INTELLIGENCE AND MUSICAL APTITUDE OF COLLEGE STUDENTS IN AIZAWL CITY WITH REFERENCE TO THEIR GENDER AND STREAM OF STUDY

BY

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CONCEPTUAL FRAMEWORK

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CONCEPTUAL FRAMEWORK

Intelligence has been defined in many different ways such as in terms of one's capacity for logic, abstract thought, understanding, self-awareness, communication, learning, emotional knowledge, memory, planning, and problem solving.

Within the discipline of psychology, various approaches to human intelligence have been adopted. The psychometric approach is especially familiar to the general public, as well as being the most researched and by far the most widely used in practical settings.

Intelligence is derived from the Latin verb *intelligere*, which means to comprehend or perceive. A form of this verb, *intellectus*, became the medieval technical term for understanding, and a translation for the Greek philosophical term *nous*. This term was however strongly linked to the metaphysical and cosmological theories of teleological scholasticism, including theories of the immortality of the soul, and the concept of the Active Intellect (also known as the Active Intelligence). This entire approach to the study of nature was strongly rejected by the early modern philosophers such as Francis Bacon, Thomas Hobbes, John Locke, and David Hume, all of whom preferred the word "understanding" in their English philosophical works. Hobbes for example, in his Latin *De*

Corpore, used "*intellectusintelligit*" (translated in the English version as "the understanding understandeth") as a typical example of a logical absurdity. The term "intelligence" has therefore become less common in English language philosophy, but it has later been taken up (with the scholastic theories which it now implies) in more contemporary psychology.

1.1.0 INTELLIGENCE

Intelligence has been defined by various psychologists as follows:

A. Anastasi, (1992)[1] defines “Intelligence is not a single, unitary ability, but rather a composite of several functions. The term denotes that combination of abilities required for survival and advancement within a particular culture.”

M. Anderson (2006)[2] quoted “Intelligence is that facet of mind underlying our capacity to think, to solve novel problems, to reason and to have knowledge of the world.”

A. Binet & Simon (1905)[3] says “It seems to us that in intelligence there is a fundamental faculty, the alterationor the lack of which, is of the utmost importance for practical life. This faculty is judgement, otherwise called good sense, practical sense, initiative, the faculty of adapting one’s self to circumstances.”

W. V. Bingham (1937)[4] states “We shall use the term ‘intelligence’ to mean the ability of an organism to solve new problems”

According to E. Boring (1923)[5] "Intelligence is what is measured by intelligence tests."

C. L. Burt (1957)[6] defines intelligence as "a quality that is intellectual and not emotional or moral: in measuring it we try to rule out the effects of the child's zeal, interest, industry, and the like. It denotes a general capacity, a capacity that enters into everything the child says or does or thinks; any want of 'intelligence' will therefore be revealed to some degree in almost all that he attempts."

S. Legg and M. Hutter (2006)[7] says "Intelligence measures an agent's ability to achieve goals in a wide range of environments."

1.1.1 Theories of Intelligence

While intelligence is one of the most talked about subjects within psychology, there is no standard definition of what exactly constitutes "Intelligence". Some researchers have suggested that intelligence is a single, general ability; while others believe that intelligence encompasses range of aptitudes, skills and talents. Therefore, there are different theories about intelligence, none of which agree with each other. Every approach to thinking comes up with it's own different perspective and assumptions, often contradicting at least one earlier theory. Nature of intelligence can be understood by the different theories presented in this section.

One factor/UNI factor theory:

It reduces all abilities to a single capacity of general intelligence or 'common sense'. This would imply that they are all perfectly correlated, and would make no allowance for the unevenness of people i.e. abilities along different lines.

Since it goes against the common observation that "an individual does possess different levels of different abilities and does not shine equally in all directions"—it has no ground to stand.

Spearman's two-factor theory:

It was developed in 1904 by an English Psychologist, Charles Spearman, who proposed that intellectual abilities were comprised of two factors : one general ability or common ability known as 'G' factor and the other a group of specific abilities known as 'S' factor. 'G' factor is universal inborn ability. Greater 'G' in an individual leads to greater success in life. 'S' factor is acquired from the environment. It varies from activity to activity in the same individual.

He believed that an individual's performance on a test of intellectual ability is determined by two factors: the g factor which is a general factor and the s factor which is a factor specific to a particular test.

Thorndike's multifactor theory:

Thorndike believed that there was nothing like General ability. Each mental activity requires an aggregate of different set of abilities. He distinguished the following four attributes of intelligence:

(a) Level—refers to the level of difficulty of a task that can be solved.

(b) Range—refers to a number of tasks at any given degree of difficulty.

(c) Area—means the total number of situations at each level to which the individual is able to respond.

(d) Speed—is the rapidity with which we can respond to the items.

E.L. Thorndike's multi- factor theory stands in sharp contradiction of Spearman's two-factor theory. According to this, intelligence is a name conveniently given to infinite number of specific abilities combined together.

It can be stated that intelligence is the sum total of all the specific capacities with regard to every separate act. It also means that E.L. Thorndike denies the existence of a general factor. Intelligence is a host of highly independent factors. This theory was given to us in the beginning of the present century.Thorndike concluded that there were three types of Intelligence:

(a) Abstract Intelligence:

It is the ability to understand words, numbers and letters and to use them effectively abstract intelligence is required in ordinary academic subjects in schools such as reading, writing and solving academic problems. The highest level of abstract intelligence is manifested in the thoughts of poets, philosophers and writers.

(b) Social Intelligence:

It is the ability of an individual to deal effectively and efficiently with his social and cultural environment. Social intelligence is revealed when a person is able to establish and develop desirable social relations in conformity with his social and cultural norms.

(c) Concrete Intelligence:

It is the ability to understand and deal with things as in skilled trades or scientific appliances, this is also known as mechanical or motor intelligence. In education concrete intelligence is required in learning dances and participating in games and sports.

Thurstone's theory:

This theory states that Intelligent activities are not an expression of innumerable highly specific factors, as Thorndike claimed. Nor is it the expression primarily of a general factor that pervades all mental activities that is the essence of intelligence, as Spearman held. Instead, the analysis of interpretation of Spearman and others led them to the conclusion that 'certain' mental operations have in common a 'primary' factor that gives them psychological and functional unity and that differentiates them from other mental operations. These mental operations then constitute a group. A second group of mental operation has its own unifying primary factor, and so on. In other words, there are a number of groups of mental abilities, each of which has its own primary factor, giving the group a functional unity and cohesiveness. Each of these primary factors is said to

be relatively independent of the others. Thurstone has given the following six primary factors:

(i) The Number Factor (N)—ability to do Numerical Calculations rapidly and accurately.

(ii) The Verbal Factor (V)—found in tests involving Verbal Comprehension.

(iii) The Space Factor (S)—involved in any task in which the subject manipulates the imaginary object in space.

(iv) Memory (M)—Involving ability to memorize quickly.

(v) The Word Fluency Factor (W)—involved whenever the subject is asked to think of isolated words at a rapid rate.

(vi) The Reasoning Factor (R)—found in tasks that require a subject to discover a rule or principle involved in a series or groups of letters.

Based on these factors Thurstone constructed a new test of intelligence known as "Test of Primary Mental Abilities (PMA)."

Guildford's model of structure of intellect:

Guilford proposed a three dimensional structure of intellect model. According to Guilford every intellectual task can be classified according to it's

(1) content,

(2) the mental operation involved and

(3) the product resulting from the operation.

He further classified content into five categories, namely, Visual, Auditory, Symbolic, Semantic and Behavioral. He classified operations into five categories,

namely, Cognition, Memory retention & Memory recording, Divergent production, Convergent production and evaluation. He classified products into six categories, namely, Units, Classes, Relations, Systems, Transformations and Implications.

Cattell's fluid and crystallized theory:

The fluid aspect of this theory says that intelligence is a basic capacity due to genetic potentiality. While this is affected by the past and new experiences, the crystallized theory is a capacity resultant of experiences, learning and environment.

Fluid intelligence or *fluid reasoning* is the capacity to think logically and solve problems in novel situations, independent of acquired knowledge. It is the ability to analyze novel problems, identify patterns and relationships that underpin these problems and the extrapolation of these, using logic. It is necessary for all logical problem solving, e.g., in scientific, mathematical, and technical problem solving. Fluid reasoning includes inductive reasoning and deductive reasoning.

Crystallized intelligence is the ability to use skills, knowledge, and experience. It does not equate to memory, but it does rely on accessing information from long-term memory. Crystallized intelligence is one's lifetime of intellectual achievement, as demonstrated largely through one's vocabulary and general knowledge. This improves somewhat with age, as experiences tend to expand one's knowledge.

The terms are somewhat misleading because one is not a "crystallized" form of the other. Rather, they are believed to be separate neural and mental systems. Crystallized intelligence is indicated by a person's depth and breadth of general knowledge, vocabulary, and the ability to reason using words and numbers. It is the product of educational and cultural experience in interaction with fluid intelligence.

Fluid and crystallized intelligence are thus correlated with each other, and most IQ tests attempt to measure both varieties. For example, the Wechsler Adult Intelligence Scale (WAIS) measures fluid intelligence on the performance scale and crystallized intelligence on the verbal scale. The overall IQ score is based on a combination of these two scales.

Gardener's theory of multiple intelligence:

Howard Gardner (1983)[8] in his book "Frames of Mind, The Theory of Multiple Intelligence," puts forth a new and different view of human intellectual competencies. He argues boldly and cogently that we are all born with potential to develop a multiplicity of Intelligence, most of which have been overlooked in our testing society, and all of which can be drawn upon to make us competent individuals. The potential for musical accomplishments, bodily mastery and spatial reasoning, and the capacities to understand ourselves as well as others are. Gardner argues, "the multiple forms of intelligence that we must add to the conventional—and typical tested—logical and linguistic

skills long called I.Q.". The multiple intelligence theory is that people possess eight types of intelligence as follows:

(a) Naturalist Intelligence ("Nature Smart")

Designates the human ability to discriminate among living things (plants, animals) as well as sensitivity to other features of the natural world (clouds, rock configurations). This ability was clearly of value in our evolutionary past as hunters, gatherers, and farmers; it continues to be central in such roles as botanist or chef. It is also speculated that much of our consumer society exploits the naturalist intelligences, which can be mobilized in the discrimination among cars, sneakers, kinds of makeup, and the like.

(b) Musical Intelligence ("Musical Smart")

Musical intelligence is the capacity to discern pitch, rhythm, timbre, and tone. This intelligence enables us to recognize, create, reproduce, and reflect on music, as demonstrated by composers, conductors, musicians, vocalist, and sensitive listeners. Interestingly, there is often an affective connection between music and the emotions; and mathematical and musical intelligences may share common thinking processes. Young adults with this kind of intelligence are usually singing or drumming to themselves. They are usually quite aware of sounds others may miss.

(c) Logical-Mathematical Intelligence (Number / Reasoning Smart)

Logical-mathematical intelligence is the ability to calculate, quantify, consider propositions and hypotheses, and carry out complete mathematical operations. It enables us to perceive relationships and connections and to use abstract, symbolic thought; sequential reasoning skills; and inductive and deductive thinking patterns. Logical intelligence is usually well developed in mathematicians, scientists, and detectives. Young adults with lots of logical intelligence are interested in patterns, categories, and relationships. They are drawn to arithmetic problems, strategy games and experiments.

(d) Existential Intelligence

Sensitivity and capacity to tackle deep questions about human existence, such as the meaning of life, why do we die, and how did we get here.

(e) Interpersonal Intelligence (People Smart")

Interpersonal intelligence is the ability to understand and interact effectively with others. It involves effective verbal and nonverbal communication, the ability to note distinctions among others, sensitivity to the moods and temperaments of others, and the ability to entertain multiple perspectives. Teachers, social workers, actors, and politicians all exhibit interpersonal intelligence. Young adults with this kind of intelligence are leaders among their peers, are good at communicating, and seem to understand others' feelings and motives.

(f) Bodily-Kinesthetic Intelligence ("Body Smart")

Bodily kinesthetic intelligence is the capacity to manipulate objects and use a variety of physical skills. This intelligence also involves a sense of timing and the perfection of skills through mind–body union. Athletes, dancers, surgeons, and craftspeople exhibit well-developed bodily kinesthetic intelligence.

(g) Linguistic Intelligence (Word Smart)

Linguistic intelligence is the ability to think in words and to use language to express and appreciate complex meanings. Linguistic intelligence allows us to understand the order and meaning of words and to apply meta-linguistic skills to reflect on our use of language. Linguistic intelligence is the most widely shared human competence and is evident in poets, novelists, journalists, and effective public speakers. Young adults with this kind of intelligence enjoy writing, reading, telling stories or doing crossword puzzles.

(h) Intra-personal Intelligence (Self Smart")

Intra-personal intelligence is the capacity to understand oneself and one's thoughts and feelings, and to use such knowledge in planning and directioning one's life. Intra-personal intelligence involves not only an appreciation of the self, but also of the human condition. It is evident in psychologist, spiritual leaders, and philosophers. These young adults may be shy. They are very aware of their own feelings and are self-motivated.

(i) Spatial Intelligence ("Picture Smart")

Spatial intelligence is the ability to think in three dimensions. Core capacities include mental imagery, spatial reasoning, image manipulation, graphic and artistic skills, and an active imagination. Sailors, pilots, sculptors, painters, and architects all exhibit spatial intelligence. Young adults with this kind of intelligence may be fascinated with mazes or jigsaw puzzles, or spend free time drawing or daydreaming.

Other Theories.

Eysenck distinguishes between speed and power components of intelligence. Speed is measured by the time required to complete the task and power is measured through untimed test of reasoning.

Gensen splits intelligence into two levels: 1) Associative ability being the capacity to learn, remember and recall information. It represents the lower level of continuum. Cognitive ability is concerned with reasoning and is located at the higher level. Cognitive ability depends upon associated ability but not the vice versa.

Hebb has distinguished two meanings of intelligence on neurological basis. Intelligence A is the innate potential based on the development process. This type of intelligence is dependent upon the possession of a good brain and a good neutral metabolism. Intelligence B involves the functioning of the brain, and is observable indirectly from the individual's behavior. Intelligence A is not observable

and cannot be measured, whereas intelligence B is measured through tests.

1.1.2 Development of intelligence

There have been a number of approaches to the study of the development of intelligence. Psychometric theorists, for instance, have sought to understand how intelligence develops in terms of changes in intelligence factors and in various abilities in childhood. For example, the concept of mental age was popular during the first half of the 20th century. A given mental age was held to represent an average child's level of mental functioning for a given chronological age. Thus, an average 12-year-old would have a mental age of 12, but an above-average 10-year-old or a below-average 14-year-old might also have a mental age of 12 years. The concept of mental age fell into dis-favour, however, for two apparent reasons. First, the concept does not seem to work after about the age of 16. The mental test performance of, say, a 25-year-old is generally no better than that of a 24- or 23-year-old, and in later adulthood some test scores seem to start declining. Second, many psychologists believe that intellectual development does not exhibit the kind of smooth continuity that the concept of mental age appears to imply. Rather, development seems to come in intermittent bursts, whose timing can differ from one child to another.

1.1.3 Factors influencing intelligence:

The factors influencing intelligence can be categorized broadly into two: Heredity and environment.

Heredity:

Heritability is defined as the proportion of variance in a trait which is attributable to genotype within a defined population in a specific environment. Heritability measures the proportion of 'variation' in a trait which can be attributed to genes, and not the proportion of a trait caused by genes. The value of heritability can change if the impact of environment (or of genes) in the population is substantially altered. A high heritability of a trait does not mean environmental effects, such as learning, are not involved. Since heritability increases during childhood and adolescence, one should be cautious drawing conclusions regarding the role of genetics and environment from studies where the participants are not followed until they are adults.

Studies have found the heritability of IQ in adult twins to be 0.7 to 0.8 and in children twins 0.45 in the Western world. It may seem reasonable to expect genetic influences on traits like IQ should become less important as one gains experiences with age. However, the opposite occurs. Heritability measures in infancy are as low as 0.2, around 0.4 in middle childhood, and as high as 0.8 in adulthood. One proposed explanation is that people with different genes tend to reinforce the effects of those genes, for example by seeking out different environments. Debate is

ongoing about whether these heritability estimates are too high, owing to inadequate consideration of various factors — such as the environment being relatively more important in families with low socioeconomic status, or the effect of the maternal (fetal) environment.

Environment:

Much research investigates the impact of environment on intelligence. This is one of the most important factors in understanding human group differences in IQ test scores and other measures of cognitive ability. It is estimated that genes contribute about 20-40% of the variance in intelligence in childhood and about 60% in old age. Thus the environment and its interaction with genes account for the remaining approximate 50% of intelligence. Historically, there has been great interest in the field of intelligence research to determine environmental influences on the development of cognitive functioning, in particular, fluid intelligence, as defined by its stabilization at 16 years of age. Despite the fact that intelligence stabilizes in early adulthood it is thought that genetic factors come to play more of a role in our intelligence during middle and old age and that the importance of the environment dissipates.

1) Family

Having access to resources of the home, and having a home life conducive to learning, definitely affects scores on intelligence tests. However, it is difficult to disentangle possible genetic factors from a parent's attitude or use of language.

A child's ordinal position in their family has also been shown to affect intelligence. A number of studies have indicated that as birth order increases IQ decreases with first born having especially superior intelligence. Many explanations for this have been proposed but the most widely accepted idea is that first born receive more attention and resources from parents and are expected to focus on task achievement, whereas later born are more focused on sociability.

2) Peer group

JR Harris suggested in *The Nurture Assumption* that an individual's peer group influences their intelligence greatly over time, and that different peer group characteristics may be responsible for the black-white IQ gap. Several longitudinal studies support the conjecture that peer groups significantly affect scholastic achievement, but relatively few studies have examined the effect on tests of cognitive ability. The stereotype threat, first introduced by Claude Steele, is the idea that people belonging to a stereotyped group may perform poorly in a situation where the stereotype is relevant. This has been shown to be a factor in differences in intelligence test scores between different ethnic groups, men and women, people of low and high social status and young and old participants.

3) Education

There is controversy as to whether education affects intelligence in that education has a complicated relationship with intelligence; it is both a dependent and

independent variable. Previously measured intelligence has been shown to predict educational achievement and attainment. The correlation between IQ and educational attainment is somewhere between .40 and .60. Those who did better on intelligence tests in their childhood tend to have a lower drop- out rate, and complete more years of school, therefore making intelligence a predictive factor of how well someone will succeed in schooling.

However, on the other hand, education has been shown to improve a person's performance on these intelligence tests, from a very young age. A study by Ceci illustrates the numerous ways in which education can affect intelligence. It was found that; IQ decreases during summer breaks from schooling, children with delayed school entry have lower IQ's, those who drop out of education earlier have lower IQ's and children of the same age but of one year less schooling have lower IQ scores. Thus it is difficult to unravel the interconnected relationship of IQ and education where both seem to affect one another, however it appears that quantity of schooling may be important as it underpins the cognitive processes of performance on IQ tests.

4) Training and interventions

Research on the effectiveness of interventions, and the degree to which fluid intelligence can be increased, especially after age 16, is somewhat controversial. Fluid intelligence is typically thought of as something more innate, and defined as immutable after maturity. One recent article however, demonstrates that, at least for a

period of time, fluid intelligence can be increased through training in increasing an adult's working memory capacity. Working memory capacity is defined as the ability to remember something temporarily, like remembering a phone number just long enough to dial it.

5) Environmental enrichment

Environmental enrichment affects cognition and intellectual development from a neurobiological perspective.More stimulating environments can increase the number of synapses in the brain which increases synaptic activity. In humans this is most likely to occur during the development of the brain but can also occur in adults.

6) Society/Poverty

The more years children spend in poverty, the lower their IQs tend to be. Children from lower- and working-class homes average 10-15 points below their middle-class age mates on IQ tests. In many countries, children from wealthier homes score better on IQ test than children from poorer homes. The greater the gap in wealth in a country the greater the difference in IQ scores.Chronic inadequate diet can disrupt brain development. Chronic or short-term inadequate diet at any point in life can impair immediate intellectual functioning. Reduced access to health service, poor parenting, and insufficient stimulation and emotional support can impair intellectual growth.

7) Race/Ethnicity

Overall, differences in IQ scores of children from different racial and ethnic groups describe children's

performance only in the environments in which the children live. These findings do not indicate potential, nor do they tell us what these children would do if they live someplace else. Most group differences in IQ are due to environmental differences -- as discrimination and inequality decrease -- IQ differences decrease.

The average IQ score of Euro-American children is 10-15 points higher than that of African-American children.The average IQ score of Latino and American-Indian children fall somewhere in between those of Euro-American and African-American children. The average IQ score of Asian-American children tend to be higher than any other group in the US. American-Indian, Latino children, and Asian-American children are better on the performance part than the verbal part of an IQ test, but African-American children are better on the verbal part than the performance part of an IQ test

1.1.4 Measurement of Intelligence:

We can observe the intelligence of an individual only to the extent that it is manifested by him in one or more intelligence tests. Many such tests have been devised by psychologists for the measurement of intelligence. Various types of tests have been constructed so far for measuring the intelligence but the credit goes to Binet and Simon, who have first developed the test to measure intelligence. Binet is considered the father of intelligence.

Alfred Binet and the First IQ Test

During the early 1900s, the French government asked psychologist Alfred Binet to help decide which students were mostly likely to experience difficulty in schools. The government had passed laws requiring that all French children attend school, so it was important to find a way to identify children who would need specialized assistance.

Faced with this task, Binet and his colleague Theodore Simon began developing a number of questions that focused on things that had not been taught in school such as attention, memory and problem-solving skills. Using these questions, Binet determined which ones served as the best predictors of school success. He quickly realized that some children were able to answer more advanced questions that older children were generally able to answer, while other children of the same age were only able to answer questions that younger children could typically answer. Based on this observation, Binet suggested the concept of a mental age, or a measure of intelligence based on the average abilities of children of a certain age group.

This first intelligence test, referred to today as the Binet-Simon Scale, became the basis for the intelligence tests still in use today. However, Binet himself did not believe that his psychometric instruments could be used to measure a single, permanent and inborn level of intelligence (Kamin, 1995)[9]. Binet stressed the limitations of the test, suggesting that intelligence is far too broad a concept to quantify with a single number. Instead, he insisted that

intelligence is influenced by a number of factors, changes over time and can only be compared among children with similar backgrounds (Siegler, 1992)[10].

The Stanford-Binet Intelligence Test

After the development of the Binet-Simon Scale, the test was soon brought to the United States where it generated considerable interest. Stanford University psychologist Lewis Terman took Binet's original test and standardized it using a sample of American participants. This adapted test, first published in 1916, was called the Stanford-Binet Intelligence Scale and soon became the standard intelligence test used in the U.S.

Intelligence Testing During World War I

At the outset of World War I, U.S. Army officials were faced with the monumental task of screening an enormous number of army recruits. In 1917, as president of the APA and chair of the Committee on the Psychological Examination of Recruits, psychologist Robert Yerkes developed two tests known as the Army Alpha and Beta tests. The Army Alpha was designed as a written test, while the Army Beta was administered orally in cases where recruits were unable to read. The tests were administered to over two million soldiers in an effort to help the army determine which men were well suited to specific positions and leadership roles (McGuire, 1994)[11].

At the end of World War I, the tests remained in use in a wide variety of situations outside of the military with individuals of all ages, backgrounds and nationalities. For

example, IQ tests were used to screen new immigrants as they entered the United States at Ellis Island. The results of these mental tests were inappropriately used to make sweeping and inaccurate generalizations about entire populations, which led some intelligence "experts" to exhort Congress to enact immigration restrictions (Kamin, 1995)[12].

The Wechsler Intelligence Scales

The next development in the history of intelligence testing was the creation of a new measurement instrument by American psychologist David Wechsler. Much like Binet, Wechsler (1939)[13] believed that intelligence involved a number of different mental abilities, describing intelligence as, "the global capacity of a person to act purposefully, to think rationally, and to deal effectively with his environment" Dissatisfied with the limitations of the Stanford-Binet, he published his new intelligence test known as the Wechsler Adult Intelligence Scale (WAIS)in 1955.

Wechsler also developed two different tests specifically for use with children: the Wechsler Intelligence Scale for Children (WISC) and the Wechsler Preschool and Primary Scale of Intelligence (WPPSI). The adult version of the test has been revised since its original publication and is now known as the WAIS-IV.

1.1.5 Types of Intelligence test: Intelligence tests are classified in a number of ways:

(a) Viewed from the point of administration, it can be classified as:

Individual Tests: A test can be said individual test in the sense that they can be administered to only one person at a time. Many of the tests in these scales require oral responses from the examinee or necessitate the manipulation of the materials. Individual intelligence tests are preferred by psychologist in clinics, hospitals and other settings where clinical diagnosis are made, and where they serve not only as measures of general intelligence but also as means of observing behavior in a standard situation.

Group tests: Group test was developed to meet a pressing practical need. Group test can be administered to a group of persons at a time. Group tests were designed as mass testing instruments; they not only permit the simultaneous examination of large groups but they also use simplified instruction and administration procedures. There by requiring a minimum of training on the part of examiner.

(b) Viewed from the point of nature of tests, it can be classified as:

Verbal or Language Tests: In these the subject make use of language in which the instructions are given in words, written, oral, or both. The individuals being tested are required to use language verbal or written, for their responses. The test content is loaded with verbal material. Some verbal test of intelligence are:

(1) Stanford Binet Test of Intelligence

(2) The group test of General Mental Ability - R.K.Tandon

(3) Group Test of Intelligence in English for age 13 to 17 years - C.G.Ahuja

Non Verbal or Non-language Test: A non verbal or non-language test, is one in which no language is used at all either in the instruction or in construction of items. Usually, the instructions are given through gestures, black-board demonstration, charts and the items are neither verbal nor manipulative types. Non language test are especially designed for the illiterate, foreign speaking, deaf, or others who for any reason are unable to take a language test

Test items of non-verbal are usually of figured relation type where the examinee has to discover, without actual manipulation or objects, the relationship between various figures and design. In the non-verbal test the use of paper and pencil is involved. This is also called *'Paper and Pencil Test'* of intelligence. The examinee uses the paper and pencil to underline or cross out the items which do not require any ability or skill to read or write. Three major abilities are measured by the non-verbal test of intelligence: Perceptual ability, Spatial ability and Reasoning ability.

One of the biggest advantages of non-verbal test is that it can be administered to persons belonging to the different culture. It is also known as culture free or culture fair or cross cultural test of intelligence. Some non-verbal intelligence tests are:

(1) Army beta test

(2) Chicago non-verbal test

(3) Raven's progressive matrices test

(4) CIE non-verbal group test of intelligence

Performance Test: A performance test is one in which language is used only in the instructions or not at all when directions are given. The task to be performed requires an overt motor response other than verbal. The principal characteristic of the performance test is that a response to a solution of the task does not require the use of language or number.

Performance tests are most valuable when used with persons handicapped by language such as the deaf, illiterate, foreign language speaking groups and those who have speech or reading disabilities. They are valuable, also in helping to identify children who are inarticulate or excessively shy because of emotional reasons and therefore, they might appear at a disadvantage on verbal test of intelligence.

Some of the better known scales are:

(1) The Pinter-Patterson scale

(2) The Arthur's point scale

(3) Alexander's battery of performance tests

(4) Bhatia's battery of performance tests.

(5) Wechler Bellevue intelligence scale

1.2.0 APTITUDE

Aptitude may be described as a special ability or specific capacity distinct from the general intellectual ability

which helps an individual to acquire the required degree of proficiency or achievement in a specific field.

The word aptitude is derived from the word aptos which means 'fitted for'. Aptitude implies fitness and suitability, a readiness to acquire proficiency in a given field or job.

According to Bingham(1937)[14] 'Aptitude refers to those qualities characterizing a person's way of behavior which serve to indicate how well he can learn to meet and solve a certain specified kinds of problem.'

According to Freeman (1965)[15] 'An aptitude is a combination of characteristics indicative of an individual's capacity to acquire (with training) some specific knowledge, skill, or set of organized responses, such as the ability to speak a language, to become a musician, to do mechanical work.

Traxler (1957)[16] defines 'Aptitude is a condition, a quality or a set of qualities in an individual which is indicative of the probable extent to which he will be able to acquire under suitable training, some knowledge, skill or composite knowledge, understanding and skill, such as ability to contribute to art, music, mechanical ability, mathematical ability or ability to read and speak a foreign language.'

These definitions reveal the predictive nature of aptitudes. If one has an aptitude for music it means that one's present condition or ability reveals that if one is to learn music one would be successful. The knowledge of an

individual's aptitude thus helps one to predict his future success in a particular field of activity, with appropriate training or experience.

1.2.1 Aptitude test:

The term "aptitude," in relation to psychological testing came out of the "nature-nurture" controversy in the 1920's (and later in the 1940's and 1960's) when scientists began to divide into hereditary and environmental camps. In the process of trying to discriminate which characteristics of intelligence are innate and which are acquired, aptitude came to denote, over a period of time, "innate" intelligence as opposed to achievement which denoted, "acquired" intelligence (Rothe, 1991)[17].

Aptitude tests are measures of aptitude. An aptitude test is a device or a technique 'designed to indicate a person's potential ability for performance of a certain type of activity of a special kind'. An aptitude test measures the present performance which is symptomatic or indicative of one's ability for future accomplishment in a particular work or job.

Aptitude tests have been observed to be a highly accurate tool for selection of the right candidate as compared to the interview, group discussion, written tests and so on. Based on this assumption, today an increasing number of organizations include this tool in their recruitment process. There are a wide variety of aptitude tests.

1.2.2. Types of aptitude tests:

Aptitude tests may roughly be grouped into two types:

1. Aptitude test Batteries: Aptitude test batteries measure multiple aptitudes. These tests are called batteries because each test in them is not a sub-test, but an independent test measuring a single and relatively pure ability. They do not give a single score for the entire battery of tests, but usually many separate scores for each part of the battery. These batteries yield an overall profile of a person's abilities.

2. Special Aptitude Test: Certain areas such as vision, hearing, motor dexterity, and artistic talents are rarely included in the multiple aptitude batteries. Special aptitude tests attempt to concentrate on ability in a particular area. They reveal aptitudes in smaller areas or specific areas. Besides, they also need special type of materials to test them. The stimulation for the development of the tests of special aptitudes came from the problems posed in vocational selection and counseling, as well as, requirements in military, education, business and industry, of persons (having a wide variety of aptitudes) to fill up their highly specialized jobs. Thus, in a sense, it may be said that the need for the aptitude research and aptitude testing has, in a way, arisen out of many pressing and urgent requirement in industrial and military situations, of matching job requirement with specific patterns of abilities characterizing each individual. There are many kinds of specific Aptitude tests. Some of these aptitude tests are:

(a) Mechanical Aptitude Test: Mechanical ability, like most other abilities, is composed of more than one factor, and so, mechanical aptitude is not a unitary trait, but a combination of many traits, e.g. spatial perception and imagination; manual dexterity involving precision of muscular coordination; and motor abilities of strength, speed of movement and endurance.

(b) Clerical Aptitude Tests: Clerical aptitude refers to a group of characteristics which go along with success in clerical work. These characteristics include average intelligence, proficiency in language and in arithmetic, the ability to perceive numbers and words quickly and accurately, and motor skill or manual dexterity.

(c) Artistic Aptitude Tests: These test are useful for locating students who may have special talent and deserve special opportunities for training in art, special attention in art courses and encouragement to capitalize on extra-curricular opportunities for the development of their talent whether for vocational or for avocational purposes.

(d) Manual Dexterity Aptitude Tests: This has been considered as different from mechanical aptitude. The aptitude for manual dexterity includes manipulation, wrist and finger or arm-and-hand coordination and steadiness.

(e) Test of Musical Aptitude: Musical aptitude has been found to be a composite of specific physical capacities like sense of pitch, sense of rhythm, sense of time, and qualities like creative imagination and emotional sensitivity.

Other special aptitude tests are *Medical Aptitude Test, Technical Aptitude Test, Scientific Aptitude Test, Aptitude for Military Career*: etc

1.2.3 Musical aptitude

Music aptitude is the potential for music achievement. Music achievement is the level of skill that one has acquired based on her/his aptitude and music experiences. One's music aptitude is not necessarily represented by his/her music achievement. It is possible that a low music achiever may have high music aptitude. (Gordon, 1987)[18]. As with IQ, music aptitude is distributed normally throughout the population at birth (Gordon, 1990)[19]. Although music aptitude is innate, it is not hereditary (Taggart, 1989)[20]. That is, the level of music aptitude that one is born with cannot be predicted on the basis of the level of music aptitude of her/his parents.

Gordon (1971)[21] suggested that favorable environmental influences are necessary for a child to maintain the level of music aptitude with which she/he is born. According to Gordon (1987)[22], the music aptitude of children up to approximately nine years of age is developmental; the music aptitude of children approximately nine years of age and older is stabilized. Unless a person's music environment is rich and varied, the level of his music aptitude will continually decrease until age nine, at which time it stabilizes (Gordon, 1987)[23]. In Scheinfeld's study (1956)[24], there is some evidence to suggest that music aptitude may

be environmentally based. For example, Toscanini, Rubinstein, and Schnabel, whose parents were found to be untalented by definition in Scheinfeld's study, all had outstanding music environments. This seems to bear out the nurture theory.

1.2.4 Measuring Music Aptitude

Music aptitude can only be measured with a valid music aptitude test. Music teachers' judgments about students' musical "talent" are often based significantly on musical achievement, not the potential to achieve. It is not uncommon, for example, for students of average aptitude to achieve at a high level as a result of a rich musical background and dedicated effort. Only a valid music aptitude test can distinguish between actual achievement and the potential to achieve further. Because many students with high music aptitude have not had the opportunity to achieve in music, a music aptitude test can reveal musical potential that might otherwise remain unknown to those students and their teachers.

Some musical aptitude tests are:

1) *Intermediate Measures of Musical Audiation* (Gordon, 1982)
2) *Measure of Musical Abilities* (Bentley, 1966)
3) *Musical Aptitude Profile* (Gordon, 1965)
4) *Seashore Measures of Musical Talents* (Seashore et al., 1960)
5) *Standardized Tests of Musical Intelligence* (Wing, 1961)

1.2.5 Influence of heredity and environment

Music is an ancient and universal trait that has existed through the history of man. Music's ability to establish attachment between individuals is evident; lullabies attach infant to a parent and singing or playing music together adds group organization (Insel & Young 2001; Peretz 2006)[25,26]. The similarity between animal and human song as well as between ancient and new music supports the idea that music is coded in our genes. The neuronal architecture of an infant is ready to process music already at birth (Zentner & Kagan 1996; Perani et al. 2010)[27,28] and multiple measurable effects of listening to and/or playing music on brain structure and functions further suggest a biological effect of music. Music has been shown to activate specific areas, e.g. cortical regions, hippocampus, thalamus and amygdala of the brain (Bengtsson et al. 2007; Limb & Braun 2008; de Manzano & Ullen 2012; Liu et al. 2012)[29,30,31,32].

Musical aptitude manifests itself in many different ways. For example, a person may have ability to detect small differences in tone pitch or duration, the structures of music, or the ability to intuitively learn or appreciate music. Musical aptitude is varying between individuals so that most of us have moderate ability whereas less or more capable individuals are less common (Karma 2007)[33]. Different test patterns have been developed to measure individuals' musical aptitude (Seashore 1960; Shutter-Dyson & Gabriel 1981; Karma 2007)[34.35,36] The tests have

been used to define musical abilities of children applying in music schools. Recent studies have revealed a substantial genetic component in music perception including absolute pitch (Theusch et al. 2009)[37], congenital amusia (Peretz et al. 2007)[38], auditory structuring ability (Pulli et al. 2008)[39] and musical ability (Park et al. 2012)[40]. The heritability of musical aptitude or ability was estimated to be 40-48 % (Pulli et al. 2008; Park et al. 2012)[41,42].

These preliminary molecular studies support the hypothesis that musical aptitude is a complex trait resulting from currently unknown number of genomic variations, environment, and their complex interactions.

As one analogy goes, "if genetics loads the gun, experiences pull the trigger." Therefore, musical aptitude is a complex behavioral trait… Environmental factors, such as the childhood musical environment, the example set by parents and siblings, and music education affect musical abilities.

1.2.6 Chronicles of music:

Early history (pre-1860)

The study of sound and musical phenomenon prior to the 19th century was focused primarily on the mathematical modelling of pitch and tone. The earliest recorded experiments date from the 6th century BC, most notably in the work of Pythagoras and his establishment of the simple string length ratios that formed the consonances of the octave. This view that sound and

music could be understood from a purely physical stand point was echoed by such theorists as Anaxagoras and Boethius. An important early dissenter was Aristoxenus, who foreshadowed modern music psychology in his view that music could only be understood though human perception and its relation to human memory. Despite his views, the majority of musical education through the Middle Ages and Renaissance remained rooted in the Pythagorean tradition, particularly through the quadrivium of astronomy, geometry, arithmetic, and music. However, research by Vincenzo Galilei (father of Galileo) demonstrated that, when string length was held constant, varying its tension, thickness, or composition could alter perceived pitch. From this he argued that simple ratios were not enough to account for musical phenomenon and that a perceptual approach was necessary. He also claimed that the differences between various tuning systems were not perceivable, thus the disputes were unnecessary. Study of topics including vibration, consonance, the harmonic series, and resonance were furthered through the scientific revolution, including work by Galileo, Kepler, Mersenne, and Descartes. This included further speculation concerning the nature of the sense organs and higher-order processes, particularly by Savart, Helmholtz, and Koenig.

Rise of an empirical music psychology (1860–1960)

The latter 19th century saw the development of modern music psychology alongside the emergence of

a general empirical psychology, one which passed through similar stages of development. The first was structuralist psychology, led by Wilhelm Wundt, which sought to break down experience into its smallest definable parts. This expanded upon previous centuries of acoustic study, and included Helmholtz developing the resonator to isolate and understand pure and complex tones and their perception, the philosopher Carl Stumpf using church organs and his own musical experience to explore timbre and absolute pitch, and Wundt himself associating the experience of rhythm with kinesthetic tension and relaxation. As structuralism gave way to Gestalt psychology and behaviorism at the turn of the century, music psychology moved beyond the study of isolated tones and elements to the perception of their inter-relationships and human reactions to them, though work languished behind that of visual perception. In Europe Géza Révész and Albert Wellek developed a more complex understanding of musical pitch, and in the US the focus shifted to that of music education and the training and development of musical skill. Carl Seashore led this work, producing his *The Measurement of Musical Talents* and *The Psychology of Musical Talent*. Seashore used bespoke equipment and standardized tests to measure how performance deviated from indicated markings and how musical aptitude differed between students.

Modern music psychology (1960–present)

Music psychology in the second half of the 20th century has expanded to cover a wide array of theoretical and applied areas. From the 1960's the field grew along with cognitive science, including such research areas as: (1) music perception, particularly of pitch, rhythm, harmony, and melody; (2) musical development and aptitude; (3) music performance; and (4) affective responses to music. This period has also seen the founding of music psychology-specific journals, societies, conferences, research groups, centers, and degrees, a trend that has brought research toward specific applications for music education, performance, and therapy. While the techniques of cognitive psychology allowed for more objective examinations of musical behavior and experience, the theoretical and technological advancements of neuroscience have greatly shaped the direction of music psychology into the 21st century.

While the majority of music psychology research has focused on music in a Western context, the field has expanded along with ethnomusicology to examine how the perception and practice of music differs between cultures. It has also emerged into the public sphere. In recent years several best selling popular science books have helped bring the field into public discussion, notably Daniel Levitin's *This Is Your Brain On Music* (2006), Oliver Sacks' *Musicophilia* (2007), and Gary Marcus' *Guitar Zero* (2012). In addition, the controversial "Mozart effect" sparked lengthy debate

among researchers, educators, politicians, and the public regarding the relationship between classical music listening, education, and intelligence.

1.3.0 THE STATE OF MIZORAM:

Mizoram is one of the Seven sister states of the North Eastern India, sharing borders with the states of Tripura, Assam, Manipur and with the neighboring countries of Bangladesh and Burma. It's capital is Aizawl.

Until 1894, when the missionaries introduced elementary education, Mizos were illiterate without any written language. The first primary school was set up in 1898 at Aizawl. In 1901 it was thought that literacy was only 0.9% but by 2005 census had reached 89%. Today Mizoram is second only to Kerala for literacy in India at 95%. There are several educational establishments under the umbrella of the Ministry of Education, including universities, colleges and other institutions. Within Mizoram University, there are 29 undergraduate colleges including 2 professional institutions affiliated with the university. The total enrollment in these institutions is approximately 5200 students.

The capital, Aizawl is the largest city in the state. It is also the centre of administration containing all the important government offices, state assembly house and civil secretariat. The population of Aizawl strongly reflects the different communities of the ethnic Mizo people.

Mizo traditional tunes are very soft and gentle, with locals claiming that they can be sung the whole night without the slightest fatigue. The guitar is a popular instrument and Mizos enjoy country style music. Within the church services are drums, commonly used and known locally as "khuang". The "Khuang" is made from wood and animal hide and are often beaten enough to instigate a trance like state with worshipers as they dance in a circular fashion. Mizos enjoy singing and even without musical instruments, they enthusiastically sing together, clapping hands or by using other rhythmic methods. Informal instruments are called chhepchher. The early Mizos were close to nature and music is still an essential part of the cultural life. Whilst gospel music remains an integral part of Mizo culture, Western influence is evident from the contemporary music scene as young people experiment with rock, metal, rap, pop and hip-hop.

1.4.0 RATIONALE OF THE STUDY:

Harold Lyon (1976)[43] erstwhile U.S. Federal Director of the gifted and talented observed that the planets survival depends on how successfully the potential of the gifted and talented children is realized.

A nation's wealth of superior talent is the most precious of its resources according to renowned philosophers like Pluto, Aristotle down to the present day scientists. The development of a nation depends upon the vision and insight of a relatively few exceptionally able

people. The vision necessary for the promotion of human welfare must come from the gifted and they should be educated for worthwhile leadership and productivity in a democracy. Democracy will be realized in its richest sense by recognizing the full range of ability in our total population and also by giving full recognition and adequate opportunities for the maximum development for the gifted and talented. This indicates the necessity for identifying the gifted and talented individuals and fosters their talents to the fullest possible extent.

A thorough examination of various studies reveals the fact that research in the area of intelligence has been conducted by many researches worldwide. However, research in Musical Aptitude has been largely unexplored. Especially in Mizoram, such a kind of study has not been taken up so far. The Mizos in general are very much interested in music and singing; therefore, it comes as a surprise that research in aptitude for music has not really been attempted. Although some studies have been conducted in the area of intelligence of Mizo students, studies of Musical aptitude among the Mizo students has never been conducted in the state of Mizoram.

Concerning the limited studies done in this area, and considering the benefit the state of Mizoram is going to harvest from the research in this area, the investigator was inclined to undertake the present study. The study was intended to find out the intelligence and musical aptitude of college students and compare them with respect to their

gender and stream of study. The study was intended to further investigate the provisions available for the gifted and talented students and suggest measures for their development. Keeping these in mind, the researcher had come up with the following research questions:

1) Can musical aptitude of college students be determined?
2) What is the general intelligence level of college students?
3) Is there a difference in musical aptitude of college students with respect to their gender?
4) Is the difference in the intellectual level of college male and female students significant?
5) Will there be a difference in the musical aptitude between different streams of study?
6) Will the difference in the intellectual level of college students among different streams of study be significant?
7) Is there a significant relation between musical aptitude and intelligence among college students?
8) What provisions does the state have for developing the talents of the students?

1.5.0 STATEMENT OF THE PROBLEM

Mizoram is a small state in the remotest part of the North Eastern India with a population of only about ten lakhs. In spite of their scanty population, they are at present having the second highest literacy percentage in the

whole of India. Considering their remoteness, education occupies a very important place in the hearts of the Mizo people. Previous research (Malsawmi, H. 1997)[44] has identified a number of gifted students. Besides this, Mizos are very fond of singing. They would sing not only during happy occasions but even in the event of death. Looking at the state of affairs, It is surprising that up till now no studies with respect to musical aptitude of the Mizos has ever been conducted. If such studies are not conducted there would be no way of providing opportunities for the development of their talent, be it on their intelligence or their musical abilities. With this problem in view, the present study is stated as "*Intelligence and musical aptitude of college students in Aizawl city with reference to their gender and stream of study*".

1.5.1 Operational definition of key terms:

Intelligence: According to Cambridge Learner's dictionary (2006)[45,] Intelligence is the ability to learn, understand and make judgments or have opinions that are based on reason. In the present study, Intelligence refers to the score obtained on the Standard progressive matrices developed by Raven and Raven (1995)[46]

Musical Aptitude: The web refers Musical aptitude to a person's innate ability to acquire skills and knowledge required for musical activity, and may influence the speed at which learning can take place and the level that may be achieved. Study in this area focuses on whether aptitude

can be broken into subsets or represented as a single construct, whether aptitude can be measured prior to significant achievement, whether high aptitude can predict achievement, to what extent aptitude is inherited, and what implications questions of aptitude have on educational principles. For the present study, musical aptitude refers to the score obtained on the Musical Aptitude Profile developed by Edwin E. Gordon (2001)[47].

College student: For the present study, college students include Students studying in different colleges of Aizawl.

1.6.0 OBJECTIVES OF THE STUDY:

1. To find out the intelligence and musical aptitude of college students in Aizawl.
2. To find out the differences in the level of intelligence of college students in Aizawl with reference to gender and stream of study.
3. To find out the differences in the level of musical aptitude of college students in Aizawl with reference to gender and stream of study.
4. To find out the relation between intelligence and musical aptitude among college students in Aizawl.
5. To find out the existing provisions for the education of the students having intellectual and musical talents and to suggest measures for the development of their talents.

1.7.0 HYPOTHESES :-

1. There is no significant difference between male and female college students with respect to their intelligence.
2. There is no significant difference between science and arts college students with respect to their intelligence.
3. There is no significant difference between science and commerce college students with respect to their intelligence.
4. There is no significant difference between science and theology college students with respect to their intelligence.
5. There is no significant difference between arts and commerce college students with respect to their intelligence.
6. There is no significant difference between arts and theology college students with respect to their intelligence.
7. There is no significant difference between commerce and theology college students with respect to their intelligence.
8. There is no significant difference between Science male and Science female college students with respect to their intelligence.
9. There is no significant difference between Arts male and Arts female college students with respect to their intelligence.

10. There is no significant difference between Commerce male and Commerce female college students with respect to their intelligence.
11. There is no significant difference between Theology male and Theology female college students with respect to their intelligence.
12. There is no significant difference between Arts male and Science male college students with respect to their intelligence.
13. There is no significant difference between Arts male and Commerce male college students with respect to their intelligence.
14. There is no significant difference between Arts male and Theology male college students with respect to their intelligence.
15. There is no significant difference between Commerce male and Theology male college students with respect to their intelligence.
16. There is no significant difference between Commerce male and Science male college students with respect to their intelligence.
17. There is no significant difference between Theology male and Science male college students with respect to their intelligence.
18. There is no significant difference between Arts female and Science female college students with respect to their intelligence.

19. There is no significant difference between Arts female and Commerce female college students with respect to their intelligence.
20. There is no significant difference between Arts female and Theology female college students with respect to their intelligence.
21. There is no significant difference between Commerce female and Theology female college students with respect to their intelligence.
22. There is no significant difference between Commerce female and Science female college students with respect to their intelligence.
23. There is no significant difference between Theology female and Science female college students with respect to their intelligence.
24. There is no significant difference between male and female college students with respect to their musical aptitude.
25. There is no significant difference between science and arts college students with respect to their musical aptitude.
26. There is no significant difference between science and commerce college students with respect to their musical aptitude.
27. There is no significant difference between science and theology college students with respect to their musical aptitude.

28. There is no significant difference between arts and commerce college students with respect to their musical aptitude.
29. There is no significant difference between arts and theology college students with respect to their musical aptitude.
30. There is no significant difference between commerce and theology college students with respect to their musical aptitude.
31. There is no significant difference between Science male and Science female college students with respect to their musical aptitude.
32. There is no significant difference between Arts male and Arts female college students with respect to their musical aptitude.
33. There is no significant difference between Commerce male and Commerce female college students with respect to their musical aptitude.
34. There is no significant difference between Theology male and Theology female college students with respect to their musical aptitude.
35. There is no significant difference between Arts male and Science male college students with respect to their musical aptitude.
36. There is no significant difference between Arts male and Commerce male college students with respect to their musical aptitude.

37. There is no significant difference between Arts male and Theology male college students with respect to their musical aptitude.
38. There is no significant difference between Commerce male and Theology male college students with respect to their musical aptitude.
39. There is no significant difference between Commerce male and Science male college students with respect to their musical aptitude.
40. There is no significant difference between Theology male and Science male college students with respect to their musical aptitude.
41. There is no significant difference between Arts female and Science female college students with respect to their musical aptitude.
42. There is no significant difference between Arts female and Commerce female college students with respect to their musical aptitude.
43. There is no significant difference between Arts female and Theology female college students with respect to their musical aptitude.
44. There is no significant difference between Commerce female and Theology female college students with respect to their musical aptitude.
45. There is no significant difference between Commerce female and Science female college students with respect to their musical aptitude.

46. There is no significant difference between Theology female and Science female college students with respect to their musical aptitude.
47. There is no significant correlation between intelligence and musical aptitude among college students in Aizawl.
48. There is no significant correlation between intelligence and musical aptitude among the science students in Aizawl.
49. There is no significant correlation between intelligence and musical aptitude among the commerce students in Aizawl.
50. There is no significant correlation between intelligence and musical aptitude among the arts students in Aizawl.
51. There is no significant correlation between intelligence and musical aptitude among the theology students in Aizawl.
52. There is no significant correlation between intelligence and musical aptitude among all male college students in Aizawl.
53. There is no significant correlation between intelligence and musical aptitude among all female college students in Aizawl.

1.8.0 DELIMITATION OF THE STUDY:

Due to limitation of time in collecting data, the sample for the present study is delimited to the stream of arts,

science, commerce and theology from selected colleges in Aizawl.

1.9.0 ORGANIZATION OF THE REPORT:

The report of the present study has been divided into six chapters to facilitate a systematic presentation.

Chapter 1 – The first chapter is an introduction that deals with the conceptual and theoretical framework of intelligence and musical aptitude. Besides these, the chapter includes the rationale for the study, statement of the problem, objectives and hypotheses of the study. Operational definitions of the terms used and delimitation of the study has also been incorporated in this chapter.

Chapter 2: The second chapter titled, "Review of related literature" has been divided into three categories namely - 1) Studies related to Intelligence, 2) studies related to Music and 3) studies concerning both Intelligence and Music.

Chapter 3: This chapter describes the methodology and procedure adopted for the present study. Research design, population and sample, tools employed for data collection, administration and collection of data, sources of data and statistical techniques used have been discussed in this chapter.

Chapter 4: The fourth chapter analyzes and interprets the collected data on the basis of the objectives stated in chapter 1.

Chapter 5: The fifth chapter is devoted to major findings, discussions on the major findings, recommendations and suggestions for further studies.

Summary:

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CHAPTER II

REVIEW OF RELATED LITERATURE

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This chapter deals with the review of related literature. The purpose of the study of research works done in the same field is to understand what type of study has been done and what exactly has been explored before the present research work started. The study of related literature and research work not only provides conceptual frame of reference for the contemplated research but also suggests method, procedures, sources of data and statistical techniques appropriate to the solutions of the problem selected for present study. The researcher is able to formulate the hypothesis on the basis of review of related literature which presents the rationale for the study. In the present study the researcher has used various books, dissertations, handbooks, articles, journals, thesis, web sites as reference material.

The review of literature has been divided into three categories:

1) Studies related to Intelligence,
2) Studies related to Music and
3) Studies concerning both music and intelligence.

2.1.0 Studies related to Intelligence:

Terman (1916)[1] found the absence of a sex difference in average intelligence and asserted that the superiority of girls over boys is so slight that for practical purpose it

would seem negligible. This same view was supported by Burt and Moore (1912)[2] and Spearman (1923)[3].

Howells, T. H. (1928)[4] in his study on 'A comparative study of those who accept as against those who reject religious authority' and Sinclair, R. D. (1928)[5] in his study on 'A comparative study of those who report the experience of the divine presence and those who do not,' examined sensory, motor, and cognitive correlates of religiosity. Both included Intelligence tests in the battery of administered tasks. Both Howells (1928) and Sinclair (1928) found that higher levels of intelligence were related to lower levels of religiosity.

Cattell (1971)[6] after analyzing countless and large sample studies, reaffirmed that on the two main general cognitive abilities – fluid and crystallized intelligence – men and women, boys and girls, show no significant differences.

Mishra, S.P. (1978)[7]in his study on 'A comparative study of low and high achievers in science, commerce and arts on creativity, intelligence and anxiety' found that the high achievers in arts, commerce and science were higher in their level of intelligence than the low achievers in arts, commerce and science.

Sharma, K. (1982)[8] in his study on 'Factors related to creativity' observed that the students of the scientific stream possessed a higher level of verbal intelligence than those of the literary and commercial streams, and the students of the scientific and commercial streams possessed higher level non-verbal intelligence and creativity

than those of the literary stream. There was no significant difference between the students of the scientific and commercial streams on these variables.

Chatterji, P.S. (1983)[9] in his study on 'A comparative study of personality, Intelligence and Achievement Motivation of students in different academic groups' reported that science students achieved significantly higher verbal factor and total intelligence scores in comparison with those in all other academic groups. Commerce students ranked second in intelligence, the agriculture group ranked third in intelligence and arts students were the least intelligent

Singh, K.K. (1985)[10] in his study on 'Some personality factors of high and low intelligent boys of Bhagalpur', found that boys were superior in intelligence to girls.

Herrnstein and Murray (1994)[11] observed in their study, "The bell curve", that the consistent story has been that men and women have nearly identical IQs".

Lynn (1994)[12] found that there is virtually no sex difference in intelligence between the ages of 5–10 years, that between the ages of 11–14 years girls have a small IQ advantage of approximately 1 IQ point because they mature earlier, and that from the age of 15–16 years boys develop a small IQ advantage of approximately 1 IQ point, which increases in later adolescence to reach approximately 4 IQ points among adults.

Kaur, Parvinder and Bawa (1995)[13] in their study on 'Intelligence as a correlate of Academic achievement' found

that boys scored higher on verbal as well as non-verbal intelligence test, but when boys and girls were studied together, boys scored higher on verbal intelligence than non-verbal intelligence test.

Neisser, Ulric et.al (1996)[14] in their review on 'Intelligence: Knowns and Unknowns' stated that most standard tests of intelligence have been constructed so that there are no overall score differences between females and males. Differences have been found, however, in specific areas such as mathematics and verbal measures.

Malsawmi, H (1997)[15] conducting a study on 'The gifted and creative college students in Mizoram in relation to their personality and problem solving ability' and found that

1) There is no significance difference between male and female with respect to their intelligence.

2) Science students significantly have higher intelligence than the commerce students.

3) Science students significantly have higher intelligence than the arts students.

4) Commerce students significantly have higher intelligence than the arts students.

Lynn, Richard (1999)[16] conducted several meta-studies between 1994 and 2005 on 'Sex differences in intelligence and brain size: A developmental theory' and found that the mean IQ of men exceed that of women by a range of 3–5 points.

Colom et al (2002)[17] in his study on 'Null sex differences in general intelligence: Evidence from the WAIS-

III' found 3.16 higher IQ points for males but no difference on the general intelligence factor (*g*) and therefore explained the differences as due to non-*g* factors such as specific group factors and test specificity.

Colom, Roberto and Lynn, Richard (2004)[18] in their study on 'Testing the developmental theory of sex differences in intelligence on 12–18 year olds' investigated the differences in IQ between the sexes in relation to age and found that girls do better at younger ages but that their performance declines relative to boys with age.

Jorm et al (2004)[19] in their study on 'Gender differences in cognitive abilities: The mediating role of health state and health habits' concluded that after controlling for socio-demographic and health variables, gender differences tended to disappear on tests for which there was a male advantage and magnify on tests for which there was a female advantage.

Haier et al (2004)[20] in their study on 'The neuroanatomy of general intelligence: Sex matters' found that men and women apparently achieve similar IQ results with different brain regions, suggesting that there is no singular underlying neuroanatomical structure to general intelligence and that different types of brain designs may manifest equivalent intellectual performance.

Nyborg, Helmuth (2005)[21] in his study on 'Sex-related differences in general intelligence *g*, brain size, and social status' found an average advantage for males of 3.8 IQ points.

Mackintosh and Bennett (2005)[22] in their study for a sample of 17 year olds on the Progressive Matrices found that males obtained a higher mean of 6.4 IQ points. They also found that older participants (over the age of 16) were more likely to yield a male than a female advantage"

Arden, Rosalind and Plomin, Robert (2006)[23] in their study on 'Sex differences in variance of intelligence across childhood' focused on children aged 2, 3, 4, 7, 9 and 10 and stated that there was greater variance 'among boys at every age except age two despite the girls' mean advantage from ages two to seven. Girls are significantly over-represented, as measured by chi-square tests, at the high tail and boys at the low tail at ages 2, 3 and 4. By age 10 the boys have a higher mean, greater variance and are over-represented in the high tail.

Reeve, C. L., & Basalik, D. (2011)[24] conducted a study on 'A state level investigation of the associations among intellectual capital, religiosity and reproductive health'. They found that populations with higher average IQ are likely to gravitate away from religious social conventions and towards more rational.

A study conducted by Jim Flynn and Lilia Rossi-Case (2011)[25] on "Modern women match men on Raven's Progressive Matrices" found that men and women achieved roughly equal IQ scores on Raven's Progressive Matrices after reviewing recent standardization samples in five modernized nations.

2.2.0 Studies related to Music:

Vincent and Thompson (1929)[26] in a study of the effects of music in human blood pressure observed that blood pressure responses to music were influenced more by a person's interest in music than the type of music.

Karl Schuessler (1948)[27] revealed that the appeal of music goes up with increasing familiarity and that familiarity and preference for music was positively correlated. Isolation, in his study, usually led to a negative judgment of music. If familiarity leads to acceptance and even possibly liking, it would make logical sense, then, that people would be more omnivorous in musical preferences as they age and become more familiar with a broad range of music.

Denisoff and Levine (1972)[28] also found a strong association between race and musical preference. They observed that blacks were overwhelmingly placed into the soul and jazz categories. This finding is not surprising, as jazz and rural blues have historically been part of black culture. Recently, rhythm and blues, hard rock, and rap have been used for the same purpose. These musical types express black attitudes towards life and towards a white dominated society.

Skipper's (1973)[29] study observed that the higher the social class, the higher the percentage of respondents preferring classical music. This seems logical as classical music has historically been associated with the upper classes.

Skipper (1973)[30] in his study of college students, found that the higher the social class, the more likely the respondents were to indicate a likeness for music. This may be a further indication that in today's society, familiarity with many musical forms is an indicator of social status.

Skipper (1973)[31] in his study, “How popular is popular music” found that black college students were more likely to pick a musical artist of their own race as their favorite than whites were.

Dees and Vera (1978)[32] found that the music and its characteristics appropriate for an all male or an all female gathering differed. They found that compared to the background use of music for an all-female gathering, the music in the all-male gathering seemed to be less a screen for outside interference and more of a common source of unity and participation.

Svengalis (1978)[33] studied music attitude and tried to provide possible reasons for a decline in positive attitude as grade level increased. She also tried to identify why this decline was more prevalent in males than females. She found a significant negative relationship between self-concept in music and increased grade level. She also found a significant positive relationship between background in music and self-concept in music. These studies linked high self-concept to higher motivation, higher musical achievement, and enhanced involvement in music.

Brand (1982)[34] found that playing an instrument significantly correlated with the performance on the

Rhythmic Imagery, subtest of MAP. He also found that most students with a high music aptitude on the overall test tended to have played a musical instrument.

Pogonowski (1985)[35] found that among fourth, fifth, and sixth grade students, classroom music attitudes and music aptitude were unrelated to each other. However, grade level, gender, and socio-economic status were found to be related to classroom attitude. Low positive relationships between both measures of attitude, private instrumental study, and type of performing group suggest that musical background was not related to students' music learning attitudes.

As a result of his research, Brand (1986)[36] stated that beyond age nine, music environment may enhance music achievement and response, but not necessarily music aptitude. The results of his studies also reinforced the importance of music in the child's early life. From birth to age nine, parents and educators can expect to influence musical aptitude through providing a rich musical environment.

Christenson and Peterson (1988)[37] found that even with a relatively homogenous youth audience (college students) there were really two distinct cultures, a male and a female. They found that males and females use and respond to music in different ways. They observed that women had stronger preferences for mainstream pop, contemporary rhythm and blues, soul, late ”70s disco, and

Black gospel music than did men; while men had stronger preferences for southern rock, psychedelic rock, and blues.

Kuwahara (1992)[38] in a study, "Power to the people y"all" found that approximately 30% of black college students listened to rap music often. More black men than black women listened to rap music.

Wooten (1992)[39] showed in her sample that subjects with psychiatric disorders who preferred heavy metal music actually improved their negative affect after listening to the music.

Robinson (1993)[40] in his study, "Arts participation in America" shows that those with higher education do indeed express greater preference for all types of music (with the exception of country music).

Zuckerman's (1994)[41] study, "Behavioral expressions and biosocial bases of sensation seeking" shows that hard rock music was preferred by subjects who were high in sensation-seeking.

Hargreaves, Comber, and Colley (1995)[42] found that English secondary school boys liked heavy metal and rock more than girls did, while girls liked chart pop, reggae, jazz, classical, folk, and opera more than boys did. Although there has been some variation in gender differences, depending on the styles used and musical fashions, greater liking of rock and heavy rock generally has been found among males, while females expressed greater liking for lighter music, particularly mainstream pop.

North and Hargreaves (1995)[43] in their study, "Subjective complexity, familiarity, and liking for popular music" found that musically trained participants had stronger preferences for pop music of higher subjective complexity than did untrained participants.

Johnson, Jackson and Gatto (1995)[44] tested whether a priming process would lead rap music to encourage black teens to engage in violent behavior and drug selling. They found that teens exposed to violent rap music expressed greater acceptance of the use of violence and reported that they would likely engage in violence in the future.

Barongan et al. (1995)[45] discovered in their study, "The influence of misogynous rap music on sexual aggression against women" found that misogynist music facilitates sexually aggressive behavior.

A study by Johnson, Adams, Arshburn and Reed (1995)[46] revealed that women who viewed rap videos of women in sexually subordinate roles showed greater acceptance of violence than females who were not exposed to these videos.

Steele and Brown (1995)[47] in their study, "Adolescent room culture: Studying media in the context of everyday life" found that girls at all stages of sexual development and experience look for and find reinforcement for romantic myth in the media.

Spiegler (1996)[48] in a study of Marketing street culture found that the majority of those under 20 years of age liked

rap music. Further, the influence of rap music expanded to fashion among this age group.

Lester and Whipple's (1996)[49] study identified that past suicidal ideation and preference for heavy metal music was not linked to current suicidal ideation or depression, suggesting that this may be a transient state for many adolescents.

Dixon and Linz (1997)[50] found that tolerance for rap music was imbedded in cultural dispositions and political attitudes. Their study revealed that cultural factors such as appreciation of linguistic exaggeration and African American humor were related to tolerance for controversial rap music.

A study by Wester, Crown, Quatman and Heesacker (1997)[51] also uncovered that even men unfamiliar with rap music culture who are briefly exposed to sexually violent rap music become more likely to believe that men and women have adversarial relationships.

Gan, Zillmann and Mitrook (1997)[52] observed in a study that exposure to rap laden with sexual imagery fostered distinctly unfavorable evaluations of black women.

Field, Martinez et al. (1998)[53] in their study observed that biological measures have been found to improve post-listening to rock music in comparison to a control group, even though self-report of mood was not influenced

Koch et al. (1998)[54] firstly found that use of patient-controlled analgesia and sedatives during urologic procedures to be reduced when accompanied by preferred music listening.

When measuring classical music effects, Gerra, et al. (1998)[55] found no significant changes in hormonal concentrations, but an improvement in emotional state. However, these same authors found that "techno-music" (fast music generated by electronic instruments and a computer that is very popular with college students) was associated with significant increases in heart rate and systolic blood pressure as well as significant changes in self-rated emotional states.

Ballard, Dodson and Bazzini (1999)[56] found in their study, “Genre of music and lyrical content” that antisocial rap lyrics were less likely to inspire prosocial behaviors than antisocial country/pop lyrics.

Fried (1999)[57] had participants read a violent lyrical passage which was described as either a rap song or a country song. She found that the reactions to the lyrics were significantly more negative when the passage was described as rap rather than as country.

North, Hargreaves, and O’Neill (2000)[58] in a study of the importance of music to adolescents, observed that female adolescents used music more for mood regulation, while male adolescents used it more for identity formation and to create an impression with others.

Tarrant, North, and Hargreaves (2001)[59] found that male adolescents used similarity of musical taste to define in-group members. Gender is a primary social category and the identification with being male or being female has a

stronger influence on liking for musical styles than does possessing gender-related traits.

Cadigan et al. (2001)[60] observed that 30 minutes of relaxing music to reduce blood pressure, respiration rate and psychological distress, but with no corresponding reduction in pain perception.

Lacourse and colleagues (2001)[61] discovered that the vicarious release experienced through music listening was actually inversely related with suicidal ideation for girls

Rubin, West and Mitchell (2001)[62] in their study, "Differences in aggression, attitudes toward women, and distrust as reflected in popular music preferences" reveals that rap listeners showed more aggression and distrust of authority than non-rap listeners.

Kallinen, K. (2002)[63] found that background music can influence how people evaluate news content, with men evaluating news most positively in the presence of slow music.

Tekman and Hortaçsu's (2002)[64] study reveals that college students had more positive perceptions of individuals who listened to music that the college students liked.

De Bourdeaudhuijet et al (2002)[65] in their study on 'Effect of distraction on treadmill running time in severely obese children and adolescents' found that when the children ran while listening to music they were not distracted by exhaustion, thus showing a positive correlation between listening to music and physical

performance. Accordingly, when the children ran without music they were easily distracted by their exhaustion.

Nilsson et al. (2003)[66] observed that instrumental music played to hernia and varicose vein patients undergoing surgery to correspond with lower pain intensity, but with no related effects on nausea, fatigue and anxiety.

MacDonald et al. (2003)[67] found foot surgery patients to feel significantly less anxiety when listening to preferred music but with no corresponding effect on pain intensity ratings.

Through his research, Gordon (2007)[68] has determined that music aptitude is developmental, fluctuating from birth through approximately age 9, and stabilized thereafter. The interplay between the music aptitude we receive at birth and the music environments we experience during the first few years of life begins to account for the variety of individual music differences teachers observe among students in their music classrooms.

2.3.0 Studies concerning both Music and Intelligence:

Eterno (1961)[69] shows that 90% of eighth graders who played a musical instrument for a year or more scored above average in a pronunciation test, while only 10% scored a rating of average. Not one person who played a musical instrument scored below average.

Roe's (1987)[70] study found that musical choices were related to student's current academic success and to their

self-predicted future success. His results identified that the more isolating the music of choice, the more isolated the teenager felt, leading to the conclusion that music references reflect self-perception. This has been supported by Took and Weiss (1994)[71] who suggest that early failure in the school system leads to an increased interest in heavy metal music.

Lamar (1989)[72] found a significant and positive relationship between music aptitude and reading and one that approached significance for mathematics. He also found that music aptitude was also highly related with academic achievement in 8 to 12-year-old students.

Brady (1991)[73] in his study on 'The Role of Working Memory in Reading Disability' found that music instruction enable learners to improve their reading skills by improving their verbal memory.

Dryden (1992)[74] in his study on 'The Impact of Instrumental Music Instruction on the Academic Achievement of Fifth Grade Students' found that music participants had higher achievement scores in reading but not math.

Douglas & Willatts (1994)[75] in their study on 'the relationship between musical ability and literacy skills' found that Musical activity has been related to linguistic intelligence.

Took and Weiss (1994)[76] found adolescents preferring heavy metal to perform poorer in school, using grades as the dependent criterion. The teens also had more acting-out

problems in school, sexual activity, arrests, and use of controlled substances.

Sutton (1995)[77] found parallels between SLI (speech and language impairment) children's progress in music and their progress in language. She found that as children began to build their music into phrases and structures, so they also began to express themselves with their voices and to construct simple sentences.

Elbert et al. (1995)[78] found that Active training and practicing music has been shown to enlarge cortical presentations in the somato sensory and auditory domains in professional musicians. The plastic changes were seen in the cortex specific for the fingers that were frequently used and stimulated in the playing of an instrument compared to controls.

Rauscher etal. (1995)[79] found that listening to ten minutes of Mozart's Sonata for 2 pianos, K.448, resulted in an increase of 8 to 9 points on the spatial IQ subtest of the Stanford-Binet Intelligence Scale.

Hoffman (1995)[80] compared fifth graders who received keyboard instruction with those who received traditional text-based music instruction. After one year of instruction (at the end of fourth grade) the keyboard students had higher scores on only one measure, a subtest of language mechanics. However, after two years of instruction (at the end of fifth grade), the keyboard students outperformed their counterparts on total language, 3 R's battery, concept

of numbers, math computations, math applications, and total math.

Geoghegan and Mitchelmore (1996)[81] found that there was a difference in mathematics achievement between the music group and the non-music group. The group of children who were involved in the music program scored higher on the mathematics achievement test than the children who had not been involved in the music program and had a limited musical background. Further analysis revealed that the difference in mathematics achievement may have been a result of the children's home musical background rather than the music program itself.

Trent (1996)[82] found that High school seniors who had participated in instrumental music programs from 6th through 12th grades scored significantly higher on standardized tests of language arts and math than their counterparts who had participated in non-music extra-curricular activities or who had not participated in extra-curricular activities.

Furnham and Bradley (1997)[83] found that complex vocal music was more likely to have an impact on task performance than less complex, instrumental music.

Costa-Giomi (1997)[84] also showed that 9 year olds who were provided with two years of keyboard lessons significantly out-perform children without such lessons on spatial tasks.

Arnett-Gary (1998)[85], Shobo (2001)[86] and Yoon (2000)[87] found that those who participate in music have higher academic achievement than those who do not.

Koelsch et al. (1999)[88] in their study on 'Superior pre-attentive auditory processing in musicians' established that Mismatch negativity (MMN) studies found that musical training shapes the auditory cortex so that even minimal changes in auditory stimuli sequences are detected.

Besides the broad effect of music on general cognitive performance, some studies also found associations with mathematical (Cheek & Smith, 1999)[89] and spatial abilities (Hetland, 2000)[90]

Kluball (2000)[91] found that the study of instrumental music was significantly related to mathematics and science tests but not to language arts, social studies, writing and the SAT verbal and mathematics tests.

Cox (2001)[92] in his study on 'Effects on academic achievement for fifth-grade students in a band pull-out program' found that the reason for apparent superior achievement is that music participants had higher academic achievement scores prior to enrolling in music studies.

Schellenberg (2003)[93] found the association between positive mood states and cognition. Positive moods increase levels of dopamine which is believed to lead to an improvement on a variety of cognitive tasks. He suggests that listening to music is one way to induce positive moods,

thereby increasing levels of dopamine which in turn enhances performance on cognitive tasks.

Jakobson et al. (2003)[94] in their study on 'time tagging: A key to musician's superior memory' found the putative link between musical and language abilities in the discrimination of rapid auditory events.

In an experimental design, Schellenberg (2004)[95] reported an effect on IQ using Wechsler's WISC-III in 6-year-olds after keyboard or singing lessons for 36 weeks. The music group showed a larger increase than the control group taking drama lessons in the same time or waiting for piano lessons.

Schlaug et al (2005)[96] in their investigation of 9 to 11-year olds, found that musicians performed better on several tests than their non-musical peers. They scored significantly higher on tests of vocabulary and finger tapping. They also exhibited a strong, but statistically non-significant, trend towards better spatial and math skills.

Walker & Kreiner (2006)[97] found in their study of male and female college students that participants who expressed a preference for intense rebellious music (defined as alternative, rock, and heavy metal) tended to have higher scores on an intelligence test, especially those processes involving abstraction.

In a retrospective design with 6 to 11 year-old children, Schellenberg (2006)[98] found a correlation between the duration of music lessons and performance in a verbal and non-verbal IQ test as well as school performance. The

effects on IQ and on academic performance were still observable in undergraduates that had been trained to play an instrument in childhood.

Fujioka et al (2006)[99] on a study of 4 to 6-year olds, "One year of musical training affects development of auditory cortical evoked fields in young children" found that musically-trained kids performed better on a test of working memory.

Tallal & Gaab (2006)[100] found that Musical instrument training improved auditory information processing, which in turn is crucial for the acquisition of reading and writing skills.

Patel and Iverson (2007)[101] in their study "The linguistic benefits of music abilities" found that musicians perform significantly better on tests of Spatial-temporal skills, Math ability Reading skills, Vocabulary, Verbal memory and Phonemic awareness

Forgeard, Winner, Norton, and Schlaug (2008)[102] observed a relationship between playing an instrument and higher cognitive functions in a sample of forty-one (8- to 11-year-old) children who had at least 3 years of musical instruction. Beside motor learning and enhanced melodic discrimination, the authors also found enhanced vocabulary and nonverbal reasoning scores.

Hyde et al. (2009)[103] found no differences in a prospective study investigating 6 year old children between a group of 16 control children and 15 children who had weekly private keyboard lessons for 15 months.

Nevertheless, the authors were able to show near-transfer effects (motor and auditory skills) as well as structural brain changes for the keyboard group.

Kraus and Chandrasekaran (2010)[104] state that musical training develops auditory skills as well as verbal memory. Listening to songs and singing them improve listening skills in a foreign language that is one of the essential skills for language learning.

Herrmann (2010)[105] in his study about the effect of background music in an educational setting found that calming background music produces a variety of positive physiological effects. Students become relaxed and focused. Their time on-task increases significantly, their mood is elevated, and aggressive behaviors are diminished.

Hanna-Pladdy and Mackay (2011)[106] in their study of older adults aged 65-80 found a correlation between childhood music training and cognitive performance. The more years a person had spent playing an instrument, the better he performed on tests of word recall, visual (nonverbal) memory, and cognitive flexibility.

Samuel A. Mehr et al (2013)[107] published the results of a six-week intervention on preschoolers. At the study's end, the researchers tested children for improvements in four areas--spatial-navigational reasoning, visual form analysis, numerical discrimination, and receptive vocabulary. Kids who'd experienced music training performed no better than kids assigned to classes in visual arts

In a longitudinal study, Fullagar et al. (2013)[108] showed that high degrees of flow were accompanied with low experiences of performance anxiety in music performance students.

2.4.0 Conclusions:

An exhaustive examination of various books, journals, research papers and educational reviews from the internet as well as from different libraries have resulted in the accumulation of a certain amount of literature in connection with the topic being researched.

The above reviews reveal that a number of studies have been conducted in the area of intelligence all over the globe and numerous studies have also been conducted on musical aptitude abroad. There have been various studies conducted on the relationship between intelligence and musical ability in other foreign countries. However, no studies have been found by the investigator either in India or in foreign countries, who has undertaken studies on intelligence and musical aptitude of college students and comparing the two variables among different streams of study.

The present research is undertaken while keeping the above consideration in view. The research assumes significance as the present study is directed to investigate the intelligence and musical aptitude of college students in one of the remotest state capital of India, and to compare them with respect to their gender and stream of study. The study also aims to ascertain the relationship between

intelligence and musical ability of these college students. It is envisaged that the study will throw light on the level of intelligence and musical aptitude of college students in Aizawl and also compare the two variables on the basis of their gender and stream of study. It is hoped that the present investigation will arouse interest and enthusiasm so that it may lead to numerous other studies on giftedness and musical aptitudes in other parts of India, let alone in tribal and backward regions of India.

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CHAPTER III

METHODOLOGY

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METHODOLOGY

All those methods which are used by the researcher during the course of studying his research problem are termed as research methods. This chapter deals with the methodology adopted in the present investigation. The design of the present investigation is systematically presented as follows:

1. Research design:
2. Population and sample
3. Tools employed for data collection
4. Collection and tabulation of data
5. Statistical techniques for analysis.

3.1.0 Research design:

Descriptive research is devoted to the gathering of information about prevailing conditions or situations for the purpose of description and interpretation. This type of research method is not simply amassing and tabulating facts but includes proper analyses, interpretation, comparisons, identification of trends and relationships.

The present study belongs to the category of 'Descriptive Research' with composite characteristics of inter-group comparison as it involves survey and fact finding enquiry relating to Intelligence and Musical Aptitude of College Students with reference to their Gender and

Stream of Study. Descriptive research is used to obtain information concerning the current status of the phenomena to describe "what exists" with respect to variables or conditions in a situation. Blends of both qualitative and quantitative analysis have been employed in the present investigation.

3.2.0 Population and sample:

The population of the present study consists of all students studying in the colleges within Aizawl city. Altogether there are 16 Colleges where there are altogether 11498 Students. Out of these students there are 5910 males and 5588 females. The following Table no 3.1 shows the status of enrollments in colleges within Aizawl city.

Table No 3.1

Status of enrollments in colleges within Aizawl city

Sl	**College**	**Male**	**Female**	**Total**
1	Pachhunga University College	1073	920	1993
2	Govt. Aizawl College	649	654	1303
3	Govt. Hrangbana College	1017	1046	2063
4	Zirtiri Residential Science College	336	274	610
5	Govt. Mizoram Law College	146	108	254
6	Govt. Aizawl North College	453	444	897
7	Govt. Aizawl West College	395	347	742
8	Govt. T Romana College	434	480	914
9	Govt. J Thankima College	412	304	716
10	Govt. Johnson College	334	350	684
11	RIPANS	168	382	550
12	NIELIT	238	73	311
13	Mizoram College of Nursing	2	118	120
14	Institute of Advanced Study in Education	53	68	121
15	Aizawl Theological College	101	6	107
16	Academy of Integrated Christian Studies	99	14	113
	Grand Total	5910	5588	11498

Source: Higher & Technical education, Govt. of Mizoram

For the present study, the sample selected consisted of 400 students from eight different colleges in Aizawl city. The samples were selected following Stratified Random Sampling. There were 50 students each from Hrangbana College, Aizawl College, Pachhunga University College, Zirtiri Residential Science College, Johnson College, Aizawl North College, Academy of Integrated Christian Studies (AICS) and Aizawl Theological College. For each stream of study i.e. Arts, Science, Commerce and Theology, two colleges were selected. Altogether, the sample selected consists of 229 males and 171 females. The following table No. 3.2 shows the details of sample selected for the present sample.

Table No 3.2

Details of Sample selected for the study

Sl.No	Colleges	Stream	Male	Female	Total
1	Hrangbana college	Commerce	20	30	50
2	Aizawl college	Commerce	25	25	50
3	Aizawl North College	Arts	20	30	50
4	Johnson College	Arts	20	30	50
5	Pachhunga University college	Science	27	23	50
6	Zirtiri Residential College	Science	27	23	50
7	Aizawl Theological College	Theology	44	6	50
8	Academy of integrated Christian Studies	Theology	46	4	50
Grand total			**229**	**171**	**400**

Source: Field work

3.3.0 Tools employed for data collection:

The following tools were used for the present study

i) Standard Progressive Matrices – sets A, B, C, D and E. (Raven, 1995)

ii) Musical Aptitude Profile. (Edwin E. Gordon, 1995)

3.3.1 Standard Progressive Matrices (SPM)

The standard progressive matrices designed by Raven and Raven (1995) measure the educative component of 'g' as defined in Spearman's theory of cognitive ability. The scale is made up of five sets, or series, or diagrammatic puzzles exhibiting serial change in two dimensions simultaneously. Each puzzle has a part missing, which the person taking the test has to find among the options provided.

It consists of 60 problems divided into five sets (A, B, C, D and E) each made up of 12 problems. In each set the first problem is as nearly as possible self-evident. The problem which follows build on the argument of those that have gone before and become progressively more difficult. The order of the items provides the standard training in the method of working. The five sets provide five opportunities to grasp the method of thought required to solve the problems and five progressive assessments of a person's capacity for intellectual activity. To ensure sustained interest and freedom from fatigue, each problem is boldly presented, accurately drawn, and, as far as possible, pleasing to look at.

The Standard Progressive Matrices was originally designed to cover the widest possible range of mental ability and to be equally useful with persons of all ages, whatever their education, nationality or physical condition.

Reliability:

Raven (1958) reported the retest reliability varying with age from .83 to .93. Sinha (1950, 1951) obtained a reliability coefficient of .90. Dolke (1976) reported that the test-retest reliability at one and a half months interval was .83. Interval consistency reliability computed by K.R. formula was .67 and the odd-even reliability using Spearman Brown formula was .73.

Validity:

Standard Progressive Matrices correlated .86 with the Terman Merill scale, and found to have a 'g' saturation of .82. (Raven, 1958), Sinha (1950) reported a validity coefficient of .54. Bureau of Psychology (1958) reported a validity coefficient of .53 with the Terman-Merill scale, .58 with National Institute of Industrial Psychology NIIP 70/23, .51 with NIIP form Realtion Test, and .53 with General Intelligence Test (Verbal).

A sample of the Raven's Progressive Matrices and answer sheet is attached in APENDIX - 1

3.3.2 Musical Aptitude Profile (MAP)

The basic factors measured by the Musical Aptitude Profile (Edwin E. Gordon) battery are included in three total tests: Tonal Imagery, Rhythm Imagery and Musical Sensitivity. There are seven sub tests in the battery. Two sub tests are provided for each of the two non-preference total tests, Tonal Imagery and Rhythm Imagery. They are Melody and Harmony for the former and Tempo and Meter

for the latter. The preference total test, Musical Sensitivity, consists of three subtests. They are Phrasing, Balance and Style. The organization of the complete battery is presented in table no. 3.3

Table No. 3.3

Complete battery of Musical Aptitude Profile

Tests	Items	Working time (mins)	Administration Time (mins)
Tonal Imagery (T) Non preference	80 (40 pairs)	30	1st session
Part 1 – Melody (t1)	40 (20 pairs)	15	50
Part 2 – Harmony (T2)	40 (20 pairs)	15	
Rhythm Imagery (R) Non preference	80 (40 pairs)	36	2nd session
Part 1 – Tempo (R1)	40 (20 pairs)	18	50
Part 2 – Meter (R2)	40 (20 pairs)	18	
Musical Sensitivity (S) Preference	90	45	3rd session
Part 1 – Phrasing (S1)	30	16	60
Part 2 – Balance (S2)	30	14	
Part 3 – Style (S3)	30	15	

Each total test, including practice songs and directions for each sub tests is provided in audio format. The tests consist of original short selections, composed for violin and cello by the author, performed by professional artists. No prior formal music achievement is required as a prerequisite for taking the test. Knowledge of music theory, music notation and music history are not at all necessary.

Students are asked to compare a short musical phrase with a musical answer and to decide if the musical phrase and musical answer sound alike or different (Test 'T'),

exactly the same or different (Test 'R'), or to decide which of the two is a more musical performance (Test 'S'). The student has a separate answer sheet on which to indicate his or her answers. If the student is in doubt about the answer to a question, he or she simply marks the question mark (?) column. Thus, students are not forced to make decisions on all questions, they may respond to only those questions they feel comfortable in answering.

The test battery consists of both preference and non-preference test. The musical sensitivity test, which contains the preference measures, contributes to a more comprehensive appraisal of music aptitude, because musical creativity and expression are at least as important to success in music education as the ability to audiate tonal pattern and rhythm pattern relationships.

Reliability

A soundly planned, carefully constructed, and comprehensively standardized music aptitude test battery offers the most objective and reliable measure of a student's music potential available to the teacher. Test reliability may be measured by a variety of statistical data. Those data reduce, however, to two basic types of indexes. The first is the reliability coefficient. It relates to the average stability of the test scores of all students who took the test. In numerical value, the reliability coefficient is always between .00 and .99, and generally between .60 and .95. The closer the coefficient approaches the upper limit, the greater is the freedom of the test scores from those factors described

above, factors that obscure real difference among two or more aptitudes of any one student and differences among the music aptitudes of two or more students.

The standard error of measurement may be best understood through a hypothetical example. Suppose a number of students who had equal music achievement were to take the same music achievement test. Despite their equal achievement, they would not all get the same scores. Instead, their obtained scores would have a considerable range. A few would have higher scores than they deserve and a few would have lower scores than they deserve. The majority would get scores fairly close to the value that represents their actual achievement. The standard error of measurement is an index of the variability of scores of students who have the same actual achievement. There is no way of knowing precisely just how much a student's achievement may have been underestimated or overestimated. The best estimate that may be made of the student's achievement is that which is represented by the obtained score. The student's actual achievement, however, may be estimated. To do that, the standard error of measurement is added to and subtracted from the student's obtained score. In about two cases of every three, a student's true achievement is represented by a score that is included within that interval estimate. In general, the following interpretation of obtained scores is appropriate:

2/3 of obtained scores will be confined to within one standard error of measurement of the true score.

19/20 of obtained scores will be confined to within two standard errors of measurement of the true score.
997/1000 of obtained scores will be confined to within three standard errors of measurement of the true score.

For the present study, the investigator employed 'Split-Half Method' for the establishment of reliability of the scale. The scale was divided into two halves on the basis of odd and even number. The co-efficient of reliability was computed by using the "Product Moment Correlation". The co-efficient of reliability of the scale came out to be .84, which is considered adequate for an aptitude scale.

Validity:

The types of statistical data that might be supplied as evidence of the test quality are reliability coefficients, difficulty indexes of test items (questions), indexes of the discriminating power of test items, homogeneity of test items within a subtest, and correlations of tests with other measures, such as course grades, teacher's evaluations, scores on similar tests, performance achievement, later success in music, and experimental measures of essentially the same behaviors. It is true that all of those qualities bear on the overall validity of a test, but, still, there is no absolute index of the validity of a test. The presence of such data does not prove that a test measures what 'it purports' to measure, nor do such data reveal whether the traits that are measured are those traits that should be measured. That is why mental tests theorists frequently suggest that

all tests have only 'some' validity, and that a given test may have more validity for some purposes than for others.

Content validity of the present scale was determined by giving the Musical aptitude Profile to five (5) experts in the field of music. All of them agreed that the content of the profile has adequate validity. A sample (CD) of the Musical Aptitude Profile and answer sheet is attached in APENDIX-2

3.4.0 Collection and tabulation of data:

The collection of data was done in a systematic manner. The data were collected both from primary and secondary sources. Data such as provisions for the gifted and talented students were collected from secondary sources such as government offices and private music institutions. Primary data were collected from eight colleges in Aizawl during the months of September – December 2013. The investigator personally visited the selected colleges for the study. The tests were administered to the students after obtaining permission from the college authority. The tests were administered by the investigator with the help of study mates and lecturers of the college during the class hours. Before the administration of the tests, the purpose of the study was mentioned. The investigator provides answer sheets for the two tests, Musical Aptitude Profile and Standard Progressive Matrices. After explaining the necessary guidelines and answering questions of uncertainty from the students about the two

test, the first test - Music Aptitude Profile was administered. This was followed by the Standard Progressive Matrices.

The time taken to complete both the tests was about three hours. These tests were administered to 400 students from eight different colleges in Aizawl city.

The data collected from the four hundred students were scrutinized and tabulated after scoring the responses on both Music aptitude profile and Standard progressive matrices using the test scoring procedures given in the respective manuals. Each student was assigned a serial number and their details regarding gender, college and stream of study, and the scores of the two tests were entered in the tabulation sheet and these were statistically treated and analyzed. The following statistical tests were employed for the present study.

3.5.0 Statistical techniques for analysis:

Keeping in view the nature of the data and objectives of the study, the investigator employed the following statistical techniques for analyzing the data:

3.5.1 *Descriptive Statistics Measures:*

Measures of Central tendency, Percentages, Stanine grade, and Percentiles were employed to find out the nature of score distribution and for classification of students in different categories.

3.5.2 *Test of significance for mean difference:*

The difference between the mean scores of the different groups based on gender and stream of study with respect to the variable intelligence and musical aptitude, were tested for significance by applying the t-test

3.5.3 *Co-efficient of correlation:*

Pearson Product moment correlation was employed to find out the relationship between the variable intelligence and musical aptitude among different groups of respondents

CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

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ANALYSIS AND INTERPRETATION OF DATA

The present chapter deals with the analysis and interpretation of data. The objective of the present study includes finding out the intelligence and musical aptitude of college students in Aizawl. Moreover, the purpose is to compare the two variables with respect to gender and stream of study. The objectives also comprise of finding out the relationship between intelligence & aptitude and thereby discover provisions for talented students and make suggestions as well.

The data relating to intelligence and musical aptitude were collected by administering the Standard Progressive Matrices (SPM) and Musical Aptitude Profile (MAP). The responses obtained from the subjects were scored following the standard scoring procedures. The scores were classified, tabulated and analyzed. The analysis of the data was carried out with the help of standard statistical techniques, keeping in view the objectives of the study and the findings were meaningfully interpreted. The findings of the study are presented in the present chapter in accordance with the objectives stated in chapter I.

4.1.0 Objective No. 1: To find out the intelligence and musical aptitude of college students in Aizawl.

The intellectual level as well as the musical aptitude of college students were established and categorized in the following way:

4.1.1 Intelligence of college students:

In order to find out the intelligence of the students, Ravens Progressive matrices was administered to all the respondents, after this, their scores were tabulated and transformed into percentile scores. Norms for interpretation was established by taking the 25th and 75th percentile score. Those scoring below 25th percentile were categorized into low intelligent group; those scoring between the 25th and 75th percentile were categorized as average intelligence and those scoring above 75th percentile were categorized as high intelligent group.

The following table No. 4.1 shows the number and percentage of all respondent's intellectual level which is categorized under three levels.

Table 4.1

Classification of college students with respect to their intelligence

Categories	Low Intelligence	Average Intelligence	High Intelligence
All Students (N=400)	80 (20%)	202 (50.5%)	118 (29.5%)
Male (N=229)	50 (21.9%)	116 (50.6%)	63 (27.5%)
Female (N=171)	30 (17.5%)	86 (50.3%)	55 (32.2%)
Science (N=100)	11 (11%)	50 (50%)	39 (39%)
Commerce (N=100)	18 (18%)	47 (47%)	35 (35%)
Arts (N=100)	22 (22%)	54 (54%)	24 (24%)
Theology (N=100)	29 (29%)	51 (51%)	20 (20%)

The above table 4.1 shows that out of all 400 respondents, 80 (20%) of the students are categorized as having low intelligence, 202 (50.5%) possess average intelligence and 118 (29.5%) of them have high intellectual level.

This implies that among college going students, although majority of respondents possess average intelligence, there are more students with high intelligence than those with low intelligence.

The above table also reveals that among the male respondents, there are 50 (21.9%) male students having low intelligence, 116 (50.6%) students having average intelligence and the rest 63 (27.5%) male learners having high intelligence. Similarly, among the female respondents, 30 (17.5%) have low intelligence, 86 (50.3%) have average intelligence and the rest 55 (32.2%) have high intelligence.

This shows that there are more high intelligent learners than the low intelligent learners among both the male and female learners, although majority of both the males and females possess average intelligence.

The above table also indicates that 11% of science students, 18% of commerce students, 22% of arts students, and 29% of theology students possess low intelligence, while 50% of science students, 47% of commerce students, 54% of arts students and 51% of theology students have average intelligence and at the same time, 39% of science students, 35% of commerce students, 24% of arts and 20% of theology students have high intelligence.

This illustrates that among science, commerce and arts respondents there are greater number of high intelligent learners than low intelligent learners but among the theology students, the low intelligent students outnumbered the high intelligent students. At any rate, amongst all streams, it was found that majority of students have average intelligence.

4.1.2 Musical aptitude of college students:

Musical Aptitude Profile was also administered to all respondents in order to find out the musical aptitude of the students. After tabulation, the scores of all 400 respondents were transformed into stanine score Accordingly, stanine 1, 2 & 3 indicates low musical aptitude, stanine 4, 5 & 6 indicates moderate musical aptitude, and stanine 7, 8 & 9 indicates high musical aptitude.

The following table no. 4.2 shows the number and percentage of all respondent's musical aptitude categorized under three levels.

Table 4.2

Classification of college students with respect to their musical aptitude

Categories	Low Musical Aptitude	Average Musical Aptitude	High Musical Aptitude
All Students (N=400)	95 (23.75%)	209 (52.25%)	96 (24%)
All male (N=229)	63 (27.51%)	124 (54.15%)	42 (18.34%)
All female (N=171)	32 (18.70%)	85 (49.71%)	54 (31.59%)
Science (N=100)	18 (18%)	62 (62%)	20 (20%)
Commerce (N=100)	16 (16%)	48 (48%)	36 (36%)
Arts (N=100)	12 (12%)	54 (54%)	34 (34%)
Theology (N=100)	53 (53%)	41 (41%)	6 (6%)

The above table 4.2 reveals that out of all 400 respondents, majority 209 (52.25%) of the student respondents have average musical aptitude, while 95 (23.75%) student respondents have low musical aptitude and almost the same number 96 (24%) have high musical aptitude. Among the male respondents, 27.51% have low musical aptitude, 54.15% possess average musical aptitude, and 18.34% have high musical aptitude, while amongst the female, 18.70% have low musical aptitude, 49.71% have average musical aptitude, and 39.59% have high musical aptitude. This illustrates that there are more females having high musical aptitude than low musical aptitude, on the contrary, there are more males having low musical aptitude than high musical aptitude although majority of both the males and females have average musical aptitude.

The above table also demonstrates that 18% of science students, 16% of commerce students, 12% of arts students, and 53% of theology students possess low musical aptitude, whereas 20% of science, 36% of commerce, 34% of arts and 6% of theology students have high musical aptitude respectively. The table also establishes that 62% of science, 48% of commerce, 54% of arts and 41% of theology students have average musical aptitude. This explains that majority of science, commerce and arts college students have average musical aptitude but majority of theology students have low musical aptitude. Among science, commerce and arts students, more students possess high

musical aptitude than low musical aptitude whilst among the theology students, more students possess low musical aptitude than high musical aptitude.

4.2.0 Objective No. 2: To find out the difference in the level of intelligence of college students in Aizawl with reference to gender and stream of study.

The intellectual level of the students was compared on the basis of their gender and stream of study. For this, the Mean and Standard Deviation of the scores were calculated. The mean differences were tested by applying 't' test and the details are presented in the following tables.

4.2.1. Difference in intelligence between all Male and Female respondents.

Hypothesis no. 1 states that there is no significant difference between male and female college students with respect to their intelligence.

Table no. 4.3 shows the comparison of Male and Female respondents with respect to their Intelligence.

Table 4.3

Comparison of male and female with respect to their intelligence

Groups	Number	Mean	SD	MD	SEM	t-value	Significant level
Male	229	45.62	7.65	0.81	2.31	1.06	NS
Female	171	46.43	7.42				

An examination of the result vide Table No - 4.3 reveals that the 't' value for the significance of difference between the intellectual scores of male and female

respondents is 1.06, whereas the required t-value with df = 398, to declare the difference as significant is 1.97 at 0.05 level of confidence. Since the value of the calculated 't' value is lower than the criterion 't' value, therefore, it can be concluded that there is no significant difference between the male and female respondents with respect to their intelligence. Therefore, the null hypothesis (No. 1) that assumes there is no significant difference between male and female college students with respect to their intelligence is accepted. However, a comparison of their mean score shows that female respondents are slightly higher than the males but this difference may be attributed to chance factor.

4.2.2. *Difference in intelligence between arts and science student.*

Hypothesis no 2 states that there is no significant difference between science and arts college students with respect to their intelligence.

Table No - 4.4 illustrates the comparison of science and arts respondents with respect to their intelligence.

Table 4.4

Comparison of science and arts students with respect to their intelligence

Groups	Number	Mean	SD	MD	SEM	t-value	Significant level
Science	100	47.92	5.85	2.69	.94	2.87	.01**
Arts	100	45.23	7.33				

**Significant at 0.01 level

A perusal of the result vide Table No - 4.4 reveals that the 't' value for the significance of difference between

science and arts is significant. Since the calculated 't' value is greater than the criterion 't' value, therefore, it can be concluded that there is a significant difference between science and arts respondents with respect to their intelligence. Therefore, the null hypothesis (No. 2) that assumes there is no significant difference between science and arts college students with respect to their intelligence is rejected, since the two groups differed significantly at .01 level of confidence. A comparison of their mean score shows that this difference is in favour of the science students, as their mean score is higher than the arts students. The result indicates that the science students have higher intelligence than the arts students.

4.2.3 *Difference in intelligence between science and commerce student.*

Hypothesis no 3 states that there is no significant difference between science and commerce college students with respect to their intelligence.

Table No - 4.5 illustrates the comparison of science and commerce respondents with respect to their intelligence.

Table 4.5

Comparison of science and commerce students with respect to their intelligence

Groups	Number	Mean	SD	MD	SEM	t-value	Significant level
Science	100	47.92	5.85	1.09	.89	1.22	NS
Commerce	100	46.83	6.76				

Analysis of the result vide Table No - 4.5 reveals that the 't' value for the significance of difference between the attitude of the science and commerce students is 1.22, whereas the required 't' value with df = 198 to declare the difference as significant is 1.97 at 0.05 level. Since the calculated 't' value is lower than the criterion 't' value, it can be concluded that there is no significant difference between science and commerce students. Therefore, the null hypothesis (No.3) which assumes there is no significant difference between science and commerce students with regard to their intelligence is accepted. A comparison of their mean score shows that although there is no significant difference between the two groups, the science students have a higher mean intelligent score

4.2.4 *Difference in intelligence between science and theology student.*

Hypothesis no 4 states that there is no significant difference between science and theology college students with respect to their intelligence.

Table No - 4.6 illustrates the comparison of science and theology respondents with respect to their intelligence.

Table 4.6

Comparison of science and theology students with respect to their intelligence

Groups	Number	Mean	SD	MD	SEM	t-value	Significant level
Science	100	47.92	5.85	4.04	1.10	3.67	.01**
Theology	100	43.88	9.32				

** significant at 0.01 level

A glimpse of the result vide Table No - 4.6 reveals that the 't' value for the significance of difference between science and theology students is 3.67. Since the calculated 't' value is greater than the criterion 't' value, it can be concluded that there is a significant difference between science and theology students with respect to their intelligence. Therefore, the hypothesis (No.4) that assumes there is no significant difference between science and theology students with respect to their intelligence is rejected since there exist a significant difference at 0.01 level of confidence. A comparison of their mean score shows that this difference is in favour of the science students. Thus, it can be concluded that science students possess a higher intellectual ability than the theology students.

4.2.5 *Difference in intelligence between arts and commerce student.*

Hypothesis no 5 states that there is no significant difference between arts and commerce college students with respect to their intelligence.

Table No - 4.7 illustrates the comparison of arts and commerce respondents with respect to their intelligence.

Table 4.7

Comparison of arts and commerce students with respect to their intelligence

Groups	Number	Mean	SD	MD	SEM	t-value	Significant level
Arts	100	45.23	7.33	1.60	.10	1.60	NS
Commerce	100	46.83	6.76				

As seen in Table No - 4.7, it has been found that the 't' value for the significance of difference between the students of arts and commerce is 1.60 whereas the required 't' value with df = 198 to declare the difference as significant is 1.97 at 0.05 level and 2.60 at 0.01 level. Since the calculated 't' value is lower than both the criterion 't' value, it can be concluded that there is no significant difference between the arts and commerce students with respect to their intelligence. Therefore, the null hypothesis (No.5) which assumes there is no significant difference between arts and commerce students with respect to their intelligence is accepted. However a comparison of their mean score shows that commerce students have a higher mean score than the arts students which indicates that although not significant, commerce students have a slightly higher intellectual ability than the arts students.

4.2.6 *Difference in intelligence between arts and theology student.*

Hypothesis no. 6 states that there is no significant difference between arts and theology college students with respect to their intelligence.

Table No - 4.8 illustrates the comparison of arts and theology respondents with respect to their intelligence.

Table 4.8

Comparison of arts and theology students with respect to their intelligence

Groups	Number	Mean	SD	MD	SEM	t-value	Significant level
Arts	100	45.23	7.33	1.35	1.19	1.14	NS
Theology	100	43.88	9.32				

A perusal of the result vide Table No - 4.8 reveals that the 't' value for the significance of difference between arts and theology students is 1.14, whereas the required 't' value with df = 298 to declare the difference as significant is 1.96 at 0.05 level. Since the calculated 't' value is lower than the criterion 't' value, it can be concluded that there is no significant difference between arts and theology students with respect to their intelligence. Therefore, the null hypothesis (No.6) which assumes there is no significant difference between arts and theology college students with respect to their intelligence cannot be rejected, consequently, it is accepted. A simple comparison of their mean score indicates the arts students have a higher mean score in intelligence than theology students, but this could be a chance factor.

4.2.7 *Difference in intelligence between commerce and theology student.*

Hypothesis no 7 states that there is no significant difference between commerce and theology college students with respect to their intelligence.

Table No - 4.9 illustrates the comparison of commerce and theology respondents with respect to their intelligence.

Table 4.9

Comparison of commerce and theology students with respect to their intelligence

Groups	Number	Mean	SD	MD	SEM	t-value	Significant level
Commerce	100	46.83	6.76	2.95	1.15	2.56	.05*
Theology	100	43.88	9.32				

*Significant at 0.05 level

A glance of the result vide Table No - 4.9 reveals that the 't' value for the significance of difference between commerce and theology students is 2.56. Since the calculated 't' value is greater than the criterion 't' value at '05 level, it can be concluded that there is a significant difference between commerce and theology students with respect to their intelligence. Therefore, the hypothesis (No.7) that assumes there is no significant difference between commerce and theology students with respect to their intelligence is rejected since there exist a significant difference at 0.05 level of confidence. A comparison of their mean score shows that this difference is in favour of the commerce students. Thus, it can be concluded that commerce students possess a higher intellectual ability than the theology students.

4.2.8 *Difference in intelligence between different groups of students*:

Sixteen (16) different groups of college students from science, commerce, arts and theology streams were compared with respect to their intelligence.

Hypothesis no. 8-23 states that there is no significant difference between the following groups of college students with respect to their intelligence:

Hypothesis No. 8 – Science male and Science female
Hypothesis No. 9 – Arts male and Arts female
Hypothesis No. 10 – Commerce male and Commerce female
Hypothesis No. 11 – Theology male and Theology female
Hypothesis No. 12 – Arts male and Science male
Hypothesis No. 13 – Arts male and Commerce male
Hypothesis No. 14 – Arts male and Theology male
Hypothesis No. 15 – Commerce male and Theology male
Hypothesis No. 16 – Commerce male and Science male
Hypothesis No. 17 – Theology male and Science male
Hypothesis No. 18 – Arts female and Science female
Hypothesis No. 19 – Arts female and Commerce female
Hypothesis No. 20 – Arts female and Theology female
Hypothesis No. 21 – Commerce female and Theology female
Hypothesis No. 22 – Commerce female and Science female
Hypothesis No. 23 – Theology female and Science female

Table No - 4.10 illustrates the comparison of different groups of college students with respect to their intelligence.

Table 4.10

Comparison of different groups of students with respect to their intelligence

Sl. No.	Groups	N	M	SD	MD	SEM D	t-value	Sig. level
1	Science Male	54	47.56	6.95	.79	1.15	.70	NS
	Science Female	46	48.35	4.27				
2	Arts Male	40	45.40	6.70	.28	1.46	.19	NS
	Arts Female	60	45.12	7.78				
3	Commerce Male	45	46.44	5.98	.71	1.34	.53	NS
	Commerce Female	55	47.15	7.38				
4	Theology Male	90	44.14	8.90	2.64	4.18	.63	NS
	Theology Female	10	41.50	12.90				
5	Arts male	40	45.40	6.70	2.16	1.42	1.52	NS
	Science male	54	57.56	6.95				
6	Arts male	40	45.40	6.70	1.04	1.39	.75	NS
	Commerce male	45	46.44	5.98				
7	Arts male	40	45.40	6.70	1.26	1.41	.89	NS
	Theology male	90	44.14	8.90				
8	Commerce male	45	46.44	5.98	2.30	1.29	1.78	NS
	Theology male	90	44.14	8.90				
9	Commerce male	45	46.44	5.98	1.11	1.30	.86	NS
	Science male	54	47.56	6.95				
10	Theology male	90	44.14	8.90	3.41	1.33	2.56	.05*
	Science male	54	47.56	6.95				
11	Arts female	60	45.12	7.78	3.23	1.19	2.73	.01**
	Science female	46	48.35	4.27				
12	Arts female	60	45.12	7.78	2.03	1.41	1.44	NS
	Commerce female	55	47.15	7.38				
13	Arts female	60	45.12	7.78	3.62	4.20	.86	NS
	Theology female	10	41.50	12.90				
14	Commerce female	55	47.15	7.38	5.65	4.20	1.35	NS
	Theology female	10	41.50	12.90				
15	Commerce female	55	47.15	7.38	1.20	1.18	1.02	NS
	Science female	46	48.35	4.27				
16	Theology female	10	41.50	12.90	6.85	4.13	1.66	NS
	Science female	46	48.35	4.27				

*Significant at 0.05 level
**Significant at 0.01 level

The above Table No - 4.10 shows the 't' values for the significance of difference between different groups of college students with respect to their intelligence. As depicted in the table above, it is found that most of the calculated 't' values between various groups of college students are lower

than the criterion 't' values, therefore it can be concluded that there is no significant difference between various groups of students with respect to their intelligence - except for the comparison between two groups namely *Theology male and Science male group* as well as *Arts female and Science female group*. With respect to the comparison between these two groups, the calculated t values are higher than the criterion t values which indicate that with reference to their intelligence, there are significant differences between the groups compared. Therefore all other hypotheses except hypotheses No. 17 & 18 can be accepted since all other hypotheses assumes there are no significant differences between the groups compared with respect to their intelligence and no significant differences was found. However, hypotheses no 17 & 18 that assumes no significant differences between the groups compared, remains rejected since there exist a significant difference between these groups at 0.05 and at 0.01 level of confidence respectively. A comparison of the mean score of these two group shows that both the differences are in favour of the Science male and Science female respectively. Thus, it can be concluded that Science male students have significantly higher intellectual ability than Theology male students. At the same time we can also conclude that Science female students have significantly higher intelligence than Arts female students.

4.3.0 Objective No. 3: To find out the difference in the level Musical Aptitude of college students in Aizawl with reference to gender and stream of study.

The musical aptitude of the students was compared on the basis of their gender and stream of study. For this, the Mean and Standard Deviation of the scores were calculated. The mean differences were tested by applying 't' test and the details are presented in the following tables.

4.3.1 Difference in Musical Aptitude between all Male and Female respondents.

Hypothesis no. 24 states that there is no significant difference between male and female college students with respect to their musical aptitude.

Table no. 4.11 shows the comparison of Male and Female respondents with respect to their musical aptitude.

Table 4.11

Comparison of male and female students with respect to their musical aptitude

Groups	Number	Mean	SD	MD	SEM	t-value	Significant level
Male	229	159.47	25.26	8.43	2.42	3.48	.01**
Female	171	167.90	22.95				

**Significant at 0.01 level

An examination of the result vide Table No - 4.11 reveals that the 't' value for the significance of difference between the musical aptitude scores of male and female respondents is 3.48, whereas the required t-value with df = 398, to declare the difference as significant is 1.97 and 2.59 at 0.05 and 0.01 level of confidence. Since the value of the calculated 't' value is higher than the criterion 't' value,

therefore, it can be concluded that there is a significant difference between the male and female respondents with respect to their musical aptitude. Therefore, the null hypothesis (No.24) that assumes there is no significant difference between male and female college students with respect to their musical aptitude is rejected as a significant difference is established between them at 0.01 level of confidence. A comparison of their mean score shows that female respondents have higher mean score than the male respondents, therefore it can be concluded that female college students have higher musical aptitude than the male college students.

4.3.2 Difference in Musical Aptitude between Science and Arts respondents.

Hypothesis no. 25 states that there is no significant difference between science and arts college students with respect to their musical aptitude.

Table no. 4.12 shows the comparison of Science and Arts respondents with respect to their musical aptitude.

Table 4.12

Comparison of science and arts students with respect to their musical aptitude

Groups	Number	Mean	SD	MD	SEM	t-value	Significant level
Science	100	164.07	20.22	6.40	2.86	2.24	.05*
Arts	100	170.47	20.21				

*Significant at 0.05 level

A glance of the result vide Table No - 4.12 reveals that the 't' value for the significance of difference between

science and arts students is 2.24. Since the calculated 't' value is greater than the criterion 't' value at '05 level, it can be concluded that there is a significant difference between science and arts students with respect to their musical aptitude. Therefore, the hypothesis (No.25) that assumes there is no significant difference between science and arts students with respect to their intelligence is rejected since there exist a significant difference at 0.05 level of confidence. A comparison of their mean score shows that this difference is in favour of the arts students. Thus, it can be concluded that arts students possess a superior musical aptitude than the science students.

4.3.3 Difference in Musical Aptitude between Science and Commerce respondents.

Hypothesis no. 26 states that there is no significant difference between science and commerce college students with respect to their musical aptitude.

Table no. 4.13 shows the comparison of Science and Commerce respondents with respect to their musical aptitude.

Table 4.13

Comparison of science and commerce students with respect to their musical aptitude

Groups	Number	Mean	SD	MD	SEM	t-value	Significant level
Science	100	164.07	20.22	7.86	3.24	2.42	.05*
Commerce	100	171.93	25.37				

*Significant at .05 level

A perusal of the result vide Table No - 4.13 reveals that the 't' value for the significance of difference between science and commerce students is 2.42, whereas the required 't' value with df = 98 to declare the difference as significant is 1.96 at 0.05 level. Since the calculated 't' value is higher than the criterion 't' value at 0.05 level, it can be concluded that there is significant difference between science and commerce students with respect to their musical aptitude. Therefore, the null hypothesis (No.26) which assumes there is no significant difference between science and commerce college students with respect to their musical aptitude is consequently rejected. A simple comparison of their mean score prove that the difference in the mean score is in favour of the commerce student. Therefore it can be concluded that commerce students have a higher musical aptitude than science students.

4.3.4 Difference in Musical Aptitude between Science and Theology respondents.

Hypothesis no. 27 states that there is no significant difference between science and theology college students with respect to their musical aptitude.

Table no. 4.14 shows the comparison of Science and Theology respondents with respect to their musical aptitude.

Table 4.14

Comparison of science and theology students with respect to their musical aptitude

Groups	Number	Mean	SD	MD	SEM	t-value	Significant level
Science	100	164.07	20.22	18.24	3.09	5.90	.01**
Theology	100	145.83	23.41				

**Significant at 0.01 level

A glimpse of the result vide Table No - 4.14 reveals that the 't' value for the significance of difference between science and theology students is 5.90. Since the calculated 't' value is greater than the criterion 't' value, it can be concluded that there is a significant difference between science and theology students with respect to their musical aptitude. Therefore, the hypothesis (No.27) that assumes there is no significant difference between science and theology students with respect to their musical aptitude is rejected since there exist a significant difference at 0.01 level of confidence. A comparison of their mean score shows that this difference is in favour of the science students. Thus, it can be concluded that science students possess a superior musical aptitude than the theology students.

4.3.5 Difference in Musical Aptitude between Arts and Commerce respondents.

Hypothesis no. 28 states that there is no significant difference between arts and commerce college students with respect to their musical aptitude.

Table no. 4.15 shows the comparison of Arts and Commerce respondents with respect to their musical aptitude.

Table 4.15

Comparison of arts and commerce students with respect to their musical aptitude

Groups	Number	Mean	SD	MD	SEM	t-value	Significant level
Arts	100	170.47	20.21	1.46	3.24	.45	NS
Commerce	100	171.93	25.37				

As seen in Table No - 4.15, it has been found that the 't' value for the significance of difference between the students of arts and commerce is 0.45 whereas the required 't' value with df = 198 to declare the difference as significant is 1.97 at 0.05 level and 2.60 at 0.01 level. Since the calculated 't' value is lower than both the criterion 't' value, it can be concluded that there is no significant difference between the arts and commerce students with respect to their musical aptitude. Therefore, the null hypothesis (No.28) which assumes there is no significant difference between arts and commerce students with respect to their musical aptitude is accepted. However a comparison of their mean score shows that commerce students have a higher mean score than the arts students which indicates that although not significant, commerce students have a slightly higher musical aptitude than the arts students.

4.3.6 Difference in Musical Aptitude between Arts and Theology respondents.

Hypothesis no. 29 states that there is no significant difference between arts and theology college students with respect to their musical aptitude.

Table no. 4.16 shows the comparison of Arts and Theology respondents with respect to their musical aptitude.

Table 4.16

Comparison of arts and theology students with respect to their musical aptitude

Groups	Number	Mean	SD	MD	SEM	t-value	Significant level
Arts	100	170.47	20.21	24.64	3.09	7.97	.01**
Theology	100	145.83	23.41				

Significant at 0.01 level

A look of the result vide Table No - 4.16 reveals that the 't' value for the significance of difference between arts and theology students is 7.97. Since the calculated 't' value is greater than the criterion 't' value, it can be concluded that there is a significant difference between arts and theology students with respect to their musical aptitude. Therefore, the hypothesis (No.29) that assumes there is no significant difference between arts and theology students with respect to their musical aptitude is rejected since there exist a significant difference at 0.01 level of confidence. A comparison of their mean score shows that this difference is in favour of the arts students. Thus, it can be concluded that arts students possess a higher musical aptitude than the theology students.

4.3.7 Difference in Musical Aptitude between Commerce and Theology respondents.

Hypothesis no. 30 states that there is no significant difference between commerce and theology college students with respect to their musical aptitude.

Table no. 4.17 shows the comparison of Commerce and Theology respondents with respect to their musical aptitude.

Table 4.17

Comparison of commerce and theology students with respect to their musical aptitude

Groups	Number	Mean	SD	MD	SEM	t-value	Significant level
Commerce	100	171.93	25.37	26.10	3.45	7.56	.01**
Theology	100	145.83	23.41				

**Significant at 0.01 level

A glance of the result vide Table No - 4.17 reveals that the 't' value for the significance of difference between commerce and theology students is 7.56. Since the calculated 't' value is greater than the criterion 't' value, it can be concluded that there is a significant difference between commerce and theology students with respect to their musical aptitude. Therefore, the hypothesis (No.30) that assumes there is no significant difference between commerce and theology students with respect to their musical aptitude is rejected since there exist a significant difference at 0.01 level of confidence. A comparison of their mean score shows that this difference is in favour of the commerce students. Thus, it can be concluded that

commerce students have a higher musical aptitude than the theology students.

4.3.8 *Difference in Musical aptitude between different groups of students:*

Sixteen (16) different groups of college students from science, commerce, arts and theology streams were compared with respect to their musical aptitude.

Hypotheses no. 31-46 states that there are no significant differences between the following groups of college students with respect to their musical aptitude.

Hypothesis No. 31 – Science male and Science female
Hypothesis No. 32 – Arts male and Arts female
Hypothesis No. 33 – Commerce male and Commerce female
Hypothesis No. 34 – Theology male and Theology female
Hypothesis No. 35 – Arts male and Science male
Hypothesis No. 36 – Arts male and Commerce male
Hypothesis No. 37 – Arts male and Theology male
Hypothesis No. 38 – Commerce male and Theology male
Hypothesis No. 39 – Commerce male and Science male
Hypothesis No. 40 – Theology male and Science male
Hypothesis No. 41 – Arts female and Science female
Hypothesis No. 42 – Arts female and Commerce female
Hypothesis No. 43 – Arts female and Theology female
Hypothesis No. 44 – Commerce female and Theology female
Hypothesis No. 45 – Commerce female and Science female
Hypothesis No. 46 – Theology female and Science female

Table No - 4.18 illustrates the comparison of different groups of college students with respect to their musical aptitude.

Table 4.18

Comparison of different groups of students with respect to their musical aptitude

Sl. No.	Groups	N	M	SD	MD	SEMD	t-value	Sig. level
1	Science Male	54	162.82	16.87	2.73	4.18	.65	NS
	Science Female	46	165.54	23.67				
2	Arts Male	40	167.38	19.55	5.16	4.07	1.27	NS
	Arts Female	60	172.53	20.54				
3	Commerce Male	45	177.84	26.66	10.75	5.06	2.13	.05*
	Commerce Female	55	167.09	23.77				
4	Theology Male	90	144.77	23.09	10.63	8.38	1.27	NS
	Theology Female	10	155.40	25.34				
5	Arts male	40	167.38	19.55	4.56	3.85	1.18	NS
	Science male	54	162.82	16.87				
6	Arts male	40	167.38	19.55	10.47	4.99	2.10	.05*
	Commerce male	45	177.84	26.27				
7	Arts male	40	167.38	19.55	22.61	3.93	5.75	.01**
	Theology male	90	144.77	23.09				
8	Commerce male	45	177.84	26.27	33.08	4.61	7.18	.01**
	Theology male	90	144.77	23.09				
9	Commerce male	45	177.84	26.27	15.03	4.54	3.31	.01**
	Science male	54	162.82	16.87				
10	Theology male	90	144.77	23.09	18.05	3.35	5.40	.01**
	Science male	54	162.82	16.87				
11	Arts female	60	172.53	20.54	6.99	4.38	1.60	NS
	Science female	46	165.54	23.67				
12	Arts female	60	172.53	20.54	5.44	4.16	1.31	NS
	Commerce female	55	167.09	23.77				
13	Arts female	60	172.53	20.54	17.13	8.44	2.03	NS
	Theology female	10	155.40	25.34				
14	Commerce female	55	167.09	23.77	11.69	8.63	1.36	NS
	Theology female	10	155.40	25.34				
15	Commerce female	55	167.09	23.77	1.55	4.74	.33	NS
	Science female	46	165.54	23.67				
16	Theology female	10	155.40	25.34	10.14	8.74	1.16	NS
	Science female	46	165.54	23.67				

*Significant at 0.05 level
**Significant at 0.01 level

The above Table No - 4.18 illustrates the 't' values for the significance of differences between different groups of college students with respect to their musical aptitude. As

depicted in the table above, it is found that the calculated 't' values between various groups of college students specifically serial no 3, 6, 7, 8, 9 & 10 are higher than the criterion 't' values, therefore those calculated t values which are higher than the criterion 't' values have significant difference between the compared groups. This indicates that with reference to their musical aptitude, there are significant differences between the groups compared. Therefore hypotheses no 33, 36, 37, 38, 39 and 40 which assumes there are no significant differences between the groups compared are rejected since there exist a significant differences between these compared groups, some at 0.05 level and some at 0.01 level of confidence. Meanwhile all other hypotheses are accepted as no significant differences were found between the groups compared.

When the mean scores of those significantly different groups were compared, the following conclusions can be inferred. Between commerce male and commerce female, the mean score difference is in favour of the commerce male, therefore commerce males have higher musical aptitude than the commerce females. Among arts male and commerce male, the mean score difference is in favour of commerce male, this means commerce males possess higher musical aptitude than arts males. Amongst arts male and theology male, the mean score difference is in favour of arts male which implies arts males are superior than theology males in musical aptitude. Between commerce male and theology male, the mean score difference is in

favour of commerce male demonstrating that commerce males have superior musical aptitude than theology males. Among commerce male and science male, the difference in their mean score is in favour of the commerce male explaining that commerce males are better in musical aptitude than science males. When the mean score of theology male and science male was compared, science male have a higher mean score which prove that science males evidently outshine theology males in their musical aptitude.

4.4.0 Objective No. 4: To find out the relation between intelligence and musical aptitude among college students in Aizawl.

In order to find out the relation between intelligence and musical aptitude, the coefficient of correlation between the scores obtained from both the Raven's Progressive Matrices and Musical Aptitude Profile was determined. For this, Pearson product Moment Correlation Method was employed. The details of the findings are presented in the following tables:

4.4.1 Relationship between Intelligence and Musical aptitude among all college respondents.

Hypothesis No. 47 states that there is no significant correlation between intelligence and musical aptitude among college students in Aizawl.

Table 4.19 shows the relationship between intelligence and musical aptitude among college students in Aizawl.

Table 4.19

Correlation coefficient between intelligence and musical aptitude among college students (N = 400)

	Intelligence	Musical aptitude
Intelligence	1.000	.340**
Musical aptitude	.340**	1.000

**Significant at 0.01 level

From the above table 4.19, it is revealed that there is a positive correlation between intelligence and musical aptitude among college students in Aizawl and the relationship is significant at 0.01 level. Hence the null hypothesis no. (47) that state there is no significant relationship between intelligence and musical aptitude among college students in Aizawl is rejected, since a significant positive correlation r = .34 is established between these two variables. The analysis brings to light that although the relationship is slight, there is positive correlation between intelligence and musical aptitude which shows that the higher the intelligence of the college students, the higher the musical aptitude of the college students and vice versa.

4.4.2 Relationship between Intelligence and Musical aptitude among science respondents.

Hypothesis No. 48 states that there is no significant correlation between intelligence and musical aptitude among the science students in Aizawl.

Table 4.20 shows the relationship between intelligence and musical aptitude among science students in Aizawl.

Table 4.20

Correlation coefficient between intelligence and musical aptitude among science students (N = 100)

	Intelligence	Musical aptitude
Intelligence	1.000	.446**
Musical aptitude	.446**	1.000

**Significant at 0.01 level

From the above table 4.20, it can be observed that there is positive correlation between intelligence and musical aptitude among science students in Aizawl and the relationship is significant at 0.01 level. Hence the null hypothesis no. (48) that says there is no significant relationship between intelligence and musical aptitude among science students in Aizawl is rejected, since a significant positive correlation r = .45 is established between these two variables. The analysis explains that there is substantial positive correlation between intelligence and musical aptitude which illustrate that the higher the intelligence of the science students, the higher is their musical aptitude and vice versa.

4.4.3 Relationship between Intelligence and Musical aptitude among commerce respondents.

Hypothesis No. 49 states that there is no significant correlation between intelligence and musical aptitude among the commerce students in Aizawl.

Table 4.21 depicts the relationship between intelligence and musical aptitude among commerce students in Aizawl.

Table 4.21

Correlation coefficient between intelligence and musical aptitude among commerce students (N = 100)

	Intelligence	Musical aptitude
Intelligence	1.000	.072
Musical aptitude	.072	1.000

Table No. 4.21 illustrates that there is positive correlation between intelligence and musical aptitude among commerce students in Aizawl but this relationship is not significant at any level. Hence the null hypothesis no. (49) that declares there is no significant relationship between intelligence and musical aptitude among commerce students in Aizawl is accepted, as no significant correlation is established between these two variables. It can therefore be concluded that although a slight positive correlation is established between these two variable, the relationship could be the result of a chance factor.

4.4.4 Relationship between Intelligence and Musical aptitude among Arts respondents.

Hypothesis No. 50 states that there is no significant correlation between intelligence and musical aptitude among the arts students in Aizawl.

Table 4.22 shows the relationship between intelligence and musical aptitude among arts students in Aizawl.

Table 4.22

Correlation coefficient between intelligence and musical aptitude among arts students (N = 100)

	Intelligence	Musical aptitude
Intelligence	1.000	.451**
Musical aptitude	.451**	1.000

**Significant at 0.01 level

It is evident from the above table 4.22, that there is positive correlation between intelligence and musical aptitude among arts students in Aizawl and that the relationship is significant at 0.01 level. Thus, the null hypothesis no.(50) that states there is no significant relationship between intelligence and musical aptitude among arts students in Aizawl is rejected, since a significant positive correlation r = .45 is found between these two variables. The analysis explains that there is marked positive correlation between intelligence and musical aptitude which means that the higher the intellectual level of the arts students, the higher is their musical aptitude as well and vice versa.

4.4.5 Relationship between Intelligence and Musical aptitude among Theology students.

Hypothesis No. 51 states that there is no significant correlation between intelligence and musical aptitude among the theology students in Aizawl.

Table 4.23 shows the relationship between intelligence and musical aptitude among theology students in Aizawl.

Table 4.23

Correlation coefficient between intelligence and musical aptitude among theology students (N = 100)

	Intelligence	Musical aptitude
Intelligence	1.000	.337**
Musical aptitude	.337**	1.000

**Significant at 0.01 level

It is obvious from the above table 4.23, that there is positive correlation between intelligence and musical aptitude among theology students in Aizawl and that the relationship is significant at 0.01 level. Accordingly, the null hypothesis no. (51) that says there is no significant relationship between intelligence and musical aptitude among theology students in Aizawl is rejected, since a significant positive correlation r = .34 is found between these two variables. The analysis signifies that there is positive correlation between intelligence and musical aptitude which implies that the more intelligent the theology students are, the better their musical aptitude is and vice versa.

4.4.6 Relationship between Intelligence and Musical aptitude among all male college students.

Hypothesis No. 52 states that there is no significant correlation between intelligence and musical aptitude among all male college students in Aizawl.

Table 4.24 shows the relationship between intelligence and musical aptitude among all male college students in Aizawl.

Table 4.24

Correlation coefficient between intelligence and musical aptitude among male college students (N = 200)

	Intelligence	Musical aptitude
Intelligence	1.000	.353**
Musical aptitude	.353**	1.000

**Significant at 0.01 level

As is evident from the above table 4.24, that there is positive correlation between intelligence and musical aptitude among all male college students in Aizawl and that the relationship is significant at 0.01 level. Accordingly, the null hypothesis no. (52) that declares there is no significant relationship between intelligence and musical aptitude among all male college students in Aizawl is rejected, since a significant positive correlation r = .35 is found between these two variables. The analysis signifies that there is positive correlation between intelligence and musical aptitude which explains that the more intelligent the male college students are, the higher their musical aptitude is and vice versa.

4.4.7 Relationship between Intelligence and Musical aptitude among all female college students.

Hypothesis No. 53 states that there is no significant correlation between intelligence and musical aptitude among all female college students in Aizawl.

Table 4.25 shows the relationship between intelligence and musical aptitude among all female college students in Aizawl.

Table 4.25

Correlation coefficient between intelligence and musical aptitude among female college students (N = 200)

	Intelligence	Musical aptitude
Intelligence	1.000	.311**
Musical aptitude	.311**	1.000

**Significant at 0.01 level

Evidently, that there is positive correlation between intelligence and musical aptitude among all female college students in Aizawl as can be seen from the above table 4.25, and the relationship is significant at 0.01 level. Consequently, the null hypothesis no. (53) that says there is no significant relationship between intelligence and musical aptitude among all female college students in Aizawl is rejected, since a significant positive correlation r = .31 is established between these two variables. The analysis denotes that there is positive correlation between intelligence and musical aptitude. This suggests that intelligent female students also have high musical aptitude and vice versa.

4.5.0 Objective No. 5: To find out the existing provisions for the education of the students having academic and musical talents and to suggest measures for the development of their talents.

The investigator found that although inadequate, there are certain existing provisions for the education of students having academic and musical talents which are presented

below along with suggestive measures for the development of their talents.

4.5.1 Existing provision in Mizoram for the education of the students having intellectual talents:

In spite of the high literacy rate, there are no special educational arrangements for the intellectually talented students in Mizoram. Although no special education is offered to them, certain incentives in the form of scholarships and cash awards are being provided to them by the government. The Mizoram scholarship board under the Department of Higher and Technical Education provides cash incentives award to those persons who got through in the UPSC conducted written examinations. The board also makes provision for reimbursement of coaching course fee and hostel accommodation for four months to those who qualify in the civil service preliminary examinations and preparing for the main examinations.

Mizoram scholarship board has also been providing Research Fellowship to those selected University recognized registered PhD and M.Phil scholars, provided their research works (topics) has significant relevance for the state of Mizoram. The selection is done purely on the basis of merit.

Post Matric merit scholarship is also being provided by the scholarship board in the higher secondary, degree, and post-graduate level

The NEC stipend & book grant is also being given to those selected individuals pursuing higher professional

courses, from diploma to PhD courses, selected on the basis of merit.

Ministry of minority affairs has also started awarding merit scholarship to selected students of economically weaker section of minority community from HSLC up to Ph.D and technical and vocational courses since 2007.

National Means-cum-Merit Scholarship Scheme (NMMSS) award scholarships to meritorious students of economically weaker sections to arrest their drop out and encourage them to continue their study.

Under Mizoram Post Matric Merit Science Scholarship scheme, the Science and Technology wing under Mizoram Planning Department also have been giving scholarships and book grants to selected B.Sc and M.Sc students.

SCERT also conducts the National Talent Search examination at the state level for class VIII, and those who qualify at the national level are provided merit scholarship as they continue to pursue higher studies

The science promotion wing under the State Council of Educational Research and Training (SCERT) awards prize money and certificates to the top three scorers in science and mathematics subjects in High School Leaving Certificate Examinations and also to the top three scorers in different science subjects in the Higher Secondary School Leaving Certificate Examinations in Mizoram.

The science promotion wing also awards incentives to each topper in science & mathematics in the promotion

exams of classes VIII, IX and XI (Science) to all the schools of Mizoram irrespective of types of management.

Innovation in Science Pursuit for Inspired Research (INSPIRE) award sponsored by the Department of Science &Technology (Central) is also provided by the science promotion wing. Under this scheme, a one-time award of 5000/- is given to the students for making a science project and bringing the project to the District Level Exhibition centre for display. All students awardees who's projects are selected at district level would get an opportunity to participate in the state level exhibition. Selected project at state level would get an opportunity to participate in the national level exhibition, where 5 best project would be selected.

Moreover, state level science drama competition, National level Science exhibition, Eastern India science fair, students science seminar etc. are organized every year by this wing.

Further, in order to make the teaching of science effective and interesting, all needy schools were supplied science kits and equipments. Besides this, short term/orientation training programmes for science and mathematics teachers of higher secondary schools, high schools, middle schools and primary schools are regularly conducted by the science promotion wing under SCERT.

Proficiency award is also being given by the Department of English under SCERT to those top three

scorer in English subject in the high and higher secondary school leaving certificate examinations.

4.5.2 Existing provision in Mizoram for the education of the students having musical talents:

No special instruction is provided by the government either as a curricula or extra curricula activities in government schools for developing musical talents. However, some private schools gave music instruction to their students generally because of parental request, and also as a means of attracting students for admission to their schools.

There is one '*Institute of Music and Fine Arts*' (IMFA) at Chanmari, Aizawl under the department of Art and culture, Government of Mizoram which was opened in 1979. IMFA offered a three months full time course in music for mostly high school students and above. Students were selected through interview and the selected students were provided a stipend of Rs.500 per month since 2009. The IMFA syllabus includes:

Music 1 – Music awareness
Music 2 – Staff notation and guitar practical
Music 3 – Staff notation and guitar fingering
Music 4 – Sound system/mixing and Cipher notation
Music 5 – Vocal exercise

Further, a number of musical institutions have been opened by private bodies so that students can learn the basics of music during their spare time. The following are the list of private institutions offering music lessons:

Emily Singing Institute is an institution at Chanmari, Aizawl which provides music lesson in Vocals only. It was established in the year 1991. Students who wish to learn vocal training gets admitted to this institution. The time schedule is one hour per student and the school opens from 10 AM to 6 PM daily.

Synod school of music at Mission veng, Aizawl was established in the year 1992. They offer Elementary music course of three months where tonic solfa and staff notation are taught. Other courses include keyboard which follows the Trinity guildhall course, and Violin class where the school develops their own school syllabus. Classes are open in the morning for children 9 – 13 years, in the evening for 14 – 18 years and during the day time for 19 years and above.

Mystic is a music institution at Khatla, Aizawl which was opened in the year 2001. Music theory as well as playing of musical instruments such as keyboards, guitars, drums are being taught to students seeking admission to this institutions. Besides developing their own syllabus, the institution followed the syllabus specified by Trinity college of Music, London and Rock school, United Kingdom. The class schedule is one hour daily except for drums which is one hour thrice a week. Students can appear for their certificate exams after they complete their course and there is no time bar to finish the course. As long as tuition fees are given they can continue to learn until they can get their certificate.

Crescendo, the school of music, Chanmari Aizawl was established in the year 2005. Crescendo provides music lesson in music theory, keyboard and guitars. Their class schedule is one hour daily for each student. They also followed the syllabus specified by Trinity college of Music, London for their course. Again there is no time bar to complete their course and students sit for their certificate examinations when they complete their course.

William Booth School of Music from Tuikual, Aizawl is owned by the Salvation Army and was established in the year 2006. They impart music lesson in theory, brass, guitar and keyboard. Their time schedule is one hour per each student, but the school is open only during morning (6 -8 AM) and evening (3 – 6 PM) The course followed by this institution is Royal School of Music, London

Sonata School of Music at Mission veng, Aizawl which was opened in 2007 offers music lesson in keyboard, guitars and violin. The class schedule is one hour daily and they also followed the syllabus specified by Trinity college of Music, London and Rock school, UK. Students can appear for their certificate exams after completing their course which also does not have any time bar.

Grandton school of music located at Zarkawt, Aizawl was established in the year 2010. This institution provides music lesson in guitar, drums and keyboard. The school is open from 9 A.M. to 6 P.M. and the time schedule for each student is one hour. The syllabus followed by this school is Trinity college of music, London. Students appear for their

certificate exams when they finished their course, but there is no time bar in finishing their course.

Music Inn (*Sarabande school of music)* which is situated at Chaltlang Dawrkawn, Aizawl was started in the year 2010. This institution provide music lesson in keyboard, guitars and piano apart from theory lesson (staff notation and tonic solfa) and church music. The class schedule is one hour daily except drums which is one hour thrice a week. The course followed by this institution is Trinity college of Music, London. Here too, the course does not have any time bar and students sit for their certificate exams after they complete their course.

Vortex was initiated in the year 2013 at Sikulpuikawn, Aizawl. The institution offered music lesson on keyboard, guitars, drums, and bass guitars. The class schedule is 45 minutes twice a week and they followed the syllabus recognized by Rock school, UK besides developing their own school syllabus. Like other private institutions, students will appear for their certificate exams after they complete their course, and there is no time bar in completing their course.

Home free school of music situated at Vaivakawn, Aizawl was established in 2013. They provide music lesson in keyboard and guitar. The time schedule for each student is one hour and they followed the course specified by Trinity Guildhall.

Drop Doubt School of music situated at Mission veng, Aizawl was established this year i.e. 2014. They provide

music lessons in theory, guitar and drums. They followed the course specified by Rock school UK and Trinity College of music. The class schedule is thrice a week for each department

4.5.3 Suggested measures for the development of the talents of students with intellectual and musical ability.

Till date, no significant special educational provisions for the highly intelligent students as well as the musically talented students have really been undertaken by the state of Mizoram. The scholarships provided to meritorious students are too meager to give them stimulation for advancement. Provisions for learning music provided by the government and private institutions are somewhat pathetic.

One of the first steps in order to develop the talents of students with intellectual and musical ability is to identify the highly intelligent and musically talented students. This identification can be done by the teachers with the help of psychological tests like aptitude test, achievement test or just by observing their interest and personality.

Educational institution should provide the highly intelligent students with special enrichment programmes and also make provisions to develop the musical skill of those students who possess musical aptitude. The nature of these programmes which may vary would have to be carefully designed. The intellectually gifted students may be encouraged to take up some project work so that they will develop a feeling of pride and develop confidence in

themselves. The musically talented students may be encouraged to pursue their interest and the schools and colleges may arrange a platform to demonstrate their ability while providing opportunity to develop their talents in the form of music class in the institutions. These talented students will also enjoy what they are learning.

Essentially, the proper development of the intellectually gifted and musically talented students depends to a large extent upon the intelligence, wisdom and the sense of responsibility of the teacher. The teacher should try to make arrangement for developing special qualities in his more talented students.

Apart from these, the Government also has a responsibility in providing opportunities for developing the talents of the students. The Government could arrange winter camps or summer camps during vacations for the academically talented students. Students will be selected from different institutions and brought together for a special educational programme which is very challenging and planned under the guidance of experts in the field. The programme would emphasize on creative and experimental projects where students will learn skill of investigation, stressing initiative and originality with a high standard of accomplishments. The programme would also emphasize cooperative planning and activity that provides opportunity for leadership training and experiences in social adjustment and a deep concern for community responsibility. The students will be provided with the best available books to

consult for writing their project report and for holding discussion. Different subjects in science, commerce and arts can be covered.

The Government of Mizoram could also open up music school or Music College, somewhat like Delhi School of Music and can have a tie up with European universities like Trinity College of Music, London; Royal Academy of Music, England; Royal Academy of Music, England, etc. Mizo's being a great lover of Western Music, this school/college may offer challenging courses in Western Classical Music as well as Indian music.

Mizoram University already had one School of Fine Arts, Planning & Architecture. It is suggested that under this School of Fine Arts, Planning & Architecture, the university be requested to offer post-graduate degree in music and a Doctor of Philosophy in Music. All the private music schools will then seek recognition from the Government and all these private music schools and institutions along with Government managed music college/schools will be affiliated to this University

If such type of programmes could be organized and music schools /colleges opened in Mizoram as well as in other parts of the country, talents of our youths could be nurtured and developed and brought to the right direction, instead of letting it go down the drain; and the society in general will be greatly benefited.

CHAPTER V

MAJOR FINDINGS, DISCUSSIONS, RECOMMENDATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

CHAPTER V

MAJOR FINDINGS, DISCUSSIONS, RECOMMENDATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

The present chapter deals with the major findings, discussions, recommendations and suggestions for further research.

5.1.0 MAJOR FINDINGS

The following are the major findings of the present study:

5.1.1 Intelligence of college students.

(a) Although majority of college students possess average intelligence, there are more students with high intelligence than those with low intelligence.

(b) Though majority of college students have average intelligence, science, commerce and arts respondents have greater number of high intelligent learners than low intelligent learners while among theology students, the low intelligent students outnumbered the high intelligent students.

5.1.2 Musical aptitude of college students.

(a) Majority of college students have average musical aptitude

(b) There are more female college students having high musical aptitude than low musical aptitude. There are

more male college students having low musical aptitude than high musical aptitude

(c) Majority of science, commerce and arts college students have average musical aptitude but majority of theology students have low musical aptitude.

(d) Among science, commerce and arts college students, more students possess high musical aptitude than low musical aptitude whilst among the theology college students, more students possess low musical aptitude than high musical aptitude.

5.1.3 Difference in intelligence between various groups

(a) There is no significant difference in intelligence between male and female college students.

(b) Science students have significantly higher intelligence than the arts students.

(c) There is no significant difference in intelligence between science and commerce students.

(d) Science students possess a significantly higher intellectual ability than the theology students.

(e) There is no significant difference in intelligence between arts and commerce students.

(f) There is no significant difference in intelligence between arts and theology students.

(g) Commerce students possess a significantly higher intellectual ability than the theology students.

(h) Science males have significantly higher intellectual ability than theology males.

(i) Science females possess significantly higher intelligence than arts females.

5.1.4 Difference in Musical Aptitude among various groups.

(a) Female college students have significantly higher musical aptitude than the male college students.

(b) Arts students possess a significantly superior musical aptitude than the science students.

(c) Commerce students significantly excel science students in musical aptitude.

(d) Science students possess a significantly superior musical aptitude than the theology students.

(e) There is no significant difference between arts and commerce students

(f) Arts students possess a significantly better musical aptitude than the theology students.

(g) Commerce students have a significantly higher musical aptitude than the theology students.

(h) Commerce males significantly surpass commerce females in their musical aptitude.

(i) Commerce male possess a significantly higher musical aptitude than arts male.

(j) Arts males are significantly superior to theology males in musical aptitude.

(k) Commerce male have significantly superior musical aptitude than theology male

(l) Commerce males are significantly better in musical aptitude than science male.

(m) Science males significantly outshine theology male in their musical aptitude

5.1.5 Relation between intelligence and musical aptitude

(a) College students with higher intelligence tend to have higher musical aptitude and vice versa.

(b) Science students possessing higher intelligence have better musical aptitude and vice versa.

(c) There is no significant correlation between intelligence and musical aptitude among commerce students

(d) Arts students having high intellectual ability also have high musical aptitude as well and vice versa.

(e) The more intelligent theology students are, the better their musical aptitude is and vice versa.

(f) More intelligent male college students are inclined to have higher musical aptitude and vice versa.

(g) Female college students having higher intelligence also tend to have higher musical aptitude and vice versa.

5.1.6 Existing provisions for the education of the students having intellectual talents:

(a) Cash incentives award to those who got through in the UPSC conducted written examinations

(b) Research Fellowship to University recognized registered PhD and M.Phil scholars.

(c) Post Matric merit scholarship at the higher secondary, degree, and post-graduate level

(d) NEC stipend & book grant to individuals pursuing higher professional courses, selected on the basis of merit.

(e) Merit scholarship to economically weaker section of minority community from HSLC up to Ph.D and technical and vocational courses.

(f) Mizoram Post Matric Merit Science Scholarship scheme, to B.Sc and M.Sc students.

(g) Cash award to the top three scorers in science and mathematics subjects in the HSLC & HSSLC (sc) examinations.

(h) Incentives to each topper in science & mathematics in the promotion exams of classes VIII, IX and XI (Science)

(i) Merit scholarship for those who qualify for National Talent Search examination.

(j) National Means-cum-Merit Scholarship Scheme (NMMSS) to meritorious students of economically weaker sections.

(k) Proficiency award in English for top three scorer in English in high and higher secondary school leaving certificate examinations.

(l) Innovation in Science Pursuit for Inspired Research (INSPIRE) Award to the students, towards cost of bringing project/model to the District Level Exhibition centre for display.

5.1.7 Existing provisions for the education of the musically talented students.

(a) *Institute of Music and Fine Arts (IMFA)* provides music class on Music awareness; Staff notation and guitar practical & fingering; Sound system/mixing and Cipher notation as well as Vocal exercise.

(b) *Emily Singing Institute* teaches vocals only

(c) *Synod school of music* offers music class in tonic solfa and staff notation, keyboard and violin.

(d) *Mystic* offers music lesson in keyboard, guitars and drums

(e) *Crescendo* provides music lesson in music theory, keyboard and guitars.

(f) *William Booth School* of music offers music lesson in Brass, guitar, piano, keyboard and also teaches music theory

(g) *Sonata School of Music* offers music lesson in keyboard, guitars and violin.

(h) *Grandton school of music* imparts music class in guitar, drums and keyboard

(i) *Music Inn (Sarabande school of music)* provides music lesson in keyboard, guitars, piano, theory lesson (staff and tonic solfa) and church music.

(j) *Vortex* offers music lesson on keyboard, guitars, drums, and bass guitars.

(k) *Home free school of music* provides music lesson in keyboard and guitar

(l) *Drop Doubt School* of music gives music lesson in theory, guitar and Drums

5.1.8 Suggested measures for the development of the talents of students

(a) Identification of the highly intelligent and musically talented students

(b) The intellectually gifted students should be encouraged to take up project work. The musically talented students should be provided music class in the institutions.

(c) The Government should arrange a special educational camp during vacations for the academically talented students.

(d) The Government should open up music school/College for students having high musical aptitude and interest.

(e) Mizoram University be requested to open Department of Fine Arts where post-graduate degree in music and a Doctor of Philosophy in Music be offered.

5.2.0 DISCUSSION ON THE FINDINGS OF THE PRESENT STUDY.

The main findings of the present study are discussed with respect to its probable causes.

5.2.1 Discussion on the findings relating to intelligence of college students:

(i) It was found that majority of college students possess average intelligence. Although majority of college students possess average intelligence, there are more students with high intelligence than those with low intelligence.

Discussion*:* It has already been established by other researchers that approximately 95 percent of the population scores an IQ between 70 and 130, which is within two standard deviations of the mean. It is also useful to know that roughly 68% of cases fall within the limit of plus or minus one standard deviation on either side of the mean.

Therefore, it is not surprising that majority of college students have average intelligence, because intelligence tends to be normally distributed with a small number of individuals scoring extremely high or low on the intelligence test, and most people scoring moderately. Therefore, even among the college students of Aizawl, it is found that majority of students have average intelligence. However, findings also reveal that more number of students possess high intelligence than low intelligence. The rationale for this finding could be that, we do not find mentally retarded individuals in colleges as they would have dropped out of schools long before they entered college, and only the more intelligent students are able to take admission in the degree colleges. Therefore, naturally, more number of high intelligent students should be located in the colleges than low intelligent students.

(ii) It was found that science, commerce and arts respondents have greater number of high intelligent learners than low intelligent learners while among theology students, the low intelligent students outnumbered the high intelligent students.

Discussion: Reeve, C. L. & Basalik, D. (2011)[1] also found that populations with higher IQ are likely to gravitate away from religious social conventions. Other studies have found that intelligent people are less likely to believe in God because they have an analytical thinking style, which sometimes undermine religious belief. This may be the reason why more intelligent students in Aizawl do not take up theology stream. At the same time, studies that found negative relation between intelligence and religion may not necessarily mean only dumb people believe in God. Rather, it may only imply that more intelligent people may have less need for religion, and may find certain basic needs fulfilled outside of religion, consequently intelligent students do not opt for theology stream. Therefore, the reason why low intelligent theology students outnumber the high intelligent theology students could be accounted to this effect.

(iii) Findings also reveal that there is no significant difference between male and female college students with respect to their intelligence.

Discussion: Similar findings have been established by Jim Flynn and Lilia Rossi-Case (2011)[2]; Neisser, Ulric et.al (1996)[3] Malsawmi,H (1997)[4] Terman (1916)[5] Burt and

Moore (1912)[6] Spearman (1923)[7] Cattell (1971)[8] Herrnstein and Murray (1994)[9] etc. Studies have found that with respect to intelligence, differences between the mean of men and women are minimal or negligible, but the variability of male scores is greater than that of female, therefore men are often overrepresented at extreme scores, both very high and very low. Men are more likely to become geniuses. We find men like Albert Einstein, Stephen Hawking, Isaac Newton, Mozart or Da Vinci. But even though men produce a higher percentage of the world's geniuses they also produce more of the greatest retards too. The present study did not come across any genius or idiots at the college level. Therefore, the finding that there is no significant difference between the male and female college students with respect to their intelligence is not without a reason. It is quite justifiable.

(iv) The study also reveals that Science students have significantly higher intelligence than the arts and theology students.

Discussion: Sharma, K. (1982)[10] Chatterji, P.S. (1983)[11] Malsawmi, H (1997)[12] also found similar results. In our part of the world, people are considered 'successful' if only they are doctors and engineers. These are the top two 'respectable' professions for high achievers. It is a widely accepted belief that getting an education in science makes one intelligent and enables one to acquire a degree which is not only valued by society but also leads to a highly-paid

occupation. Therefore, those high achievers, the more intelligent students often opt for the science stream. This could be the reason why the present study discovers science students as possessing significantly higher intelligence than the arts and theology students. However, the investigator is of the opinion that while pursuing certain superficial goals, one tend to undermine one's personal choice. Not all minds are meant to work well in the fields of science. More often than not, it is the social pressure that plays its role. People do wonders even in the areas of arts and humanities which in itself hold a huge treasure chest of knowledge. Science education open doors in the fields of medicine, architecture, engineering, healthcare, technology and quantitative analysis, while arts and humanities offer a wide range of career prospects in social and civil service, academia, media, fine arts, tourism, linguistics and other similar areas. It is time to rid ourselves of the notion that science is the only domain for intellectuals. One should realize that to pursue a career in one's area of choice is something that eventually leads to success in professional life. Work doesn't become a burden then, and life becomes more enjoyable. Science and arts/humanities both have their own significances and should be given their due importance to keep a balance in societies. Where the former focuses on developing technical skills, the latter enhances soft skills among individuals.

(v) It was also found that commerce students possess a significantly higher intellectual ability than the theology students.

Discussion: Increasing integration of the world economy and globalization has further enhanced the importance of commerce. The study of commerce includes subjects like accounting, statistics, economics and it provides a springboard for work opportunities in a range of financial services, banking, business and industry, management and entrepreneurial ventures, law, hotel management and government services. Conversely theology is the study of religious faith, practice, and experience; especially the study of God and of God's relation to the world. For many, it seems pointless to study something whose mere existence has not even been conclusively established. Besides, job opportunity with excellent status is hard to come by. This could be the reason why more intelligent student in Aizawl opts for the commerce degree rather than the theology degree.

(vi) The study also found that science males have significantly higher intellectual ability than theology males.

Discussion: Sinclair (1928)[13] also found similar results. "If science disappeared from human memory, we would soon be living in caves again. If theology disappeared from human memory, no one would notice." This is what a lot of people believe in, and for this reason many people consider theology as a completely and utterly useless pursuit.

Besides this, science is considered to have a better scope for future career; as a result, more intelligent male students in Aizawl must have this tendency to opt for science rather than the theology stream.

(vii) Findings also reveal that science females possess significantly higher intelligence than arts females.

Discussion: Similar findings have also been established by Sharma, K. (1982)[14] Chatterji, P.S. (1983)[15] Malsawmi, H (1997)[16] It is believed that studying science will broaden one's understanding of the world around us and may allow one to influence and develop accepted scientific knowledge, and will give one the skills needed to approach most matters in a reasoned and analytical manner whereas arts is a major component of the overall dumping down of the public education system because anyone can succeed in arts and teachers are not accountable to students unlike the science. Therefore more intelligent female students opt for the science stream. This may be the rationale why female science students have significantly higher intelligence than the female arts students.

5.2.2 Discussion on the findings relating to musical aptitude of college students:

(i) It was also found that majority of college students have average musical aptitude.

Discussion: Recent research such as Gordon (1990)[17] Karma (2007)[18] reveals that music aptitude, like all human characteristics, is normally distributed in the population. All persons have the potential to achieve in music. Relatively few have high aptitude, a similar number have low aptitude, and the majority of persons fall somewhere in the middle of the "bell curve" with average aptitude. The reason why majority of college students in Aizawl also have average musical aptitude could be accounted to this factor.

(ii) Findings also reveal that among the college students, there are more females having high musical aptitude than low musical aptitude. Also, there are more males having low musical aptitude than high musical aptitude.

Discussion: "Women are faster and more accurate at identifying emotions," says Ruben Gur, a neurologist at the University of Pennsylvania. Studies have shown women to be more adept than men at encoding facial differences and determining changing vocal intonations. There's something musical in the way people speak, and *intonation* describes that musicality. Intonation also means "producing musical tones," either with your voice or a musical instrument. This could be the reason why the present study found that more females have high musical aptitude than low musical aptitude, and more males have low musical aptitude than high musical aptitude. Perhaps female college students of Aizawl are more skillful in determining musical tones than their male counterparts.

(iii) It was also found that majority of science, commerce and arts college students have average musical aptitude but majority of theology students have low musical aptitude.

Discussion: Music has always been the language of expressing the Christian faith. However, most of the popular music that we hear these days is obviously not religious. Songs today are able to freely address different topics such as drug, sex, violence, love etc. Music has shifted from expressing religious ideas and concepts to expressing the many secular ideas. Jazz seem to be the first genre of music to stray away from the traditional relationship between music and religion. It caused a major change in the messages of music that were presented to society. This change in the traditional perception of music led to the creation of the blues, rap, rock 'n roll, and other popular genres of music we enjoy today, that do not necessarily present religious themes. Meanwhile common themes of Christian music include praise, worship, celebration, penitence and lament. However, one should note that Christian music is also changing from the traditional music to contemporary Christian music which even includes Christian rap of the twenty first century. In this fashion, Christians are trying to preserve the message of the church while meeting the needs of an ever changing world. But, it is perhaps not easy for a religious organization to alter its music genre at par with the changing world therefore, since environmental factors also affect musical aptitude, this

could be one of the reasons why majority of theology students have low musical aptitude.

(iv) The present study also reveals that female students have significantly higher musical aptitude than the male students.

Discussion: Studies have found that generally, girls speak earlier, have larger vocabularies, and sing in tune earlier than boys. Because of this, parents or the community may have been motivated to train or socialize the mizo female students to have more positive attitude toward music, which may influence their music learning and their musical Aptitude. In this way, Mizo female students having significantly higher musical aptitude than male students could very well be attributed to their genetics as well as their environmental surroundings.

(v) The present study also discovered that Arts students possess a significantly superior musical aptitude than the science as well as theology students.

Discussion: Arts stream involves the study of subjects like languages, political science, history, sociology, philosophy, psychology, etc. With a background in arts, one can pursue career options such as teaching, social work, law, politics, radio artist, acting, singing, music and many more. And since music is included in the broad categories of the arts stream, it is not surprising that the arts students possess a

significantly superior musical aptitude than the science or theology students.

(vi) The present study also tells that commerce students significantly excel science and theology students in musical aptitude

Discussion: Science is an intensive course and requires hard work, persistence and commitment. It has been realized that students taking the science stream are so busy and engrossed with their studies that they hardly have time to nurture their musical ability, this may be the plausible explanation as to why commerce students excel the science students in musical aptitude. At the same time, secular music was frowned upon by organized religion, as being a threat. Christian music scene never has had the competition or drive of the secular music scene, causing it to have a much lower bar. This may be the reason why commerce students excel theology students in musical aptitude.

(vii) It was also found that science students possess a significantly superior musical aptitude than the theology students.

Discussion: There is something different between science and religion. In science experiments have an objective process by which something must be proven. In addition, when a scientific conclusion is reached, the experiment should be able to be reproduced again and again with the

same results. The same cannot be said for religion. While religion can provide personal, spiritual, and emotional relief, it is not the root upon which law, government, and other things concerning the body politic should be based upon. The present study also found that science students have significantly higher intellectual abilities than the theology students which naturally could be the basis as to why science students also possess a significantly superior musical aptitude than the theology students, because musical talent also needs intellectual capability.

(viii) It was also found that commerce males significantly surpass commerce females in their musical aptitude.

Discussion: Music recording industry is basically business oriented. Consequently it is much associated with commerce subject. Among the Mizo youth more males play musical instruments than females. No matter what instrument you pick, it seems like male players outnumber female players by a substantial margin. Consequently, this could be one reason why the present study found that commerce males outshine the commerce females in music aptitude.

(ix) It was also found that commerce male possess a significantly higher musical aptitude than arts, theology and science male

Discussion: The music recording industry offers important new business opportunities for those taking up the

commerce subject. Business in recorded discs and tapes has increased over the last 10 years. The basic resource, musical talent, is abundantly available among the Mizo youth. Perhaps there are more students with musical abilities who are also interested in gaining knowledge of the business sector amongst the college male students because the present research found that commerce male possess a significantly higher musical aptitude than arts, theology and science male

(x) It was also found that arts males are significantly superior to theology males in musical aptitude

Discussion: Music is an art form whose medium is sound and its common elements are pitch, rhythm, dynamics, and the sonic qualities of timbre and texture. Art is something that is created completely from the mind with or without some kind of inspiration and created on different kinds of mediums. While people would consider paintings and sculptures art, music also is considered art because crafting notes to create a song is just as difficult as mixing paints to make a picture. The notes must be pleasant to the ear and the lyrics, if the song has any, must be able to convey a message or a feeling that people can relate to. Students taking arts are expected to be better in music than students opting for theology because as cited above, music is also one form of art. This could be one of the possible reason why the present research found that arts males are significantly superior to theology males in musical aptitude.

*(xi) It was also found that science males significantly outshine theology male in their musical aptitude***.**

Discussion: Music and science are closely related. Both use mathematical principles and logic, blended with creative thinking and inspiration to arrive at conclusions that are both enlightening and inspirational. Music composition is basically a mathematical exercise. From a basic source of sounds, rhythms and tempos, an infinite variety of musical expressions and emotions can be produced. It is the interaction of sounds, tempo, and pitch that creates music, just as the interaction of known facts and knowledge coupled with imagination, conjecture and inspiration produces new scientific discoveries. Both Science and Music use "formulas" and "theories" to solve problems, and to explore the intangible mysteries of life. There are a number of scientific theories that try to explain music. This is a clear indication that music is as complex and varied as any scientific principle or theory. Since music and science are closely related, this could be the reason why the present research found that science males significantly outshine theology male in their musical aptitude**.**

5.2.3 Discussion on the findings relating to intelligence and musical aptitude of college students:

(i) There is a positive correlation between intelligence and musical aptitude among college students of Aizawl.

Discussion: Different studies have found that there is positive correlation between musical ability and intelligence. Rauscher et al (1993)[19] and Hetland (2000)[20] found that people enjoyed brief improvements in their visual-spatial skills immediately after listening to a Mozart sonata. Schellenberg (2005)[21] found that people improved their performance because listening to music elevated their mood and left them feeling more alert. Other researchers indicate that music lessons change the course of brain development and, just possibly, influence children's success in other, non-musical tasks. Skoe and Kraus (2012)[22] found that people who played musical instruments as children showed more robust brainstem responses to sound than did non-musicians. Schlaug et al (2005)[23] in his experiment on brain scans of 9- to 11-year old children have revealed that those kids who play musical instruments have significantly more grey matter volume in both the sensorimotor cortex and the occipital lobes. Other researchers also suggest that the brains of non-musicians change in response to musical training. Pascual-Leone (2001)[24] discovered that when non-musicians were assigned to perform a 5-finger exercise on the piano for two hours a day, the size of the area associated with finger movements became larger and more active within five days. Fujioka et al (2006)[25]; Schellenberg (2006)[26]; Patel and Iverson (2007)[27]; Hanna-Pladdy and Mackay (2011)[28] in their co-relational studies have reported a number of advantages for musically-trained children, ranging from better verbal and mathematical skills to higher

scores on tests of working memory, cognitive flexibility, and IQ. In spite of these finding, one can still doubt about the responsibility of music training for these intellectual advantages, because correlations do not prove the cause of relationship between intelligence and musical aptitude. The present study also found that the more intelligent the students are, the better musical aptitude they possess. There could be many reasons for this correlation. One rationale could be that an intelligent student has greater capacity for abstract thinking and music is an abstract form of art. Theoretically, it is quite logical to believe that serious music training could significantly improve skills in non-musical cognition. For instance, students of music are required to focus attention for long periods of time; decode a complex symbolic system (musical notation); translate the code into precise motor patterns; recognize patterns of sound across time; discriminate differences in pitch; learn rules of pattern formation; memorize long passages of music; track and reproduce rhythms; understand ratios and fractions (e.g., a quarter note is half as long as a half note); improvise within a set of musical rules. If students improve these skills, they might find their improvements transfer to other domains, like language and mathematics. But one cannot rule out the idea that genes may be responsible for much of the IQ advantage enjoyed by musicians. But it seems clear that music training causes changes in the brain, and that serious student of music hone a variety of skills that could be relevant in other

contexts. Given evidence that certain games can enhance self-regulation and working memory, and even help dyslexic children learn to read, the notion that music training has transferable effects isn't all that far-fetched.

5.3.0 Recommendations and Suggestions for further research:

The present research discovered a number of findings which had not been discovered earlier by other researchers. On the basis of these findings, the investigator came up with certain recommendations and suggestions for further research as follows:

5.3.1 Recommendations:

On the basis of the present findings, the following recommendations are proposed:

(1) It is recommended that music class or music subject should be introduced in the school and college curriculum. One should be aware that music class had always been included in the elementary school curriculum of Mizoram once upon a time, but it had been dropped from the curriculum more than twenty years back because the Mizoram Board of School Education considers the elementary curriculum to be overloaded with too many subjects. Therefore, it is strongly recommended to re-introduce music in the school curriculum and also to include music as one of the subject at the college level.

(2) It is also recommended that Mizoram University should open one department of Music which offers post-

graduate degree in music and a Doctor of Philosophy in Music under the School of Fine Arts, Planning & Architecture.

(3) It is recommended that the Government should set up a number of Institutions in different parts of Mizoram specially meant for those students who possess intellectual talents. Here, Enrichment programmes of different types suited to the needs of the students will be brought in.

(4) It is recommended to increase the merit scholarship received by meritorious students at different levels and also to provide special scholarship to those students who possess good musical talents so that they can pursue further studies in line with their musical aptitude.

5.3.2 Suggestions for further research:

Suggestion for further research is proposed by the investigator as follows:

(1) Impact of music training on the intelligence and academic achievement among Elementary School Students in Mizoram: An Experimental study

(2) An Investigation of the association between Musical Aptitude and personality of Higher Secondary School Students in Mizoram.

(3) A comparative study of the intelligence and aptitude in music among urban and rural elementary school students in Mizoram

(4) A comparative study of college students of different North Eastern state of India with respect to their personality and musical ability.

End notes:

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SUMMARY

SUMMARY

INTRODUCTION

One manifestation of the difference among students is that they seldom learn at the same rate. Differences in rates of learning are based on differences in intelligence, differences in one's aptitude, experience, interest, desire to learn, and countless psychological, emotional, and physical factors.

Intelligence:

Intelligence is a cognitive or mental characteristic that affects one's potential to learn or to perform. Aptitudes are sometimes treated as interchangeable with intelligence, particularly when they focus on prediction of performance in other settings or on other occasions. Cognitive abilities have been conceived very broadly (e.g., intelligence) and also in terms of specialized abilities such as verbal, spatial, memory, reasoning, problem solving, and psychomotor ability.

"Intelligence is not a single, unitary ability, but rather a composite of several functions. The term denotes that combination of abilities required for survival and advancement within a particular culture." – A. Anastasi (1992)

Measurement of intelligence:

We can observe the intelligence of an individual only to the extent that it is manifested by him in one or more intelligence tests. Many such tests have been devised by

psychologists for the measurement of intelligence. The available tests are classified in a number of ways

1. ***Classification from the point of view of administration:***

a) *Individual Test:* Individual test is a test administered individually; it requires a highly experienced examiner.

b) *Group test:* A test administered in a group is a group test, more frequently used for testing normal adult.

2. ***Classification from the point of view of nature of tests:***

a) *Verbal or Language Tests:* In these the subject makes use of language in which the instructions are given in words, written, oral, or both. The individuals being tested are required to use language verbal or written, for their responses.

b) *Non Verbal or Non-language Test:* A non verbal or non-language test is one in which no language is used at all either in the instruction or in construction of items.

c) *Performance Test:* A performance test is one in which language is used only in the instructions or not at all when directions are given. The task to be performed requires an overt motor response other than verbal. The principal characteristic of the performance test is that a response to a solution of the task does not require the use of language or number.

Aptitude:

Aptitude is one's potential for success in a specific discipline. Some authors have defined aptitudes to include

factors - affective, cognitive, and personality characteristics - that influence one's readiness or likelihood of learning or performing successfully.

Aptitude tests have been observed to be a highly accurate tool for selection of the right candidate as compared to the interview, group discussion, written tests and so on. Based on this assumption, today an increasing number of organizations include this tool in their recruitment process. The aptitude tests thus used are specifically designed tests to measure the ability to acquire/ apply skills and/or knowledge to a specific type of job.

Music Aptitude

Musical ability is often viewed in all-or-none terms: some are blessed with “talent,” others must do without. Recent research, however, reveals that music aptitude, like all human characteristics, is normally distributed in the population. All persons have the potential to achieve in music. Relatively few have high aptitude, a similar number have low aptitude, and the majority of persons fall somewhere in the middle of the “bell curve” with average aptitude.

Musical aptitude (i.e. having a fine ear for music) is the ability to intuitively learn or appreciate music, and especially to distinguish off-key and off-pitch music.

Most of the music aptitude or talent described today is tonal memory, time discrimination and pitch discrimination.

Measuring Music Aptitude

Music aptitude can only be measured with a valid music aptitude test. Music teachers' judgments about students' musical "talent" are often based significantly on musical achievement, not the potential to achieve. It is not uncommon, for example, for students of average aptitude to achieve at a high level as a result of a rich musical background and dedicated effort. Only a valid music aptitude test can distinguish between actual achievement and the potential to achieve further. Because many students with high music aptitude have not had the opportunity to achieve in music, a music aptitude test can reveal musical potential that might otherwise remain unknown to those students and their teachers.

It is not the purpose of aptitude testing to identify students for inclusion or exclusion in music activities. All children have the right to a comprehensive musical education. Music aptitude testing helps music teachers meet the unique needs of each student.

RATIONALE OF THE STUDY:

A thorough examination of various studies reveals the fact that research in the area of intelligence has been conducted by many researches worldwide. However, research in Musical Aptitude has been largely unexplored. Especially in Mizoram, such a kind of study has not been taken up so far. The Mizos in general are very much interested in music and singing; therefore, it comes as a surprise that research in aptitude for music has not really

been attempted. Although some studies have been conducted in the area of intelligence of Mizo students, studies of Musical aptitude among the Mizo students has never been conducted in the state of Mizoram.

Concerning the limited studies done in this area, and considering the benefit the state of Mizoram is going to harvest from the research in this area, the investigator undertook the present study. The study established the intelligence and musical aptitude of college students and compared them with respect to their gender and stream of study. The study further investigates the provisions available for the gifted and talented students and suggested measures for their development. Therefore, the problem for the present study has been stated as *"Intelligence and musical aptitude of college students in Aizawl city with reference to their gender and stream of study".*

OBJECTIVES OF THE STUDY:

1. To find out the intelligence and musical aptitude of college students in Aizawl.
2. To find out the differences in the level of intelligence of college students in Aizawl with reference to gender and stream of study.
3. To find out the differences in the level of musical aptitude of college students in Aizawl with reference to gender and stream of study.
4. To find out the relation between intelligence and musical aptitude among college students in Aizawl.

5. To find out the existing provisions for the education of the students having academic and musical talents and to suggest measures for the development of their talents.

HYPOTHESES:

1. There is a significant difference in the intellectual level of college students in Aizawl with respect to their gender.
2. There is a significant difference between the musical aptitude of college students in Aizawl with respect to their gender.
3. There is a significant difference in the intellectual level of college students in Aizawl with respect to their stream of study.
4. There is a significant difference in the musical aptitude of college students in Aizawl with respect to their stream of study.
5. There is a significant relation between intelligence and musical aptitude among college students in Aizawl with respect to their gender.
6. There is a significant relation between intelligence and musical aptitude among college students in Aizawl with respect to their stream of study.

Operational definition of the terms used:

Intelligence: In the present study, Intelligence refers to the score obtained on the Standard progressive matrices developed by Raven and Raven (1992).

Musical aptitude: For the present study, musical aptitude refers to the score obtained on the Musical Aptitude Profile developed by Edwin E. Gordon (1995).

College students: Students studying arts, science, commerce and theology in different colleges of Aizawl**.**

METHODOLOGY

Descriptive research studies are designed to obtain pertinent and precise information concerning the current status of phenomena and wherever possible, to draw valid conclusion from the facts discovered. Descriptive studies are more than just a collection of data. These studies involve measurement, classification, analysis, comparison and interpretation. The present study belongs to the category of "descriptive research" with composite characteristics of inter group comparison. Since the main objective is to find and compare the intellectual level and musical aptitude of college students with respect to their gender and stream of study, the causal comparative status survey design is employed in the present investigation.

Population:

The population of this study comprised of all students studying in different colleges within Aizawl city.

Sample:

A representative sample of 400 students from arts, science, commerce and theological stream has been selected for the study with the help of stratified clustered random sampling design.

The following table no.1 shows the details of sample selected for the present sample.

Table No.1

Details of Sample selected for the study

Sl.No	Colleges	Stream	Male	Female	Total
1	Hrangbana college	Commerce	20	30	50
2	Aizawl college	Commerce	25	25	50
3	Pachhunga University college	Science	27	23	50
4	Zirtiri Residential Science College	Science	27	23	50
5	Aizawl North College	Arts	20	30	50
6	Johnson College	Arts	20	30	50
7	Aizawl Theological College	Theology	44	6	50
8	Academy of integrated Christian Studies	Theology	46	4	50
Grand total			**229**	**171**	**400**

Tools used:

1. Standard progressive matrices sets A,B,C,D and E. developed by J.C.Raven. Published by Manasayan, New Delhi. 1990.
2. Musical Aptitude profile developed by Edwin E. Gordon. Published by GIA Publications Inc. (GI.G-4304K). 7404 South Mason Avenue Chicago, IL 60638. 2001.

Mode of data collection

The primary data for the present study were collected personally by visiting the selected colleges during the months of September – December 2013. The tools mentioned above were administered personally to the students in the selected colleges within Aizawl city. The secondary data were collected from government offices like SCERT and music schools during the months of February - April 2014.

Analysis of data:

The data collected from the four hundred students were scrutinized and tabulated after scoring the responses on both Music aptitude profile and Standard progressive matrices using the test scoring procedures given in the respective manuals. Each student was assigned a serial number and their details regarding gender, college and stream of study, and the scores of the two tests were entered in the tabulation sheet and these are treated using various statistical methods. Descriptive statistics such as Measures of Central tendency, Percentages, Stanine grade, and percentiles were employed to find out the nature of score distribution and for classification of students in different categories. The difference between the mean scores of the different groups based on gender and stream of study with respect to the variable intelligence and musical aptitude, were tested for significance by applying the t-test

Pearson Product moment correlation was employed to find out the relationship between the variable intelligence and musical aptitude among different groups of respondents.

MAJOR FINDINGS

The following are the major findings of the present study:

1. Intelligence of college students.

(a) Although majority of college students possess average intelligence, there are more students with high intelligence than those with low intelligence.

(b) Though majority of students have average intelligence, science, commerce and arts respondents have greater number of high intelligent learners than low intelligent learners while among theology students, the low intelligent students outnumbered the high intelligent students.

2. Musical aptitude of college students.

(a) Majority of college students have average musical aptitude

(b) There are more females having high musical aptitude than low musical aptitude. There are more males having low musical aptitude than high musical aptitude.

(c) Majority of science, commerce and arts college students have average musical aptitude but majority of theology students have low musical aptitude.

(d) Among science, commerce and arts students, more students possess high musical aptitude than low musical aptitude whilst among the theology students, more students possess low musical aptitude than high musical aptitude.

3. Difference in intelligence between various groups

(a) No significant difference between male and female in intelligence.

(b) Science students have significantly higher intelligence than the arts students.

(c) No significant difference between science and commerce students.

(d) Science students possess a significantly higher intellectual ability than the theology students.

(e) No significant difference between arts and commerce students.

(f) No significant difference between arts and theology students.

(g) Commerce students possess a significantly higher intellectual ability than the theology students.

(h) Science males have significantly higher intellectual ability than theology males.

(i) Science females possess significantly higher intelligence than arts females.

4. Difference in Musical Aptitude among various groups.

(a) Female students have significantly higher musical aptitude than the male students.

(b) Arts students possess a significantly superior musical aptitude than the science students.

(c) Commerce students significantly excel science students in musical aptitude.

(d) Science students possess a significantly superior musical aptitude than the theology students.

(e) No significant difference between arts and commerce students

(f) Arts students possess a significantly better musical aptitude than the theology students.

(g) Commerce students have a significantly higher musical aptitude than the theology students.

(h) Commerce males significantly surpass commerce females in their musical aptitude.

(i) Commerce male possess a significantly higher musical aptitude than arts male.

(j) Arts males are significantly superior to theology males in musical aptitude.

(k) Commerce male have significantly superior musical aptitude than theology male

(l) Commerce males are significantly better in musical aptitude than science male.

(m) Science males significantly outshine theology male in their musical aptitude

5. Relation between intelligence and musical aptitude

(a) Intelligent college students tend to have higher musical aptitude and vice versa.

(b) Intelligent science students have better musical aptitude and vice versa.

(c) No significant correlation between intelligence and musical aptitude among commerce students

(d) Arts students having high intellectual ability also have high musical aptitude as well and vice versa.

(e) The more intelligent theology students are, the better their musical aptitude is and vice versa.

(f) Intelligent male college students are inclined to have higher musical aptitude and vice versa.

(g) Intelligent female college students also have high musical aptitude and vice versa.

6. *Existing provisions for the education of the intellectually talented students*

(a) Cash incentives award to those who got through in the UPSC conducted written examinations

(b) Research Fellowship to University recognized registered PhD and M.Phil scholars.

(c) Post Matric merit scholarship at the higher secondary, degree, and post-graduate level

(d) NEC stipend & book grant to individuals pursuing higher professional courses, selected on the basis of merit.

(e) Merit scholarship to economically weaker section of minority community from HSLC up to Ph.D and technical and vocational courses.

(f) Mizoram Post Matric Merit Science Scholarship scheme, to B.Sc and M.Sc students.

(g) Cash award to the top three scorers in science and mathematics subjects in the HSLC & HSSLC (sc) examinations.

(h) Incentives to each topper in science & mathematics in the promotion exams of classes VIII, IX and XI (Science)

(i) Merit scholarship for those who qualify for National Talent Search examination.

(j) National Means-cum-Merit Scholarship Scheme (NMMSS) to meritorious students of economically weaker sections.

(k) Proficiency award in English for high and higher secondary school leaving certificate.

(l) Innovation in Science Pursuit for Inspired Research (INSPIRE) Award to the students, towards cost of

bringing project/model to the District Level Exhibition centre for display.

7. *Existing provisions for the education of the musically talented students.*

(a) *Institute of Music and Fine Arts (IMFA)* provides music class on Music awareness; Staff notation and guitar practical & fingering; Sound system/mixing and Cipher notation as well as Vocal exercise.

(b) *Emily Singing Institute* teaches vocals only

(c) *Synod school of music* offers music class in tonic solfa and staff notation, keyboard and violin.

(d) *Mystic* offers music lesson in keyboard, guitars and drums

(e) *Crescendo* provides music lesson in music theory, keyboard and guitars.

(f) *William Booth School* of music offers music lesson in Brass, guitar, piano, keyboard and also teaches music theory

(g) *Sonata School of Music* offers music lesson in keyboard, guitars and violin.

(h) *Grandton school of music* imparts music class in guitar, drums and keyboard

(i) *Music Inn (Sarabande school of music)* provides music lesson in keyboard, guitars, piano, theory lesson (staff and tonic solfa) and church music.

(j) *Vortex* offers music lesson on keyboard, guitars, drums, and bass guitars.

(k) *Home free school of music* provides music lesson in keyboard and guitar

(l) *Drop Doubt School* of music gives music lesson on theory, guitar and Drums

8. *Suggested measures for the development of the talents of students*

(a) To identify the highly intelligent and musically talented students

(b) The intellectually gifted students should be encouraged to take up project work. The musically talented students should be provided music class in the institutions.

(c) The Government should arrange a special educational camp during vacations for the academically talented students.

(d) The Government should open up music school/College for students having high musical aptitude and interest.

(e) Mizoram University be requested to open Department of Fine Arts where post-graduate degree in music and a Doctor of Philosophy in Music be offered.

Recommendations:

On the basis of the present findings, the following recommendations are proposed:

- It is recommended that music class or music subject should be introduced in the school and college curriculum.
- It is also recommended that Mizoram University should open one department of Music which offers post-graduate degree in music and a Doctor of Philosophy in

Music under the School of Fine Arts, Planning & Architecture.

- It is recommended that the Government should set up a number of Institutions in different parts of Mizoram specially meant for those students who possess intellectual talents. Here, Enrichment programmes of different types suited to the needs of the students will be brought in.
- It is recommended to increase the merit scholarship received by meritorious students at different levels and also to provide special scholarship to those students who possess good musical talents so that they can pursue further studies in line with their musical aptitude.

Suggestions for further research:

Suggestion for further research is proposed by the investigator as follows:

- Impact of music training on the intelligence and academic achievement among Elementary School Students in Mizoram: An Experimental study
- An Investigation of the association between Musical Aptitude and personality of Higher Secondary School Students in Mizoram.
- A comparative study of the intelligence and aptitude in music among urban and rural elementary school students in Mizoram
- A comparative study of college students of different North Eastern state of India with respect to their personality and musical ability.

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- http://www.sciencedaily.com/releases/2011/10/111016212019.htm (17/08/2014)

APPENDICES

PARTICULARS OF THE CANDIDATE

NAME OF THE CANDIDATE : REUBEN LALCHUANGKIMA

DEGREE : M. Phil

DEPARTMENT : Education

TITLE OF DISSERTATION : Intelligence and Musical Aptitude of college students in Aizawl city with reference to their gender and stream of study.

DATE OF PAYMENT OF ADMISSION : 20.07.2012

(Commencement of First Sem)

COMMENCEMENT OF FIRST SEM/ : January 2013

DISSERTATION

(From conclusion of end and semester exams)

APPROVAL OF RESEARCH PROPOSAL

1. BOS in Eduation : 01.05.2013

2. SCHOOL BOARD : 07.05.2013

REGISTRATION NO.& DATE : Mzu/m.phil/116 of 07.05.2013
DUE DATE OF SUBMISSION : 31st December, 2013
EXTENSION (IF ANY) : Upto 31st July, 2014