

Exploring the factors that contribute to guitar playing skills

Kanishk Harish*, Moosath Harishankar Vasudevan**

*Department of Psychology, CHRIST (Deemed to be University) BENGALURU, INDIA

**Department of Psychology, CHRIST (Deemed to be University), BENGALURU, INDIA

Abstract - There are many factors that contribute to the learning of a musical instrument. The following study is exploratory in nature. The focus was on identifying the multiple factors that contribute to the learning of the guitar. There was also an aim to understand the working memory capacity and the learning style/modality of an experienced guitarist. The sample consisted of 40 guitarists, among which 8 of them were randomly selected for an interview to understand the different factors that contributed to their learning. The NIMHANS Verbal N back test was used to test working memory. It was found that guitarists had a very high working memory. The O'Brien Questionnaire was used to study the different learning modalities of guitarists. Most guitarists were primarily known to be Kinesthetic learners and secondarily auditory learners. The interview results indicated that early family exposure, a combination of intrinsic and extrinsic motivation and subjective methods to overcome problems and develop skills were important for learning.

Key words – Learning, Motivation, Guitar Influence, Practice, Persistence, Working Memory, Modality of Learning, Music

1. INTRODUCTION

Musical intelligence is one of the seven intelligences that are used to perceive and understand the world (Morgan, 1996). This is described in the “Theory of multiple

intelligences” as proposed by Howard Gardner.

The theory describes individuals possessing this form of intelligence, as showing certain levels of sensitivity to factors like Melody, Rhythm and

Sound (Morgan, 1996). This potential is innate and is also influenced by environmental factors. Audiation is a process that describes these functions. It can be defined as the understanding, perception and internalizing of a sound, during the absence of a physical sound (Gordon, 1999). A study was conducted on 10 musicians and 10 non musicians to test the difference in perception of Auditory Stimuli. Event related potentials, along with the Seashore test were used to study the difference in perception of music. The results indicated that there was a higher level of cognitive processing in musicians compared to non-musicians. This was inferred as musicians having a higher level of auditory processing. (Fabheur, Frese & Evers, 2015) This forms a basis to understand the specific learning modality with respect to a guitarist.

The meanings of an innate quality and a factor of heredity are associated to musical aptitude in specific ways. This could be developed by different factors (Gordon, 1995). The profile of the musical aptitude test consists of dimensions like melody, tempo, timbre and rhythm (Gordon, 1995). Gordon (1995) mentioned that “the basis of musical learning is a

preference and stronger capacity for auditory learning”. This form of learning was mentioned as being very important in developing musical ability. A study conducted on 78 participants, had a criteria of multiple sub domains, such as rhythm, pitch and timbre, tested on them. A secondary study using AMMA, was conducted on 56 participants to validate the aptitude test. These tests were validated. It is called the Profile of Music Perception skills. Results indicated that the inclusion of factors such as timbre, tuning and tempo were important in the determining of the results (Law & Zentner, 2012)

During the process of reading, studying and encoding, learning is facilitated (Karpicke & Roediger, 2008). Expert musicians develop and modify information in their long term and Working memory at a fast pace (Williamon & Egner, 2004). Working Memory is an essential process while playing an instrument. The concept of Working Memory was introduced by Baddeley (1992). It was defined as the system of the brain that allocates temporary storage and manipulation of necessary information to perform cognitive tasks like learning and reasoning. A study was conducted on 6 pianists. They underwent

different memory tasks. During the course of the study they were asked to recreate a specific piece of music. This process was studied through the means of an EEG and an ERP

(Electroencephalogram and Event Related Potential). The results showed that a long term working memory was very important in forming the framework for the cognitive process while playing music (Williamon & Egner, 2004)

Working memory is important while playing music. This is essential at times, while playing sheet music or improvisation. A weaker capacity for Working Memory could result in limiting the musician's skill to "sight read" or improvise. (Bower, 2010) This forms a basis to study and understand the capacity of working memory of a guitarist.

This study is an exploratory study.

However it focuses specifically on the skills and aptitude of one instrument. It focuses on the skills and aptitude of guitar playing. There is no existing test, specific to measure aptitude of guitar playing skills. Hence this article describes a study that attempts to understand individual specific factors that contribute to the learning of

the instrument. It also explores the working memory and the preferred learning modality of guitar players. The guitar is chosen as the instrument in this case. This is due to the popularity of the instrument and increase in demand of guitar tutoring and learning. Music Trades magazine industry stated that guitars were among the top sold instruments in the previous century and are still among the top sold instruments in the world (Wiklund & Chesky, 2006). In the year 2011, the sales of the guitar contributed to over 50 percent of all the musical instruments sold in France. (Barthet, Anglade, Fazekas, Kolozali & Macrae, 2011) The influence and the versatile use of the guitar in vast genres such as blues, rock, heavy metal, jazz and classical etc. is one of the reasons for its vast popularity. Its accessibility and pricing also form contributing factors to the popularity of the instrument (Barthet et al., 2011)

There is specific focus on this instrument as there is a need for an extensive study done in order to identify the factors that contribute to its learning.

II. METHOD

Participants

This study follows a mixed method by incorporating methods of qualitative and quantitative research. The sample consists of 40 guitarists. The sample was selected through a method of purposive sampling and snowball sampling. 8 of the participants (guitarists) were interviewed as part of the qualitative study. A semi structured questionnaire consisting of sixteen was developed for the interview. The questions were constructed in a manner to understand all the different possible factors that individually contribute to the learning of the instrument. The sample included guitar players who have had a minimum experience of 4 years of consistent playing in the age range of 18-30. All the participants agreed to participate in the study by completing the consent form approved by Christ (Deemed to be University).

Materials and Procedures

The Interviews were conducted through two modes of communication. It consisted of phone call interviews and in person interviews. The interviews were audio recorded using a

phone application (Easy voice recorder) for the purpose of transcription. The Verbal N-Back test was conducted in person. The Learning style questionnaire was administered through the use of online Google forms.

III. Measures

Verbal N-Back Test

The Verbal N-Back test is a part of the NIMHANS Neuropsychological battery. It is used to specifically assess verbal working memory. There are two versions of the tests. The 1 back test involves verbal storage and rehearsal. The 2 back test includes the articulatory loop in the verbal modality and the visuo-spatial sketchpad in the visual modality. It involves the recall of consonants after they are randomly presented, auditorily. The rate of success is determined by the correct number of responses in the tests. (Smith & Joindes, 1999)

O'Brien Learning Style Questionnaire

The O'Brien Learning Style Questionnaire consists of 30 questions which includes a three option response. There is no mistake or wrong answer indicated. The

responses are given through the numbers 1, 2 and 3 with each of them attributed to a statement which the participant can choose the most appropriate number that applies to them. There are three sections of the questionnaire. Each of the section depicts and measures Auditory, Kinesthetic and Visual modality of learning separately. (O'Brien, 1989) The scores were added separately in each section to obtain the maximum score. The highest among the three of the sections indicates the modality that the participant prefers to be his or her learning style.

The Interview Questionnaire

The Interview Questionnaire is a semi structured interview schedule that was developed for this study. It consists of 16 questions. It is a combination of open and close ended questions. All the questions were structured in a manner to probe and collect information about the participant's personal experiences and history to understand all the different factors that

contributed to their learning of music, and learning and playing the guitar. The interviews were recorded after the consent of the participants.

Ethical Considerations

During the course of the study the following ethical procedures were followed:

- Informed Consent – Consent was obtained from every participant through the use of Google forms
- Confidentiality – The results obtained during the course of the tests conducted and the information collected during the interview remained confidential and were stored in a password protected computer for the sake of preservation of records
- Deception – Techniques like deception were not used during the course of study. Participants were briefed about the study and its aim.

IV. RESULT

The Verbal N – Back tests were conducted on all the 40 participants. Using SPSS, only descriptive statistics were calculated.

Table 1: Demographic Table

<u>Sample</u>	<u>40</u>
Mean Age	21.725
Males	32
Females	7
Prefer Not to say	1
Avg. Years of Experience	6.95 (S.D – 2.828)

Table 2: Verbal N Back

		H1	H2
N	Valid	40	40
Mean		8.55	7.43
Std. Deviation		.677	1.083
Minimum		7	6
Maximum		9	9

The results above indicate that the highest score obtained on the 1 back test is 9. A score of 9 indicates the highest score attainable in the test. The minimum score obtained in the one back test is 7. The highest score obtained in the 2 back test is 9. A score of 9 also indicates the highest score obtained. The lowest score obtained in this test is 6. This indicates that there was better performance in the 1 back test compared to the 2 back test.

Table 2.1: 1 back (Hits)

		Frequency	Percent	Valid Percent	Percentile of each participant
Valid	7	4	9.5	10.0	5
	8	10	23.8	25.0	25
	9	26	61.9	65.0	95
	Total	40	95.2	100.0	

The 1 back test results indicate that 9 is the most common score achieved. Twenty six participants received 9 as the highest score which is the highest obtainable and the most common score. 7 was the least score achieved by four participants, each.

Table 2.2: 1 back (Errors)

		Frequency	Percent	Valid Percent	Percentile of each participant
Valid	0	16	38.1	40.0	100
	1	10	23.8	25.0	41
	2	6	14.3	15.0	19
	3	5	11.9	12.5	13
	4	3	7.1	7.5	03
	Total	40	95.2	100.0	

The table above indicates that the sixteen participants committed no errors. Ten participants committed 1 error. The highest number of errors was committed by three participants.

Table 2.3: 2 back (hits)

		Frequency	Percent	Valid Percent	Percentile of each participant
Valid	6	9	21.4	22.5	30
	7	14	33.3	35.0	50
	8	8	19.0	20.0	80
	9	9	21.4	22.5	95
	Total	40	95.2	100.0	

The 2 back test results indicate that 7 is the most common score achieved. Fourteen participants received 7 as their highest score. Although 7 is the score most commonly achieved score, 9 remains the highest score. The least score achieved was 8, which was also the least common score observed.

Table 2.4 : 2 back (Errors)

		Frequency	Percent	Valid Percent	Percentile of each participant	
Valid	1	4	9.5	10.0	41	
	2	4	9.5	10.0	21	
	3	11	26.2	27.5	6	
	4	9	21.4	22.5	3	
	5	6	14.3	15.0	10	he
	6	6	14.3	15.0	3	
	Total	40	95.2	100.0		tabl

Table 3 : Learning styles

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Auditory	7	17.1	17.1	17.1
	Auditory/Kinesthetic	2	4.9	4.9	22.0
	Kinesthetic	18	43.9	43.9	65.9
	Visual	11	26.8	26.8	95.1
	Visual/Auditory	1	2.4	2.4	97.6
	Visual/Kinesthetic	1	2.4	2.4	100.0
	Total	41	100.0	100.0	

e above indicates that the most common error observed is 3, which was committed by eleven people. The highest errors committed were by 6 participants, with an error count of 6. The least errors committed were committed by 4 participants with an error count of 1.

The results indicate that the most preferred learning style was through the kinesthetic modality. 18 participants have their learning style as a kinesthetic style of learning. The Visual modality of learning was the second most preferred modality of learning. The least preferred methods of learning were the Visual/Auditory and the Visual/Kinesthetic modality of learning.

The interviews were analyzed through the method of thematic analysis.

Table 1

Codes	Issues discussed	Themes
Family Influence	<ul style="list-style-type: none"> • Musical environment • Culture • Childhood exposure • Support 	<ul style="list-style-type: none"> • Different cultural factors along with family support builds a foundation
Exposure at a young age	<ul style="list-style-type: none"> • Family exposure • Different genres • Foundation 	<ul style="list-style-type: none"> • An early exposure to music forms the basis of development of interest in music
Exposure to different music	<ul style="list-style-type: none"> • Exploratory nature • Learning different genres • Peer influence 	<ul style="list-style-type: none"> • An exploratory nature towards learning music represents a vast style in playing
Style of playing/Personal influence	<ul style="list-style-type: none"> • Extrinsic motivation • Imitation of artists • Influence of other instruments 	<ul style="list-style-type: none"> • Extrinsic needs to imitate favorite artists fuels the need to learn • Subjective styles develop across playing different instruments and/or different genres
Training	<ul style="list-style-type: none"> • Teacher trained 	<ul style="list-style-type: none"> • Academic training

	<ul style="list-style-type: none"> • Self-taught • Duration (daily and total years) • Skill achievement • Ear training • Reading music • Technological assisted learning (Internet, videos) • Breaking down a song 	<p>does not ensure solidity in playing</p> <ul style="list-style-type: none"> • A longer experience in learning is only important up to an extent • Understanding of music becomes natural after a period of training and playing
Practice approach	<ul style="list-style-type: none"> • Fixed Schedules • Repeated activities • Persistence • Procrastination • Intrinsic Motivation • Play as wish, unfixed time schedules 	<ul style="list-style-type: none"> • Strict adherence to a schedule does not ensure good results • Procrastination can be good for learning • Persistent practice
Problems faced	<ul style="list-style-type: none"> • Mood • Failure • Time • Expectation • Learning speed 	<ul style="list-style-type: none"> • Failure can be attributed to an indifference in mood, time and expectations • Indifferent moods can interfere with learning irrespective of skill level



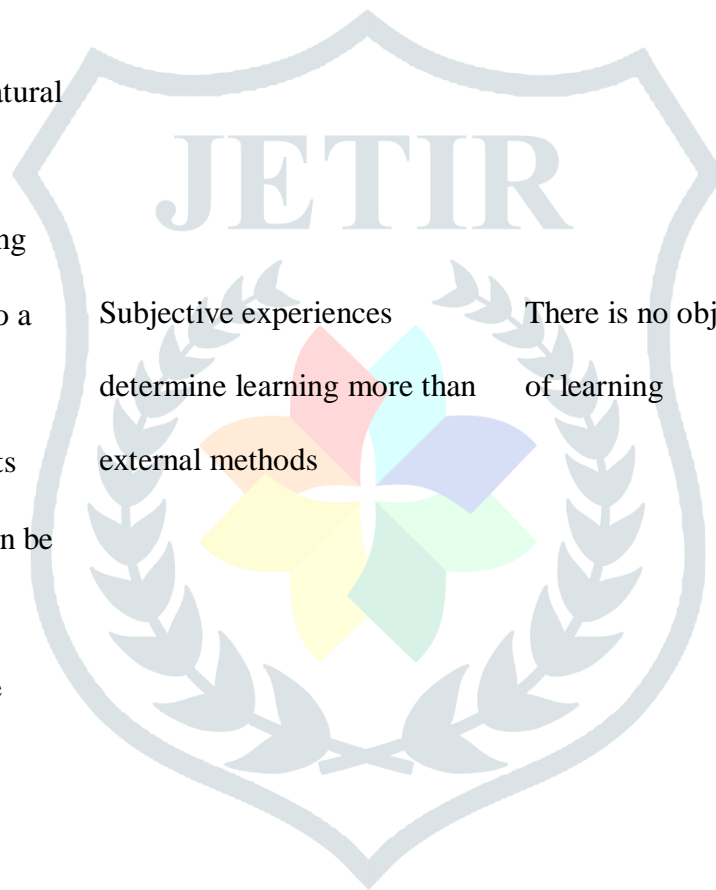
		<ul style="list-style-type: none"> • Frequency of failure and success affect learning
Mood/Emotion	<ul style="list-style-type: none"> • Therapeutic • Expressiveness • Amplification of emotion 	<ul style="list-style-type: none"> • Different moods result in difference in perception of music • The effects of music are not only therapeutic • Personality attributes can be made to an individual choosing to express through music.
Motivation	 <ul style="list-style-type: none"> • Achievement • Satisfaction • Impression • Inspiration • Competitiveness 	<ul style="list-style-type: none"> • Achieving satisfaction can limit learning • The failure to impress an audience may hinder learning • A strong sense of intrinsic motivation is less affected by external factors
Song Perception	<ul style="list-style-type: none"> • Content • Vibe • Mood • Emotion 	<ul style="list-style-type: none"> • Perception of a song is subjective • Perception is not limited to the

	<ul style="list-style-type: none"> • Expressiveness • Critiquing 	<p>specialization of the listener</p> <ul style="list-style-type: none"> • Critiquing music will improve understanding and learning
Peer influence	<ul style="list-style-type: none"> • Social expectation • Peer pressure 	<ul style="list-style-type: none"> • The need to impress social groups can fuel learning • Learning need not be solely intrinsic
Hobbies/Activities	<ul style="list-style-type: none"> • Travel • Social events • Concerts 	<ul style="list-style-type: none"> • Music can be learned through means of observation rather than solely self-indulgence • Inspiration and Influence do not have a boundary
Jamming	<ul style="list-style-type: none"> • Competition • Expressiveness • Comparison • Group learning 	<ul style="list-style-type: none"> • Expressiveness of emotion can be exaggerated due to competitions • Healthy competition improves learning
Reinterpretation of old songs	<ul style="list-style-type: none"> • Creativity • Challenges 	<ul style="list-style-type: none"> • Reinterpretation helps one understand their learning output

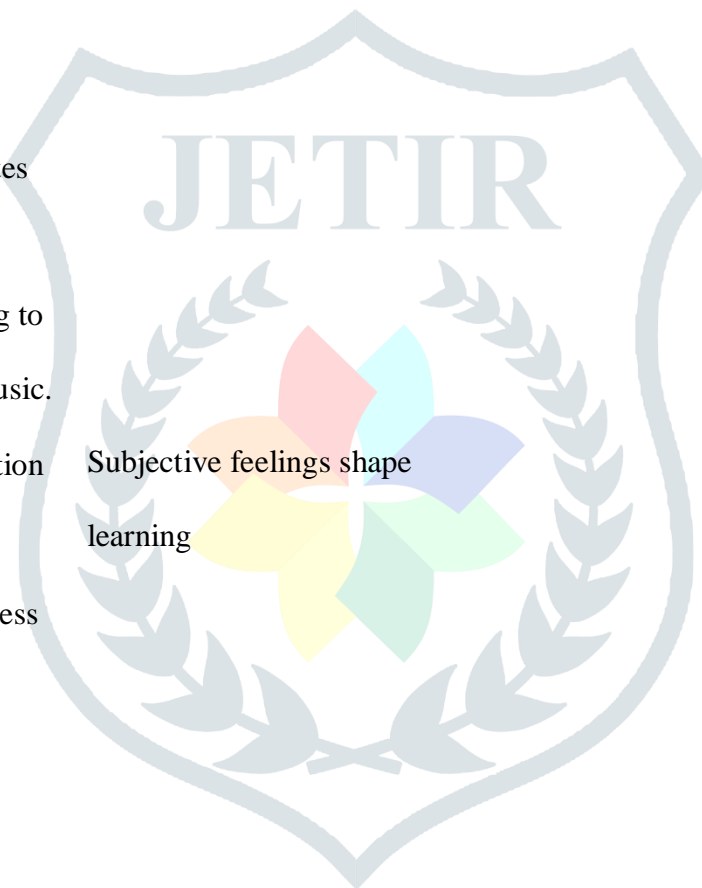
Table 2

Basic Themes	Organizing themes	Global themes
<ul style="list-style-type: none"> • Different cultural factors along with family support builds a foundation 	Early foundation	
<ul style="list-style-type: none"> • An early exposure to music forms the basis of development of interest in music 	Ability to explore and develop different styles	Early exposure to music is essential
<ul style="list-style-type: none"> • An exploratory nature towards learning music represents a vast style in playing 		
<ul style="list-style-type: none"> • Extrinsic needs to imitate favorite artists fuels the need to learn 	A combination of extrinsic and intrinsic motivation is necessary to learn	Reinforced motivation fuels learning
<ul style="list-style-type: none"> • Subjective styles develop across playing different instruments and/or different genres 		

- Academic training
does not ensure
solidity in playing
- A longer experience in
learning is only
important up to an
extent
- Understanding of
music becomes natural
after a period of
training and playing
- Strict adherence to a
schedule does not
ensure good results
- Procrastination can be
good for learning
- Persistent practice
- Failure can be
attributed to an
indifference in mood,
time and expectations
- Indifferent moods can
interfere with learning
irrespective of skill
level



- Frequency of failure and success affect learning
- Different moods result in difference in perception of music
- The effects of music are not only therapeutic
- Personality attributes can be made to an individual choosing to express through music.
- Achieving satisfaction can limit learning
- The failure to impress an audience may hinder learning
- A strong sense of intrinsic motivation is less affected by external factors
- Perception of a song is subjective
- Perception is not



limited to the

specialization of the

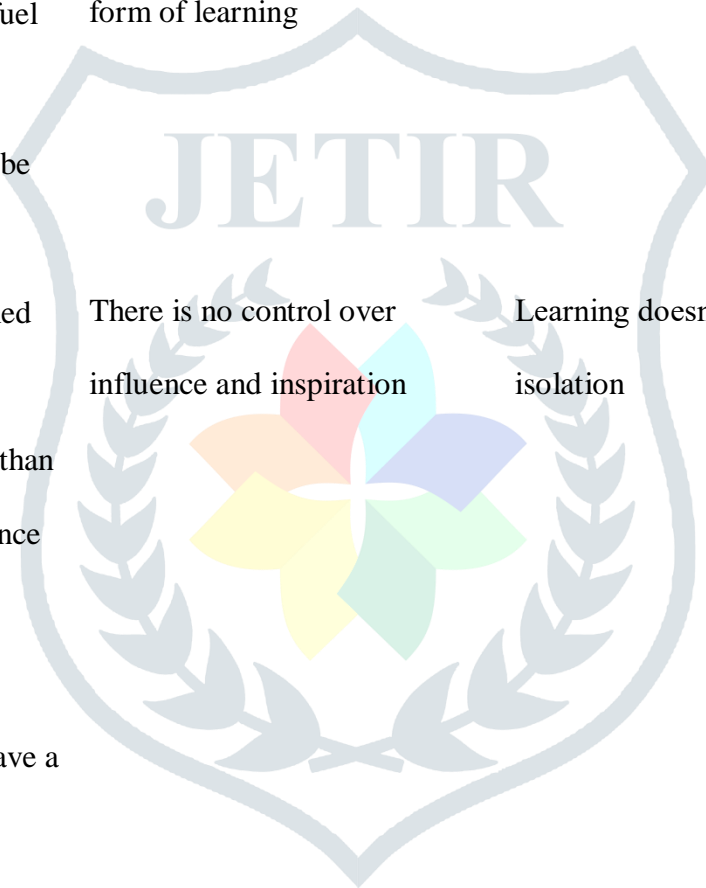
listener

- Critiquing music will improve understanding and learning
- The need to impress social groups can fuel learning
- Learning need not be solely intrinsic
- Music can be learned through means of observation rather than solely self-indulgence
- Inspiration and Influence do not have a boundary
- Expressiveness of emotion can be exaggerated due to competitions
- Healthy competition improves learning
- Reinterpretation helps

Self- indulgence is only one form of learning

There is no control over influence and inspiration

Learning doesn't occur in isolation



one understand their

learning output

V. DISCUSSION

In this current study, the aim was to understand all the different factors that contribute to the learning of the guitar. Along with finding out the factors, there was also a Verbal N Back test and a learning styles questionnaire administered to understand the average working memory capacity and the most common learning modality of an experienced guitarist. This was done to form or determine an average level of these specific functions in an experienced guitarist.

The Verbal N back test conducted indicated that the Working Memory capacity of a guitarist in the 1 back test is high. This is consistent in findings that the working memory capacity of a musician is generally above average. This test required the participants to tap on the table every time a syllable was consecutively repeated. Based on the correct responses, the participants would be scored. Most

of the participants scored high while a few other participants made minimal errors by either incorrectly tapping or missing/omitting the syllables. The 2 back test also follows a similar procedure of the participant tapping on the table when a syllable is repeated after one gap. The results of this test indicated that high scores were achieved, but not as commonly observed as the 1 back test. The error count was high with a few participants. Although this is lower than the one back test, it is an above average score. There was no participant that made no error. The findings of both these tests indicate that guitarists who are experienced for five or more years have a high and above average working memory capacity. This is consistent with literature that suggests that experienced musicians develop and modify information in their long term and Working memory at a fast pace (Williamon & Egner, 2004). High scores in the 1 back test indicate a good level of attention. In the 2 back test, high

scores implicate a good level of attention and working memory. The results also prove the contrary that a weaker capacity for Working Memory could result in limiting the musician's skill to "sight read" or improvise. (Bower, 2010)

The learning style questionnaire O'Brien indicated that most of the participants (guitarists) were kinesthetic learners. Although studies indicate that the auditory skill of long term musicians was high, the current study indicated that most guitarists prefer to learn through the kinesthetic modality. Learning is preferred through touching and manipulation of objects. Eighteen of the participants were shown to be kinesthetic learners. Visual and auditory learners achieved a score that was close in value. Visual learners were the second most common after kinesthetic learners. The least common modalities preferred were guitarists who combined Visual and auditory methods and Visual and Kinesthetic methods. Drastic differences were found only among these two groups as they were the least preferred modalities. There is no other existent literature that suggests that guitarists are largely kinesthetic learners. This is a new finding of the study.

Along with administering the tests to the sample, interviews were also conducted on eight participants. Thematic analysis was done to explore the different recurring themes that were observed to understand the different contributing factors to guitar learning.

Global theme – Early exposure to music is essential.

Organizing theme – Early Foundation, Ability to explore and develop different styles

The global theme of early exposure to music was a recurring theme observed. Early exposure to music is essential in laying a foundation of interest in an individual. It need not be a factor that is attributable to guitar playing but it builds a foundation of interest in music. Most of the participants were exposed to music at an early age. This happened either due to family members listening to different forms of music in the presence of the participant or family members encouraging the participant to learn playing an instrument at an early age. An early exposure to music led many participants to develop their own interest in picking the instrument that they wanted to learn later on or develop their own signature styles. The guitar was an instrument

that proved to be of interest to all of them.

Participants either learned a percussion instrument and then moved to learning the guitar or learned an acoustic guitar and then learned the electric guitar. This is consistent with literature that suggests that audio perception is an important ability observed during childhood itself. Audio Perception at an early age can be defined as the ability to locate and localize a specific sound in the environment (Lotto & Holt 2010).

“Uh...like I said, my family was musically inclined, so and since I used to watch and listen to my grandfather playing mridangam”

“Everyone listens to some form of the music or the other so at my home either you know somebody is playing an instrument or singing a classical song or at some level there is some music playing in the TV or recorder”

“Yeah they did, my family is very supportive about my music and they are okay with me...uh....doing it full time also....”

Global theme -Reinforced motivation fuels learning

Organizing theme - A combination of extrinsic and intrinsic motivation is necessary to learn

Learning an instrument requires persistence and developing individual methods of learning. Many of the participants learned by attempting to imitate playing like their favorite artists. Some of the participants learned the guitar because of an unexplained satisfaction and happiness with the instrument. This was attributed to an unexplained feeling or fascination after seeing, listening to or playing the guitar. It is explained in a manner of positive self-concept.

This is in accordance with Asmus & Harrison, (1990) who found out that positive self –concept on achieving or completing a task is a source of motivation. It is a combination of extrinsic and intrinsic motivation. This indicates a combination of intrinsic and extrinsic motivation to learn the guitar. They could also be attributed to situational causes. The need of performing or learning a song may also fuel learning among individuals who portray an intrinsic motivation to learn. All the participants that described motivation from the family also described a strong motivation to play the instrument. This is in accordance with a study conducted by Sichivitsa (2007) who

mentioned that musicians with better family support were better motivated to learn and involve themselves in music.

“So guitar I learned on my own initially, there was a book at home”

“I became quite serious about like ...accompanying my teacher and all that”

“I was going to classes to do it, so I wasn't self-taught....so someone formally taught me to play

Global theme - There is no objective method of learning

Organizing theme - Subjective experiences determine learning more than external methods

All the guitarists described subjective methods of learning the instrument. No one mentioned any specific method to learn. They had all devised their personalized methods to learn the instrument. The only commonly observed factors were persistence and techniques to overcome a hindrance. An indifferent mood while playing the instrument may result in different experiences. The indifferent mood may persist or the mood may change and may result in a therapeutic experience, or prove to be a good creative outlet. However these are not methods

that are described as being necessary steps for learning an instrument. They are subjective experiences that cannot be prefixed or planned, but they still result in a learning experience.

Frequency of failure and success can also affect learning. Achieving satisfaction is essential, but not consistently. Repeated and continuous achievements may discourage learning and may result in repeated methods to achieve gratification. A combination of failure and success is essential for learning.

“I found another teacher for six months, then again for another six months I did not have a teacher, then I had a small course with uhhh another guitarist for two months and then now again for the past one year I've not been under any formal training”

“I decide to pick up a new song on the guitar which I haven't before or pick up a new genre or listen to new music which I can try playing on the guitar or uh, basically challenge my creativity and try to come up with new versions of songs which people would not think of, may be a jazz version of an old Bollywood song or something like that.”

“Jamming definitely helps because before coming to college I was never part of any band or group which was specifically made, which got together to play music. So when I came here the idea of jamming, writing your own songs with a band, creating music and making covers, it all became very real and very raw”

“I have become better at performance ever since I have been learning these new aspects of music.”

Global theme - Learning doesn't occur in isolation

Organizing theme - There is no control over influence and inspiration, Musical aptitude may be innate but intrinsic motivation to learn is not

Many participants did report different sources of influence and inspiration to learn. Emotional expression while playing the guitar encouraged or hindered learning. Lack of emotional expression resulted in feelings of incompleteness. Other than undergoing an experience, critiquing music or analyzing another piece of music also helps in understanding music in a better way. Competition also improves learning. Jam sessions involve different individuals playing and performing music together. The need to play and perform

better also improves learning. By modifying, reinterpreting an already existing piece of music, creativity is fueled.

“no I try various methods...either I figure it out myself...or I watch videos....or I just keep playing...I practice..”

“I'm just inspired as in, I will go hours and hours I can feel like I have endless stamina and i can go on till 4 or 5 am in the morning and still continue doing it,”

This study is limited to studying only guitarists and relies on subjective experiences to develop an understanding the factors responsible for learning. This stems from personal developmental experiences to draw data with respect to learning factors. There may be a possible weakness in drawing direct casual references. Future research will make use of these results to develop a scale to understand aptitude to play the guitar. They will form a basis for developing the scale.

VI. CONCLUSION

The present study examined factors that contribute to learning the guitar along with analyzing the working memory and learning

styles of guitarists. The working memory of guitarists was very high in both the tests administered and many of them were reported to be kinesthetic learners. Differences were found largely in personal experiences. But they were related in manners of persistence in training and learning and the ability to overcome hindrances.

Different influences were reported, different learning methods and different results. It was found that early family exposure along with a supportive social/family support fueled learning.

A combination of extrinsic and intrinsic factors is also very essential in learning. The most prominent factors and themes discussed are Duration, imitation, Skill achievement, ear training, reading music, technological assisted learning, breaking down a song, repeated activities, leaning speed, time. Most of the selected themes are in accordance with the advanced measures of music aptitude (Gordon,

1995). Factors like Working memory and Learning styles will also be included in the assessment. There was no funding or sponsorship for the research.

Future/Further Study

The present study provides scope for further research. The research finding of Guitarists being kinesthetic learners is not in specific to guitar learning. The finding however provides a basis for further research to understand if the guitar is learned in a kinesthetic manner.

This can be done as there is no specific method to assess learning modalities of guitarists. Brain imaging techniques can also be used to understand specific functioning in context to guitar playing. Working memory can be assessed individually to study if experience in playing increases capacity for working memory. These are the future aspects that will be studied.

REFERENCES

Barthet, M., Anglade, A., Fazekas, G., Kolozali, S., & Macrae, R. (2011, October). Music recommendation for music learning: Hotttabs, a multimedia guitar tutor. In *Workshop*

on Music Recommendation and Discovery (pp. 7-13).

Grashel, J. (2008). The Measurement of Musical Aptitude in 20th Century United States: A Brief History. *Bulletin of the Council for*

- Research in Music Education*, (176), 45-49. Retrieved from <http://www.jstor.org/stable/40319432>
- Faßhauer, C., Frese, A., & Evers, S. (2015). Musical ability is associated with enhanced auditory and visual cognitive processing. *BMC neuroscience*, 16(1), 59.
- Gordon, E. E. (2001). *Music aptitude and related tests*. Chicago, IL: GIA Publications, Inc.
- Gordon, E. (1968). A Study of the Efficacy of General Intelligence and Musical Aptitude Tests in Predicting Achievement in Music. *Bulletin of the Council for Research in Music Education*, (13), 40-45. Retrieved from <http://www.jstor.org/stable/40317039>
- Morgan, H. (1996). An analysis of Gardner's theory of multiple intelligence. *Roeper Review*, 18(4), 263.
- Gordon, E. E. (1995). The role of music aptitude in early childhood music. *Early Childhood Connections: The Journal of*
- Bower, B. (2010). Practice can be less than perfect: Working memory may limit musicians' sight-reading skill. *Science News*, 178(2), 10-10. Retrieved from <http://www.jstor.org/stable/20722941>
- Hansen, D., & Milligan, S. (2012). Aural Skills: At the Juncture of Research in Early Reading and Music Literacy. *Music Educators Journal*, 99(2), 75-80. Retrieved from <http://www.jstor.org/stable/23364291>
- Norton, D. (1979). Relationship of music ability and intelligence to auditory and visual conservation of the kindergarten child. *Journal of Research in Music Education*, 27(1), 3-13.
- Wang, Y. C., Wickstrom, R., Yen, S. C., Kapellusch, J., & Grogan, K. A. (2017). Assessing manual dexterity: Comparing the WorkAbility Rate of Manipulation Test with the Minnesota Manual Dexterity Test. *Journal of Hand Therapy*.
- Leite, W. L., Svinicki, M. & Shi, Y. (2009). *Attempted Validation of the Scores of the VARK: Learning Styles Inventory*

- With Multitrait-Multimethod
Confirmatory Factor Analysis
Models. Educational and Psychological
Measurement. 70, 323-339.
- Gordon, E. E. (1999). All about Audiation and
Music Aptitudes: Edwin E. Gordon
discusses using audiation and music
aptitudes as teaching tools to allow
students to reach their full music
potential. *Music Educators Journal*,
86(2), 41-4
- Gordon, E. (2007). *Learning sequences in music:
A contemporary music learning theory*.
GIA Publications.
- Baddeley, A. (1992). Working memory. *Science*,
255(5044), 556-559.
- Williamon, A., & Egner, T. (2004). Memory
structures for encoding and retrieving a
piece of music: An ERP investigation.
Cognitive Brain Research, 22(1), 36-44.
- Carl Seashore, Seashore Measures of Musical
Talents (New York: The
Psychological
- Corporation, 1960, Revised).
- Stamou, L., Schmidt, C. P., & Humphreys, J. T.
(2010). Standardization of the Gordon
primary measures of music audiation in
Greece. *Journal of Research in Music
Education*, 58(1), 75-89.
- Verdis, A., & Sotiriou, C. (2017). The
psychometric characteristics of the
Advanced Measures of Music Audiation
in a region with strong non-Western
music tradition. *International Journal of
Music Education*, 0255761417689925.
- Law, L. N., & Zentner, M. (2012). Assessing
musical abilities objectively: Construction
and validation of the Profile of Music
Perception Skills. *PloS one*, 7(12), e52508.
- Beall, G. (1991). Learning sequences and music
learning. *The Quarterly Journal of Music
Teaching and Learning II*, 1, 87-96.
- Fjellman-Wiklund, A., & Chesky, K.
(2006). Musculoskeletal and general health
problems of acoustic guitar, electric

guitar, electric bass, and banjo

players. *Medical problems of performing artists*, 21(4), 169.

Matlin, Margaret W. (2009) Working Memory. Cognition, seventh edition. John Wiley & Sons, Inc. USA

Lotto, A., & Holt, L. (2011). Psychology of auditory perception. *Wiley Interdisciplinary Reviews: Cognitive Science*, 2(5), 479-489.

Mukundan, C. R. (1996, October). NIMHANS neuropsychological battery: test descriptions, instructions, clinical data and interpretation. In *Proceedings of the National Workshop in Clinical Neuropsychology* (Vol. 24, p. 29). NIMHANS Publications.

Makofske B. (2011) Manual Dexterity. In: Kreutzer J.S., DeLuca J., Caplan B. (eds) *Encyclopedia of Clinical Neuropsychology*. Springer, New York, NY

O'Brien, L. (1989). Learning styles: Make the student aware. *NASSP Bulletin*, 73(519), 85-89.

Sichivitsa, V. O. (2007). The influences of parents, teachers, peers and other factors on students' motivation in music. *Research Studies in Music Education*, 29(1), 55-68.

