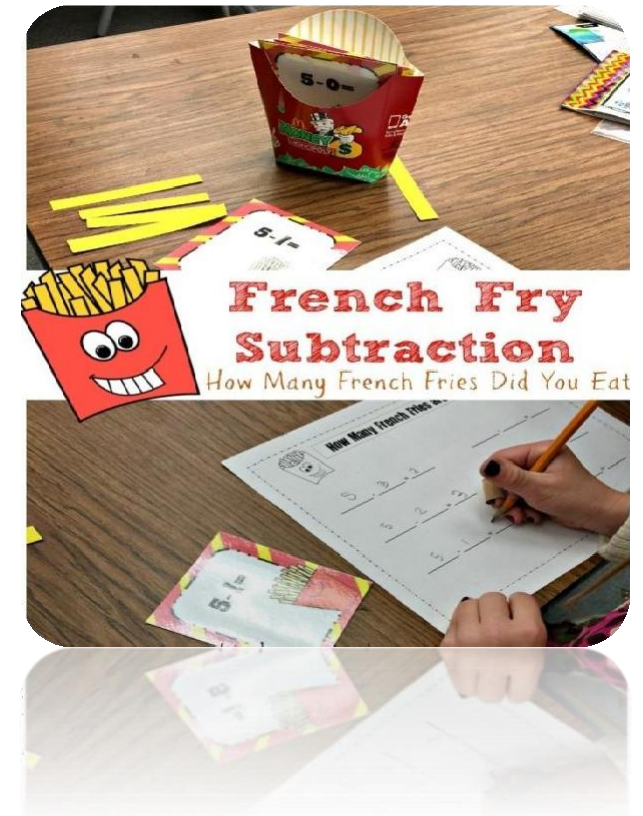
SUBTRACTION

1. FRENCH FRY SUBTRACTION

Materials Required : Paper cards, chart paper, paper strips and paper basket.

Procedure:

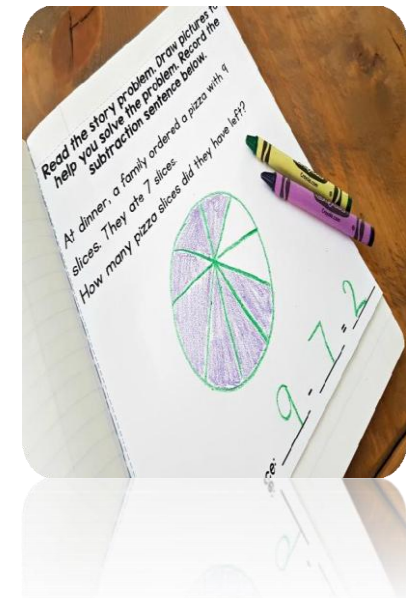
- Write the subtraction problem on the paper card (example :5-1).
- Ask the child to take the paper strips i.e. the minuend (French fries, here 5)from the basket and keep away those paper strips (Subtrahend, here 1) from it to obtain the answer.
- The question and answer should be written on the chart paper by the child.



2. STORY PROBLEM

Materials Required : Paper, pen and crayons. Procedure

- Write the story problem on a paper.
- Make the child read the story problem, draw picture to solve the problem and write the answer below as shown in the picture.



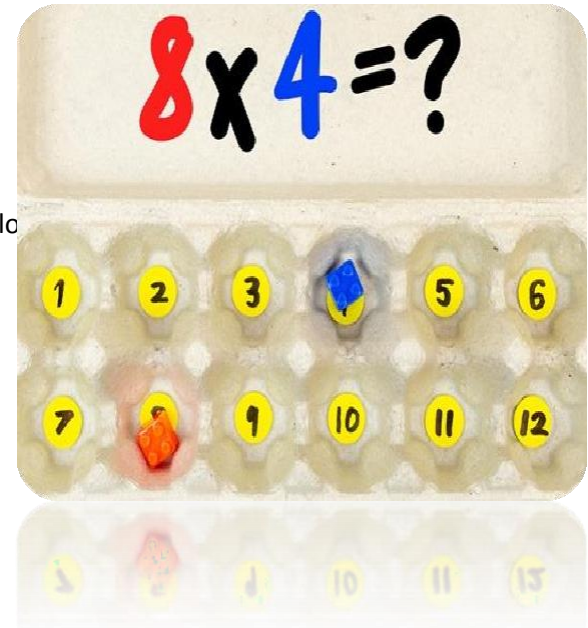
MULTIPLICATION

1. WHO AM I ?

Materials Required : Chart paper ,pieces of paper and sketch pens.

Procedure

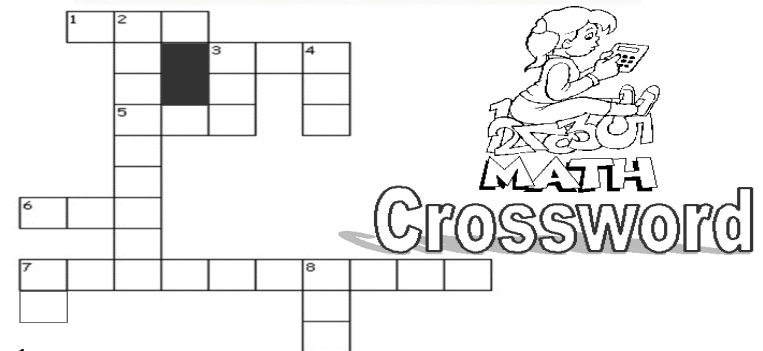
- Write the multiplication problem on top of the chart paper and numbers from 1 to 12 below
- The child need to cover the numbers to be multiplied using pieces of paper.
- The answer should be told orally and later written on the chart .



2. CROSSWORD PUZZLE

Materials Required : A4 sheet,pen and scale Procedure :

- Decide on the grid size.
- Decide on the clues (eg :- Samuel had 5 pet bunnies.Each bunny had 2 toys.How many toys did all the bunnies have together?)
- Decide on the answers.
- Number the starting square for each word/number.
- Begin in the upper-left corner of the puzzle,and divide the words/numbers by whether they run vertically or horizontally.
- Make the child write all the answers.



Across

1. Patricia was washing dishes every night for a week. She washed 32 dishes each night. How many dishes did she wash?
3. Samuel had 5 pet bunnies. Each bunny had 23 toys. How many toys did all the bunnies have together?
5. Benny bunny had a lot of children. He put 4 children in each bedroom and filled up 93 bedrooms. How many kids did Benny bunny have?
6. Alfred the Leprechaun wanted to give 8 pots of gold to each of his friends. Alfred had 21 friends. How many pots of gold does Alfred need?
7. Write these numbers in order from smallest to biggest: 552, 65, 91, 866

Down

2. Write these numbers in order from biggest to smallest: 30, 265, 19, 28
3. Sal was going to buy 6 chocolate bars. Each chocolate bar cost 17 cents. How much money does Sal need?
4. Solve this problem: $65 \times 9 =$ _____
7. Quick, quick! What's 8×8 ?
8. Paul wanted to plant some tomatoes. He had 25 rows to plant and he could fit 8 plants in each row. How many tomatoes could Paul plant?

TIME CONCEPT

1. TELL THE TIME

Materials Required : A4 sheet and pen. Procedure :

- Draw clocks depicting daily routine time.
- Write sentences that match the time and draw suitable pictures.
- Make the child read the sentences and look at the clock.
- Later ask the child to write the time for each daily routine.



2. TELLING TIME

Materials Required : Chart paper and sketch pens Procedure

- Draw clocks with different time.
- Time depicted on the clock should be written in words as shown in the figure.
- The child need to draw lines to match the clocks to the time in words.

Telling Time - Quarter Hours - Matching 1a

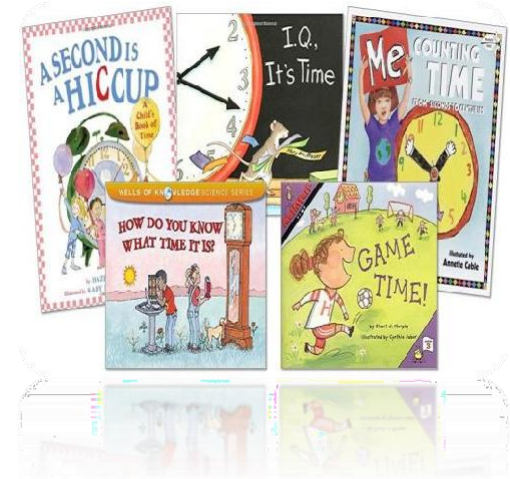
Draw lines to match the clocks to the time in words.

	Quarter past one	
	Quarter to six	
	Quarter past two	
	Quarter to ten	
	Quarter past twelve	
	Quarter to four	
	Quarter past three	
	Quarter to five	

3. READ READ AND READ

Materials Required : Books Procedure

- Make the child read books that teach the concept of time .



ACTIVITIES TO TEACH VARIOUS MATHEMATICAL CONCEPTS FOR CHILDREN HAVING PREDOMINANCE IN LOGICAL-MATHEMATICAL INTELLIGENCE

ADDITION

1. MAGIC DIGITS ADDITION

Materials Required : A4 sheet and sketch pen. Procedure

- Write few digits and an addition problem as shown in the figure.
- The child need to think logically and use the digits to complete the addition problem (fill the boxes suitably).

Use the digits below to complete the addition problem.

8	3	4
3	8	0
+		
<hr/>		
6	9	2

Use the digits below to complete the addition problem.

1	2	2
	8	3
+		
<hr/>		
1	5	1

9 8 5

1 2 1

2.NUMBERS ABOUT ME..!

Materials Required :Chart paper and pen. Procedure

- Draw a box containing numbers from 0 to 99.
- Below it, write questions (eg:- Color your favorite number red .Now add 5 and then add 10.What number did you land on?).
- The child must color the 0-99 chart according to the question.

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

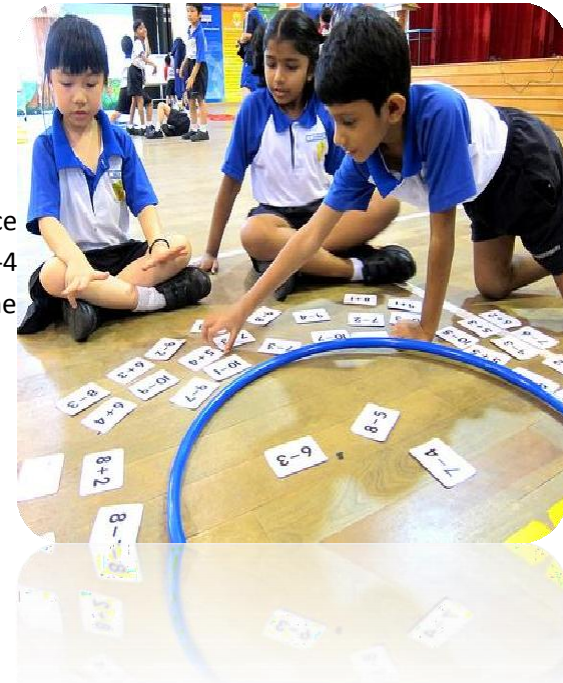
1. Color your age blue.. Now add 10 more, what number did you land on? _____.
2. Color your birthday number red. Now subtract 10. What number did you land on, if any? _____.
3. Color the number of people in your family purple. Now add one. What number did you land on? _____.
4. Color the number of pets you have green. Now subtract one. What number did you land on? _____.

SUBTRACTION

1. SEPARATE ME OUT

Materials Required : Paper strips, pen and hula hoop. Procedure

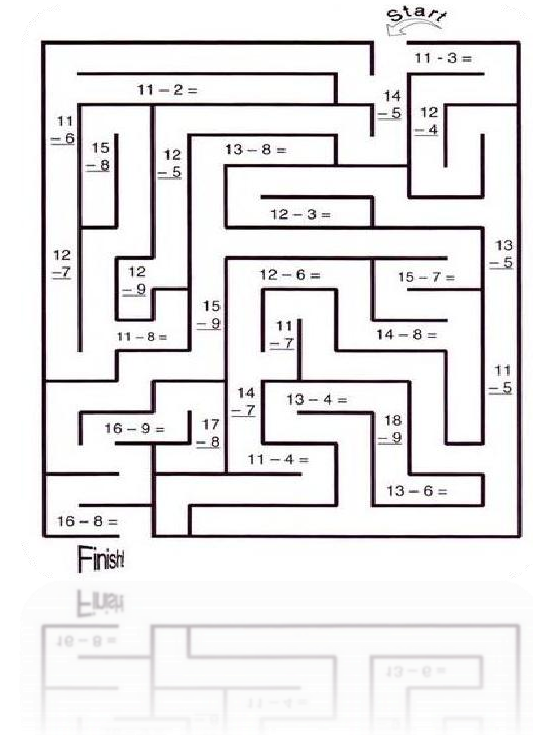
- Write subtraction problem on the paper strips.
- Scatter the strips around the hula hoop.
- Children should place the strips inside the hula hoop which provide the same difference when the subtrahends are subtracted from the minuends (eg: Strips where 5-2 ,4-1,7-4 ,3-0 etc are written should be placed inside the hula hoop as they give the same difference -3).



2.SUBTRACTION MAZE

Materials Required : A4 sheet Procedure :

- Draw a maze and write subtraction problems on the way.
- The problem should be solved by the child as he/she travel through the maze and reach the finish point.
- **Note** -If the answer is an odd number, the way travelled is a wrong path.



MULTIPLICATION

1. MULTIPLICATION SUPERHEROES (2 player game)

Materials Required : 2 dice,game pieces,chart paper and a pen. Procedure

- Write multiples of various numbers.
- Take turns rolling the dice.
- Each child must say the product and cover it with a game piece.
- The first person to cover 4 in a row wins the game .

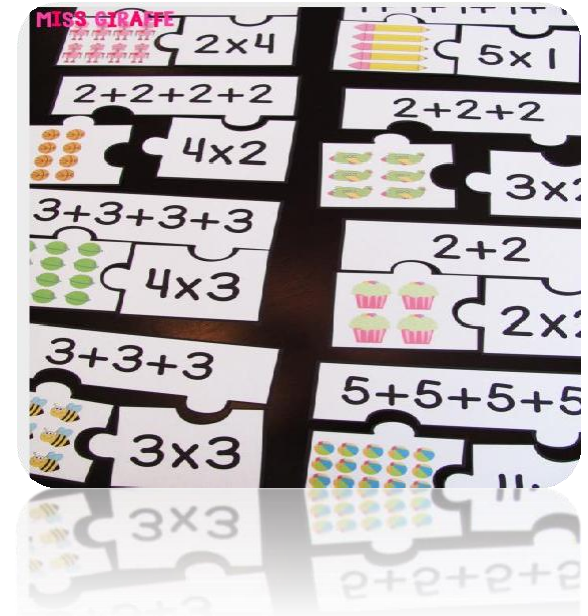
1	3	30	15	6	10
6	15	3	25	9	4
24	2	8	20	15	12
36	6	18	24	10	3
12	18	5	30	12	8
24	16	18	2	4	20
4	12	25	6	5	9

11	18	32	9	2	4
----	----	----	---	---	---

2. MULTIPLICATION PUZZLE

Materials Required : Paper, sketch pen and scissors. Procedure

- Create a grid (Use a ruler to mark out and draw a grid pattern) .
- Draw the puzzle template (To create puzzle pieces, begin adding ball and socket shapes along the edges of the grid squares so that the pieces will fit into each other when the puzzle is cut).
- Cut out the puzzle pieces.
- Write the multiplication problems and draw pictures on the puzzle pieces.
- The child needs to solve the puzzle.



TIME CONCEPT

1. LEGO TIME

Materials Required : Duplo blocks, marker and A4 sheet Procedure

- Write the time in numbers (2.35 pm) and in words (Twenty-five to three) on duplo blocks .
- None of the sets should be matched.
- Students need to match them and record the time on an A4 sheet.



2. BINGO BOARD (2 player game) Materials Required : Chart paper and pen

Procedure

- Make 2 bingo boards having 5 rows and 5 columns using a chart paper.
- Write different times on each column.
- The teacher need to tell the time in different ways.
- (for example, instead of just saying 6:30, the teacher should say half past six. the time of 8:37 could be read as 23 minutes before 9.)
- Once identified, the children should cutoff that particular time.
- The child who is the first to have all the time called displayed in a horizontal line on their board wins the 1 line prize.
- To win the 2 line prize, the child must have all the numbers called on 2 lines of the same board.

T	I	M	E	O
10:00	11:35	9:10	12:15	8:37
4:30	7:55	3:20	6:30	10:13
3:00	1:25	FREE SPACE	3:45	11:06
9:30	5:05	8:40	2:15	5:17
5:30	10:55	2:50	3:30	12:48

2:30	10:22	5:20	3:30	15:48

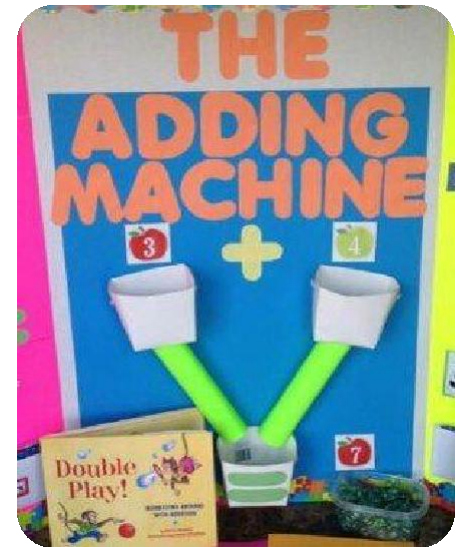
ACTIVITIES TO TEACH VARIOUS MATHEMATICAL CONCEPTS FOR CHILDREN HAVING PREDOMINANCE IN BODILY-KINESTHETIC INTELLIGENCE

1.ADDITION

1. THE ADDITION MACHINE

Materials Required : Cardboard, chart paper, color sheet, paper cups, balls, scissors and gum. Procedure

- Paste a chart paper on the cardboard.
- Take 2 paper cups and put a hole so that balls can go out of it smoothly.
- Fix the paper cups on the chart paper with an addition sign (made using color paper) in the middle.
- Make 2 paper tubes and fix it at the holes of the cups (Bottom portion).
- Fix the tubes in such a way that both the paper tubes meet at a point that reaches the cup placed at the bottom.
- The teacher gives the question (eg:3 +4).Here, the child must put 3 balls in the 1st cup and 4 balls in the 2nd cup. The balls roll down to the 3 rd cup placed at the bottom.
- The total number of balls should be counted to find the answer.



2. MATH RACE

Materials Required : Paper cards and marker. Procedure

- Addition problems are to be written on the paper cards.
- Two rows of paper cards (equal paper cards in each row) are placed from the starting point to the end point.
- Two students are made to stand at the starting points and are asked to answer each problem that comes their way.
- The student who completes it correctly and reach the end point wins the race.
- (Note : The student is made to move 2 steps backward for each wrong answer).



3.SNOWBALL MATH GAME

Materials Required :-Baskets, clips, white paper and paper cards. Procedure

- Make snowballs using white paper.
- Write addition problems (eg: $3+5$, $2+4$) on the paper card and clip it on each basket.
- The child need to either add up the numbers (eg: $2+2=4$) and put the required number of balls in the basket or look into both the numbers separately ,collect the required balls and put in the same basket counting them to get the answer.

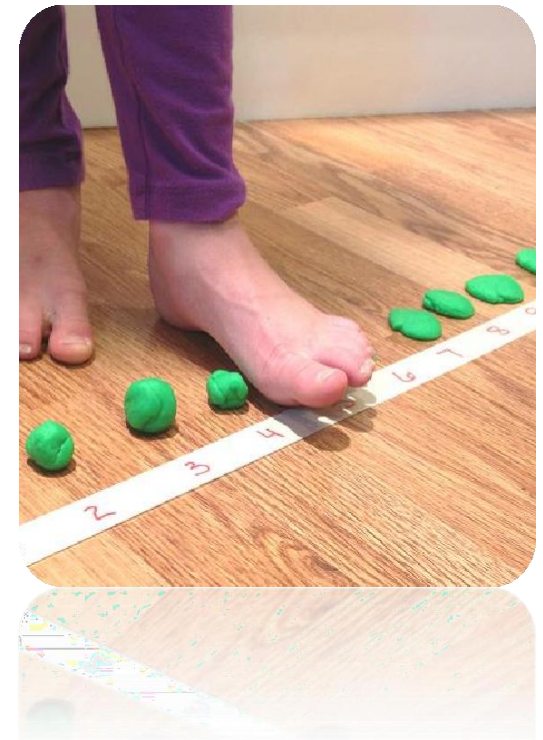


SUBTRACTION

1.PRESS ME !

Materials Required : Long paper strip ,sketch pen and clay. Procedure

- Write numbers from 1-10 at regular intervals on the long paper strip.
- Place clay balls beside each number.
- For a question $10-4$,the child must press the clay balls from 10th position till he reaches the clay ball beside number 4.
- Later the child must count the number of balls pressed to get the answer.



2. WHACK THE BALLS

Materials Required : Cardboard box, board with 10 holes, balls ,paper and stick.

Procedure

- The question must be written on a paper (eg: 8-3).
- The number of balls placed in the holes should be equal to the minuend as shown in the figure (here 8 balls).
- The child should whack the number of balls (The balls whacked should be equal to the subtrahend - here 3).



MULTIPLICATION

1. JUMP HIGH

Materials Required : chalk Procedure:

- Various multiplication problems would be written on the ground as shown in the figure.
- The child needs to solve all the questions by jumping from one problem to the other.
- **Note-** If the answer is wrong, the child must move 2 steps backward .



2. ROLL ROLL AND ROLL

Materials Required : Clay and paper strip. Procedure

- Write the multiplication problem on a paper strip.
- Child must mould the clay into balls as per the question (eg : 2×2 ,so 4 clay balls).

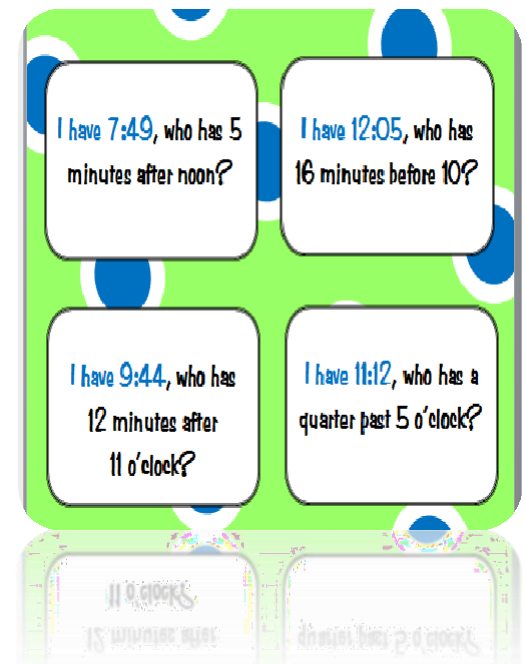


TIME CONCEPT

1.1 **HAVE....WHO HAS....?** (Group game) Materials Required : Paper strips and

pen. Procedure

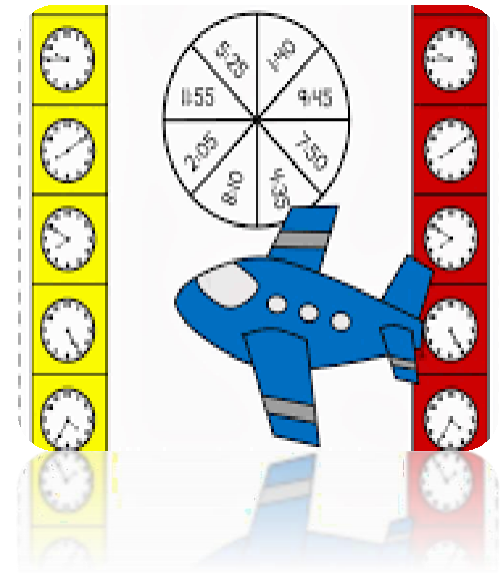
- Different time and different questions are to be written on each paper strip (Example:I have 5.40,who has 10 minutes before 10 o'clock?).
- Each child is given a paper strip .
- The child need to move around to find his classmate who has the answer to his question .



2. TIME TRAVEL

Materials Required : Chart paper, sketch pens and toy aeroplane. Procedure

- Draw a circle in the centre of a chart paper.
- Divide the circle into 8 equal parts and write different time in each part (eg:5.30,4.35 etc).
- Draw many clocks depicting different timings.
- The teacher need to tell a time from the circle and the child must land the toy plane to the correct clock.



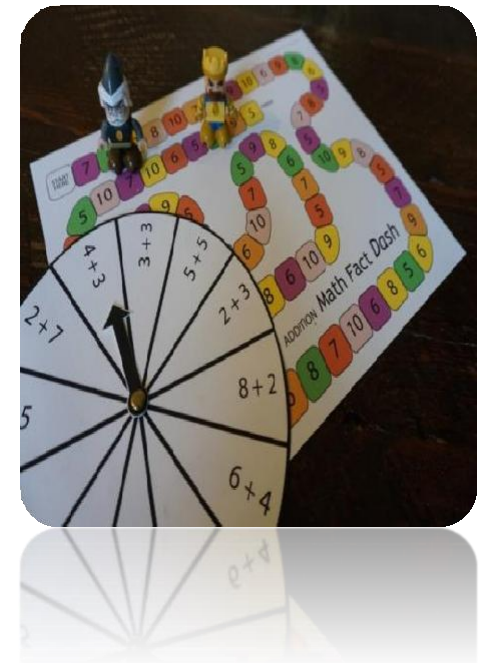
ACTIVITIES TO TEACH VARIOUS MATHEMATICAL CONCEPTS FOR CHILDREN HAVING PREDOMINANCE IN INTERPERSONAL INTELLIGENCE

ADDITION

1. NUMBER RACE (2 player game)

Materials Required : Chart paper ,drawing pin, pen and 2 puppets Procedure

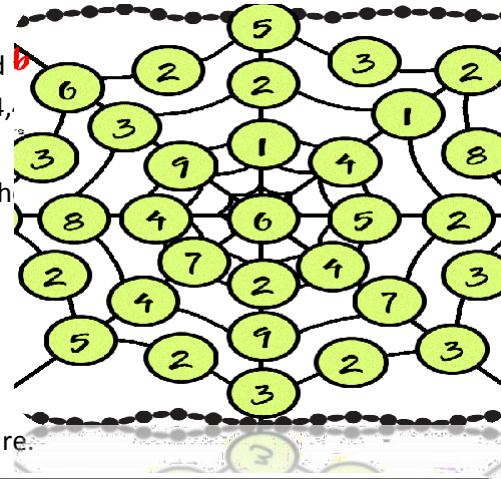
- Cut out a circle from a chart paper.
- Divide the circle into 10 equal parts and write down the addition problem in each part (eg:4+2).
- Make an arrow using paper and fix it at the center of the circle with a drawing pin so that it could be rotated.
- Take another chart and write numbers in a line as shown in the figure (the answers in a random fashion).
- Children take turns and rotate the number wheel to find the answer for the question at which the arrow is pointed (eg: $4+2=6$) and place the puppet at number 6 (seen nearest).
- The 1st child to finish the race wins the game.
(Note : If the answer found is wrong, the puppet must be placed 2 numbers behind).



2. SPIDER WEB (2 player game)

Materials Required :Chart paper, pen and dice(3) Procedure

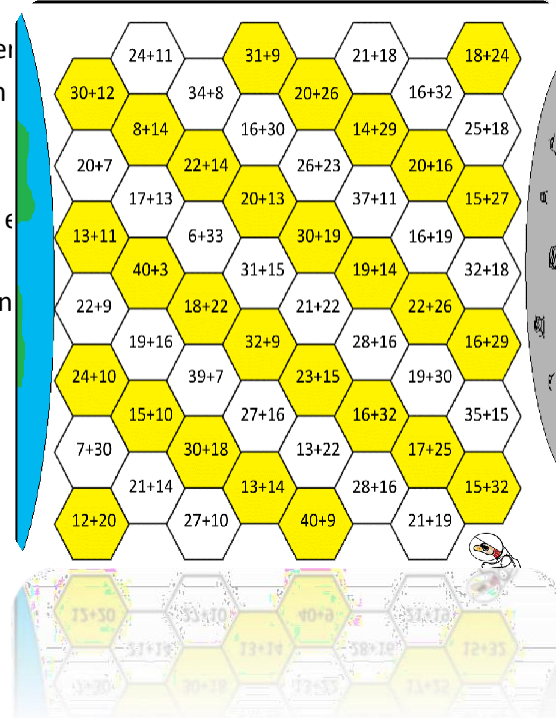
- Take a chart paper and draw a spider web with numbers in it.
- Players take turns to throw 3 dice and add the numbers together.
- The player then strike off 2 or 3 numbers of their choice that add to the sum of the dice. For example, if a player throws 3,4 and 6 which totals 13, then the player could strike off 4, 5 and 4.
- Once a number is struck off it remains struck off.
- When the player cannot complete their turn, the other player is then it's their turn.



3.RACE TO THE MOON (Group game)

Materials Required : Chart paper and 2 sketch pens. Procedure

- Take a chart paper and draw hexagon shapes as shown in the figure.
- Fill the hexagons with addition problems (eg :6+7).
- Draw parts of earth and moon at both sides of the chart paper.
- Each child should start solving the problem from the hexagon that is connected to the earth.
- The child who reaches the moon first wins the game.
- **Note**
 - The problem solved should be of the hexagons that connect to the next hexagon.
 - No two child must solve the same problem.
 - The child will be out from the game if the addition goes wrong.



SUBTRACTION

1. BOWLING GAME

Materials Required :- Ball, ten ball pins, plastic board, A4 sheet and pen.

Procedure :

- Arrange the ball pins (10) at one end of the board.
- Make the child roll the ball to knock down the pins.
- The total number of ball pin is considered as the minuend, the number of ball pins knocked down is the subtrahend and the remaining ball pins is the difference (answer).
- The minuend, subtrahend and the difference should be written down on the A4 sheet.
- As it is a 2 player game, The child who gets a difference 0 first wins the game.



2. LEGO TOWER SUBTRACTION RACE (2 player game)

Materials Required : Building blocks and dice. Procedure:

- As it is a 2 player game, Both children should build the blocks as per the minuend provided.
- Children must throw the dice by taking turns to find the subtrahend.
- Once the difference is found, that number of blocks should be taken away from the tower.
- The first child with no blocks wins the race.



MULTIPLICATION

1. MULTIPLICATION RACE (2 player game)

Materials Required: Chart paper, dice, counters and pen Procedure

- Draw columns as shown in the figure and write down the multiplication problems in it.
- Each player puts their counter on the space that says “start”.
- Take turns to roll the dice and solve the problems.
- The 1st one to reach the finish point is the winner.
(Note- If an answer turns to be wrong, the counter should be kept 2 columns behind the current position).



2. MULTIPLICATION WAR (2 player game) Materials Required : playing cards and pen Procedure

pen Procedure

- Deal out all the playing cards face down evenly among the two players.
- One the count of three, both players turn their top card face up.
- The first to call out the answer to the multiplication problem shown win both cards.
- Winner is the player with maximum number of card.
- **Note**-A's=11, face cards =10



TIME CONCEPT

1. EGGSACTLY THE RIGHT TIME (Group game)

Materials Required : Egg shells divided into two equal halves and marker.

Procedure

- Draw pictorial representations of time at the top half of egg shell and write the time.
- Scatter the egg shells.
- The students need to fix the eggs correctly.
- The more number of correctly fixed egg the child has, he is the winner.



2. WHAT TIME IS IT?

Materials Required : Analog clock Procedure

- Find a working clock to look at.
- Teach child the relation between seconds, minutes and hours.
- Tell the child that every hand in the clock travels in the same direction.
- Make the child look at the number that the hour hand is pointing at and familiarise him that the hour hand will be pointed in between two numbers.
- Tell the child to look for minute hand when the hours hand is pointing at a number.
- Make the child explain the concept to another child.



ACTIVITIES TO TEACH VARIOUS MATHEMATICAL CONCEPTS FOR CHILDREN HAVING PREDOMINANCE IN INTRAPERSONAL INTELLIGENCE

ADDITION

1. PICK ME UP !

Materials Required : Chocobar sticks, pen, color paper, gum and scissors.

Procedure

- Write a number (1-20) on the chocobar sticks.
- Make 3 folders using color sheet(2 folders to place the sticks i.e. the addends and 3rd folder to place the stick which is the sum) as shown in the figure .
- Above the folders draw a plus sign and = sign appropriately .
- The child need to pick up all the 3 sticks by himself/herself and do self learning.



2. FUN WITH ARRAYS

Materials Required :- Chart paper, fabric paint and ear buds. Procedure

- Write addition problems and their solutions on a chart paper (eg: $3+3+3=9$).
- The child need to put dots appropriately in the box provided below the problem(eg:If the problem is $3+3+3$, then the child must put 3 dots ,3 times in 3 rows using different colors).



3. FIND ME OUT

Materials Required :-Colored paper balls, paper strip, chart paper and pen.

Procedure

- Write addition problems on the paper strips (eg : $5+5 = \dots$).
- Take a chart paper ,draw 2 boxes with each box having 5 columns and 2 rows.
- The addition problem (paper strip kept at the top of the chart) must be answered by the child by placing the colored paper balls on each cell.
- The number of balls on each box should be counted and written down at the bottom of the chart as shown in the figure.



SUBTRACTION

1. SUBTRACTION SLIDE

Materials Required : Slider bag, A4 sheet, marker and pencil.

Procedure

- Write 1-10 on a slider bag at regular intervals using a marker.
- The question must be written on the A4 sheet (Example : $10-5$).
- The child must place the plastic slider at the minuend (here 10) and move it to the subtrahend (here 5).
- Later the child must count the difference and write it down on the sheet provided.



Subtraction Slide

Using Slider Bags as a
Beginning Subtraction Strategy

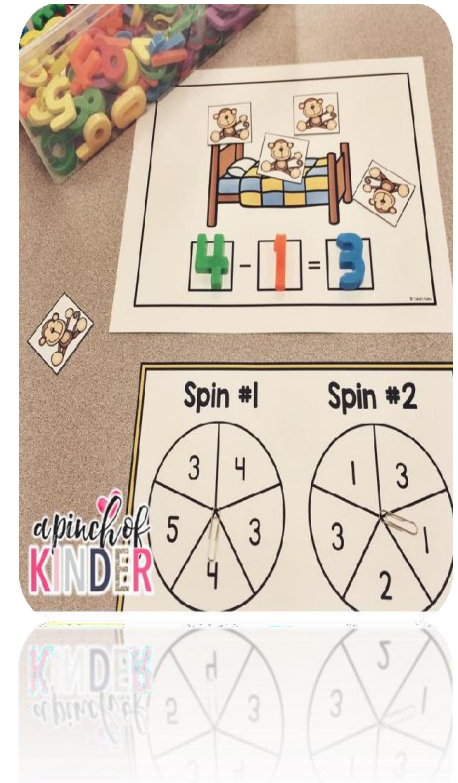


2. SPIN IT UP..!

Materials Required : Chart papers, number blocks, paper holder clips and drawing pin

Procedure

- Draw 2 circles on a chart paper.
- Divide the circles into 5 equal parts and write a number on each part.
- Fix paper holder clips at the centre of the circles using pins so that it could be rotated.
- The child need to spin the paper holder clips of both the circles to obtain the minuend and subtrahend.
- Number blocks that match the minuend, subtrahend and the difference should be placed on the chart paper as shown in the figure.



MULTIPLICATION

1. MULTIPLICATION GAME

Materials Required : Cardboard,scissors,glue ,paper strips,aluminium wire and pen.

Procedure

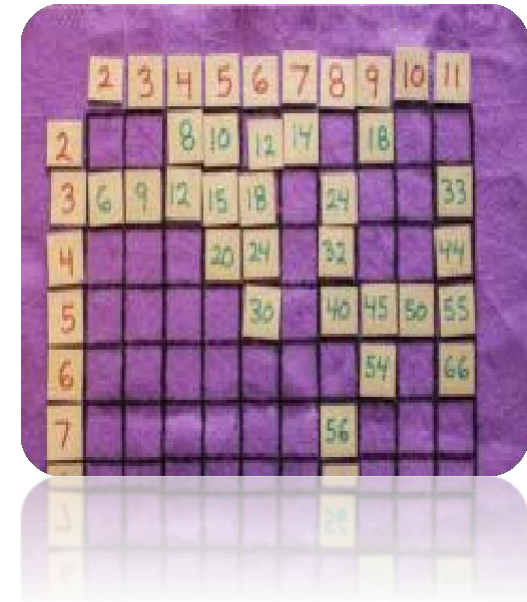
- Using cardboard and aluminium wire make a multiplication model as shown in the figure.
- Take 6 paper strips (write 1 to 10 in 2 of them, a multiplication sign and = sign on the other 2 and the products obtained on the remaining 2 strips as shown in the figure).
- Wrap the strips around the aluminium wire as shown in the figure.
- The child need to rotate the strip accordingly(eg: 4*5=20)



2. ARRANGE !

Materials Required : cardboard pieces, sketch pens and chart paper. Procedure

- Draw a box with 10 rows and 10 columns on a chart paper
- Write the product of multiplication tables 1 to 10 on cardboard pieces.
- Write numbers from 1 to 10 both horizontally and vertically
- The child need to arrange the cardboard pieces as shown in the figure.

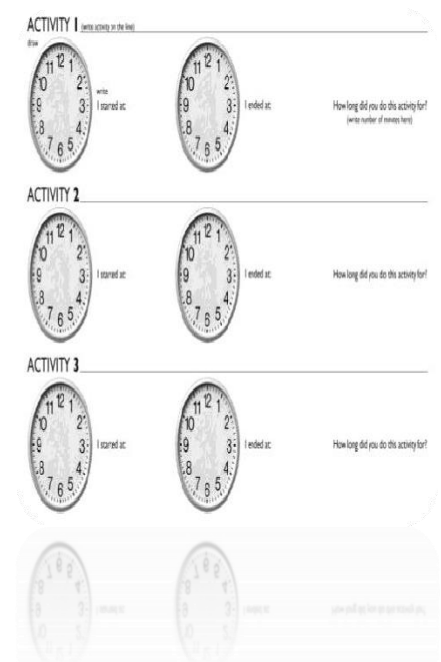


TIME CONCEPT

1. TIME FOR....

Materials Required : Chart paper, analog clock and pen Procedure

- Write activity 1 ,activity 2 and activity 3 as headings on the chart paper.
- Below each heading draw 2 clocks as shown in the figure
- The students need to record the time they do a special or unique activity on the clock and figure out the duration(Example : Basketball practice,dance class etc).



2. SELF PRACTICE

Materials Required : Cardboard piece ,paper strips ,scissors pen and drawing pin.

Procedure

- Draw a clock on the cardboard piece.
- Cut out minute hand and hour hand using paper strips.
- Fix the minute hand and hour hand in the centre of the clock using drawing pin.
- Aids in helping the child self learn the time.



ACTIVITIES TO TEACH VARIOUS MATHEMATICAL CONCEPTS FOR CHILDREN HAVING PREDOMINANCE IN NATURALISTIC INTELLIGENCE

ADDITION

1. PEBBLE ADDITION

Materials Required :- Pebbles and marker Procedure

- Write numbers on the pebbles using marker.
- Select two pebbles ,add the numbers on it and select the appropriate pebble which contains the answer.



2.ADDITION USING STICKS

Materials Required :- Wooden holders, wooden rounds (where numbers are written) and wooden sticks.

Procedure

- Sticks are kept appropriately in each holder (example : 2 sticks where it is written 2, 5 sticks where it is written 5 etc).
- To a problem $2+3$, the child must take all the sticks from 2 and 3 and count them up.



SUBTRACTION

1. LETS SUBTRACT

Materials Required: Wooden sticks, wooden number blocks and stones.

Procedure

- 2 boxes having 2 rows and 5 columns are created using the wooden sticks.
- The teacher should place the wooden number blocks (minuend and subtrahend) above each box.
- The child must place the correct number of stones in each column of the box
- Later the difference should be told orally by the child.

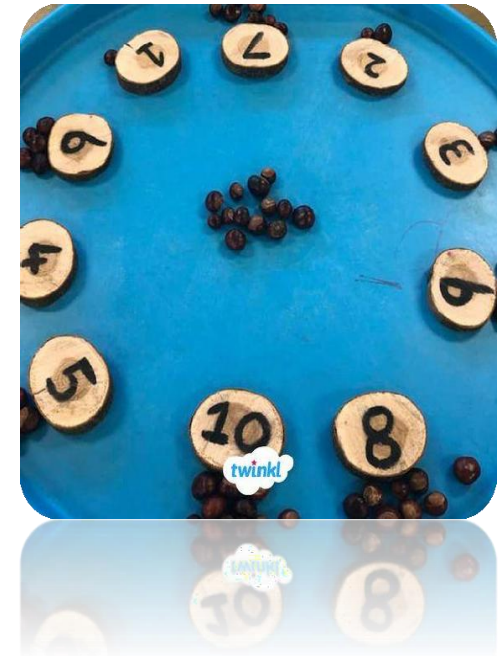


2. FIND THE ANSWER

Materials Required : Wooden pieces,plastic board, marker and seeds.

Procedure

- Number each wooden piece and place appropriate number of seeds near the piece.
- When the teacher tells the minuend and subtrahend,the student should take up the right wooden piece and the seeds ,solve the problem mentally and convey the answer by arranging the seeds in the centre of the board as shown in the figure.



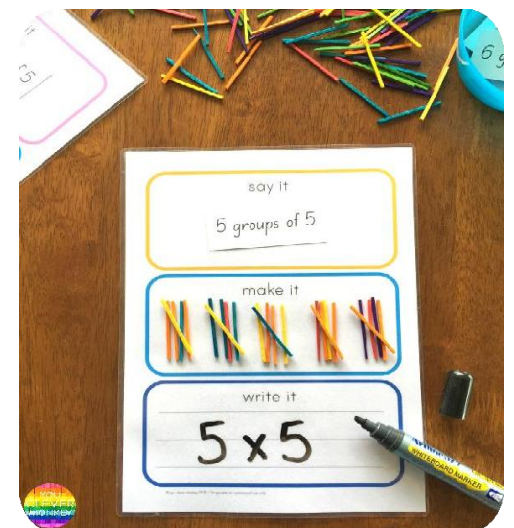
MULTIPLICATION

1. MULTIPLICATION FUN

Materials Required : Coconut broom sticks,fabric paint,marker and A4 sheet.

Procedure

- Dip the coconut broom sticks in fabric paint to make it colorful and let it dry.
- Write the multiplication problem on an A4 sheet.
- The child must arrange the coconut broom sticks according to the question (eg : $2 \times 2 = 4$,so a total of 4 sticks should be kept 2 together).



2. MULTIPLICATION PROBLEM GENERATOR

Materials Required : egg carton,sketch pen Procedure

- Write a number in the bottom of each depression.
- Put two marbles inside.
- The child need to shake the egg carton,open the top,and whatever two numbers the marbles have landed on,they need to be multiplied.



TIME CONCEPT

1. CLOCK

Materials Required : Wooden piece ,saw Procedure

- Teacher assigns a time to each child.
- Children must find wooden piece from the environment and make a clock .

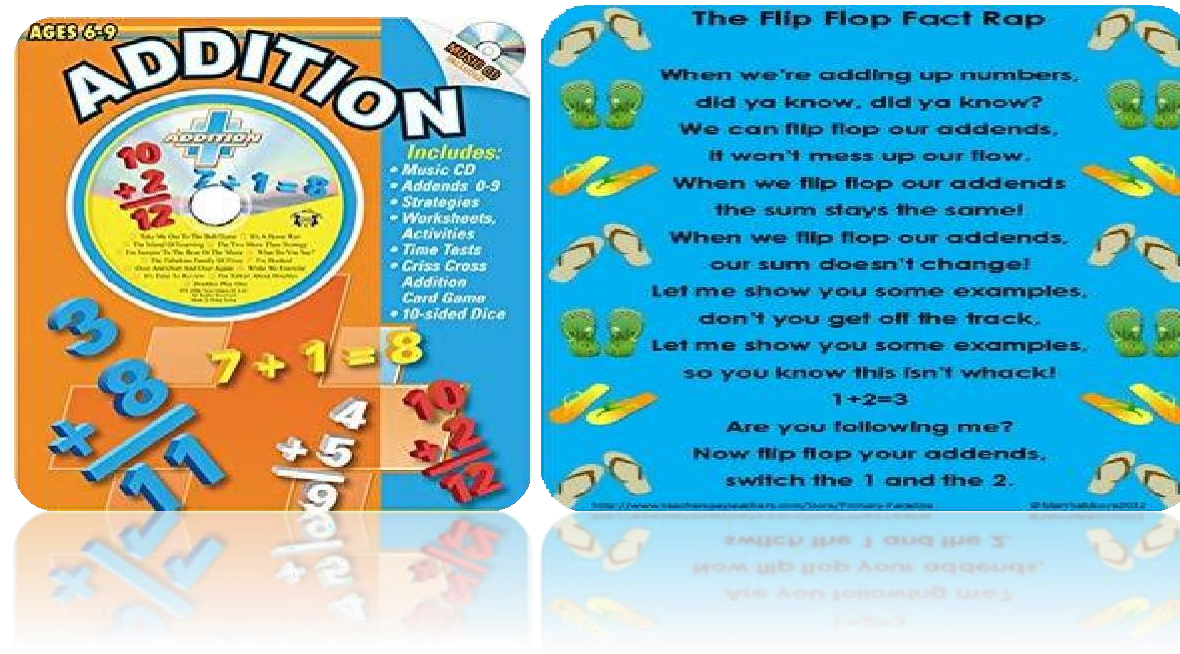


ACTIVITIES TO TEACH VARIOUS MATHEMATICAL CONCEPTS FOR CHILDREN HAVING PREDOMINANCE IN MUSICAL INTELLIGENCE

ADDITION

1. MUSIC CD'S AND ADDITION SONGS

Addition can be taught by playing songs in the class relating to addition or by reciting a rhyme like the flip flop fact rap.



SUBTRACTION

1. XYLOPHONE SUBTRACTION

Materials Required : Xylophone ,paper and pen Procedure

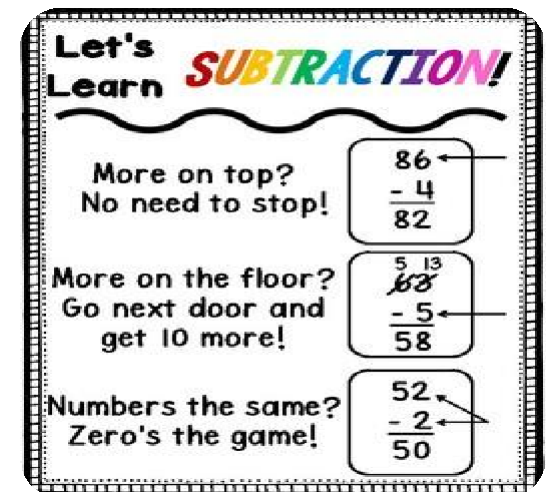
- A number should be written on a piece of paper and stuck on each bar of a xylophone.
- The teacher provides the minuend and subtrahend by striking the mallets on the bars and by writing it on a paper.
- The child need to find the answer (eg:-5-2 =3 and strike the mallet on the bar where the number/difference is written, here 3).
- Later the answer should be written on the paper.



2. LETS SING..!

Materials Required : Chart paper and pen Procedure

- Write the subtraction problem on a chart along with ways to solve it.
- The problem must be solved with a tune.

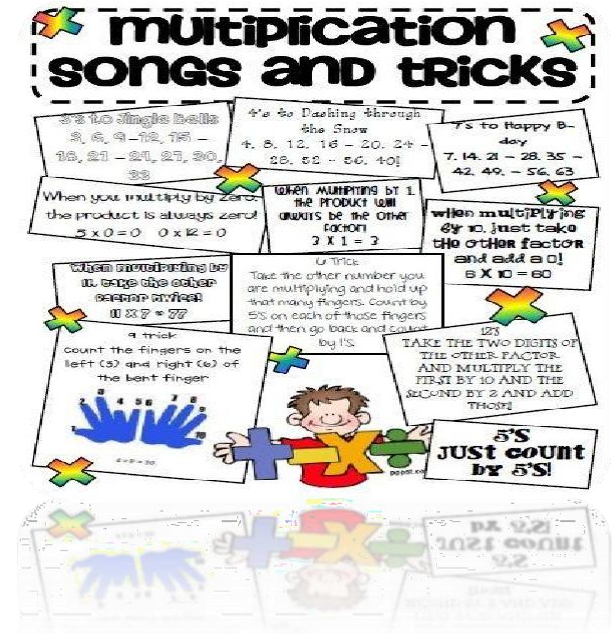


MULTIPLICATION

1. SING WITH ME..!

1 Materials Required : None Procedure

- Sing each multiplication table in different tunes
- (Example :The table of four can be sung in the tune of christmas song “ Dashing through the snow”, similarly the multiplication table of 7 can be sung in the tune of birthday song “Happy birthday to you”).

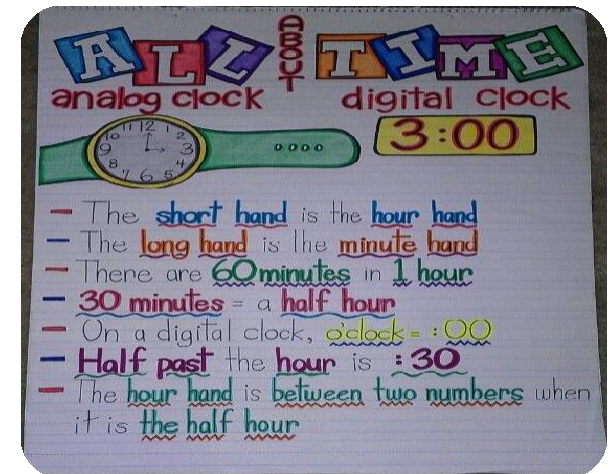


TIME CONCEPT

1. ALL ABOUT TIME

Materials Required : Chart paper and sketch pens. Procedure

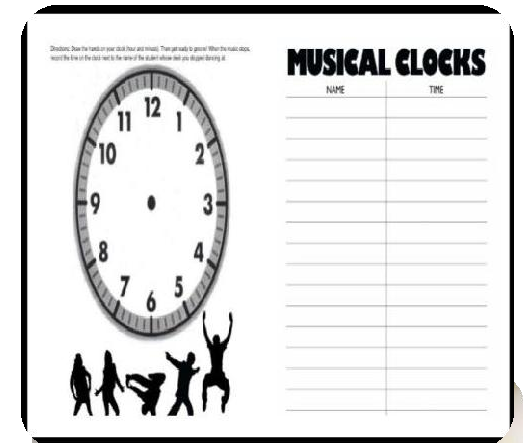
- Write time facts on a chart.
- Make the children sing it with different tunes and tones.



2. MUSIC ON

Materials Required : A4 sheets and pen Procedure

- Draw a blank clock .
- Draw a table beside it with 2 columns each with headings “ name” and “time” (Recording sheet).
- Children need to draw hands on their clock (hand and minute) and leave it on their desk.
- Children need to dance around ,move from desk to desk when the music is played.
- When the music stops,Children need to record whose desk they stopped at and the time on their clock.
- Repeat until they have recorded every student’s time.
- At the end of the activity they need to turn in their clock and recording sheet so the teacher can assess their time-telling skills.



REFERENCES



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- <https://in.pinterest.com/remhyatt/subtraction-activities/>
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