Peer Interactions and Learning Experiences in Higher Education: A Study of Undergraduates in Institution of National Importance

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MAY 2020

DECLARATION BY THE SCHOLAR

This is to certify that the M.Phil. Dissertation being submitted by me on the topic entitled '**Peer Interactions and Learning Experiences in Higher Education: A Study of Undergraduates in Institution of National Importance'** has been completed under the guidance of **Dr. Aarti Srivastava**. It is declared that the present study has not previously formed the basis for the award of any Degree, Diploma, Associateship or Fellowship to this or any other University.

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CERTIFICATE OF THE SUPERVISOR

This is to certify that the dissertation entitled '**Peer Interactions and Learning Experiences in Higher Education: A Study of Undergraduates in Institution of National Importance'** is the work undertaken by Ms. **Kumari Archana** under my supervision and guidance as part of her M.Phil. degree in this University. To the best of my knowledge, this is the original work conducted by her and the dissertation may be sent for evaluation.

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I owe this research to my parents, who taught me that we can change our life by hard work and with good heart we can make changes in life of others as well.

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LIST OF ABBREVIATIONS

IIT- Indian Institute of Technology

JEE- Joint Entrance Examination

ATM-Automatic Teller Machine

MHRD- Ministry of Human Resource Development

ICAP - Interactive Constructive Active Passive

PhD - Doctor of Philosophy

CGPA- Cumulative Grade Point Average

ABSTRACT

The students who enters into fully residential courses of graduation encounter various challenges, they have to adjust and adapt to the new learning environment as well as they have to create the social relations with people they have started living with. In this case, peer becomes an integral part of students' life. The objective of the study was to get in depth on the perception of students about learning, examining the influence of peer interaction on students' and studying the process of self-organized learning among peers.

The researcher has used the exploratory research design and used qualitative approach to understand in depth and in details the students' perception of learning, peer interaction and to explore the process of peer learning. Observation and interview have been used to collect the data from students regarding to understand their meaning of learning, their perception of peer learning and to gets in depth details of their group formation for learning in informal manner. Questionnaire has been used to collect detail of profile of respondents and to find empirical data for the attitude and opinion of students about the positive influence of peer interaction. Conventional content analysis has been used to analyse the data collected from interviews.

With the intention to get in-depth of higher education student's perception of learning which was first objective of the study, it is found that learning for students has a very broad meaning which does not confine to academic or professional learning but it also includes the different skill sets needed for psychological well-being as well for social support from the society.

While examining the influence of peer interactions on learning experience of students which was second objective of the study, results shows that students found peer learning very helpful for learning, they reported that their motivation and interest goes up, at time for exams as well as when they decide to learn something in group, all focus and speed increases while learning with peers, they said peer learning just happens spontaneously.

Additionally, while investigating perception of higher education students for peer learning and its influence on them, findings shows that students find peer interaction as one of the key factors for their learning as well as for their career. The influence of peer interaction can be of both negative in nature which discourage students for being open and comfortable as well as positive in nature which encourage students to grow towards long term goals of their career with the support of peers.

Positive influence of peer interaction on students learning experiences helps students in exploring new things, enhancing learning and experimenting on effective ways on learning. Positive influence resulted into one category which can be called social and psychological support to students and another as support for professional learning and career to students. The positive influence is one of the crucial conditions which should exist for self-organised peer learning.

While studying the process of self-organised peer learning in informal settings which was third objective of the study, researcher found that the self-organising peer learning system in higher education is a system where students form their own peer learning group which is connected (where every group member is connected to each other) and the group have same view of future. This kind of self-organised peer learning systems emerges when there is freedom provided to students to interact with any of the peer without any restrictions, we can call it 'minimally invasive environment'.

The findings on self-organised peer learning systems in higher education creates need for further research in this area. For instance, to measure the academic achievement of students due to self- organised peer learning. To find out the applicability of self-organised peer learning in different contexts of higher education institutions. To examine the role of teachers in self organised peer learning.

These initial developments in this area also indicates the complexities involved in this research. There is need to measure and re-examine these findings in different contexts of higher education students. The major lesson we learn from this study is that the learner does not need to know all but rather they should be equipped to find out.

Keywords: Higher Education Students, Peer Interaction, Peer Learning, Self-Organised System

CHAPTER 1: INTRODUCTION

When students take admission in graduation after completion of higher secondary education, the changes they find in their graduation life are quite different and sometimes difficult in comparison of their prior experience of schooling. It becomes challenging to transform to the new changes for the students, especially for the students who enrol in fully residential graduation courses. They have to adjust and adapt to the new learning environment as well as they have to create the social relations with the community they are living with. For students their peers become essential part of their life and peers make huge influence on them. Moreover, the influence of the interaction with peers contributes in shaping student's learning behaviour as well as their social skills. The influence can encourage students to learn as well as it has potential to discourage students to learn because of the lack of support from peers while completing their graduation. Whether peer interaction is an encouraging factor for higher education students or not , primarily there is need to first find out that whether the opportunity to learn from peers is provided by the higher educational institution as well as is there any encouragement to make the interaction with peers as an component of learning as great importance? On the basis of these factors, study can be conducted on the peer interaction and learning experiences of students from higher education.

On one hand, high level of peer interaction enhances the perceived quality of learning experience of students and on other hand, learning outcomes gets positively influenced. The motivation to find personal meaning for learning and to attain higher cognitive level is assisted by the peer interaction. With the interaction with peers, students participate in construction of knowledge and because the peers are at the better position to understand and relate to the learning experiences of students, it leads to better understanding of knowledge. (Costaa, Cardosob, Limac, Ferreirad, Abrantese, 2011)

Furthermore, if the composition of students is diverse in nature, it enriches the critical thinking skills as well as learning of students. We need to examine that does peer interaction has lot of potential to enhance the learning and engagement of

students in learning process. If it is, then at what extent it can help students in learning. However, the diversity in students contains risk of negative peer interaction as well (Roksaa,Kilgob, Trolianc, Pascarellad, Blaiche & Wisee, 2017) although negative peer interaction may occur among students where diversity is not there. So, we need to look into the limitations of peer interaction and peer learning. The findings from the researches are creating discourse that peer interaction is essential for quality learning, there is need to find new ways to provide opportunities for peer learning to students. We need to explore the process of peer learning and there is requirement to find out that whether higher educational institutions need to provide more resources to facilitate peer interaction or not. Number of questions arises while thinking about peer interaction's benefits. This indicates that peer interaction and learning experience of the higher education students is the pivotal topic to study. The process of peer interaction becomes crucial to make sense and to get in depth of the learning experiences of higher education students.

Many researchers experimented and talked about different pedagogical method which is distinct from the traditional methods used in education system in the last century. One of the such experiment named as "Hole in the Wall" was conducted by Sugata Mitra and his colleagues from 1999 to 2005 at 17 locations across India. In this experiment, computers (ATM like screens of computer) provided freely to the children of slums with the internet access and no teacher. The findings from the experiment says that children (usually aged 8 to 13) has learned computers by themselves, at that time children who belongs to villages and urban slums did not know about computer and Internet was unknown to them. These children didn't have anyone to teach them computer. Further, results indicated that providing access to internet and leaving children in unsupervised manner demonstrated educational achievements.

It is found that due to curiosity for the new device which looks like television, children who even don't know English, they were able to learn surfing and was understanding the content available on internet which was written by keeping adults in mind, this implies that children learnt to understand the content on their own. On the question of how this is possible that learners are learning on their own using new device computer to reach educational objectives? Results from 'Hole in the Wall' indicated that every time children worked in groups, constantly interacted

with each other lead them to achieve educational achievements. The way children interacted with each other was of chaotic manner which is contradictory to the typical classroom environment of pin-drop-silence. The learning was the outcome of self-organising systems which is a set of interconnected parts, each unpredictable and spontaneous order in an apparently chaotic way. (Mitra,2006; Mitra & Stanfield, 2016)

We need to examine that after findings of this experiment, self-organised learning approach can also be used to the context of higher education students. Presently it has not been explored much but repeatedly the question has been raised that how can we apply the self-organising system on higher education students and how can we make learning enjoyable and greater engagement in learning of students in higher education. On the application of self-organising system to students in higher education, Mitra suggested that in case of undergraduate students or post graduate students we can apply the self-organising systems theory. They are open to adventure, however they have attitude of competitiveness, if that can be tackled, then it's possible to apply self- organising system theory. (Mitra, 2010). In 2016, the question still remained that how can we apply theory of self-organising system on students of higher education?

Before proceeding ahead in the chapter, researcher wants to inform the reader about what has been discussed further in this chapter. Initially, rationale of study, statement of the problem, objectives of the research and research questions have been discussed. Further researchers provide the glimpses of research design, context and conceptual framework. In the end part of the chapter, significance and scope of research has been talked about.

1.1 Rationale of the Study

Learning of the student is one of the most important focus of the education system. Purpose of education system is to facilitate and help the students to learn. Quality learning of the students depends on many factors which can be categorized into structural level factors and agency level factors. Here structural level factors include

infrastructure, Teacher- Student ratio, financial resources etc. and agency level factors includes readiness and preparedness of the students. Readiness and preparedness of the students for higher education can also be the learning of the students in schools. Students who are the agency in the education system, interacts with the structure (education system) to learn, to use resources provided and to get training for the upcoming roles in the society.

At agency level, problems in learning is one of the most important reasons for which education system is supposed to work. Providing resources is not enough for the learning for students in higher education because even with enough resources there is possibility that quality learning in students can be hindered due to different reasons. There has been an increased recognition that more attention needs to be paid to the quality of learning of the higher education students.

The subjective experience of the students in higher education institutions is one of the important factors to explore and to research further. The learning of students is influenced by the subjective experience of students. One of the factors within subjective experience is peer interaction among students. Peer interaction is an essential component which have the potential to increase the learning and effectiveness of learning at higher level. By studying the self-organising system in higher education, there is possibility that we may get an important tool to enhance the learning of students in higher education. The process of the peer learning is multidimensional in nature among students of higher education. The researcher will be focusing on peer learning process among the students of higher education.

Statement of the problem

There are 95 institutions of National Importance declared by Government of India (MHRD India,2019). These prestigious institutions have access to large proportion of resources in Indian context. The students who are pursuing education in these prestigious Indian Higher education institutions gets access to resources and various opportunities useful to them. But then also, we can't ensure that every student is learning with quality.

For students to learn, right kind of engagement is essential, despite of the fact that he or she is studying in reputable institutions which is well resourced with impressive

teachers who teaches the right content. Also, if the institution is regulated efficiently in management and governance terms (Coates, 2015).

In spite of available resources and proven competency to get admission in prestigious educational institutions, students may not able to learn efficiently as compare to the quality of education they get while completing higher education. Different kind of challenges they face after entering into higher education institutions such as assignment burden, to become active learner, coping with reading materials, culture differences, instructional problem, language barrier, time management and cognitive challenge (Fook & Sudhu, 2014). Here the student engagement into learning process becomes important but how can we ensure that every student who is entering into higher education system is learning and not getting alienated? What kind of environment we need to provide to students so that they can learn efficiently in the system? They just don't have to just survive but they can thrive in the system as the most important purpose of the education system is that students can learn in education system. One of the essential factors which plays crucial role in supporting students in learning is peer interaction and peer learning (Carver,2011). This support can be academic as well as non-academic in nature. Students should be able to identify and recognize themselves with the institutions in which they are studying as it plays vital role in assisting the students to adapt to the challenge of cultural difference (Fook & Sidhu,2014). Peer interaction becomes more important for students who are living in the hostels while graduation. Students should be able to get engage which can lead to learning different skills and also a sense of belongingness in the community they are living rather than alienation. Now the time has changed and student population which is getting enrolled in prestigious institutions of India is diverse in nature. This diversity of students gives an option to students to get exposure to different cultures and community. This diversity can be a bliss for the students but in case if the diversity of students didn't collaborate to learn then it can lead to low performance, low engagement and low learning. Students' experience of learning while pursuing graduation may provide lot of insights on peer interaction and peer learning.

1.2 Objectives and Research Questions of the Study

Objective:

1. To understand the meaning of learning perceived by students.

2. To examine the influence of peer interactions on learning experience of students while pursuing under graduation.

3. To study the process of self-organised peer learning in informal settings.

Research Questions:

1. How students identify that they are learning?
2. How peer interaction influence learning experience of under graduate students?
3. What is student's perception of peer learning?
4. How the self-organised peer learning groups forms and learn in informal settings?

Operational Definitions

Learning: Learning means what students' themselves consider as learning. Learning is considered only with the perspective of students.

Peers: Peers are enrolled in technical undergraduate course of Indian Institute of Technology, Delhi. All the peers are residing in the campus.

Peer Interaction: When two or more peers interact with each other through any means of communication.

Peer Learning: When two or more than two peers learn together is considered as peer learning.

Students: Students who are enrolled in the technical course of Indian Institute of Technology and are staying in the campus of IIT, Delhi for whole duration of course that is four years.

Effective Learning: Learning which stays with students in the long run and can retain and can teach others.

Higher Learning: Higher learning implies to the ability to think critically, creatively, solve problems and comprehend complex issues, along with that improvement in their communication and collaboration skills.

Connected Peer Learning Group: When more than two peers form a group to fulfil particular aim.

Higher Education Institution: Higher educational institutions refer to institutions which have good infrastructure, co-ed residential course, good hostels where cleaning, drinking water etc is not an issue. Good quality of food is served to students and there are proper security for students. The institutions which is recognised nationally for its quality in education.

1.3 Research Design

Researcher has used qualitative approach for the research on peer interaction and peer learning and it adhere to naturalistic paradigm**.** The rationale behind choosing this approach is to capture discursive details of student's perception of learning, peer interaction and the process of learning in informal way among students. The objective is describing the detail about the peer interaction and learning in a comprehensive manner, focus is on the contextual knowledge of peer interaction and learning in institution of national importance in India. Here the subjective experience of students is the centre of the research. The research is tracing the whole process of peer interaction and how it is helping the students in their learning. The research focus on small number of cases of technical undergraduates studying in Indian Institute of Technology, Delhi.

Researcher focuses on social constructivists approach which implies knowledge is viable not only personally, but also in social contexts, while reality is viewed as a constructive process embedded in socio-cultural practices. Researchers believe that the constructivist paradigm predominantly uses qualitative methods (Glesne & Peshkin, 1992).

The researcher has used the exploratory research design to understand in depth and in details the students' perception of learning, peer interaction and to explore the process of peer learning. The very strength of qualitative discourse is its exploratory nature. Data collection has been done with purposive sampling. Data is collected by using observation in the campus of IIT, Delhi, semi-structured interview and questionnaire were given and filled by technical undergraduates of IIT, Delhi respectively. Data analysed with the help of ATLAS.ti and excel by using conventional content analysis and basic method of percentage and summation. To know more in details for the methodology, you can go to third chapter named "Methodology used in the Study".

1.4 Conceptual Framework- Self-Organising System in Education

Sugata Mitra had applied self-organised system in the "Hole in the Wall" experiment on children of different geographical areas. In this experiment, Mitra provided computers (ATM like screens of computer) to the children of slums with the internet

access and no teacher. The insight from the experiments led Mitra to conduct various experiments between 1999 and 2005 under the name 'Hole in the Wall'* experiment, the major findings from the experiment were as follows:

- With the use of internet and computers, leaner can learn irrespective of who or where they are and what language they speak (DeBoer,2009, Mitra,2005).
- Learner can attain educational objectives on their own, related to standard school examinations in subject of computer sciences and mathematics (Inamdar & Kulakarni,2007), enhances in their English pronunciation (Mitra, Tooley, Inamdar & Dixson,2003) and also enhances their school achievement (Dangwal, Sharma & Hazarika,2014; Dangwal & Thounaojam,2011).
- Learner showed self- organising behaviour that resulted in learning in "minimally invasive" environments (Dangwal & Kapur, 2008, 2009a,2009b).
- Learner appeared to understand content that was years ahead of that expected for their age group (Inamdar,2004; Mitra,2012).

To apply self-organising system in the context of higher education students, we first need to understand the self-organising systems. In the words of Mitra, 2010 Self organising system is "system is one where the structure of the system appears without intervention from the outside". When we permit a system to self- organise, then without explicit intervention structure appears. Other than that emergence happens in self -organising systems. A functional characteristic of a system appears which is sometime a property which has not been observed earlier. This implies that if education is a self- organising system then learning is its emergent phenomenon and we can set the conditions and allow it to come. There must be attractor to have any self-organising system and in case of children, the attractor can be curiosity.

'Hole in the wall' experiment was conducted by Sugata Mitra (Winner of Ted Prize 2013) from 1999 to 2006. He was the first person who talked about self -organising systems in education, to know more refer to the book 'Hole in the wall' by him, McGraw-Hill Publication

Connected systems tend to self-organise and form patterns. If learning and consciousness are functions of connected, cognitive systems, then the basis of education must lie in self-organisation. Connected systems are those where the state of each element of the system is affected by the states of one or more other elements of the system.

Self-organised systems of education must therefore get formed such that:

1. Each learner current state is affected by the immediate past states of other learners of the group. This implies that every member of the group gets influence by each other's state of being. For instance, if one member of the group is upset due to some reason, this creates changes in behaviour of other members.
2. The connected learning group must have a common view of each individual member's future. For example, if there is a group five members which is self-organised, all of the member has common goal to achieve and have similarity how they view their future (Mitra, 2006)

When something is left to itself, it tends to become more organised, it is said to be self-organised. This is an unusual property as we often expect "things" that are left to themselves to become more disorganised and chaotic. Further, when think about order or well organised structures, generally we think that an external body or organisation has made this happen. Nevertheless, we now are aware that this is not the reality and theory of complexity has assisted us to better understand how social orders, such as language, spontaneously emerge and evolve themselves over a long period of time. Indeed, if something works once, this does not mean that it will work in same way second time also. This implies which is perfectly expressed in words of Mitra, Kulkarni and Stanfield,2016 "Regularity and conformity therefore break down to irregularity and diversity and effects are no longer the straightforward and continuous functions of causes."

Self-Organised Learning Environment is provided as alternative learning method or approach for creating unsupervised learning environments for children after insights from the whole in the wall experiment (Mitra, Stanfield 2016).

Self-organising System in Education

The question arises that how can we make learning enjoyable and greater engagement for students in higher education?

In education systems when students face challenging educational objectives, as a strategy they self- organise themselves into learning group and if they have easy access to internet and computers with the space/ environment to study which is minimally invasive; it all leads to higher learning of students. You can see figure 1.2 which illustrates the conceptual framework made on the basis of findings of earlier research done on the self-organising system in education.

Challenging educational objectives are the objectives which is not easy or impossible for individual student to deal with. These objectives can be provided through formal external environment of the higher education institutions or it can be emerged through the students themselves.

Internet and Computers implies that when students have easy access to internet and computer devices which enables them to surf the internet and search for what is unknown to them.

Minimally Invasive Environment is the environment where the peer learning groups are learning with each other where there is no one to intervene unlike the traditional classroom setting where teacher generally have control over the behaviours of the students and sometimes by unsaid protocols. These spaces can be public spaces of the educational institutions' campus.

Self-Organised Peer Learning Group are the group of peers which is formed by students on their own will among their peers. This group is comfortable with each other and willing to learn together.

Higher Learning is the consequence of the process of self-organised peer learning group. Higher learning implies to the ability to think critically, creatively, solve problems and comprehend complex issues, along with that improvement in their communication and collaboration skills.

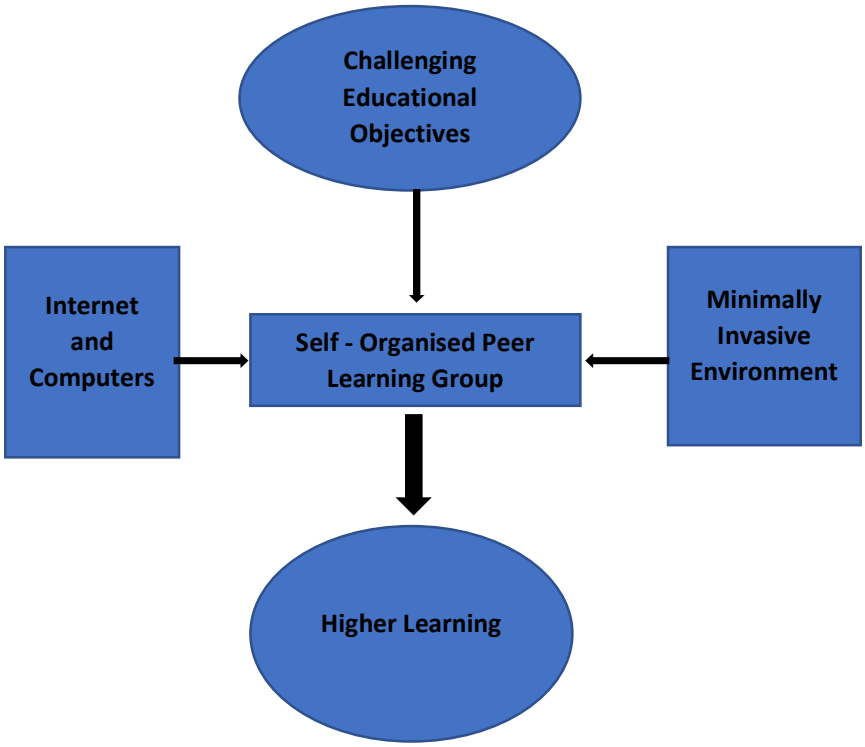

Figure 1.02: **Conceptual Framework:** Self-Organising Peer Learning Systems in Education, source: created by author on the basis of literature review on Self-Organising system in education

It becomes essential to study the patterns of self-organised systems in peer learning because researches have shown that peer interaction is one of the most prominent contributors in enhancing learning and it has the potential to help students in their crisis in learning. By focusing on this process, we can provide solutions by providing feasible environment for self-organising peer learning system to enhance learning at greater extent as solution different challenges faced by students in higher education.

1.5. Significance and Limitations of the Study

Significance: The research on peer interaction and peer learning with perspective of self-organising systems is crucial to understand if we really want to foster the learning among students with their engagement with their own curiosity and to fulfil the aim of education system to enable the students to learn effectively. We need to facilitate and help students so that they can overcome the challenges they face, when they enter higher education system. Through the help of this study, we can get the in depth understanding on how and what are the reasons which can really foster the learning of every student. With the collaboration among students, learning can become easy as well as enjoyable for students.

Limitations: The study has explored peer interaction and peer learning by using concepts of self- organising systems. Although there is need to work to examine and re-test the self-organising peer learning systems in higher education to understand its nature on different contexts of higher education. The research hasn't studied self-organising peer learning systems in context of gender perspective, caste perspective because of limited time and scope. Further it can be studied that what can be done to explore the role of teachers in facilitation in self- organising systems in higher education systems. Also, this can also be studied in other educational institutions from different geographical areas and societies by increasing population of students.

1.6 Chapter Scheme of the Study

In first chapter that is 'Introduction' in which we discussed about the research problem, research objectives & question. We also had glimpses of research design, context and got introduced to the conceptual framework used in the research.

We will further go in details of the concepts related to student engagement, peer interaction, learning and challenges students face in higher education. We will discuss, other related concepts with the discussion on self-organising systems in 'Review of Related Literature' that is second chapter.

In the third chapter, 'Methodology Used in the Study', we will go in depth of the methodology used in the study. The discursive details of the why researcher used particular research design and sampling technique for the study, method of data collection, process of data analysis with limitations, role of researcher and ethical consideration has been explained.

'Student's Perception and Experience of Learning' which is the fourth chapter put the student's view of learning and their experience of learning which consists positive peer interactions and negative aspects of peer interaction in front of you in comprehensive manner.

In the fifth chapter, 'Positive Influences of Peer Interaction and Negative Peer Interactions' social and psychological support to students, support for learning which is useful for career is discussed in depth and exhaustively.

Sixth chapter named 'Self-Organising Peer Learning Systems in Higher Education' discusses the whole process of Self-Organising learning among the higher education students.

Seventh chapter, 'Discussion and Conclusion' discusses the essence of findings i.e. key results in aggregated manner as well as provides the broader context of the findings.

After the discussion on research problem and introducing research objective, questions, research design and conceptual framework, we will move to the next chapter 'Review of Related Literature' where we will explore different concepts relevant to this study and discuss the conceptual framework thoroughly.

Chapter 2: Review of Relevant Literature

When a student gets admission into the best institutions for higher education. Initially, they strongly feel that they will excel and grow in the field very efficiently. But then what happens, how they are not able to engage effectively in the studies and in overall campus life as they had thought about it, initially. They face many challenges in campus life, why they are not able to engage themselves fully in learning and then they start tackling challenges with the help of their peers. We will try to understand the whole process of transformation in learning of students with the peer interaction. This chapter, in first section, it introduces the umbrella concept of student engagement and other related concepts as well as what researchers has found about it. In second section, we will discuss the different types of challenges faced by students in higher education. In third section, we will talk about learning as concept and other related concepts specifically focusing on higher education. We will move to explore specifically learning and peer interaction which is a significant part of student engagement in fourth section, we will try to understand the impacts of peer interaction on learning and how positive influence can enhance student's learning. Lastly, in the fifth section, we will look through self-organizing system concept, self-regulated learning and how it is applicable to students in higher education. By going through this chapter, we will understand the struggle of students in higher education system, how there are solutions to tackle their problem by understanding the Self-Organizing systems. This whole literature review process will be informing us the different concepts existing related to peer interaction and learning.

2.1 Student Engagement and Higher Education

To explore the learning of students in higher education, student engagement is essential to understand. Student engagement is being studied by many of the researchers. Student engagement refers to how connected students are to their classes, their institutions and each other. Student engagement is "multidimensional construct" or meta construct. Here Alexson and Arend argue that we should not confine student engagement into student involvement in a learning process but we should also look at the factors which

are affecting student engagement in a particular type of learning process. They argue that students as well as institutions have the responsibilities for quality learning where student's efforts are essential to grow their knowledge and skills and institutions' efforts to provide feasible environment to facilitate student learning becomes crucial. Further they suggest that it is important to research on the interaction between engagement and learning. (Alexson, Arend 2011).

In the policy brief by Olson and Peterson (2015), definition of Student engagement is :

"… In education, student engagement refers to the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught, which extends to the level of motivation they have to learn and progress in their education. Generally speaking, the concept of "student engagement" is predicated on the belief that learning improves when students are inquisitive, interested, or inspired, and that learning tends to suffer when students are bored, dispassionate, disaffected, or other- wise "disengaged." Stronger student engagement or improved student engagement are common instructional objectives expressed by educators."

Along these lines, Collaco(2017) discusses student engagement in higher education. Enjoyment, enthusiasm, reading for pleasure of learning itself and reading more that required about a subject were described as elements of student engagement. Bryson and Hand (2007) talks engagement of student at different levels lies from disengaged to engaged continuum and also different degrees of engagement can be experienced by the same student.

Hamish Caotes (2005) provided essential arguments, that for quality assurance in higher education, student engagement is valuable. For students to learn right kind of engagement is essential despite of the fact that he or she is studying in reputable institutions which is well resourced with impressive teachers who teaches the right content. Also, if the institution is regulated efficiently in management and governance terms. He talks about the "Quality of effort" by Pace,1979, which implies that it is to challenge themselves to learn, to have interaction with new ideas and practices. Also, it is to work upon the organizational, communication and reflective skills. All of these factors can help students in learning, and it will lead to shape the important part of learning they will take from education process of university.

The involvement theory given by Astin is further expanded by Kuh's engagement model. Kuh's engagement model focus on the responsibility of the institution for

constructing an engaging environment of college. The conception that the investment done by students in their experience in college, specifically with the peers and faculty, is profitable in the form of student learning. This conception is pivotal to engagement as well as to involvement. (Lundeberg, 2014)

Furthermore, Yil(2014) tries to draw attention towards the relationships between student engagement and their academic achievement. His study was aimed at determining the extent to which student engagement explains or predicts academic achievement. He utilized the definition given by Gunuc and Kuzu (2014) "… the quality and quantity of students' psychological, cognitive, emotional and behavioral reactions to the learning process as well as to in-class/out-of-class academic and social activities to achieve successful learning outcomes…" Researchers has used multidimensional concept to examine the student engagement. Yil's findings suggests that there are significant relationships between student engagement and student academic achievement. It also further suggests that the dimensions of cognitive engagement, behavioral engagement as well as sense of belonging has significant relationship with the academic achievement and engagement of the students. This figure is given by Yil for the student engagement in higher education.

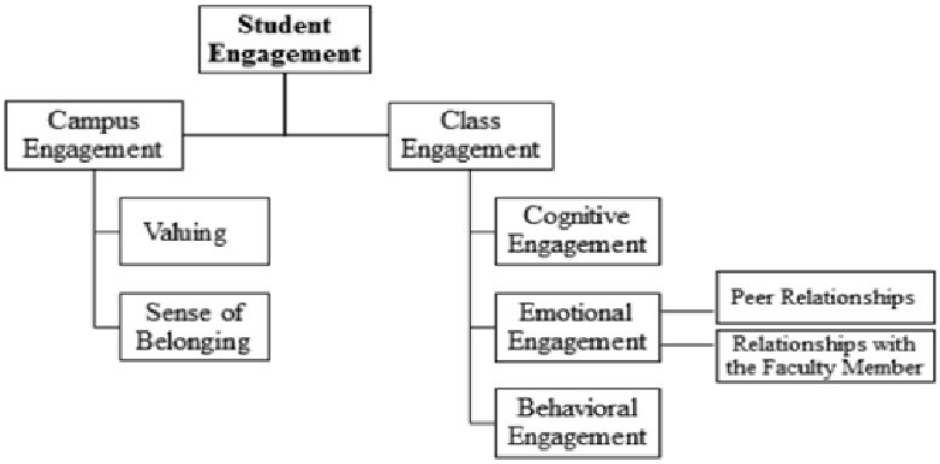

Figure-2.01-Student Engagement Structure, source: Yil(2014)

Student engagement is crucial to fulfil the objective of our higher education system. But before going further to understand the learning process of students in higher education, we need to first understand the challenges they face in the system.

2.2 Challenges Faced by Students in Higher Education

Fook & Sidhu (2014) described eight challenges which students face in higher education which are cognitive challenge, becoming an active learner, coping with reading materials, instructional problem, language barrier, time management, burden of assignments, and cultural differences in higher education.

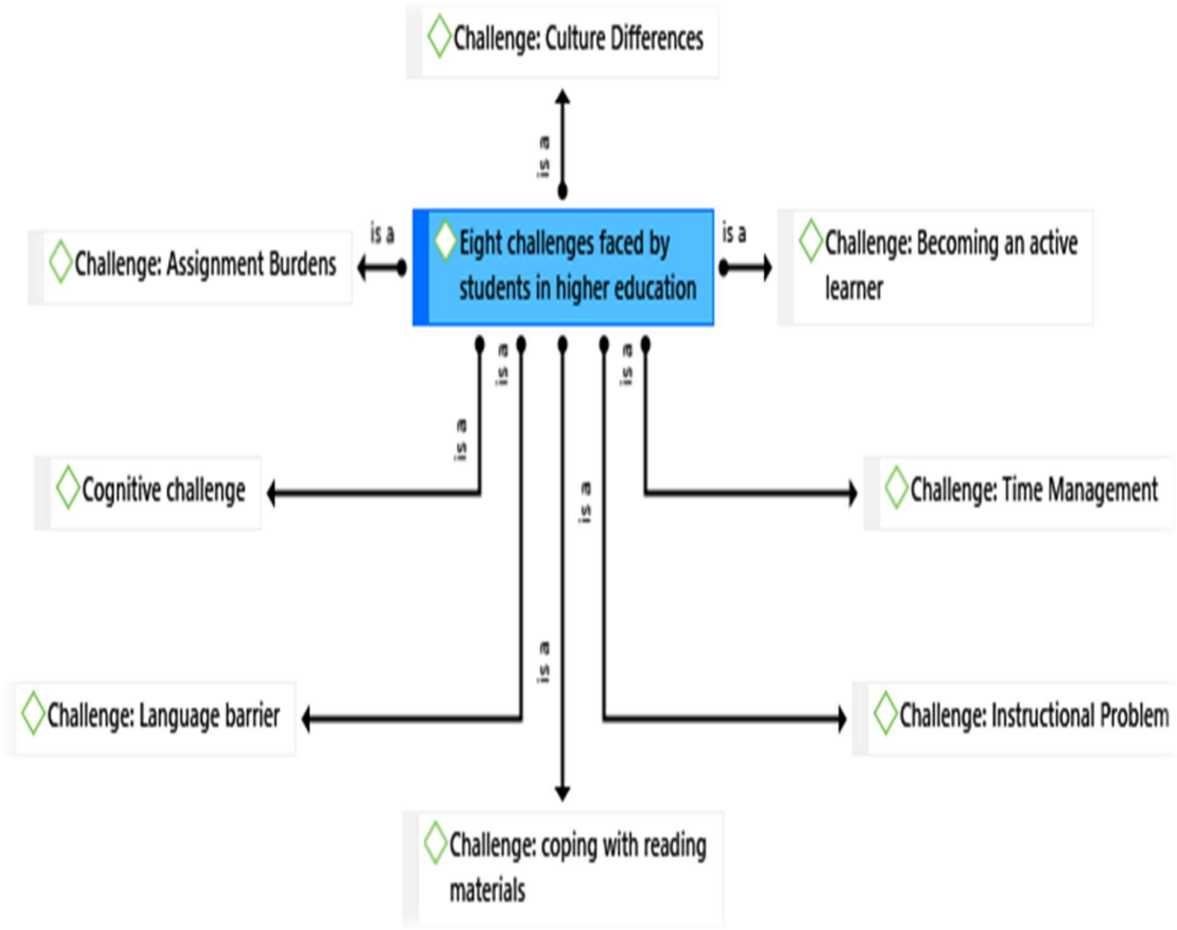

Figure 2.02: Challenges faced by Students in Higher Education, source: created on the basis of findings provided by Fook and Sidhu,2014

We will examine each challenge which students encounter in the higher education experience and will go into the reasons behind it.

Cognitive Challenge

Fook and Sidhu (2014) did research on challenges faced by higher education and collected the data from the students of undergraduates, postgraduate and instructors in school of education.

When students enter in university, they are required to think scholarly and write academically. This implies that cognitive level of students should be developed at a higher level. Students in higher education required to prepare themselves with the significant knowledge by studying and asking questions. In case if they are not able to take the challenge and then their ability to excel in higher education is not possible. Students in higher education deal with concepts in their courses which are abstract, for them it is hard to differentiate between the concepts. For students, it is hard to synergized their learning into writing, putting theory into practice and sorting their own biases while interpreting concepts. It is needed for students to think objectively and acquiring scientific skills in interpreting data. To apply the concepts into their study, they need to work hard first to understand the concepts taught in class and then to apply them. Understanding concepts is considered challenge by most of students studying in higher education from bachelors to doctorate degree. Students find it really difficult in coordinating the content to their future. For students of undergraduate courses, since they are novel to higher education, they face many cognitive challenges ranging from understanding the historical perspective of the field, perspective of professors, new concepts taught, application aspects of the theory. To understand this, we can suppose an example as there are lot of new concepts, lot of new vocabulary, lot of reading, some of the readings are written at a very scholarly level and they have no foundation in the area of study.

Becoming an Active learner

To be an active learner student need to be self-motivated to track their own learning so that they are better prepared in the class. The one of the factors behind some students do not become active learners because of their personal reasons which can be that they

are not interested with topic, they do not talk that much or they do not consider themselves as leaders in the group. It is found that active learning is not applicable to all students and all courses. Some students prefer passive learning more than active learning. Students do not able to enable themselves to be active learners in courses which are technical oriented. Sometimes listening to lectures is more relevant rather than discussing general issues. Students also felt that in case of topics which are lengthy and contained too many details need to be presented in written format instead of presentation in class. (ibid.)

Chi, Kang and Yaghmourian (2017) found that greater learning can be achieved, if students engage constructively or interactively instead of passively attending the classes or lectures. For example, if students are solving the problems on the worksheet and collaborating with the other students to solve that rather than just copying the solutions of problem that are presented will help student to achieve greater learning.

Coping with reading materials

Students finds difficult to finish all the assigned readings in the given time period. In the opinion of students, the amount of reading material was overswhelming and it is huge whoch is not able to easily handled by any studnets.(Fook & Sidhu, 2014)

Culture Differences

Some of the students find difficult to associate with culture of active classroom because they have expereinced different learning culture in there homes towns or native places. Such as the intstructor were more active in classroom and studnets were supposed to just listen and take notes. Asking questions was seen as rude behaviour and disrespecting the instructor. Fook and Sidhu(2014) examined the conceivable solutions to the paradox faced by administrators in higher education as they try to increase diversity in students while reducing tensions. Various institutional strategies were implemented after recognising the significance of oppennes to diversity. Fundamentally by opting for two strategies, one is by focusing on the inclusion of multicultral education and other by increasing the numerical diversity. They assumed that this will lead to naturally emergence of intercultural contact of students. Although it proves to be wrong as Blaclock, 1967, Blumer, 1958 and Smith, 1981 suggested that racial tensions magnify when the propotions of minorities increases. By bringing the students

together lacks a process through which the attitudes and beliefs of subgroups which are culturally different gets questioned. In this situation it becomes difficults for administrators to solve this paradox. Some practices in classroom are understood as discriminatory and prejudices. Cabrera and Nora, 1994 found that students who belonged from minority communities felt singeled out and treated differently in class proclaimed isolation from the institution and higher degree of alienation.

Instructional Problem

The loopholes of syllabus taught and provided by instructors are reported by students. In their opinion, the expectation of instructor is not clear to students as it is not informed clearly and lectures are not delevered in organised manner. Futher, the feedback given to students was not clear and materials taught are not tested. Students realised that the feedback provided to them is not effective to improve their learning. They also expressed the need of good classroom management as they feel that it would positively influence motivation for learning among them.

Language Barrier

Students feels that there are lot of new vocabularies in almost all classes, due to which they need to visit dictonary to understand the meaning of the terminology introduced in class frequently. It also becomes hard for students to catch up the topics in their course. Students faced diffuclty in expressing their ideas in class as their expressions were unclear to the class.

Time Management

Time management is big struggle to students after their busy schedule of classes. For the jobs and in case if students has responsibilty for their family, it becomes really complicated.

Assignment Burdens

Most of the students find big challenge in case of assignments in higher education. Also the instructors found that giving many small assigments to assess students was more efficienct than giving big projects or assignment. The reason behind that is the instructors can frequently interact with students and able to provide better feedback to

students in small steps of completing a bigger task in specific course. (Fook & Sidhu,2014)

After exploring the challenges faced by students in higher education, we will discuss the agruments and insights provided by different scholars on the concepts of learning, learning outcomes, ICAP framework and learning styles.

2.3. Learning of Students in Higher Education

Boud said that the learning that have the ability to address learning challenges in higher education is effective learning. He also warned that prevailing assessment in higher education is not adequate to prepare students for lifelong learning and holistic development. According to Boud and Falchikov, we need to adopt more sustainable assessment that can help students to become more active learners not only in managing their own learning but also assessing themselves beyond the end of the course rather than summative assessment that focuses on specifics, standards and immediate outcomes. (Fook & Sidhu, 2014)

We cannot limit the understanding of learning as located only within the contexts of concurrence between more and less experienced people. Along with them, we need to consider peer interactions as providing opportunities which is effective for learning language from peers. (Melander & Sahlstrom, 2009)

In the opinion of Piaget, the interaction of children with adults does not foster the cognitive growth in children because there is uneven power between child and adult. This leads to lack of reciprocity in children which is essential for development. Piaget argues that children does not question the information provided by adult and they directly agree with them or they accommodate them. This further results into lack of discussion and cooperation between children and adults, which may actually prevent learning. However, Piaget concede a probability for development between adult and child with the adaption which is organized interaction in a cooperative manner. (Reichert & Liebscher, 2012)

To raise the learning opportunities of students, there is need of opportunities to interact with their peers as well as with the teachers. The learning environment which have

Openness and empathy is essential because it leads teachers to be learning facilitators and students as active achiever of their own knowledge. Students' evaluation of their learning performance is necessary to self-regulating learning and it explicitly impact the academic achievement of students. If teacher is knowledgeable and present materials in a clear and systematic manner, it is beneficial for students. But it is essential for teachers to provide an effective learning environment with enthusiasm, communication skills and dynamism which can help students in effective manner. These factors improve students' learning performance as well as it makes the interactions between students easier which has explicit impact on academic achievement. This also indirectly impact in life realization and wellbeing in students. (Costaa, Cardosob, Limac, Ferreirad, Abrantese, 2015)

Carver, 2011 suggests that at time when student construct their learning by having discussion, they also have the capability to develop competencies which is useful for workplace. For instance, individual and small group problem solving, analytical and critical thinking, oral and written communication, research skills and method and the ability to work productively in team as well at individual level.

ICAP Framework: Interactive, Constructive, Active, Passive

The ICAP framework used by Chi, Kang & Yaghmourian in 2017 to analyze the reasons of superiority of dialogue- videos than lecture-style monologue videos in tutorial to college age student. In their words ICAP Framework is

"The ICAP framework explicitly operationalizes and differentiates what students do to engage with instruction or instructional materials into four kinds of behavioral modes based on the overt activities that students can undertake with the learning materials."

The interactive mode is when more than two peers collaborates, for instance they coconstructing while dialoguing, by asking and answering each other's questions or explaining in detail or challenging each other's comments. Coconstructing implies that each partner is generative and constructive, in a manner that is significant to or builds on the contributions of his or her partners. Conconstruction is also called making transactive contributions.

Constructive mode is about taking activities which are constructive. In this mode students create knowledge which is beyond the presented content in the instructional

materials. For instance, drawing a diagram, giving explanation, asking a question, creating solution and taking notes in their own words and so forth. Hence, it is producing new knowledge which is beyond the information provided in the instruction.

The active mode is when students physically manipulate the information in the instructional materials without adding any new knowledge, for instance taking verbatim notes that do not provide any new inferences, underlining text sentences, reciting a memorized line, copying a problem solution and so forth.

The last mode, the passive mode is when students take no overt actions regarding to the instructional materials other than attending it. For instance, when student is listening with attention to an instructor's explanation or lecture or watching the whiteboard during the time instructor working on a problem's solution. Therefore, in layman's perspective that paying attention is needed and sufficient for learning but paying attention is only passive in ICAP. (Berkowitz & Gibbs, 1982 in Chi, Kang & Yaghmourian, 2017)

These four types of mode of learning helps us in distinguishing the different approaches students use while learning. Further to understand the learning outcomes in depth, the two types of learning outcomes are identified in the literature.

Learning Outcome: Learning Performance and Academic Achievement

We can consider two learning outcomes which is Learning Performance and Academic Achievement. Learning performance meant as Self-evaluation of acquired knowledge of students, understanding and skills developed and their will to learn more. Academic achievement can be described by the grades obtained by the students. There are various elements that can add to description of learning outcomes. One of them can be pedagogical interaction, for example student-student interaction or teacher competencies. These elements considered primary reasons for improving the learning outcomes of students and helping in creating effective learning environment. (Costaa, Cardosob, Limac, Ferreirad, Abrantese, 2015). Lunderberg, 2014 described five types of learning outcomes such as general education, intellectual skills, science and technology, personal development and career preparation. This provides us the base for think learning outcomes in different dimensions.

Learning styles also differ in students according to their earlier experience and exposure to different approaches taught to them and also, they evolve their own learning style.

Learning Styles

Learning styles can be different of different students coming from various socio-cultural and economic background. Such as White women and minorities's learning styles indicates problem solving with cooperation, connected knowing and socially based knowledge. So as a result white women and minorities prefer collaborative learning due to the pedagogy match between their learning styles. But in case of White men, they prefer pedagogy which is traditional providing their more analytical, individualistic and competive learning styles. (Carbera, Nora, Amaury, Ternzini, Pascarella, 1998)

Furthermore, we will discuss the vital relationship between learning and peer interaction, we will explore the influence of peer interaction on learning of students in higher education. Since it is urgent to focus our attention to informal ways and mechanism of learning among the peers rather than only focusing on the strcuturalised and formal process provided as the input by the institutions in the forms of best teachers, infrastructure, and other resources.

Self- Regulated Learning

Environment in classroom which engage students actively have the capability of provoking the development of self-regulated learning. The meaning of the term self-regulated is "the learning performed by anyone who controls and evaluates their own learning guided by strategic actions (Planning, monitoring and personnel evaluation) and by motivation to learn". According to Bandura, social cognitive learning is a significant conceptual framework for inspecting self-regulated learning and other related factors. In this theoretical perspective, factors of personal cognitive, actual behaviours and social environment interact in a way where people are products as well as producers of environments.

In this theoretical perspective learning is knowledge acquisition through cognitive possessing of information, acquired both from being a part of society and from

individual thought process. (Young, 2005, p.26 as sited in Costaa, Cardosob, Limac, Ferreirad, Abrantese, 2015)

The students have high probability to get higher level of academic achievement, who reflect and evaluate their own learning performance with optimism. The factors they evaluate are the overall knowledge acquired, understanding and skills learned and the willingness to learn more. The interaction between students has a significant influence on learning performance. The finding provided is persistent with the self- regulating learning theory that highlights the relevance of the student participation on the construction of knowledge. (Costaa, Cardosob, Limac, Ferreirad, Abrantese, 2015)

2.4. Peer Interaction and Its Influence on Students' Learning

Quinlan (2016), suggest that relationships with peers is a major relationship amongst students in higher education. She further says that peer relations are an important aspect of students' college experience, because students' interactions with peers mediate a number of key educational outcomes including changes in values and attitudes. Social constructivist perspectives on learning provide reasons why student interactions are important to cognition and learning. One of students' greatest concerns in transitioning to higher education is whether they will make friends and "fit in". In creating the conditions for students to thrive in higher education, we must also attend to the opportunity's students have for forging meaningful friendships and building a sense of belonging in a new community. Many of our educational practices can be alienating.

Positive Peer Interaction

The opportunity to learn from each other and the encouragement to students to making peer interaction as a relevant component of learning can be evaluated by students to evaluate student-student interaction. The researches have shown that greater the student-student interaction, greater the perceived learning experience quality and it has the positive impact on learning outcomes. The student- student interaction may happen in classroom and beyond, through modern or traditional methods, this encourage students to achieve greater cognitive level and it supports to discover personal meaning for learning. Through this method, students acquire greater understanding of knowledge

and become committed to learning. (Costaa, Cardosob, Limac, Ferreirad, Abrantese, 2015)

Negative Peer Interaction

Student's learning identity can shape negatively, if there is lack of response from peer or moderation by teachers. The reason behind it is that student may feel isolated from and peripheral to academic group. (Nortvig, Petersoen & Balle, 2018)

In college experience, students may encounter neutral or positive interaction but it is found that students also experienced negative interactions related to diversity. Negative diversity interactions may have relation to the cognitive development. (Roksaa, Kilgob, Trolinac, Pascarellad, Blaiche & Wisee, 2017)

Pedagogical interaction such as student- student interaction or teacher competencies can be the factor among other several factors that can help us understanding the learning outcomes. For creating effective learning environments for students, pedagogical interaction may improve the learning outcomes of students. Hay, Hodgkinson, Peltier and Drago, 2004 suggested that pedagogical interaction has been proposed as one of the significant parts of any learning experiences. According to Hargreaves (1979) empathy among students and empathy of teachers with students is one of the essential factors to accomplish an efficient interactional environment. It is also relevant to promote the meaningful learning and allows the development of attitude of trust, openness and security. (Costaa, Cardosob, Limac, Ferrirad, Abrantese, 2015)

In residential environments, we ask students to move away from their families and home communities, to challenge provincial or received ideas from those communities, and we expect them to learn new rules of discourse and to engage with new value frameworks. Often, we expect students to make these changes in large anonymous classes, where students may come to the same lecture halls several times a week for a whole term and never actually meet anyone else in their class. Yet, a sense of belonging is a basic human drive. In fact, it is the strong need to belong within a society that causes us to obey the unwritten emotional rules of that society discussed. We reap social rewards when we behave in socially acceptable ways and suffer shame, embarrassment, and reprobation when we do not. As humans, we are social creatures, and we suffer when we are isolated from others. Strong social networks are fundamental to our health

and well-being; humans have evolved to value them accordingly. Students, particularly those in their first year, need to build up a new social network from scratch. As educators, we can create environments that help students to build these important peer relationships. We can do so through living-learning environments that offer opportunities for students to discuss what they are learning informally with students from diverse backgrounds who bring different perspectives to bear on key questions. We can create learning communities within our classrooms by dividing students into smaller groups and giving them meaningful tasks that require them to share their knowledge and learn from each other. These work groups help students meet others and feel a sense of belonging in the particular classes they are attending, thereby reducing attrition. (Quinlan, 2016)

The students in higher education gets space in campus life which provides opportunities to learn, experience and experiment new ways of life in social terms. It can be a challenge as well as an opportunity for students. Peer group formation can either be a challenge or be confined to social hierarchy, stigma and traditional values. (Sabharwal & Malish, 2018)

Brooks' study revealed that compared to the friendship's students had experienced previously, university friendships were believed to be: closer, based on a deeper knowledge of others, more mature and 'serious', and more equal. (Brooks, 2007)

Peer Assisted Learning

Peer assisted learning as a concept originated from an approach grown at University of Missouri, Kansas City by Deanna Martin in 1970s known as Supplemental Instruction. To increase student resilience, peer to peer collaboration can be helpful. This can be done by facilitating students' academic and social integration or sense of belonging and connection. Peer assisted learning's objectives is to assist students to develop the skills needed for being successful professional, promoting understanding of content of the course and adoption of deep learning approaches for students and to increase student autonomy at the same time encouraging collaborative working and learning. (Carver,2011)

Research often shown that in case of online learning, peer to peer learning leads to satisfaction among students. To make the online learning effective, social interaction

and networked learning in peers is needed to be embodied. Such as only giving access to information is not enough but also to support self-reflection through networked learning. (Nortvig, Peterson & Balle, 2018)

Collaborative Approaches for Effective Learning

How to group students in a class to enhance their learning has been a quite challenging issue. Presently, there are two famous strategy: one is diversity-based grouping or heterogeneous grouping and another is stratified or ability-based grouping also known as homogeneous grouping. Both type of grouping has their fervent enthusiasts. (Agrawal, Nandanwar & Murthy, 2017)

Collaborative learning is a determining factor in predicting cognitive level, affective level and openness to diversity in students. Cooperative learning practices can create the condition where learning is optimised, however prejudices are confronted by having productive and positive interactions between students of different backgrounds. Among many practices, collaborative learning has been proved most promising solely. Tinto (1997), kept collaborative learning in the centre of the academic and social experiences of students, with emphasise its role on the quality of effort students spends in learning. Lunderburg and Moch observed the collaborative nature of the student interaction cherished intellectual risk-taking and connected understanding of concepts. It has been found that there are positive correlations between collaborative learning and achievement, personal development (interpersonal attraction and self-esteem) and social support. (Cabrera, Nora, Amaury, Terenzini, Pascarella, 1998)

Sense of Belongingness

Fook and Sidhu, 2014 argued that the sense of belongingness helps the students to accommodate the challenges emerge due to cultural differences. Here for students in higher education institutions, the sense of belongingness is towards the institution they are studying.

Lundberg's, 2014 study of four-year college students reported that through peer teaching or interaction between students on academic topics, learning was improved. Study groups helped students to clarify their own understanding by teaching others.

Activities which are big contributors to learning and social integration are central to collaboration and student interaction. Leadership, cultural awareness, intellectual skills, social ability, civic interest and student learning are the results of peer interaction with diverse students. This kind of interaction and engagement expand learning beyond classroom and it cherish the social integration of students.

Student Belief on Their Capabilities

The attitude towards the academic work, the preference of the activities to execute and perseverance get affected by the students believes about their capabilities to learn. Learning performance is generally correlated with a more positive attitude toward the environment of learning. Students' probability is to get higher academic achievement who have positive attitude regarding learning and instruction. (Costaa, Cardosob, Limac, Ferreirad, Abrantese, 2015)

Nortvig, Peterson and Balle, 2018 observed that engagement and meaningful learning groups are proven to be the way of supporting social relations and learning experiences of students. Also, a strong sense of learning identity is significant in educational programs.

After going through peer interaction and its influence on peer learning, it becomes interesting to understand the process of learning through the lens of self-Organizing systems as it explains very efficiently how this works and why it this phenomenon takes place everywhere without providing inputs and efforts by external environment.

2.5. Conceptual Framework- Self-Organising System in Education

In the words of Mitra, 2010 Self organising system is "system is one where the structure of the system appears without intervention from the outside". When we permit a system to self- organise, then without explicit intervention structure appears. Other than that emergence happens in self -organising systems. A functional characteristic of a system appears which is sometime a property which has not been observed earlier. This implies that if education is a self- organising system then learning is its emergent phenomenon and we can set the conditions and allow it come. There must be attractor to have any self-organising system and in case of children, the attractor can be curiosity.

Connected systems tend to self-organise and form patterns. If learning and consciousness are functions of connected, cognitive systems, then the basis of education must lie in self-organisation. Connected systems are those where the state of each element of the system is affected by the states of one or more other elements of the system.

Self-organised systems of education must therefore be constructed such that:

1. Each learner current state is affected by the immediate past states of other learners (that is, they learn as a group)
2. The connected learning group must have a common view of each individual member's future (Mitra, 2006)

Mitra and his colleagues had applied self-organised system in the "Hole in the Wall" experiment on children of different geographical areas. In this experiment, Mitra provided computers (ATM like screens of computer) to the children of slums with the internet access and no teacher. The insight from the experiments led Mitra to conduct various experiments between 1999 and 2005 under the name 'Hole in the Wall' experiment, the major findings from the experiment were as follows:

- With the use of internet and computers, leaner can learn irrespective of who or where they are and what language they speak (DeBoer,2009, Mitra,2005).
- Learner can attain educational objectives on their own, related to standard school examinations in subject of computer sciences and mathematics (Inamdar & Kulakarni,2007), enhances in their English pronunciation (Mitra, Tooley, Inamdar & Dixson,2003) and also enhances their school achievement (Dangwal, Sharma & Hazarika,2014; Dangwal & Thounaojam,2011).
- Learner showed self- organising behaviour that resulted in learning in "minimally invasive" environments (Dangwal & Kapur, 2008, 2009a,2009b).
- Learner appeared to understand content that was years ahead of that expected for their age group (Inamdar,2004; Mitra,2012).

To apply self-organising system in the context of higher education students, we first need to understand the self-organising systems. Something is said to be self-organised if, when left to itself, it tends to become more organised. This is an unusual property as we often expect "things" that are left to themselves to become more disorganised and chaotic. Further, when think about order or well organised structures, generally we think that an external body or organisation has made this happen. Nevertheless, we now are aware that this is not the reality and theory of complexity has assisted us to better understand how social orders, such as language, spontaneously emerge and evolve themselves over a long period of time. Indeed, if something works once, this does not mean that it will work in same way second time also. This implies which is perfectly expressed in words of Mitra, Kulkarni and Stanfield,2016 "Regularity and conformity therefore break down to irregularity and diversity and effects are no longer the straightforward and continuous functions of causes."

Self-Organised Learning Environment is provided as alternative learning method or approach for creating unsupervised learning environments for children after insights from the whole in the wall experiment (Mitra, Stanfield 2016)

Self-organising System in Education

The question arises that how can we make learning enjoyable and greater engagement for students in higher education? On the application of self-organising system to students in higher education, he suggested that in case of undergraduate students or post graduate students we can apply the self-organising systems theory. They are open to adventure, however they have attitude of competitiveness, if that can be tackled, then it's possible to apply self- organising system theory. (Sugata Mitra, 2010)

In education systems when students face challenging educational objectives, as a strategy they self- organise themselves into learning group and if they have easy access to internet and computers with the space/ environment to study which is minimally invasive; it all leads to higher learning of students. You can see figure 2.03 which illustrates the conceptual framework made on the basis of findings of earlier research done on the self-organising system in education.

Challenging educational objectives are the objectives which is not easy or impossible for individual student to deal with. These objectives can be provided through formal

external environment of the higher education institutions or it can be emerged through the students themselves.

Internet and Computers implies that when students have easy access to internet and computer devices which enables them to surf the internet and search for what is unknown to them.

Minimally Invasive Environment is the environment where the peer learning groups are learning with each other where there is no one to intervene unlike the traditional classroom setting where teacher generally have control over the behaviours of the students and sometimes by unsaid protocols. These spaces can be public spaces of the educational institutions' campus.

Self-Organised Peer Learning Group are the group of peers which is formed by students on their own will among their peers. This group is comfortable with each other and willing to learn together. Higher Learning is the consequence of the process of self-organised peer learning group. Higher learning implies to the ability to think critically, creatively, solve problems and comprehend complex issues, along with that improvement in their communication and collaboration skills.

You can see the conceptual framework illustrated through figure 2.03 below which describes the process of self-organising peer learning system in education.

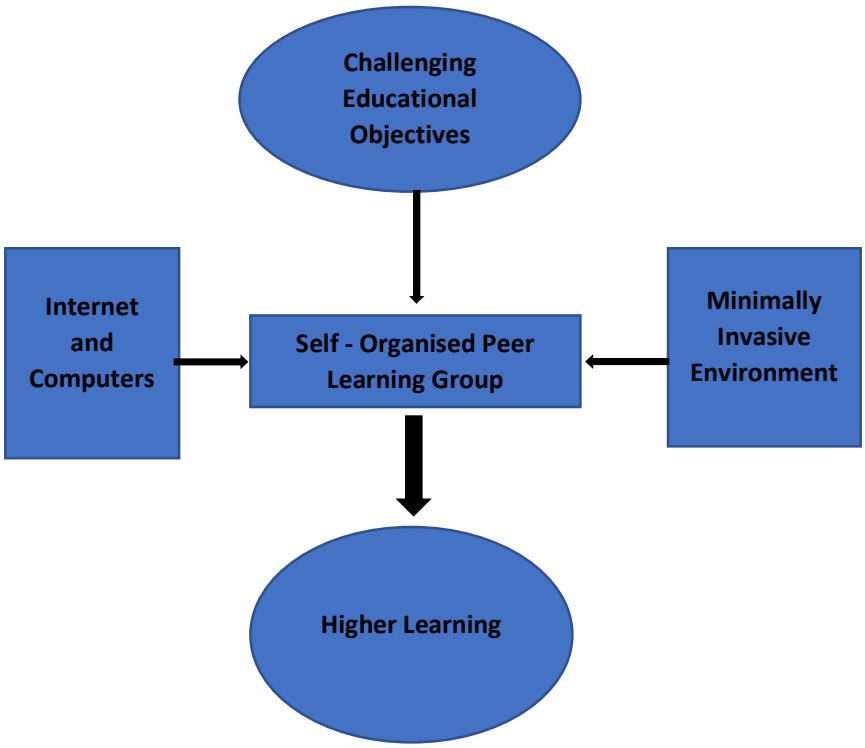

Figure 2.03 Conceptual Framework: Self-Organising Peer Learning Systems in Education

It becomes essential to study the patterns of self-organised systems in peer learning because researches have shown that peer interaction is one of the most prominent contributors in enhancing learning and it has the potential to help students in their crisis in learning or when they face different challenges related to learning. By focusing on this process, we can provide solutions by providing feasible environment for self-organising peer learning system to enhance learning at greater extent as solution different challenges faced by students in higher education.

After discussion on different relevant concept of peer learning and on conceptual framework used in the study extensively, in the next chapter we will discuss in detail about the research design, process of data collection and methods used for analysing the data in this study.

Chapter 3: Methodology Used in Study

This chapter explains in detail the methodology used in research for collecting data for this study. Researcher attempts to describes systematic thoughts which led to choose the methodology. It highlights the design of research and sample, the method of data collection and data analysis which includes step by step process of data analysis. Further validity and reliability aspects, limitations of the study, role of the researcher and ethical consideration has been discussed in details. The pyramid below describes the methods and approach used in the research in gist, the figure 3.1. One by one we will be discussing on each component of methodology used in the study.

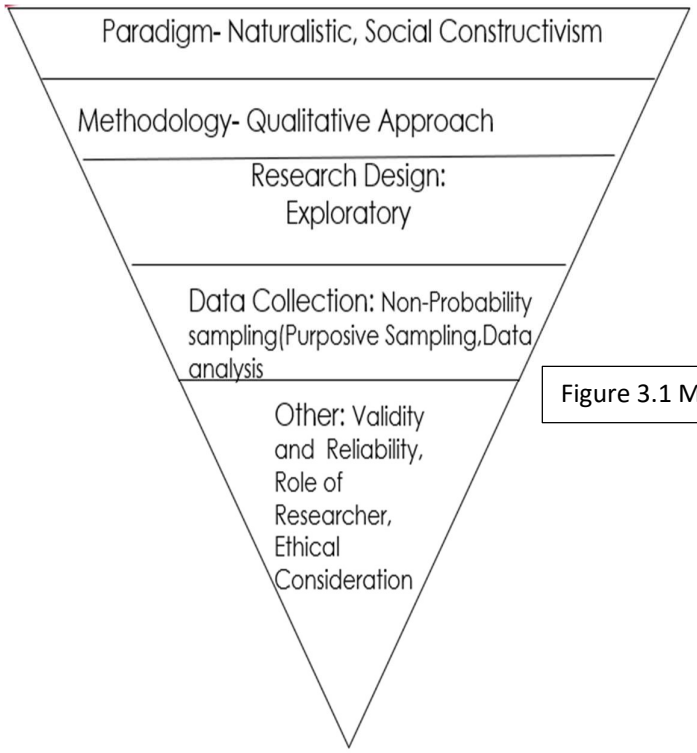

Figure 3.1 Methodology used in study

3.1. Research Approach

Researcher is using qualitative approach for the research on peer interaction and peer learning and it adhere to naturalistic paradigm**.** The reason behind choosing this

approach is to capture discursive details of student's perception of learning, peer interaction and the process of learning in informal way among students. The objective is describing the detail about the peer interaction and learning in a comprehensive manner, focus is on the contextual knowledge of peer interaction and learning in institution of national importance in India. Here the subjective experience of students is the centre of the research. The research is tracing the whole process of peer interaction and how it is helping the students in their learning. The research focus on small number of cases of technical undergraduates studying in Indian Institute of Technology, Delhi.

This research study students learning experience and their perception about peer learning; therefore, constructivism is best fit for the research because knowledge is actively 'constructed' by human beings and knowing is an adaptive process, rather than being passively received by them. This organise the individual's experiential world. Philosophical constructivist say that realty is ultimately in the eye of beholder. As human experience can't not be 'value neutral' observations and can't be universal in nature rather we need to understand lived experience from the point of view of those hold it. They have their own meaning and own world. According to Davis Elkind constructivism is the recognition that reality which is a product of human intelligence interacting with experience in the real world. As soon as you include human mental activity in the process of knowing reality, you have accepted constructivism. A core notion of constructivism is that individual live in the world of their own personal and subjective experiences. It is the individual who imposes meaning on the world rather than meaning being imposed on the individual. Correspondingly, learners do not just take in and store up given information, but they make and test tentative interpretations of new experience until a satisfactory structure emerges. Therefore, individual build a personal view of reality by trying to find order in the chaos of signals that impinge on their senses. Here researcher intend to understand the relationship of students with their peers and how they are interacting with their environment specifically in case of learning. Within the constructivism, researcher focuses on social constructivists approach which implies knowledge is viable not only personally, but also in social contexts, while reality is viewed as a constructive process embedded in socio-cultural practices. Researchers believe that the constructivist paradigm predominantly uses qualitative methods (Glesne & Peshkin, 1992).

3.2. Research Design:

The researcher has used the exploratory research design to understand in depth and in details the students' perception of learning, peer interaction and to explore the process of peer learning. The very strength of qualitative discourse is its exploratory nature. To find the solutions for problems of learning among the students in higher education, it becomes essential to first understand the experience of students and how they perceive learning. Further, how their social context playing role in the construction of their reality and in what way the peers are influencing their learning. To understand that researcher needed to study what are the learning activities of students are getting shaped with the influence of peer, they make their immediate and significant social and cultural environment.

3.3. Field of Research

The operational area of research was the primary campus of Indian Institute of Technology of Delhi. Delhi is capital of India and it is metropolitan area of north of the country. Many students migrate to this city for educational and job opportunities. This city has lot of historical places to visit and many other famous places. IIT, Delhi campus is situated in New Delhi, which is an urban district of Delhi. New Delhi has many important government offices which is the uniqueness of this place. IIT, Delhi has campus of 325 acres and it is surrounded by the Hauz Khas, monuments such as Lotus Temple and Qutub Minar.

IIT, Delhi has ranked 47th position in Engineering and Technology Category in World University Rankings by Subject 2020 by QS (Quacquarelli Symonds). So now IIT, Delhi is now among world's top 50 Engineering and Technology Institutions. Additionally, in 2018, IIT Delhi has also been recognised as Institution of Eminence by the government of India. All these things show that quality of education is ensured in the institutions. (source : official website iitd.ac.in)

3.4. Sample Design

Non-probability sampling was used in the research. Within the non-probability sampling, purposive sampling was best fit for the exploratory research. Although in the field, there were mix population of students of Masters, PhD and Undergraduates. Researcher selected sixty-three students of technical undergraduates randomly who are

enrolled for full time and totally residential. Total 11 different courses were offered in IIT Delhi such as chemical engineering, civil engineering, computer science and engineering, electrical engineering, electrical engineering (power), engineering physics, mechanical engineering, production and industrial engineering, textile engineering, biochemical engineering & bio technology and last was mathematics and computing. Students from all branches of technical course were selected and students studying in different year of graduation such as Ist year, IInd Year, IIIrd year and IVth year, all participated in the filling the questionnaire. Sample was collected through the strategy of contacting students when they are spending their free time in public places in the campus, for instance, just after their class was finished, when there is gap between two classes, Some minutes before class, when they were spending their time to talk and interact with peers to get relaxed and socialise with each other. Sampling procedure ensured that the number of students from year of graduation is proportional. Total sample was sixty-three.

For interviews researcher used snowball sampling, by getting reference of one or more students through the interviewee who were students themselves. Total twenty-five interviews were taken.

Exclusion of Data: Respondents indicating that he or she had taken the survey earlier; Respondents who were not enrolled in Under gradation technical course in IIT, Delhi.

3.5. Method of Data Collection

Observation and interview had been used to collect the insights from students regarding to understand their meaning of learning, their perception of peer learning and to gets in depth details of their group formation for learning in informal manner. Questionnaire has been used to collect detail of profile of respondents and to find empirical data for the attitude, opinion of students about the positive influence of peer interaction in the research. The question used in the research were open ended questions.

1. Observation: This technique involves the researcher in the most direct way. In participant observation the researcher participates in a research setting while observing what is happening. It helped researcher in understanding the information which is unshared. Researcher gained a depth of understanding of settings that can't be gained from distance with research settings. Researcher spent one month in the

field. She looked for human behaviour, which helped in getting understanding whether the people's talking is going in hand in hand with their body language and expressions or not. Also, researcher observed the way students were sitting in groups, how they were interacting with each other. How much time they were spending in the public places and when they were doing that. The attitudes, personal characteristics and behaviours of the researcher were also important in the whole process. By building rapport with the Under Graduates of IIT, Delhi and by continuous and regular interaction with students helped researcher to get sense of the environment in the campus of IIT, Delhi. Researcher observed open spaces where students sits and talk, sometimes do group study as well or do experiment for their projects. Researcher did observation for one month in the campus of IIT, Delhi.

2. Semi structured Interview: It has been used because this type of interview helps in gathering of information from the respondents in free manner and in-depth (See appendix). It makes respondents comfortable with the researcher. This helps to get information from respondents with their perception, opinion and emotions about the issues exist in questions. Interview was taken of students who were studying in technical under graduation courses in IIT, Delhi. Interviews were recorded in audio form after the permission from the respondent i.e. students of Under Graduation.

3. Questionnaire: It is used to discover the attitude of students for positive influence of peers on learning. It was Google form that was designed to be completed in the meeting with researcher with respondent, after explaining about research topic. In IIT, Delhi campus only, researcher went to hostel sitting room, common areas where students generally sit and discuss such as cafe, juice centre, tea centre and common sitting places near classes and labs. Students' who reported their course of study as post graduate were excluded. Only technical undergraduates' students filled the questionnaire. The researcher named the questionnaire as "Peer Interactions and Learning Experiences in Higher Education" (See in appendix). After explaining the topic of research to students, the google form was sent and students filled it while meeting with researcher in the campus of IIT, Delhi. The researcher was with students to explain, in case if they have any query and also to ensure that it is filled with proper understanding. The questionnaire had two sections: Section 1- Profile of Respondent, Section 2- Positive Influence of Peer

Interactions. Students took five to ten minutes to fill and complete it. In the first section, sixteen questions were there to get information for profile of respondent. And the second section, two question were there. First question was for knowing attitude of students towards peer interaction where fifteen statements were asked and last question (i.e. second question of second section) was for capturing additional detail related to positive influence of peer interaction. Open- ended questions used in the questionnaire so that response can be compared to information that is already known.

Six-point rating scale: Researcher carefully kept all statements in scale unidirectional so that reliability can be maintained of the scale. Researcher used summated rating scale. She chose six-point scale, as respondents who were undergraduates of IIT can easily differentiate between strongly agree, agree and rest of the measured scale. Researcher included mid-point as neutral, because intention was to use the data as interval data to generate average scores and also respondents are familiar with the topic. Researcher used Not applicable after options off the scales to prevent the midpoint being used as a dumping ground, if they feel statement has nothing to do with their experience. Questionnaire using a 6- point scale was filled by sixty-three students. It is measured on scale of Six: 1. Strongly Agree, 2. Agree, 3. Neutral, 4. Disagree, 5. Strongly Disagree, 6. Not Applicable. Fifteen statements were asked to know students' opinion about influence of peer interaction. (can refer to questionnaire provided in appendix)

3.6. Validity and Reliability

In case of interviews, researcher dealt with the verbatim transcript as a faithful reproduction of the oral record, this implies that researcher has taken each and every word of interview as valuable data to get meaning out of it. Researcher tried to put the emic perspective in order to understand why students think and act in various ways they do.

Researcher did pilot testing of the research instruments before going to the field for data collection. For the internal consistency of scale, researcher ensured the uni-directionality, uni-dimensionality in questions and used same scale for all

statements.

3.7. Data Analysis

The data collected by the researcher was of two types, one was from semi-structured interviews and second type was from the questionnaire which consists of questions related to basic profile and factors of positive influence of peer interaction. Analysis was done parallelly by two ways: Analysis of the data collected from semi-structured interviews and second was analysis of data collected via questionnaire. Both of the ways are explained separately.

Qualitative content analysis is one of numerous research methods used to analyse text data (Hsieh & Shannon, 2005). Conventional content analysis is used, as research design aims to trace the process of peer interaction and peer learning among students of undergrads of IIT Delhi and describe it. Researcher allowed the categories and names for categories to flow from the data and it led to new insights and this is known as inductive category development (Mayring, 2000). The researcher felt the benefit of conventional approach to content analysis is getting direct information from respondents without imposing preconceived categories and theoretical perspective.

Convectional content analysis was done of the data collected from the Semi-Structured Interview because this is exploratory design and the literature available for self-organising systems in learning in higher education is limited. The process of data analysis can be described as three stage of analysis, first stage of data analysis as constitution of parts, second stage as transforming implicit meaning in data into explicit meaning and third stage as articulating the structure of experience. The total interview was taken was of twenty- five technical undergrads students of IIT, Delhi.

First stage- Constitution of Parts: While collecting the data, researcher listened carefully to audio files of interviews and in a sense researcher reexperienced it, this practice helped researcher to pay attention to each and every words and in case if something is missed to register in mind while taking interview also came into notice. Further, it helped in building pre-liminary

insights and researcher wrote mostly textual memos and observational memos while transcribing the twenty-five audio files of interviews. This was one of the difficult job and one hour audio file of interview took approximately five hours to complete the transcription. Additionally, researcher reflected back on her filed notes so that she can identify the patterns and order to have a good understanding of the subjective experience of the participants. The whole process was done in student version of ATLAS.ti software which is designed for analysing qualitative data . The use of software helped researcher to keep things systematic and easy to start the work again.

Second Stage- Transforming implicit meaning in data into explicit meaning: The second stage was editing the transcriptions by putting punctuation, commas, full stop and correcting other grammatical mistakes. After editing, researcher assigned codes to research relevant segments of interview, identified the some of the example of experience of students related to codes. Through direct approach, analysis started with the relevant research findings as guidance for codes in beginning. Labels of codes were emerged through the reflective process of different key thoughts. Further codes were grouped into group codes on the basis of similarity in the patterns. These meaningful clusters of grouped codes were assigned the relevant themes and labels. Approximately grouped codes had ten to fifteen codes in it. Some of the contradictory segments were also clustered in to different group codes. This process helped researcher into forming the larger themes and in exploring whole process of peer interaction, its influence on peers and learning. This activity helped researcher to transform raw data into meaningful segments.

Third Stage- Articulating the structure of experience and interpretations: At this final stage of convectional content analysis, researcher became selective and start focusing on the areas which are most directly relevant to the analysis which is emerging. This process needed continuous comparison of the codes, groups of codes and category across each other. For this whole process researcher revisited the edited transcripts and reread all created memos while creating codes and categorisation. Furthermore, researcher noticed that memos which were mostly reflexive and conceptual in nature were also created in this process of analysis. Researcher focused on understanding the essential elements

of the student's experiences of peer interaction and peer learnings across all edited transcripts and through codes rather than focusing on individual experiences of particular students. This was essential to get the bigger picture and whole sense of the data.

Analysis of data collected through questionnaire is done in two parts, first part was profile of respondent and second part was for examining positive influence of peer interaction. The first part profile of respondents which included age, gender, language known, community, religion, father and mother education as well as occupation, it was analysed with simple techniques like percentage and sum. The second part of positive influences of peer interaction where six- point scale was used, firstly the responses was counted for each scale, then frequency of each scale for all fifteen questions were counted and lastly percentage was calculated for each scale separately using excel. The response came under not applicable option was filtered out before analysing the responses from students.

3.8. Limitations of the study

The study has explored peer interaction and peer learning, by using concepts of self-organising systems; it doesn't explore peer interaction in the context of gender perspective and role of teacher for self-organising systems. There is further to explore that what can be done to explore the role of teachers in facilitation while using self-organising systems. Also, this can be studied in other educational institutions by increasing population of students, researcher wasn't able to do the same due to time constraints. Since it is not always the case that if we provide similar feasible conditions for self-organising systems to students it will yield the same results but definitely it will enhance the learning of students to greater extent.

3.9. Role of Researcher

The respondents were technical undergraduate students and even the researcher herself is student, therefore experience of the researcher as a student can create biasness towards students. To mitigate this researcher always tried to be aware of biases and practiced the self- reflection over the whole process of research.

3.10.Ethical Consideration

The researcher needed to build rapport so that students could have trust her, so that they can share the information required in the questionnaire and can talk without hesitation while giving interview. Before recording interview, researcher always took permission from the respondents. Researcher kept non-judgmental attitude towards the information and their opinions shared with researcher. Researcher ensured that personal details of respondents are kept confidential at all stages of research.

So, after discussion on methodology used in the study where we discussed research design, process of data collection and analysis along with limitations, significance, role of researcher and ethical consideration. Now we will move further to the next chapter 'Student's Perception of Learning and their Experience of Peer Interaction. This chapter explains the results on student's perception of learning and students' experience of peer interaction.

Chapter 4: Student's Perception of learning and their Experience of Peer Interaction

This chapter focuses on subjective experiences of students pursuing graduation in technical courses (B. tech) in IIT Delhi. The intention is to discuss the discursive details of students' perception of learning and of their experiences while living in the campus of IIT, Delhi. The themes discussed in this chapter has emerged from the conventional content analysis done of the data collected from 25 interviews of technical undergraduates of IIT Delhi. The chapter is divided into three sections. In the first section, students' perception of learning is explained in a manner so that we can understand what they consider as learning and how they decide that they are learning. In the second section, students' experience of learning alone will be discussed so that we can have a glance of it and can relate that why students prefer peer learning. Third section discusses the students' experience of peer interaction, within this section peer learning, positive peer interactions and negative aspects of peer interaction will be unfolded with the emic view of students.

4.1. **Students' Perception of Learning**

Meaning of Learning Perceived by Students

Students defined the meaning of learning in different ways which has vast scope in it. According to students, learning is the process which makes them learn new things and process of gaining knowledge. Further they added, not only experiencing something new but also having a good understanding of it. If that is beneficial for long run, involves using the skill already learned and leads to solves the problems, students consider that as learning. They further got into depth and expressed that a new skill or concept they have learned which they can apply in future and stays with them can be called as factors of considering it as learning.

Also, for some students learning is a wider term where they consider any interaction with anyone which adds into their understanding of life and knowledge of subjects. This can randomly occur or it may occur in formal manner. One of the examples for this wide understanding of learning can be seen in the following statements of a student.

"Anything that makes me learn a new thing, in my experience I have learnt a lot of stuff from very differently fields, something from computer science, from mechanical engineering, very random fields that are not at all align to my field right now, but everything in the end aligned up to everything. Everything that I do, everything every skill that I have tried to take up from anywhere, any random place that might be because of my curiosity, because of just my curiosity or something that has forced to do something and want to do but it has always help me in the long run. I would consider anything new, any literally anything new it could be anything from Humanities, anything from Psychology or it can be from it can be a new word in English, I would consider everything to be beneficial for me for the long run, every day I am learning"

Good Cumulative Grade Point Average (CGPA) not always means great learning

The students distinguished between learning and achieving good Cumulative Grade Point Average. For them learning can be great as they feel that they have learned many things and they are able to have rich understanding and can think multidimensionally. They got skills to solve the problems. But in case of achieving good CGPA, it is totally a different game altogether, it engages different ways such as learning only the topic of courses which is formally prescribed and not exploring new things and even not getting engage into extra-curricular activities, etc.

This can be understood in the following words of a student:

"what we are centred about is learning we know how to comprehend, just we learn a lot from each other. The fact that we want to learn, our motive is to learn not to get marks in the end, that is one thing. So, in the end if you are in academics your ideas, your question is like if I want to learn or if I want to get marks, if I want to learn or if I want to get paper. These are completely different things and it's really difficult to be at

the centre. So, I think we are at the most extreme, we just want to learn once we know it. So, we know that now we know concept, we will bring marks anyhow. We were fine getting average or above the average."

Need to choose both: good CGPA as well as great learning

Students experienced that sometimes when they learn about what they want to learn and want to shape their career in particular direction within their field in alignment of their long-term personal goals such as entrepreneurship, research or job in particular kind of work. One of the students expressed it in these words:

"Rest of us like we know now, even if we write one or two things wrong in exam but our concepts are clear and we don't care. but so, I think that it is the attitude problem that we have, that we don't want to get more marks essentially, we are just happy with learning something new. This is the thing that you're talking about that you want both the learning as well as the marks. you want to be successful as well as learn. if you don't have this successful thing in your hand then you can't be successful, essentially you have to do something about that, you have to get Marks and have to get a good PHD and other such things. you need to have both of these things. We just lag for it."

Activities which indirectly helps in learning

In the campus there are lot of opportunities to learn new things in extracurricular actives which includes sports, dance, stage performance etc as well as in other activities such as joining club or society to pursue interest. According to students, these activities indirectly helps them in learning because this improves emotional state and make students happy.

4.2. Students' Experience of Learning Alone

Initially when students came after admission to the higher educational institutions after competing through Joint Entrance Exam (JEE from now onwards), they had the habit to study alone and had the feeling to compete. But after coming to IIT, Delhi, they found learning environment different and only studying alone was not working for them. However, students realise this when they are not able perform according to their expectation in exams and when they feel they are not learning enough for their professional growth. Usually students study alone if they find something simple and

easy. In case of doubts they approach peers. But in case if they study something of their interest, they feel to talk about that with their peers. Sometimes because of choosing different courses in last years of graduation creates a compulsory situation to study alone. When students find something interesting and easy going, they usually study alone first and later go to peers to discuss doubts. Because they can't expect other person to teach them everything from the scratch. In last years of graduation students felt that when they choose different courses, they found themselves in compulsory situation where they have to study alone. That becomes difficult for them but eventually they start feeling comfortable for doubts peer are really helpful. Students from initial years of graduation realised that studying alone does not work in IIT because here course level rises, system is completely new, competition is also there. If in initial times they have no friends, so they couldn't discuss something with peers. Students later understood the reason that this is not working here.

Learning alone is not every students' style and even sometimes it gets changed when they find difficulties during different exams or projects or even in extra- curricular activities. For some of the students they find difficult studying alone once they get used to learning with peers.

It is found that the students who are at initial years of graduation such as first year, they mostly study alone but it does not imply that they don's interact with peer to learn. Students found that it is disturbing to study with peers and studying alone helps in focusing more. The benefits of studying alone is that they can go at their own pace and they don't have rush or slow down according to the peers. Even while studying alone, students are free to take break whenever they want and they can watch video or songs.

One student described her experience of learning alone as follows:

"while studying alone there could be times you feel like sleepy not feeling like studying that happens lots of times, so while working with peers they are studying and we are also studying. The number of hours of study can increase with peers, while alone it may be reduced. For me it was the case. Apart from it the concepts and all those things, If I am studying alone then If I am not getting something, I have to search upon other resources internet or some lectures also so has to understand somethings and with peers they could help immediately help and they could explain easier way and the thing. I can specially point out my doubt and get correct way of learning in that form, while

studying alone I have to brush upon some of the resources and then try to figure out what was the accurate thing I was looking for and then get the thing."

4.3. Students' Experience of Peer Interaction

4.3.1. Peer Learning

Students consider that they are learning with peers when there is something interesting or new to them. The peer knows something more than them. When they are working with peers to solve some problems, they start discussing about that. Then students work individually and collaborate with peers which leads to emergence of something new and efficient to solve problems. There are different perspectives of different students which helps group to achieve the goal. Students feel that peer learning is something which just happens.

To learn something totally different from Courses

Students shared their experiences about peer learning. They said that due to peers they learned the subjects which they themselves don't learn or study such as one of students was really in to learning philosophy, he was learning Zen Buddhism. He used to talk about that topic, with that discussion they got to know new perspective and felt that they are able to understand the life. During projects of their interests, students share their experiences with each other and they build further on their projects with the help of each other. Sometimes students solve the given problem with different perspectives which actually goes beyond the text and they get to learn many ways of solving a single problem.

One of the students says:

"My friend knows about some particular topic in physics I would just ask and discuss that thing with them or it would be like if one of my friends is great in to say a particular subject in Philosophy. I would go ahead and discuss with them or it could be any subject, if I consider me having conversation with them, like them imparting information to me something new that I don't know I would consider that as learning. anything that it can be it can be actually something aligning to my field say some experiment to study for something in theory something like that or it can be something

philosophical like a way of life something new about Buddhism"

To get placed at top-notch companies provided the nature of work is of student's choice.

The students from fourth year which is last year of their graduation expressed that at the time of placement process, the peers were really helpful and they learned so much within few days. They worked on their communication skills in group, specially improving English. They practice mock tests and did mock interview with each other. Further, they learned the demanding skills for the companies which they were targeting such as coding and other technical skills.

Experience shared by one student in case of placements is as follows:

> "so, one incident was for the placements, so we have to prepare for that in the seventh semesters, we don't focus much on the courses but we focus more on placement. So, we prepare for that. For exam, at that point of time there are like job preparation books are there, so in that we two to three friends learned together, that learning was great. So, we worked for 4 months and we learn those things which we didn't done in the last 3 years. Example for that is, we were doing coding, solving puzzles, so these are the things."

To tackle the difficulty level of exams and assignments with the help of peers

Most of the students said, that at time of exams which is required for their degree of graduation, peer learning was highly efficient and extremely helpful. They were able to learn with high focus and concentration in the peer group which many times saved them and helped in scoring well. They signify that the quantity of learning they did in class was significantly less than the learning they did in peer learning before the day of exams. The doubts which get compiled also gets clear fast and accurately with peers while learning and they answer in exact way as can understand it easily.

Experiences of peer learning at the time of exam are as follows:

> "so, there are few subjects, most of us, because it is not so much helpful so we don't go to the class or bunk classes, we don't listen class. So in those process, I think Peer learning is very helpful because if like we are 5 student are sitting

together and some of us have mastered some section of the overall syllabus then it is a common thing that we used to teach our self, we teach each other about the thing that we have done . so that is really very helpful."

"During exams time got a lot of doubts and even they have got the same doubts and you just start discussing that and then mutually those doubt gets clear. Now if you try to think that individually you will not be able to solve that particular thing. Through discussion you are able to solve that."

Exploration of Interest

Students discloses that they don't only learn at the time of exams or placements but also when they want to work on something of their own interest. They participate in different competitions which are useful for their career. With the peers when they start working on some project, they find that they can think critically by questioning existing knowledge as well as they are able to solve one problem in different manner. One of such experience is shared by one of the students as follows:

"There is this coding competition it's given in a team of three so like I really enjoyed the practices and experience we have then because there were set of questions you have to solve, if I go to solve those question of my own probably I would not have a success rate that high as you would individually than what we achieved together. Its great to bounce of ideas of a person and then they say something you get new idea and then you say something they idea of that, it builds an idea. That's really cool. So, it was one of the nicest experiences I had".

Peers who scores well are not only peers to learn, students learn from peers whose experience is different from us

Students revealed that they don't look up for learning to the peers who scores well rather they look up to learn from peers whose experience and activities are different from them, even sometimes the presence of peer can teach them. Students perceive learning as a broad concept where they are learning through observing people, interacting with them and also through learning with them.

One of the students' expression exhibit it all.

> **"**So, it's not the case that you can only learn from the persons who are good in exams and all. We have a very broader way of learning. Like also from this, we learn so many activities from our peers. There are many girls in my hostel who are very good at various activities they are performing like dance, drama, painting may be quizzing, may be debating and all, may be singing and then in sports we have very good athletes, like I never realized that a person like me who is working for JEE, I am a Maggu (the person who only studies and do nothing else) but then I realize which kinds of people are present here, like they are, we also have national champion in our batch, how this is possible like someone is national level champion, someone is master in chess, someone is great athlete and all, we have variety of people here. There is a girl in our hostel named Shivani. She can read one novel per day. It's a very high speed. And if you start to have discussion with her on any topic, you have to sit down and you have nothing to say because she has so much knowledge about each and everything, how this is possible, like this is unbelievable. And along with JEE, we have many students who went to Japan and other countries in their 8th/9th class representing their school. There are many who are very good at dance like Kathakkali, Bharatnatyam etc. I can't say how many fields they are good at, it's a spectrum of thing. Spectrum you can understand? Yeah for example, in prism if we pass light then there is spectrum which contains different colours of light. So, I can say it's a band of properties. You can learn anything; you can't give me one thing which can't be learned here or present in IIT. Every type of activity like my roommate, they are very active in drama, they do street play, drama and all. Someone is playing squash, someone is athlete, someone is in swimming and many more."

Peer Interaction can be both positive as well as negative

Some students conveyed through their interview that peer interaction can be negative as well as positive. It depends on the person's perception and on the other peer's perception about things. It's how they perceive things.

It basically depends upon how and with whom you are interacting as peer, because in

my case I have experienced a lot of differences. It has positive as well as negative impact, it totally depends on the person you are talking with, if the person is positive enough, you will feel energized, inspired and happy but if the case is reverse, then it has negative impact as well. So, in peer Interaction also, it's more important that with whom you are interacting.

4.3.2. Positive Peer Interaction

Students shows a strong agreement that the peer interaction is important for them to grow and learn. They said that positive peer interaction is very helpful for them not only academically but non academically as well.

Perspective Richness

Students found that it can be possibility that solving a problem in a particular perspective might be tuff but with the help of peers, it becomes possible to think about that problem in many different ways. With peers we get to introduced to different perspectives, it extends their horizon of thinking and it helps them to think creatively.

Efficiency of learning increases

Students displayed in their interviews that with the learning in peer group which is really focused and clear about aims to achieve, five to six hours make us learn a lot, they found themselves very active in learning and also, they found that they doing things fast. Students found that when they study with peers in group in informal settings, learning becomes easier to them, and indicated that lecture mode is good for proving insights but through discussion with their peer they understand it in depth.

Saviour at times when educational objective seems impossible to complete

At the time when students found that they are unable to work on assignment because of the difficulty level, peers are there to save them from getting repercussion of not submitting them. They give time and try to make them understand everything form scratch. At times when exam is just after one day or two day, and if there is any student who is not able to prepare for exam then they go for help to peer learning.

Seniors guides to different clubs, societies, academics and placement

Students displayed the gratitude towards their seniors because of their role in making them familiar and comfortable with the totally new and different life they encounter at initial time of their graduation. Seniors introduce them to different clubs and societies existing in the campus, they motive juniors to join the clubs and societies. Through these activities junior students get familiar with people and place in the campus. Through different leadership roles in the clubs and societies, student learns leadership, networking and organising events.

In case of academics, senior guides junior students, they tell them effective way to prepare for different courses, how to improve grades, what was they studied in previous courses and which professor will give which kind of assignment.

In case of career, at the time placements and internships senior students guide them what to study and prepare for placement. What body language and words need to be used to impress the person who is hiring. What to take care in group discussion and lot more on how to choose company to sit in placement.

Students felt that peer interaction is important for them and in later years (Such as third year or fourth year) they found it as highly essential. However, some students feel that learning comes at a cost, because the more you want to understand something, then you are always going to miss something. That's why a lot of theoretician are not earning enough, they know everything but have nothing practically. A lot of people who just know how to market their stuff, don't do much, they might not learn much but they know how to present to other people

4.3.3. Negative Aspects of Peer Interactions

During the peer interaction of the students, it is not always the good picture but negative peer interaction also occurs with the students. Negative peer interaction refers to the interaction which unpleasant for students. The negative peer interaction actually hinders the bonding between some students.

Students when they talk to peers about some topic, they find unpleasant interaction

when their peer try to show that they know everything or they are not receptive to others talk. Students feel good when there is equal power dynamic over discussion. There is need of respect everyone's knowledge.

In some cases, peers found that peer learning creates disturbance and they don't study because of that time get wasted. So, from next time they avoid going into that group. When the group is made by the professor and assignment is given to students, many times all group members don't work and only one or two is working for the assignment because they want to learn. In this way some students work but some just act as free rider.

Many times, students decide to study in group, they get together for study but because the deadline of the assignment or exam is far, then they we start talking different things and we don't study at all.

Students also avoid spending time when a student don't know about the topic but then also talking on the topic which is not relevant to the topic. He or she just try to pretend that they know the topic very well.

Students avoid going to the peers who they found unhelpful or with whom they feel they are getting judged. Sometimes students decide to meet and study but due to someone in the group they just go outside and not study at all. Due to peer pressure students do things which they don't want to do.

Many times, students get together for study but random discussion starts or do something else other than study and time gets wasted. In case of seniors sometimes there is some sort of professionalism which creates boundaries to ask or share with them. One student said that on peer learning that "It leads to some extra learning but with a slow pace when compared with the conventional solo learning."

At the end of this chapter of where we discussed students' perception of learning, students' experience of learning alone, positive peer interaction and negative peer interaction. Now we will move to next chapter named Positive Influences of Peer Interaction on Students' Learning Experience. In this chapter we will focus on positive influences of peer interaction as this is one of the primary conditions for self-organised learning among undergraduates.

Chapter 5: Positive Influences of Peer Interaction on Students' Learning Experience

Positive influences of peer interaction on students is crucial for the learning and growth of students where they can explore, learn and experiment. So that they can enhance their critical thinking, communication skills and other skills required in their field of study. This chapter presents you the opinion and attitude of higher education students about different types of influences they found positive due to peer interaction which lead to enhancement of their skills, got social and psychological support. On the basis of analysis of collected data both from 25 interviews(Conventional content analysis using ATLAS.ti software) and 63 questionnaire ; positive influences of peer interaction are divided into two categories, first is social and psychological support and second category is support for professional learning and career.

Students have experienced positive influence of peer interaction which can be categorised in two categories which is social and emotional support and other is learned skills which are helpful in career. There are total fifteen factors (five factors for the first category and ten factors for the second category) which researcher found as positive influence of peer interaction on the basis of literature review. Students gave answers for all fifteen factors through filling questionnaire. We will discuss each factor and will understand that what students think about these factors. The responses are illustrated through tables and through histograms.

Let's discuss each factor both of the categories one by one in details extensively.

5.1. Social and Psychological Support to Students

In case of social and psychological support, students find relevance of peer interaction when they feel helped at time of crisis, motivation for study, start adapting other good habits, feeling of trust where they can share their things etc. Some of the statements given by students are as follows which indicates the social and psychological support due to peer interaction:

"It helps u get out of your bad habits"

"It makes us confident, and it reduce hesitation"

"I believe that it definitely helps but one should be positive enough to take things positively."

We will explore five factors of social and psychological support which students found helpful for their emotional wellbeing and for social relations. The following five factors were examined which are listed below and discussed in detail one by one.

1. **Increased Confidence:**

   Student's reported that with the help of peer interaction of positive nature, their confidence increased over the period of time they spent learning with peers. As their hesitation reduced to talk to different people, they begin to get clear understanding of the academic content and due to support of their peers, they felt comfortable in overall experience of the campus life.

   The increased in confidence, helped students to ask for doubts from the peers as well as to teacher and other than that it helped them in networking with people. You can refer to table 6.01, 6.02 and figure 6.01 for students' opinion on this factor of positive influence of peer interaction.

   Out of total sixty- three students, total twenty -two students strongly agreed, thirty- three students agreed, six were neutral, one disagreed and one strongly disagreed. This shows that almost all students believed that peer interaction has increased their confidence. Minority of students don't feel that effects their confidence in any way.

Increased Confidence	frequency
Agree	33
Disagree	1
Neutral	6
Strongly Agree	22
Strongly Disagree	1
Grand Total	**63**

Table- 5.01 *Increased Confidence*

Positive	**87.30%**
Neutral	**9.52%**
Negative	**3.17%**

Table- 5.02 Result *Increased Confidence*

87.30% students expressed positive opinion, **9.52%** students expressed neutral and **3.17%** students expressed negative opinion for Increased Confidence.

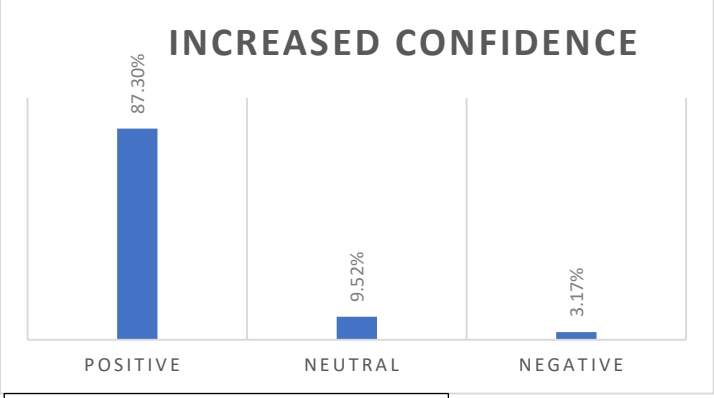

Figure- 5.01 *Increased Confidence*

"I lack in self-confidence and always underestimate myself but it's due to peer interaction which give me confidence and help to get rid of fear of interaction with strangers and many more things like that."

These words from students efficiently demonstrate, that how much peer interaction becomes important for students living in campus environment.

2. **Sense of Belongingness:**

Students' expressed that when they start making friends and begins to talk to people staying with them in the campus, it helps them in adapting to the new ways of living and feel comfortable in accommodating the cultural differences they find in the campus life. You can refer to table 6.03, 6.04 and figure 6.02 to find out what students reported in the questionnaire collected for the study.

Out of total sixty-three students, twenty-six students strongly agreed and twenty-five students agreed that due to peer interaction their sense of belongingness has been positively influenced. Although, three students disagreed and eight students think that this is not applicable in their case, this implies that there is no connection between sense of belongingness and peer interaction.

Sense of Belongingness	frequency
Agree	25
Disagree	3
Neutral	8
Not Applicable	1
Strongly Agree	26
Grand Total	**63**

Table-5.03 *Sense of Belongingness*

Positive	**80.95%**
Neutral	**12.69%**
Negative	**4.76%**

Table-5.04 Result- *sense of Belongingness*

80.95% students expressed positive attitude, **12.69%** students expressed neutral and 4.76**%** students expressed negative attitude for topic *Sense of Belongingness.*

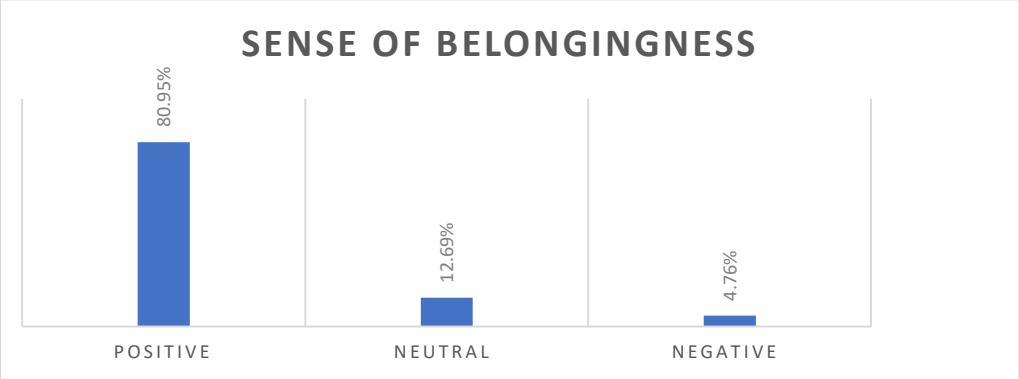

Figure-5.02 *Sense of Belongingness*

Students felt that they have their peers as people to fall back on. Sometimes they go to them just for the company and do their own individual study. They feel sometimes company of peer is enough to motivate them in difficult situations and even their presence made them feel supported. Following words of a student's expresses it in easy way.

"It is very helpful especially in times of distress when one feels demotivated and depressed, they provide mental support."

"It builds bond and trust in people around and makes me emotionally stronger and helps me becoming confident."

3. **Helped me working in collaboration with peers:**

   Students' described that before coming to IIT, Delhi for graduation, mostly they used to learn alone and peer learning was less in their earlier learning experience. But when they start living in the campus, the situation shaped in such manner that sooner or later they had to collaborate with their peers to complete some assignment, project or to learn fast and clear lot of doubts. In addition to that for participating in some competition for extra-curricular activities or for some project of new technologies which is not their part of the course, students started collaborating with peers. Through this practice, they learned how to effectively and efficiently work in group with collaboration by dividing the responsibilities and how different approach for same goal can increase the value of work or activities they are performing. To know that what

students disclosed about working in collaboration with peers, you can refer to table 6.05, 6.06 and figure 6.03.

Out of total sixty-three students, twenty-nine students strongly agreed and twenty-two students agreed that peer interaction helped them to learn working in collaboration with peers. Although, ten students don't feel that there is any impact of peer interaction on their learning to work in collaborative manner with peers, there was one student who disagree with this and one student feel that this is not applicable in their case.

Helped me working in collaboration with peers	frequency
Agree	22
Disagree	1
Neutral	10
Not Applicable	1
Strongly Agree	29
Grand Total	**63**

Table- 5.05 -*Helped me working in collaboration with peers*

Positive	**80.95%**
Neutral	**15.87%**
Negative	**1.58%**

Table- 5.06 *Helped me working in collaboration with peers*

80.95% students expressed positive attitude, **15.87%** students expressed neutral and **1.58%** students expressed negative attitude for factor 'Helped me working in collaboration with peers', see table 6.06

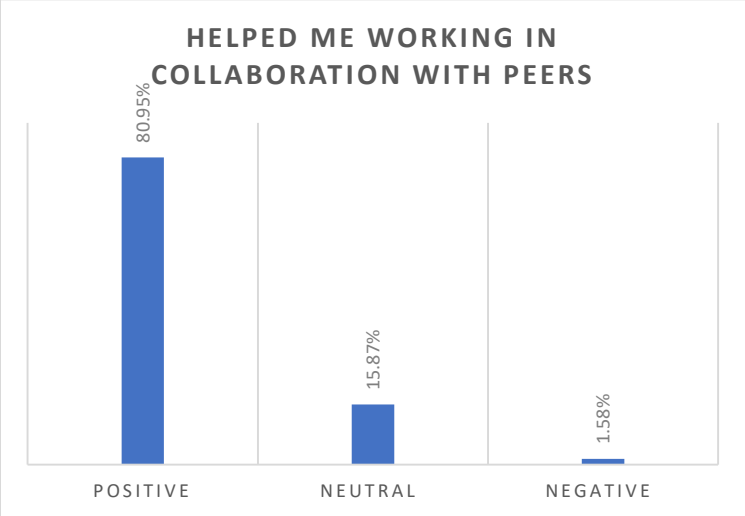

Figure -5.03- *Helped me working in collaboration with*

Students felt that there is lot of pressure to score well, its competitive pressure. When they find the peers to learn with and who are ready to help, the competitive pressure is shared with the peers. The competition goes away, although it's not fully goes away. It becomes a good and healthy combination of competition and sharing. But students realised that competition doesn't help them grow, although it may help in achieving something. Students feel that if growth is not present then it is not useful. They started understanding the importance of collaboration with peers and it helped them in academic as well as in non-academic learning. One of the students says "I got skills through interaction and collaboration with peers."

4. **Good understanding of different culture:**

   Student revealed that once they started talking, discussion and learning with peers, it also led them to know about different culture about which they were not familiar earlier such as festivals of different states, language, food, dance, dressing style and even the way people live in the villages. This also helped them reducing their biases and judgment about different culture. Their contacts increased as the peers with whom they are interacting are also interacting and peers functioned as medium to interact with large number of peers. To find out more you can refer to table 6.07, 6.08 and figure 6.04.

   Out of total sixty-three students twenty-seven students strongly agree and twenty-six students agrees that due to peer interaction, they have good understanding of different culture. However, nine students feel that peer interaction has no influence on their understanding of different culture and one student disagree with the statement that peer interaction lead to his/her good understanding of different culture.

Good Understanding of different culture	frequency
Agree	26
Disagree	1
Neutral	9
Strongly Agree	27
Grand Total	**63**

Table-5.07- *Good Understanding of different*

Positive	**84.12%**
Neutral	**14.28%**
Negative	**1.58%**

Table-5.08- Result-*Good Understanding of different culture*

84.12% students expressed positive attitude, **14.28%** students expressed neutral and **1.58%** students expressed negative attitude for factor Good Understanding of different culture

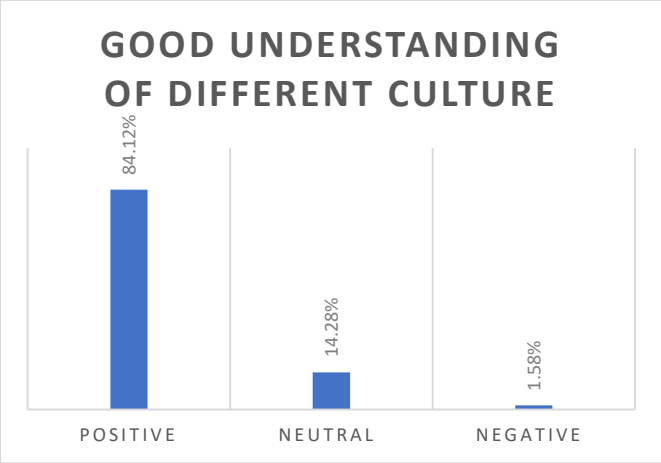

Figure-5.04- *Good Understanding of different culture*

There are students for whom village life is totally new thing, for some the culture of different state is new things. So, they get familiar with different cultures geographically and ethically. Such as what happens there, what are different food habits, different festivals, different dance, clothing etc and how differently people live and speaks various languages.

5. **Enhanced belief on my ability to learn:**

Students experienced that with the help of peer's their belief on their ability to learn improved because of the peer interaction. One reason is interacting with peers builds their personality. Other reasons are with peers they perform many extracurricular activities which increase their confidence to learn and give sense of growth to them which was absent when they didn't interact much with peers. Peers also motivates them to learn new things and support them in learning. These all positive realisations enhance their belief on ability to learn. To find out more on the attitude and opinion of students on this factor you can refer to table 6.09,6.10 and figure 6.05.

Out of total sixty - three students, although sixteen students felt that peer interaction has no connection with their belief on their ability to learn. One student strongly disagreed and one student disagreed that peer interaction has any enhancing effect of their ability to learn belief. Twenty-six students strongly agreed and nineteen students agreed that peer interaction helped them increasing their belief on their own ability to learn.

Enhanced the belief on my ability to learn	frequency
Agree	19
Disagree	1
Neutral	16
Strongly Agree	26
Strongly Disagree	1
Grand Total	**63**

Table- 5.09- *Enhanced the belief on my ability to learn*

Positive	**71.42%**
Neutral	**25.39%**
Negative	**3.17%**

Table- 5.10- Result- *Enhanced the belief on my ability to learn*

71.42% students expressed positive attitude, **25.39%** students expressed neutral and **3.17%** students expressed negative for Enhanced the belief on my ability to learn

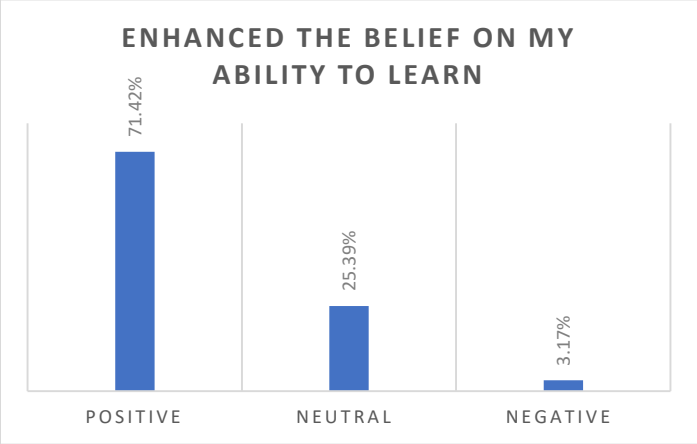

Figure-5.05- *Enhanced the belief on my ability to learn*

5.2. Support for Professional Learning and Career

Students needs to have enabling environment for learning and developing skills which can help them in developing various skills for their success in career as well as in academic terms. The interaction between students creates effective learning environemnt for learning skills and constructing knowledge. With the peers students interact, negotiate and questions each other while learning. This leads students to learn in depth and that knwledge is used on different occasion of exams, competitions, palcement, interacting with teachers and discussion with peers as well.

We will explore ten factors one by one which falls under category of support for professional learning and career which students found helpful for their professional and carrer growth. The following ten factors of positive influence of peer interaction are examined under this category 'support for professonal learning career' listed below and all the factors are analysed and dicussed individually.

1. **Improved Verbal Communication:**

   Students in initial times of their graduation felt the difficulty in interacting with peers and other people, in this situation's seniors made them comfortable and tried to make them familiar and calm. They explained to them that how it is different from school life and how to communicate to other peers. They also informed them the significance of interaction with peers. At the time of placement, students themselves organised groups to practice speaking English

so that they can face the interview and it helped them a lot. When the students spend some months in the campus life, slowly slowly they start interacting with peers as well as with seniors. Through frequent interaction with peers and through peer learning, students learned communication skills which helped them in their professional life. Students reported that they have learned a lot about the communication skills and the ways to communicate professionally. To find out more on students' opinion on this factor you can refer to table 6.11, 6.12 and figure 6.06.

Out of total sixty-three students, thirty-five strongly agreed that their verbal communication improved due to peer interaction. Twenty-three student agreed that their verbal communication improved although there were three students who don't feel that peer interaction have any affect in their verbal communication. Two of the students feel that peer interaction doesn't enhance their communication skills. Majority of students feels that their verbal communication has been improved due to peer interaction.

Improved Verbal Communication Skills	frequency
Agree	23
Disagree	1
Neutral	3
Strongly Agree	35
Strongly Disagree	1
Grand Total	**63**

Table-5.11-*Improved Verbal Communication Skills*

Positive	**92.06%**
Neutral	**4.76%**
Negative	**3.17%**

Table-5.12-Result- *Improved Verbal Communication*

92.06% students expressed positive attitude, **4.76%** students expressed neutral and **3.17%** students expressed negative attitude for Improved Verbal Communication skills

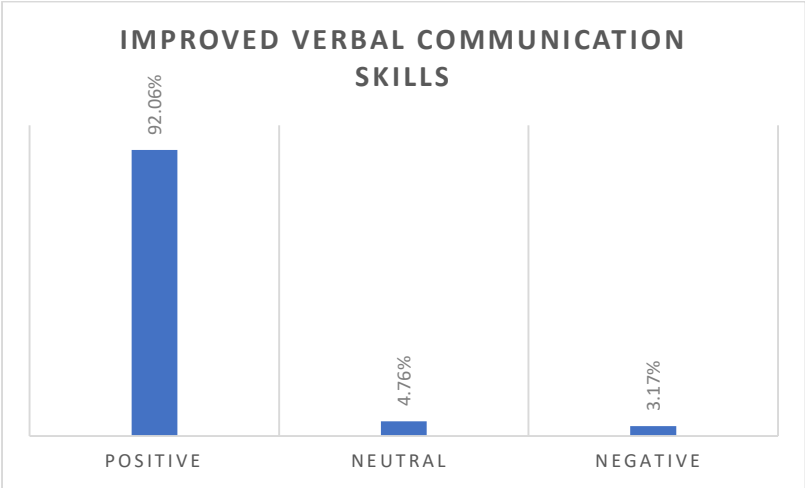

Figure-5.06- *Improved Verbal Communication Skills*

2. Improved Written Skills:

Students described that to score well as well as to present ideas written skills are important to learn and improve, in this regard peers are helpful, however only 39.68% of students expressed that peer interaction is helpful for improving written skills. We can interpret that large proportion of students didn't think that peer interaction is very helpful in improving communication skills. To find out more on this factor you can refer to table 6.13, 6.14 and figure 6.07.

Out of total sixty- three students nine students strongly felt that due to peer interaction their written skills improved and sixteen students felt that they also agree that peer interaction helped them improve their written skills. However, twenty-eight students said that there is no impact of peer interaction on their writing skills. Seven students felt that they don't think that peer interaction has any positive effect on their writing skills. One student strongly disagrees with this component and two students felt that it is not applicable in their case.

Improved Written Skills	frequency
Agree	16
Disagree	7
Neutral	28
Not Applicable	2
Strongly Agree	9
Strongly Disagree	1
Grand Total	**63**

Table-5.13- *Improved Written Skills*

Positive	**39.68%**
Neutral	**44.44%**
Negative	**12.69%**

Table-5.14-Result- *Improved Written Skills*

39.68% students expressed positive attitude, **44.44%** students expressed neutral and **12.69%** students expressed negative for Improved Written Skills

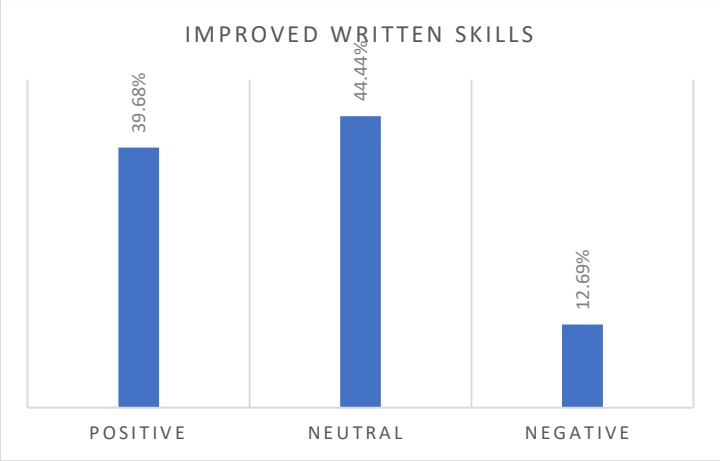

Figure-5.07- *Improved Written Skills*

3. **Helped me working with productivity:**

Students felt that peer learning actually increased their productivity because of the two reasons. One reason is that when studying alone, doubts gets complied and sometimes students just leave the topic because they are not able to grasp or keep it for later. It actually made them leaves them without completing the topics, but in case of learning with peers' students can clear the all doubts at the time it emerges by asking to their peers. This helps them in maintaining flow of the study and concepts gets clear, which eventually increase their learning speed. Additionally, even if students study alone and have doubts but when they go and ask to their friend's doubts, it gets cleared and increase their understanding of the concepts. Other reason is when students study with peers just before exams, in that case whoever is good at the subject they start teaching their own peers. Since they collaborate with peers, they are able to cover all the topics for exams and additionally they felt that those six to ten hours of study with peers proven to be more productive then lectures. Lectures are important because they provide insights but peer learning is great. To find out more on this factor what students reported you can refer to table 6.15, 6.16 and figure 6.08.

Out of total sixty-three students twenty students strongly agreed and twenty-four students agreed that due to peer interaction they started working in productive manner. Sixteen students felt that there is no change in their productive work style due to peer interaction. However, one student disagrees that peer interaction does not help in working in productive manner, one student strongly disagrees with the same and one student felt it is not applicable in their case.

Helped me working with productivity	frequency
Agree	24
Disagree	1
Strongly Disagree	1
Neutral	16
Not Applicable	1
Strongly Agree	20
Grand Total	**63**

Table 5.15 *Helped me working with productivity*

Positive	**69.84%**
Neutral	**25.39%**
Negative	**3.17%**

Table-5.16-Result-Helped me working with productivity

69.84% students expressed positive attitude, **25.39%** students expressed neutral and **3.17%**students expressed negative attitude for factor *Helped me working with productivity.*

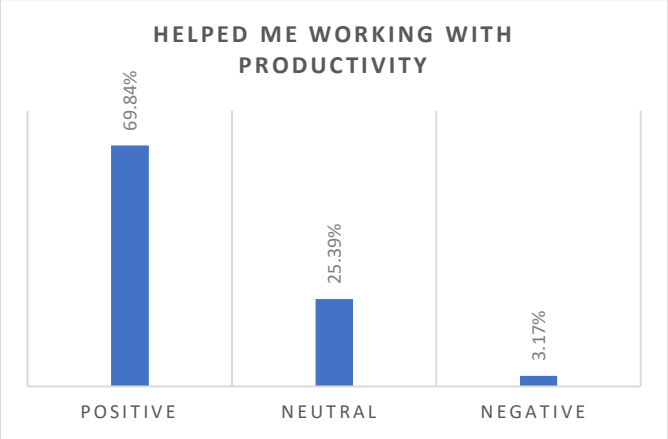

Figure-5.08- *Helped me working with Productivity*

4. Felt Supportive for Learning:

In case of support for learning from peers, students gave different insights they felt support for academic learning, non- academic learning and for the emotional support while having difficult time (Assignments is very difficult, or they are stuck in some subjects or unprepared for exams) due to exam pressure or to pursue own interest. In case of academic learning, students teach each other, clear doubts, and study together in case of if they are finding the topic of no interest. Such as understanding concepts, coding programmes, writing algorithm, helping each other in Working on assignments.

Then comes non-academic learning, this is learning of different philosophies which helps them in Indian context or of world such as Hinduism, Buddhism, happiness, Taoism etc., extracurricular activities, working in some clubs where they learn to work for people by helping them. Some students found these things of very interest and if they are studying it, then there are their peers who listens to them, discuss and again comes to them because they feel good and also get some understanding of life at philosophical level. It increases their horizons. In this scenario there are some students who don't go themselves and study these subjects but are ready to listen and have understanding of life because they found it helpful. Extracurricular activities help them for being emotionally as well as physically healthy.

Then there is emotional support which students feels such as they feel relaxed and not panic because they know in case of difficulty there are peers who will definitely help them and also students help each other in studying if there is problem of motivation to study or to do something which is beneficial for their life. One of the students conveyed this in the words as

"It helps to conquer on the doubts and to tackle the common doubts more efficiently." To find out more, you can refer to table 6.17, 6.18 and figure 6.09.

Out of total sixty-three students, twenty- one students strongly agreed and twenty-five students agreed that they feel support for learning due to peer interactions. However, fifteen students don't feel that peer interaction has any effect on the support they felt. One student disagree and one student strongly disagree that implies that peer interaction doesn't have positive effect on support for learning.

Felt Supportive for learning	frequency
Agree	25
Disagree	1
Neutral	15
Strongly Agree	21
Strongly Disagree	1
Grand Total	**63**

Table -5.17- *Felt Supportive for learning*

Positive	**73.01%**
Neutral	**1.58%**
Negative	**25.39%**

Table- 5.18- Result-*Felt Supportive for learning*

73.01% students expressed positive attitude, **1.58%** students expressed neutral and **25.39%** students expressed negative attitude for factor Felt Supportive for learning

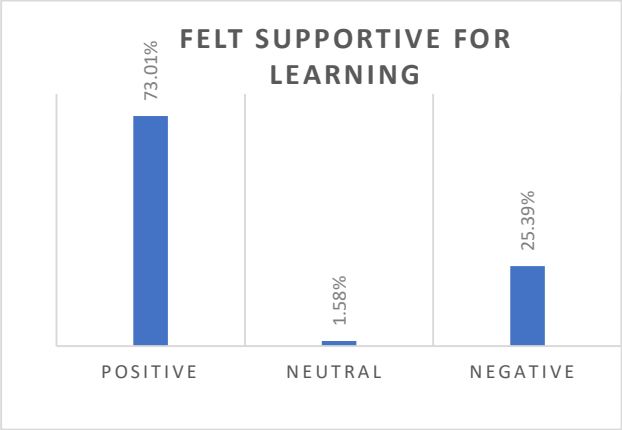

Figure-5.09- *Felt Supportive for learning*

5. **Learned about career goals and opportunities:**

Students discuss with their peer about career goals and opportunities. They also have deep discussions about their fears, interest, skills and about the exposure they get in the campus through different talks and conferences on various topics. They try to figure out that what they should focus on to learn at this stage of their life or how they should prepare and who will be helpful to reach to for the guidance. One student expressed feeling in the short but powerful words. “It's great, you got to see what people like you are dreaming about.” “Got introduced to new areas of study.” To find out more on what students reported for this factor, refer to table 6.19, 6.20 and figure 6.10.

Out of total sixty-three students, twenty-six students strongly agree and twenty-six students agrees that due to peer interaction, they learned about career goals and opportunities. However, ten students felt neutral about this and one student disagrees with this statement.

Learned about career goals and opportunities	frequency
Agree	26
Disagree	1
Neutral	10
Strongly Agree	26
Grand Total	**63**

Table-5.19-*Learned about career goals and opportunities*

Positive	**82.53%**
Neutral	**15.87%**
Negative	**1.58%**

Table-5.20-Result-*Learned about career goals and opportunities*

82.53% students expressed positive attitude, **15.87%** students expressed neutral and **1.58%** students expressed negative attitude for factor *Learned about career goals and opportunities.*

Figure-5.10- *Learned about career goals and opportunities*

6. **Identified the self-interest on career choice:**
Students found that they are able to identify the self-interest on career choices with the help of their peers. So, when students discuss different topics, subjects with their peers (seniors or juniors) through just simple interaction or through

different clubs such as robotics club or other clubs, they are able to identify their own interest. Students discusses their projects with each other in details, in this way they actually help each other and work on their interests. They have conversations about their future and what they can do. These detailed conversations actually work in favour of students to identify their interests. Sometimes while teaching to each other different academic topics also they figure out that their interests. One of the important conditions for these interactions were that they were free to discuss without any rules.

One student identified his interest for career while peer learning:

"it was in fifth semester, when I was studying properly, and my peer were unprepared. So, I sat one night before the exam and I taught them, then I realised that teachings makes you understand well and my Interest also lies in in teaching. So, I started thinking of it as a career option. After that I started teaching in last year also." To find out more what students reported refer to table 6.21, 6.22 and figure 6.11.

Out of total sixty-three students, eighteen students strongly agree and twenty-one students agrees that peer interaction lead them to identify their self-interest on career choice. However, twenty-one students responded neutral that means they don't find peer interaction has any effect on their identification of self-interest on career choice and three students disagrees that peer interaction helped them to in identifying the self-interest on career choice.

Identified the self-interest on career choice	frequency
Agree	21
Disagree	3
Neutral	21
Strongly Agree	18
Grand Total	**63**

Table- 5.21- *Identified the self-interest on career choice*

Positive	**61.90%**
Neutral	**33.33%**
Negative	**4.76%**

Table- 5.22- *Result- Identified the self-interest on career*

61.90% students expressed positive attitude, **33.33%** students expressed neutral and **4.76%** students expressed negative attitude for factor- *Identified the self-interest on career*

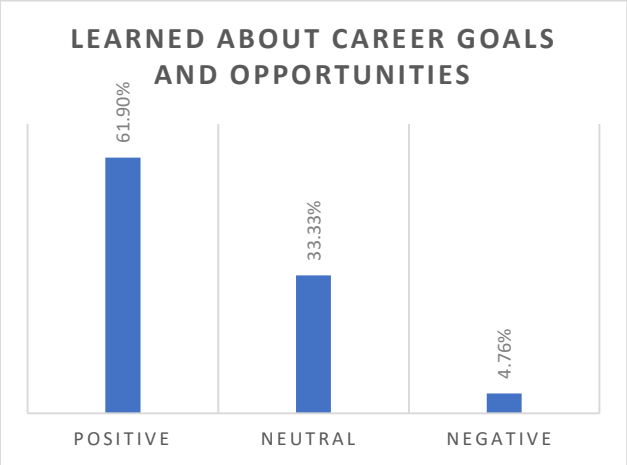

Figure-5.11- *Identified the self-interest on career*

7. Found Classroom lectures interesting after peer interaction:

While talking about influence of peer interaction on understanding of classroom lectures, students described that when they interact with their peers on the topic to be taught in the class or on the topic taught in the class, they are able to relate their discussion with classroom lectures. It helps them to understand the concepts as well as it helps them to increase the in-depth discussion on the topic with the peers further. To find out more on what students reported you can refer to table 6.23, 6.24 and figure 6.12.

Out of total sixty-three students nineteen students strongly agreed and twenty-two students agreed that due to peer interaction, they found classroom lectures interesting. Although, thirteen students felt that peer interaction had no influence on their interest of classroom lectures, five students strongly

disagreed, two students disagreed with the statement and two students felt that it is not applicable in their case.

Found classroom lectures interesting after peer interaction	frequency
Agree	22
Disagree	2
Neutral	13
Not Applicable	2
Strongly Agree	19
Strongly Disagree	5
Grand Total	**63**

Table-5.23-*Found classroom lectures interesting after peer interaction*

Positive	**65.07%**
Neutral	**20.63%**
Negative	**11.11%**

Table-5.24-Result- *Found classroom lectures interesting after peer interaction*

65.07% students expressed positive attitude, **20.63%** students expressed neutral and **11.11%** students expressed negative for *Found classroom lectures interesting after peer interaction*

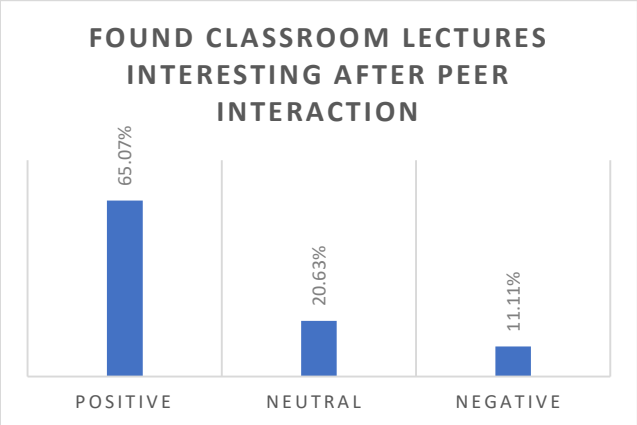

Figure-5.12- *Found classroom lectures interesting after peer interaction*

8. Became more active in learning process:

Students expressed that because of the peers they became more active in learning process. They enjoy interacting with peers about different subjects and different topics because they also found the enthusiasm in the whole process. They start getting deeper into different topics because of their discussion with their peers. This leads to adopting the habit of going deeper and understanding topics. Further, student able to develop habits of learning which is useful for effective learning such as if they are not feeling motivated, they ask to their peers to study with them or how to increase the studying time without distractions. They learn different efficient ways to learn. In informal way they feel learning becomes much easier and fun because peers are usually at same stage in learning, they can involve in great manner with the questioning and clear doubts. Sometimes, it led them to go beyond texts. Also, before exams also due to peer interaction process of learning they found themselves really active in learning. To find out more on what students reported you can see the table 6.25, 6.26 and figure 6.13.

Out of total sixty- three students eighteen students strongly agreed and thirty-three students agreed that due to peer interaction they became more active in learning process. However, eight students responded neutral that implies that they didn't find peer interaction impacted in any way in their learning process. Two students disagreed with the statement and one student felt it is not applicable in his/her case.

Became more active in learning process	frequency
Agree	33
Disagree	2
Neutral	8
Not Applicable	1
Strongly Agree	18
Strongly Disagree	1
Grand Total	**63**

Table-5.25- *Became more active in learning process*

Positive	**80.95%**
Neutral	**12.69%**
Negative	**4.76%**

Table-5.26- Result- *Became more active in learning process*

80.95% students expressed positive attitude, **12.69%**students expressed neutral and **4.76%** students expressed negative attitude for factor *Became more active in learning process.*

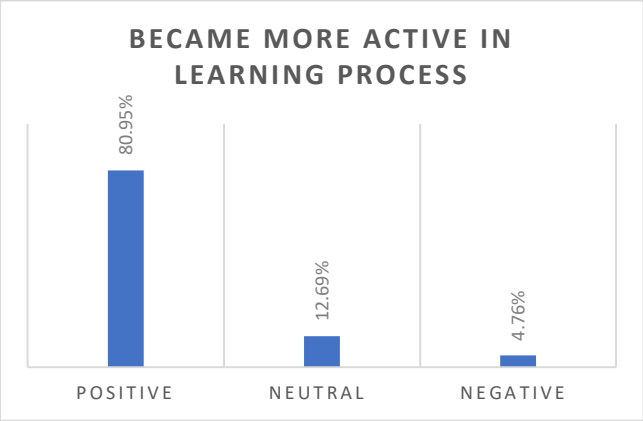

Figure-5.13- *Became more active in learning process*

9. Learned about new ways of learning:

Students experienced that due to peer interaction and peer learning, they learned new ways of learning from the learning styles of their peers. For instance, some of the peers have habit of learning everything in details and it's like starting learning any topic from scratch. Some of the peers first solve the problem and then understands theory. This makes their understanding of the topic very clear and in depth. Some of the peers always start explaining topics from basic level, without assuming that other knows the basics, students learned to explain efficiently the topic. They learned different ways of approaching the problems to solve. To find out more you can refer to table 6.27, 6.28 and figure 6.14.

Out of total sixty- three students, twenty-three students strongly agreed and twenty-five students agreed that they learned about new ways of learning. But fifteen students also felt that peer interaction has no influence on learning new ways of learning.

Learned about new ways of learning	frequency
Agree	25
Neutral	15
Strongly Agree	23
Grand Total	**63**

Table-5.27-*Learned about new ways of learning*

Positive	**76.19%**
Neutral	**23.80%**
Negative	**0%**

Table-5.28-Result-*Learned about new ways of learning*

76.19% students expressed positive attitude, **23.80%** students expressed neutral and **0%** students expressed negative attitude for factor - *Learned about new ways of learning.*

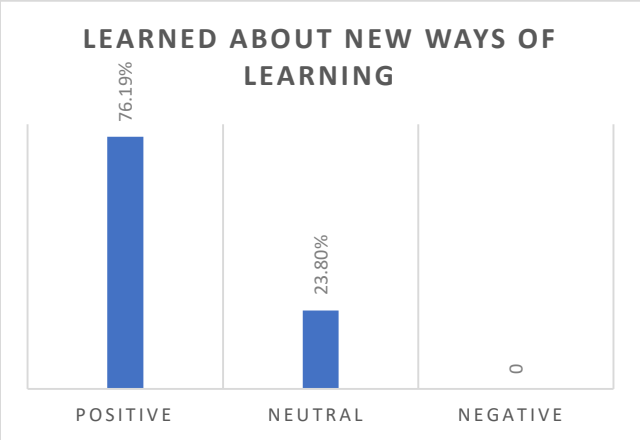

Figure-5.14- *Learned about new ways of learning*

10. Enhanced critical thinking:

Students felt that due to peer interaction their critical thinking improved because they got to know different perspectives and also started questioning things that why something exists in the way it exists. They start questioning notions, norms and perception of most of the things rather than accepting everything as the way it exists.

For example, gender, why people don't accept the LGBT communities, and why people are homophobic whether we need to not always obey the things which we are supposed to obey. Just discussion for solving one problem in different ways with peers makes students to think critically and question the theory and concepts itself. With peers we try and then try in different ways. Following statement of words reflects what we just discussed now. "They became familiar and understood multiple perspective." To find out more you can refer to table 6.29, 6.30 and figure 6.15.

Out of total sixty-three students, twenty-five students strongly agreed and twenty-eight students agreed that peer interaction enhance their critical thinking, although ten students don't feel that peer interaction has any influence on their critical thinking.

Enhanced the critical thinking	frequency
Agree	28
Neutral	10
Strongly Agree	25
Grand Total	**63**

Table-5.29- *Enhanced the critical thinking*

Positive	**84.12%**
Neutral	**15.87%**
Negative	**0%**

84.12% students expressed positive attitude, **15.87%** students expressed neutral and **0%** students expressed negative attitude for Enhanced the critical thinking.

Table-5.30- *Result-Enhanced the critical thinking.*

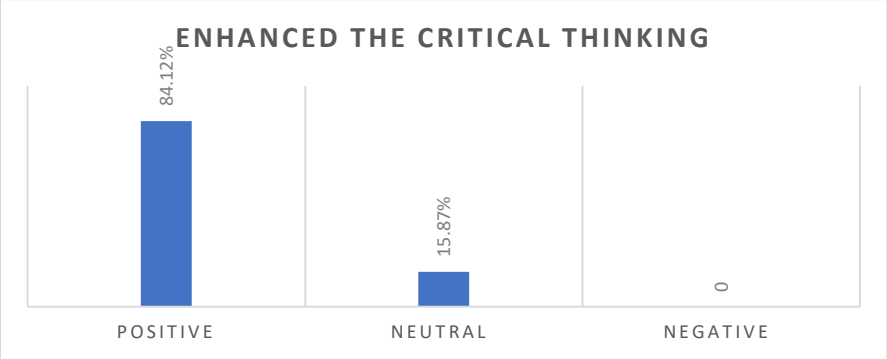

Figure-6.15-*Enhanced the critical thinking*

To show the results obtained from factors all together, the result for the factors of each category has been illustrated below in the table 5.31 'Positive influence of peer interaction' in aggregated form. The responses from students divided into three categories of positive, neutral and negative. We have already discussed these factors individually, here it is shown in aggregated manner. These three categories indicate the student's perception of different factors of positive influence of peer interaction.

-

Positive Influence of Peer Interaction			
	Opinion of Students		
Category I : Social and Psychological Support to Students	**Positive**	**Neutral**	**Negative**
Increased Confidence	87.30%	9.52%	3.17%
sense of Belongingness	80.95%	12.69%	4.76%
Helped me working in collaboration with peers	80.95%	15.87%	1.58%
Good Understanding of different culture	84.12%	14.28%	1.58%
Enhanced the belief on my ability to learn	71.42%	25.39%	3.17%
Category II: Support For Professional Learning and Career			
Improved Verbal Communication Skills	92.06%	4.76%	3.17%
Improved Written Skills	39.68%	44.44%	12.69%
Result-Helped me working with productivity	69.84%	25.39%	3.17%
Felt Supportive for learning	73.01%	1.58%	25.39%
Learned about career goals and opportunities	82.53%	15.87%	1.58%
Identified the self-interest on career	61.90%	33.33%	4.76%
Found classroom lectures interesting after peer interaction	65.07%	20.63%	11.11%
Become more active in learning process	80.95%	12.69%	4.76%
Learned about new ways of learning	76.19%	23.80%	0%
Enhanced the critical thinking.	84.12%	15.87%	0%

Table 5.31: Positive influence of peer interaction, aggregated (Source: data analysed for the study, can refer to questionnaire in appendix)

As a whole picture we can see that all the fifteen factors have positive influences of peer interaction on students learning experience. To draw meaning from this table, the bar diagram (Figure 5.16) shown below shows that which factor of positive influence of peer interaction is rated more positive in opinion of students, this implies that factors from most effective in influencing the learning experience of students. You can see that improved verbal communication skills (92.06%) is highly influential factor of positive peer interaction, followed by increased confidence (87.30%). In addition to that enhanced critical thinking (84.12%), good understanding of different culture (84.12%), learned about career goals and opportunities (82.53%) also rated influential by students. Further, become more active in learning process (80.95%), helped me working in

collaboration with peers and sense of belongingness (80.95%) are equally influential. When we move further then learned about new ways of learning (76.19%), felt supportive for learning (73.01%) and enhanced the belief on ability to learn (71.42%) are rated little bit less in comparison of earlier mentioned factors. Helped working with productivity (69.84%), found classroom lectures interesting after peer interaction (65.07%) and Identified the self-interest on career (61.90%) are less than 60% but has significant influence. Lastly, students reported improved written skills (39.68%) as the least influential of positive peer interaction.

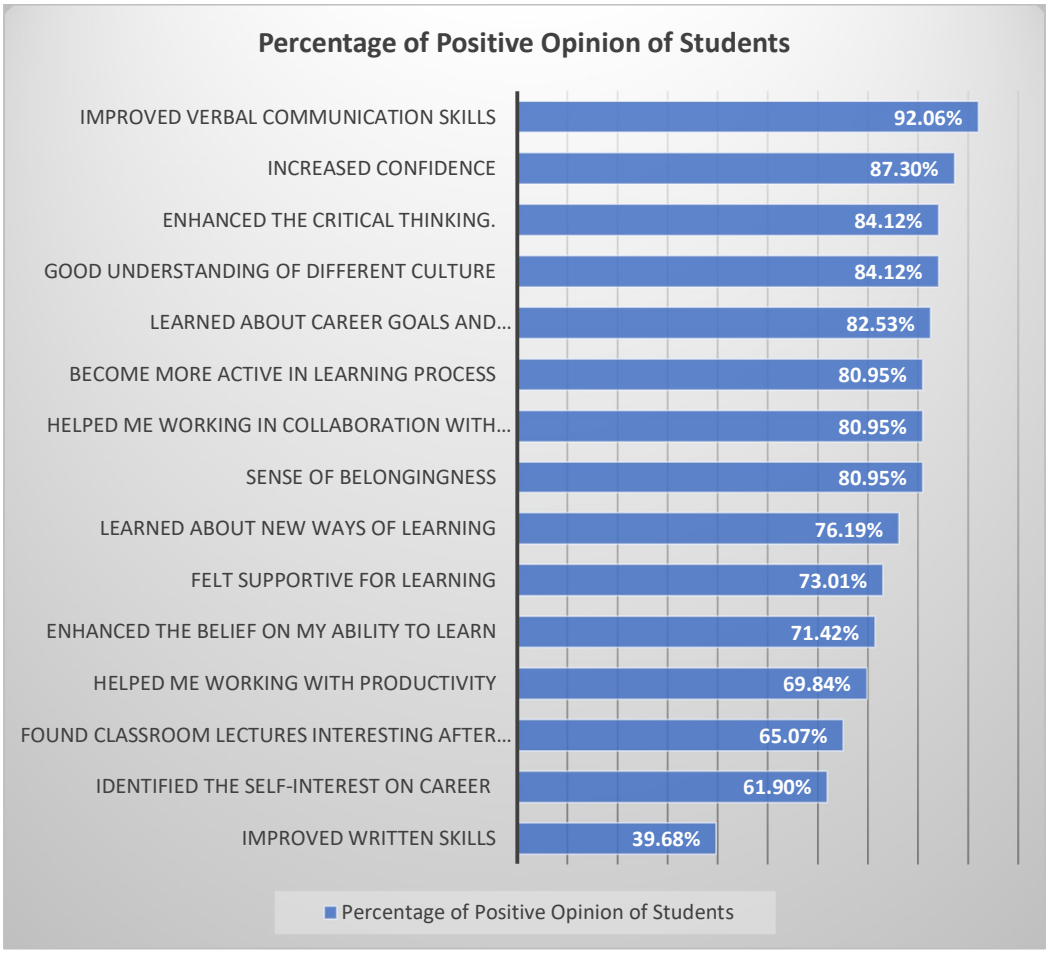

Figure 5.16. Percentage of positive opinion of student about the positive influences of peer interaction, Source: data analysed from the questionnaire

From the figure 5.16, we can draw a result that all of the fifteen factors have positive influence on learning experiences, however these factors are influential at different levels as students reported. These findings will help us creating a base for effectiveness of self-organised learning among technical undergraduates of IIT, Delhi.

After discursive discussion on positive influences of peer interaction in this chapter, we will move to next chapter named 'Self-Organising Peer Learning Systems in Higher education'. In this chapter the process of self-organised learning among technical undergraduates will be discussed.

Chapter 6: Self-Organising Peer Learning Systems in Higher Education

This chapter discusses the process of self-organising peer learning systems among higher education students. From the content analysis of 25 semi-structured interviews, findings provided the whole process of self-organised peer learning systems in higher education. The process has been described from the beginning of the how connected peer groups gets formed. Further the freedom and challenges students face while living in the campus life also has an important role to play in formation of connected peer groups. In initial part of the chapter, the discussion on immediate short- term goals of students and sense of achievement which plays a role in pushing students into the learning has been done in extensive manner. Mid part of the chapter talks about the freedom, challenges, positive influence of peer interaction and formation of connected peer group is being analysed and discussed in details. Last part of the chapter discusses the long terms goals of the students which pulls students to learn and thrive in the higher education systems.

The self-organising peer learning system in Higher education is a system where students form their own peer learning group informally which is connected and the group have same view of future. This learning process is called self-organised because this kind of learning systems is coming out from undergrad students automatically without any regulation or supervision from authorities, however there are certain basic conditions which facilitates and create a feasible environment for self-organised peer learning systems in higher education. This kind self-organised peer learning systems emerges when there is freedom to students to interact with any of the peer without any restrictions. Here the environment of campus plays a big role in this process. To survive in the education systems technical undergraduates of IIT, Delhi has to strategize the methods of learning, so that they can learn, grow and achieve the learning outcome.

You will find that each component is explained one by one and then the whole process is described. You can see the figure below illustrating the whole process of self-organising peer learning systems in higher education. It is further explained in upcoming sections.

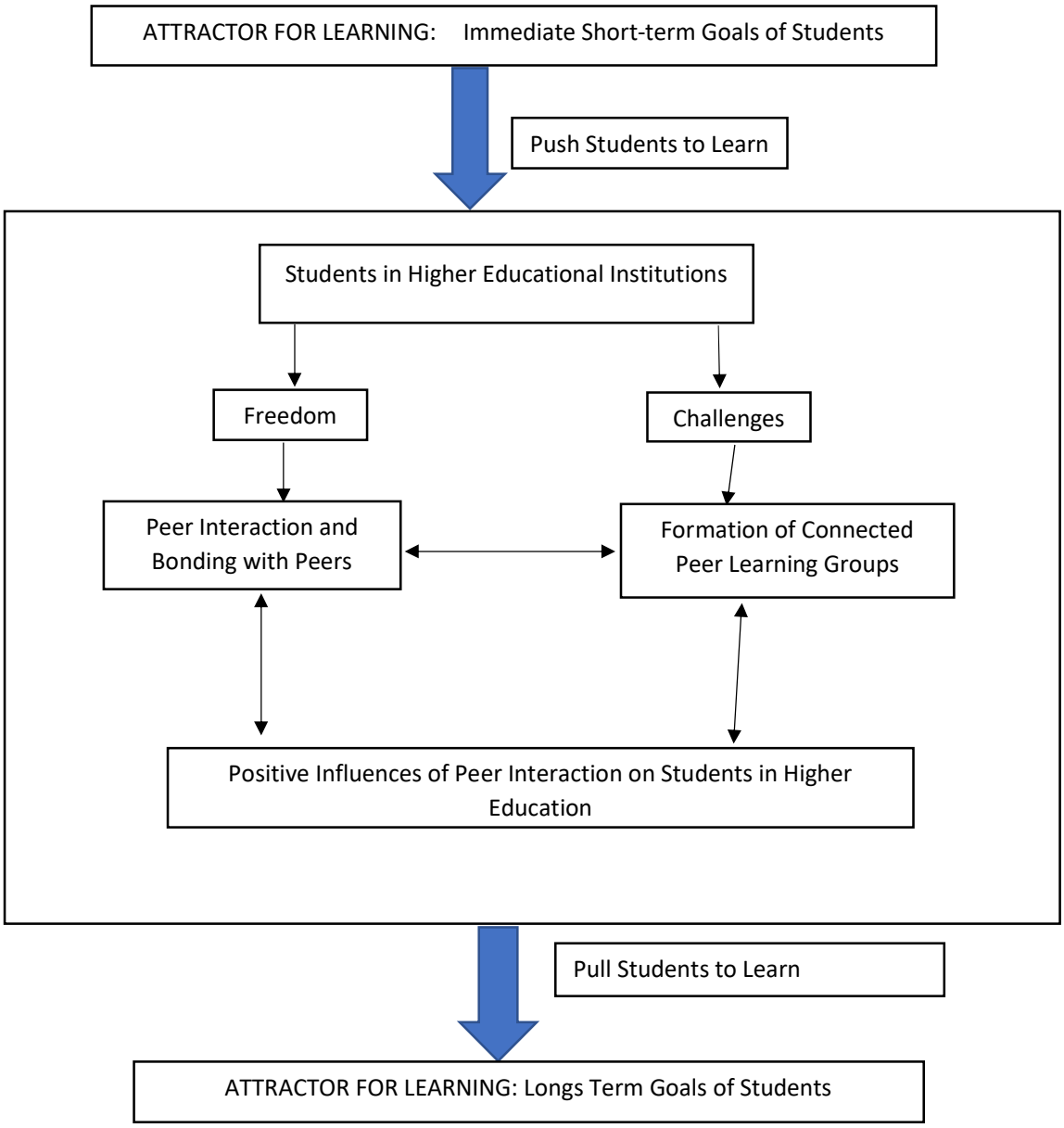

Figure-6.01 *Self-Organising Peer Learning Systems in Higher Education, source: content analysis of the data from interviews of technical undergraduates of IIT, Delhi*

The whole process of self-organised peer learning systems starts from the sense of achievement undergrad students has because of the recognition of the institute and high competition at national level (through highly competitive exam JEE) for B.Tech. in IIT,

Delhi. The sense of achievement works as the motivation factor because it creates respect of undergrad students on their individual level and respect from the society. Short terms goals act as attractor as it pushes students to learn more while pursuing graduation, it provides students a starting point to learn efficiently. The environment in the IIT, Delhi is such for undergrad students which provides freedom as well as challenges regularly to students. This initiate the process of peer interaction as well as it creates need to collaborate with peers to survive and thrive in the education system. This led to bonding between peers and at the time of challenge to overcome students forms their learning group spontaneously. In this whole process of bonding and formation of learning group, positive influence of peer interaction plays crucial role to make it happen. The one sided arrow denotes the one way factor leading to next factor (such as freedom leads to peer interaction and bonding with peers, challenges leads to formation of connected peer learning groups) but the two sided arrows denotes the continuous process of influencing each other factors(such as peer interaction and bonding with peers gets continuously influenced with formation of connected peer learning groups, both of these occurs parallelly; positive influence of peer interaction gets effected with the peer interaction and bonding with peers as well from formation of connected peer learning group, additionally both of the mentioned factors gets effected from positive influences of peer interaction). Further long-term goals act as attractor in case of undergrad for learning more and with quality to achieve their long terms goals. The long-term goals pull students to thrive in the education systems in spite of high level of difficulty. Each component of the process of self-organised peer learning systems in higher education has been explained in upcoming discussion.

6.1. Sense of achievement in students: students gets admission in the institutions of national importance and which is the best institution recognised by the country and as well as in the world. Since the admission in the best institution is not easy and students have to compete with the large number of students. This create a sense of achievement among the students who are able to get admission. This sense of achievement create confidence and make them optimistic for their career. However, it does not imply that the students who don't get admission in best institution don't have confidence or optimistic attitude towards their career. These students before coming for the graduation normally have limited exposure in comparison of residential course in IIT,

Delhi. This is in terms of number of peers, its more local and generally students' lives in their homes, but it is also the possibility that students already have experience of living with peers in hostels which includes students studied in residential systems of schooling or students went to Kota, Rajasthan to prepare for IIT-JEE entrance. But most of the times these students don't have enough freedom to talk to anybody without any pressure from society such as for boys talking to girls at any time and vice versa, for students who belongs to different class of income groups or different communities. Students also find peers from different cultures and from different geographical area. We have already discussed in detail about the profile of students which you can visit in the fourth chapter named Profile of respondents.

6.2 Attractor for Learning: Immediate Short-Term Goals of Students

Attractor in self-organised system is highly essential factor, so that this system can work and grow. Immediate Short Terms Goals which is the combination of goals which is provided by the higher education systems and which emerges through external factors so that students can be happy and comfortable with the situations. Researcher has divided these goals into two categories; however, this category is not rigid and some of the goals can be common to both categories. It is also possible that on the awareness of the students they can have goals from both the categories. Following are the immediate short-term goals of the students.

- Finding the support group to survive and thrive while pursuing graduation: When students enters the IIT, Delhi for pursuing graduation that is B.Tech. which is fully residential course, they find difficult to adapt and learn the new ways of campus life. They need to create social relations with the students they are living with as well they have to learn many new and sometimes difficult content. In this condition they search for support to survive and thrive by tackling challenges.
- Achieving excellence in particular topic or subject: Although every student wants to achieve excellence in all subjects but there is always one or more subject or topic which student found interesting. For this subject or topic students tries to find some peers who is also interested in the same topic or subject. Further, they take help and guidance from

their seniors on what to read and how to move further to get understanding in depth.

- Achieving good CGPA: In academic quizzes, exams and assignments students tries to achieve CGPA according their expectations in which their peers are helpful in attaining those gaols through learning effectively and providing support for learning.
- Learning extra-curricular activities such as sports, stage performances (anchoring, dance, Singing, acting etc): Such activities helps students increase in confidence and helps students in extending their network of peers.
- Working in club of the interests: This helps them in working on their interest area and how they can get into these fields for work or for further education.
- Networking with Professors: Networking with professors helps students to reduce hesitation in asking for guidance and help from professors. When peers learn together, they get a rich understanding of the content and it leads to some doubts which they are not able to clear with peers. The doubts and rich understanding of the content helps students to make reputation with professors and provides a starting point of conversations.
- Networking with seniors: The experience of seniors of exams, placement, assignment and classes helps students to be prepared and strategize for upcoming challenge. This also becomes important for students because seniors can be accessed easily at the time of need in comparison of professors. Networking with seniors helps students to find out the alumni who are working in the good companies or of their interested places as well as who are studying in reputed educational institutions in country or abroad.
- Feeling good with emotions and finding friends to fall back and share: This is one of the important factor because students find difficulty in managing stress due to difficulty level of the course and further students feel need to find friends with whom they can go out, can sit and talk and can share their feelings of struggle on personal as well as professional level.

- Completion of assignments, projects and presentations: Students gets many assignments and various projects while completing the course, sometimes these assignments and projects are difficult to handle individually and students take help from their peers which includes the batchmates, junior as well as seniors.
- Identifying and working on self-interest for career: Once students identify their interest of area while exploring and while studying, they need peers to discuss their insights, observation, queries, doubts and topic regularly to someone who is also interested to listen and discuss their own topic of interest.
- Personality development: Students reported that they feel that they are growing at overall personality level with their peers, the dressing style to communication skills and confidence, they gain most of it with peers' interaction.
- Networking with Alumni: Students find that networking is one of the important factors to get authentic information and guidance for career, where networking with seniors helps getting into touch with alumni.
- Getting Internship in a desired place: For this student needs to talk to peers and specially their seniors so that they can know where they have gone to internship and what is pro and cons about decision of internship.
- Getting placed in a good company: Placement is one of the most important part of the student's career, for good placement they need to strategize learning of different skills which is the demand of industry and how to get selected in top notch companies.
- Earning good amount of money: To get high package from employer and to aim at companies which provides good amount of money is one of the important parts of prospective job.
- Preparation for further higher education: For students who want to further study, they target and search students who are trying to do the same and where any of the seniors has gone to study at reputed educational institutions.

6.3. Nature and Learning Environment of Higher Educational Institutions: Freedom and Challenges

Nature of Higher educational Institutions: In this research, higher educational institutions refer to institutions which have good infrastructure, co-ed residential course, good hostels where cleaning, drinking water etc is not an issue. Good quality of food is served to students and there are proper security systems. The institutions which is recognised nationally for its quality. Have best quality faculty and competent staff for administrative and other kind of works. Campus is organised and kept beautiful such as gardens, public places to sit and talk and connected via transport system to outside city. Students population have diversity and have quite good scope of career.

The Learning environment of higher educational institution: Students have scope of freedom as well and less rules outside the formal classes (like getting into hostel at 7:30 pm or restriction on dressing styles or hair styles etc.) and less societal pressure to behave in a particular way. Students have lot of exposure in terms of not only course teaching but also have talks, discussions and conferences on range of topics from different discipline such as ecology, artificial intelligence, robotics, philosophy, environments, human rights, business, economy, entrepreneurship etc. This leads to enrichment of perspectives of students and provide them new things to explore. Other than that, the academic course structure and implementation is efficient to teach the students learn and get best out of them.

Mentorship Programme as formal way: When students come after admission for graduation to the institute, there is mentorship programme for first year students. This mentorship programme is formally structured where there is board, secretary, and general secretory. One faculty is in the committee, who is in-charge but he won't talk to students, it's just at the administrative level. In the first month of the first year, students are not allowed to talk to seniors to prevent ragging of the new students. This has been the rule for new students. So, in first month only mentors and two to three representatives are allowed to talk to new students. Mentorship programme was to make the transition from twelfth class to IIT easier for new students, and to help new students to adjust in the campus life. So, every new student gets mentor from third- or fourth-year student from graduation. The mentor's responsibility is to guide juniors to

introduce them to different clubs or society or about their interest. In case of mentor it is not compulsory, but its mentor responsibility to guide juniors to introduce them to different clubs or society. Mentors also talk about the different life in the campus to new students. Mentors supposed to help to make the life easier. Mentor can meet as they want to with juniors. This helps new students but, in some cases, new students are not able to talk to their mentors freely.

Living in hostel together: Students provided one reason for the peer learning is that they live together and because of that they are able to be close to each other. In this way ,even when they are busy they get to meet each other at the time of meals and even when they just go out or in inside the hostel.

The high level of difficulties of the course and life in the campus: Students face challenge at different level, first is at academic level, second is at social level and third is at emotional level. These challenges at different level makes peers very important for the students because they are also struggling due to these challenges and that create a understading about each other experiences. There are different statements given by different students which shows their struggle:

"I found that at least a few years back I could not study alone, I needed some company I needed to discuss. I need to understand because even seemingly simple things I can't understand when I am not interacting with peers."

"if it is very difficult I can't understand a lot of things then I prefer to study with peers. now this is about exams about formal study."

"I absolutely agree with that because I have myself learned a lot from this peer thing, a lot of subjects that we have to do something , like for the first year we could not handle a lot of subjects alone but when we used to study in groups, we got really great support, one would teach one thing and the other one teach another thing that I will always be the case but it's just that we also need that one thing in our head that scoring is still important, competition is still important, and a lot of people in IIT have been through this pressure, competitive pressure."

"so this I observed a lot, so there are friends who were not very, much comfortable to speak in English. So December is a placement semester, so from November 20 to

December 1st, so ten days, we just like, that time we all were preparing each other for this for interviews, how to deal with HR. so that time communication skills improved a lot. so in three year we were not taught how to speak but in those 10 days we learn a lot."

At the time of crisis during exam time:

"The first time was when I actually learned that what is peer learning. It was in fifth semester, final exam was there, I wasn't prepared adequately. And before that I had a habit of comparing myself. First time, I asked for the help. We sat in the library full night before the exam and they helped me, it was very great. That time I understood what is peer interaction and peer learning."

Freedom: It is to talk to any peers, to spend times with any peers, to choose and decision making on own on how to spend time, to whom to talk, what to eat, what to do, when to study, when to play, which habits to adopt or learn etc. This freedom is used in relative terms that is, in comparison of earlier life when they are dependent on their parents or guardians for various decision of their life.

Challenges: The terms challenges used in terms of the difficulty level to learn, to perform, to score good grade points when they have entered into new educational system as well as studying new subjects which highly differ from their school days. When there are lot of new things to explore, learn and experience a new and rich environment which is attractive. When they have to talk to new people, adapt in new living environment and among totally new peers of their age. They need to network to find relevant internships, get placed in good company or to prepare for higher education. All these decisions they have to take and they have to choose what they want. They have to survive in the high competition environment.

6.4. The Process of Organisation of Self-organised Peer Learning Systems:

Students studying in best higher educational institutions have sense of achievement in themselves and they see themselves as achiever. These students are open to adventure and to achieve something big. In the best higher educational institutions, the two central factors which actually facilitates the self-organising process among students is freedom and challenges.

When students enter in the educational system, the freedom they have got encourages them and even provide opportunities to choose the peers on their own terms. Students actually choose peers to whom with they want to study, to whom with they want to share their personal things, to whom with spend time and to whom with to learn. This process starts from the day one of their entry to higher educational institutions when they start to adapt and adjust to the new environment. For students there is possibility that they can choose different peers for different purpose or work such as for academic purpose, for sharing feelings, for discussing future and future goals and for extracurricular activity.

Peer Interaction and Bonding with Students: In this way the process of peer interaction and choosing peers gets started, the long-lasting frequent peer interaction happens between the peers who are comfortable with each other, learn from each other in academic and non-academic way and feels helpful nature for each other. Other than that, for students it is important that they should not feel waste of time or other negative behaviours such as predicting any superiority or talking about bad behind them. Further for learning purpose some students prefer the peers with whom their level of knowledge match so that they can learn in a good pace. However, students find teaching the topics to their peers from basic very helpful for their own in depth understanding.

Formation of Connected learning Group: During the process of peer interaction and bonding with students, parallelly the formation of connected learning group begins. The big reason behind this is that the students start facing various challenges at different stage of their graduation. In response, when they have to survive and thrive in the system, they start collaborating with each other and empower each other with the different competencies they have and acquired till the time. This actually makes the peer learning groups a serious thing and since the group have the same goal and objective, the group automatically begins to work with focus and clear goal. Other than that, these peers connected to each other in the way that their present state gets affected with each other's past state while learning. This connection occurred during the time of initial state of peer interaction and bonding. This formation is good combination of similarities and differences. Similarities of the same situation, same age and same experiences. Differences in the different competencies to benefit group and need to fulfil individual needs. Also, diversity in the way of thinking, approach to solve problems and different life experiences.

When the learning happens in this connected group; ego, differences, competitiveness and boredom towards the work or study disappears in the group and they start learning efficiently and get good speed in understanding the task or topic.

6.5. Two Way Process of Positive Influences of Peer Interaction

This works as input as well as output to the self-organising peer learning systems. Since the peer interaction starts from the beginning of the entry of students in educational institutions. While peer interaction, peers does bond with each other because they find something positive or beneficial in peers. This further gets deepens and positive influences improves on each other in case of connected peer group. This helps them in overall learning. The positive influence of peer interaction is two-way continuous process with peer interaction and bonding as well as with the formation of connected peer groups.(To read more about positive influences of peer learning, you can refer chapter five named “Positive Influences of Peer Interactions”)

6.6. Attractor for Learning: Long term goals

This factor works as pull factor for students to learn as they dream about earning good money, becoming entrepreneurs, doing something for society and to create change in the world. They dream to create their own life in their own way. The long-term goals fill confidence and motivates them to do adventure for the life they want. In this way learning becomes important for which they do collaborate with their peers.

6.7. What Students learns and how they learn in effective ways

The students reported about learning takes place in self-organised peer learning systems can be categorised into two categories, one is Learning for requirement for the completion of B.Tech. Course which is for exams, projects and assignments. This kind of learning occurs in self-organised manner where students needs to strategize to learn fast and effectively so that they can score well academically. Second category can be called as Learning for Interest where there is no compulsion to learn something but it is due to the interest of students on particular topic or subject which can be latest technology on robotics, extracurricular activities, entrepreneurial ideas, philosophy of Zen Buddhism, professional or social skills etc . This kind of learning happens due to interest of students or due to curiosity factor. This kind of learning make students feels grow and increasing the knowledge which is needed for a successful life or for healthy mindset. Only condition is that for self-organised peer learning is that the educational

objective which students are trying to achieve is challenging enough to attract the attention of students and it is near to impossible deal at individual level for all the students studying in self-organised manner. Otherwise effectiveness and learning of the students can be reduced and group can opt to gossip or doing something else other than learning.

As from the name itself self-organised peer learning systems suggests that the students organise themselves on their own without any formal structure or rules and regulations. The learning groups emerges among the students on their own and it really functions very well. The source of knowledge for these groups is with the use of internet while using different platforms such as you-tube, online sources and even online e-classes available of Edx or Course-era or other online journals. The technology specially internet has enabled the students to learn and with the peers they are able to learn the new and latest topic with ease. When students learn with their groups formally, they reported that they learning speed, concentration, interest and confidence gets increased which further motivates them to learn more. This also helps them to reduce the stress level and work load as well as pressure of performing in adverse situations.

This sort of learning happens when students learn in minimally invasive environment, with the observation it is found that mostly students learns in groups in public places such as lounge area of hostel, cafeteria, common place in academic buildings, gardens etc. in the campus. When you enter these places, you will find lots of noise in these common places, where students are sitting in different postures, laughing and discussing with all concentration where the noise at the common place neither distract them nor reduce their concentration level. This scenario is totally opposite to the situation in the formal classrooms where everybody is silent and sitting quietly with no or few discussions. The process of self-organised learning is something which does not result into same learning even with the same group of students or learners at the same place.

After discussion on findings on the process of self-organised peer learning in higher education, we will move to next chapter which is also the last chapter of the dissertation named ‘Summary and Conclusion’. In this chapter summary of findings and conclusion will be discussed.

Chapter 7: Summary and Conclusion

In this chapter, the primary focus is to provide the summary of findings of the study which is related to the peer interaction and learning experience of the undergraduate students of IIT, Delhi. The highlights are students' perception of learning, influence of peer interaction and the process of formation of peer groups in self-organised manner. Further interpretation of research findings, this discussion is followed by implications for policy, practice and future research.

Before moving further, lets discuss the profile of the respondents as this may help us to get an idea about the students participated in the study. Among the total participants in questionnaire, 33% were female and 67% were male, since in engineering the enrolment of girls is less in comparison to the boys, it gets reflected in the data of respondent. Age of the respondents was between 17 to 23. Out of total students who participated in the questionnaire, highest 43% students were from north India, 14% from South India, lowest 13% students from east India and 30% from west India region of the country. Students from all 11 courses of under graduation which are offered has participated *. Out of total respondents' students were 27% were from first year, 24% from second year, 25% from third year and 24% from fourth year. The composition of year of graduation students was approximately same from each year of graduation. Out of total respondents, 60 students knew English language and 58 students knew Hindi. Students from different states know their regional languages. Majority of respondents were from General category followed by Other Backward Classes, eight from schedule caste and only three students of Schedule Tribe participated in filling the questionnaire. The highest number of students who responded were from Hindu religion, followed by Jains.

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*List is of the courses of under graduation at IIT, Delhi: Chemical Engineering, Biochemical Engineering and Biotechnology, Mathematics and Computing, Civil Engineering, Computer Science and Engineering, Electrical Engineering, Electrical Engineering (Power), Engineering Physics, Mechanical Engineering, Production and Industrial Engineering, Textile Technology (source: iitd.ac.in website)

7.1. Summary of the Findings

With the intention to get in-depth of higher education student's perception of learning which was first objective of the study, it is found that learning for students has a very broad meaning which does not confine to academic or professional learning but it also includes the different skill sets needed for psychological well-being as well for social support from the society. On how students identify that they are learning, they student added that a new skill or concept they have learned which they can apply in future and stays with them can be called as factors of considering it as learning. Students expressed that high academic score not always means great learning which includes rich understanding and ability to think multidimensionally. In addition to that, students reported that peers who scores well are not only peers to learn, students learn from peers whose experience is different from them. Student found extracurricular activities helpful in enhancing their learning through enhancing their emotional state and releasing stress.

Students' felt that after coming to IIT, Delhi they realised that studying alone is not helping them in achieving their academic goals. Its challenging to study and learn alone because there are lot of content of the course which is not easy to deal at individual level. They feel urge to shift their learning from doing it individually to do it with peers. When the content is easy to understand, usually students study alone but when it's difficult, they go to peers to learn and understand it. Usually the students shift their approach from learning individually to learn with peers as the time they spend in the campus life increases while pursuing B.Tech at IIT, Delhi.

While examining the influence of peer interactions on learning experience of students which was second objective of the study, results shows that students found peer learning very helpful for learning, they reported that their motivation and interest goes up, at time for exams as well as when they decide to learn something in group, all focus and speed increases while learning with peers, they said peer learning just happens spontaneously. Students seek help to learn from their peers in following conditions:

- To learn something totally different from course such as latest technology of Artificial Intelligence, robotics or even new philosophy on Zen Buddhism. It can be anything of the interest of students.

- To get placement at top-notch companies or in the company of their interest and for getting admission for further education in well-known higher educational institutes in the country or abroad.
- At the difficult time of exams, assignments and projects.
- To pursue their own interest or to figure out their own interest.

Student reported that peer interaction can be both positive as well as negative. While investigating perception of higher education students for peer learning and its influence on them, findings shows that students find peer interaction as one of the key factors for their learning as well as useful for their career. The influence of peer interaction can be of both negative in nature which discourage students for being open and comfortable as well as positive in nature which encourage students to grow towards long term goals with the support of peers.

Positive peer interaction is also crucial for their growth in professional and social skills, other than just academic learning. Students found that due to peer interaction, perspective richness and efficiency of learning increases. They experienced that their peers become saviour at times when educational objectives seem impossible to complete. Their seniors guide them to become member of different clubs and societies which enhance their communication skills as well as their performance in extra-curricular activities which contributes in increasing their confidence and sense of belongingness. Additionally, seniors provide guidance to study smartly so that academically students can score high and helps in making effective strategies for placements.

Positive influence of peer interaction on students learning experiences helps students in exploring new things, enhancing learning and experimenting on effective ways on learning. Positive influence resulted into one category which can be called social and psychological support to students and another as support for professional learning and career to students. The percentage of students expressed positive opinion on each factor is mentioned below category wise:

Category I: Social and Psychological support to students includes increased confidence (87.30%), sense of belongingness (80.95%), helped in working in collaboration (80.95%), good understanding of different cultures (84.12%), enhances the belief on my ability to learn (71.42%).

Category II: Support for professional learning and career includes improved verbal communication skills(92.06%), improved written communication skills(39.68%), helped me in working with productivity(69.84%), felt supportive for learning(73.01%), learned about career goals and opportunities(82.53%), identified the self-interest on career(61.90%) , found classroom lectures interesting after peer interaction(65.07%), become more active in learning process(80.95%), learned about new ways of learning(76.19%), enhanced the critical thinking(84.12%).

On other hand, negative peer interactions can hinder growth and learning among students, unpleasant interactions for students consists of judgemental attitude, superiority complex, not being receptive of each other's discussion, not being serious for the objective decided as a group, each member does not contribute to work and pretending of having knowledge about some topic. Also, sometimes students have to participate in some activities unwillingly like going out or discussion on topic which is not useful due to peer pressure. Sometimes when learning pace doesn't match with the group, student feel demotivated to study with those peers.

While studying the process of self-organised peer learning in informal settings which was third objective of the study, researcher found that the self-organising peer learning system in higher education is a system where students form their own peer learning group which is connected (where every group member is connected to each other) and the group have same view of future. This kind of self-organised peer learning systems emerges when there is freedom to students to interact with any of the peer without any restrictions, we can call it 'minimally invasive environment'. Here the environment of campus plays a big role in this process.

Students studying in best higher educational institutions have sense of achievement in themselves and they see themselves as achiever. These students are open to adventure and to achieve something big. In the best higher educational institutions, the two central factors which actually facilitates the self-organising process among students is freedom and challenges. When students enter in the educational system, the freedom they have got encourages them and even provide opportunities to choose the peers on their own terms. Students actually choose peers with whom they want to study, with whom they want to share their personal things, with whom they want to spend time and learn. This process starts from the day one of their entry to higher educational institutions i.e.

graduation, when they start to adapt and adjust to the new environment. For students there is possibility that they can choose different peers for different purpose or work such as for academic purpose, for sharing feelings, for discussing future and future goals and for extracurricular activity. Students make learning group with peers with whom they are positively influenced.

While exploring self-organising peer learning systems among students of IIT, Delhi, researcher found and got into depth of the nature of learning process and how students learn and implement the best ways of learning where students who are the learner enjoys the learning process as well as can learn efficiently. The application of self-organised learning systems on higher education system can provide us a method to create feasible environment for fast and effective learning. Some of the conditions were observed and found out that self-organising learning environment can initiate the peer learning in self- organised way. Conditions were as follows:

- Students' lives in the campus of the higher education institute, which is safe and full of facilities such as different sports ground, different public places to hang out, all needs to fulfil to live comfortably. This condition helps students being free of the different responsibilities for living.
- Students should have freedom to live as they want to, less restrictions and have possibility to meet and can have discussion with students from diverse background. In this way students learn about different language and culture; this create a sense of increase in the horizons of knowledge as well as in understanding and make students to think after taking into account these differences.
- The exposure of different education and livelihood opportunities helps and motivates students to think, explore and find out their interest for their career.
- Different clubs and societies which gives the option to perform students on stage and in learning different updated technologies helps students develop different skills for the life time.
- The formal opportunities to work on the different applications and projects which is not to do in typical conditions of class helps students to work on problems and find solutions. These are the things which are totally new to

students and also challenging, this make students to work in the group. This helps enables them to learn. Also, students feel free to work as they want.

- Students should have easy access to internet and online resources to study.

Students found the peer learning effective and useful to tackle the challenges comes to them while pursuing B. Tech. These challenges intensively create situations for students to strategize learning which results into self- organisation peer learning systems. Following challenges were found working in favour of self-organised peer learning.

- Peer Interaction results into two consequences such as positive influence of peer interaction on peers as well as negative influence of peer interaction. Positive peer interaction influence leads to formation of connected peer learning which is self-organised. Negative peer interaction creates a distance between peers and prevent the formation of peer learning group.
- Self-organised peer learning groups comes together at the time of challenges they face and comes together to tackle it and win it such as exam, assignment or project, placement, internships and getting admission in best institutions for further education. In case, if the challenges are easy to handle, students do it individually.
- The sense of achievement and short-term goals such as competition, quiz, exams or assignment push students to learn self-organised peer learning group and long terms goals such as dream job or career of students pull them to deal with the challenges.
- The precaution is in case any students get adversely effected by the negative peer interaction, it may have the potential to stop these students to form and tackle different challenges.
- Students from diverse background is one of the important factors to foster the self- organised learning because it provides the different opinions and perspective to understand the same thing. To create self-organised learning students should perceive that they are free to work as they want which is minimally invasive environment.

- Sometimes according to different situations, the member of self-organised peer learning group changes and go to other such group if the aims of the members differs or just to gather more information on the topic of learning.
- The important fact is that even if single member is involved in self -organised peer learning group with different aim from the rest of the group, then this can disturb the effectiveness and speed of the learning but usually group itself resolves this problem together.
- Internet (online resources, YouTube etc.) and reading material (from library or other sources) are one of the important sources to the students for the access to knowledge. It is an enabling factor to learn unknown and difficult things for students.
- In the students of undergraduates, it is found that member of their self-organised groups motivates each other by appreciation, because motivation of each member effects the motivation of group. They shift their approach from competitiveness to collaboration.
- These kinds of learning frequently happen to the public places in the campus of the environment which is safe and have the facilities which is needed to study such as wi-fi connection, proper lights, good place to sit and have nearby places to eat, drinking water etc. When you go these places, you will find that there is lot of noise in the place, different students sitting in different posture but very attentive to listen to the group members.

7.2. Conclusion

The purpose of this study was to have an understanding of the students' perception of learning, examining the influences of peer interaction on learning experience of students and to study the process of self-organised peer learning among undergraduates. With the qualitative approach where researcher took semi-structured interviews of technical undergraduates, used questionnaire which included six-point scale as well as used observation as a tool, the purpose of the study was fulfilled. With the used methodology, researcher not only led to an understanding of the students' perception of learning but got in to depth of the influences of peer interaction on learning experiences of students which provided rich knowledge on positive influences. In addition to that researcher provides the discursive details of the process of self-organised learning among

higher education students (learners of the age group of 17-23) which is the first of its kind study and it is new addition to the literature as till now self- organised systems in education is only studied with the learners of age group of 6-13.

The first objective of the study was to understand the meaning of learning perceived by students and results were obtained from the conventional data analysis of data from 25 interviews of technical undergrads. In the study it is found that the perception of learning is not limited to academic or professional learning for students rather for them learning also means learning and getting lessons from other people's experience and social skills. Further students identify that they are learning, if that is beneficial for long run, involves using the skill already learned and leads to solves the problems, students consider that as learning. They further added that a new skill or concept they have learned which they can apply in future and stays with them can be called as factors of considering it as learning.(For more details, refer to page 58, chapter 4 ' Students' perception of learning and their experience of peer interaction') . It is found that for students its challenging to study and learn alone because there are lot of content of the course which is not easy to deal at individual level. They feel urge to shift their learning from doing it individually to do it with peers. When the content is easy to understand usually students study alone but when it's difficult, they go to peers to learn and understand it. (Refer to page 6, chapter 4 'Students' perception of learning and their experience of peer interaction'). This finding confirms that this does not happen only in learners of age group of 8 to 13 (Mitra, Kulkarni & Stanfield, 2016) but it also works in same way in learners of age group of 17 to 23 as well.

While examining the influence of peer interactions on learning experience of students which was second objective of the study, with the content analysis of 25 interviews data and analysis of 63 questionnaire, the results were obtained. Findings suggest that students found peer learning very helpful for learning, they reported that their motivation and interest goes up, at time for exams as well as when they decide to learn something in group, all focus and speed increases while learning with peers, they said peer learning just happens spontaneously. This finding is supported by the results provided by Costaa,

Cardosob, Limac, Ferreirad, Abrantese, 2015 which says that peer interaction is considered one of the primary reasons for improving the learning outcomes of students and helping in creating effective learning environment. This finding from study also confirms that spontaneous emergence of peer group for learning also get formed in the learner of age group of 17 to 23 but they need minimally invasive environment which is supported by finding shown by Mitra,2006 in his experiment of 'Hole in the wall' about the process group formation of learner where it is suggested that the learning groups does not form with the planning but it is made spontaneously while learning, it is not pre planned. However, there is difference found in case of technical undergraduates of IIT, Delhi that in initial time of the students which is when they begin there course (which can be first year or second year), there is spontaneous group formation at time of challenges but later once the group becomes strongly connected and they achieved their educational objectives together, it becomes more or less fixed, although it is not always the case. Indeed, then also at the peak time, students groups changes according to situations like availability of their peers, completion of the course or whether the peer found the topic to be discussed in group easy or difficult.(for more details refer to page 103, under the heading ' 6.4 The process of organisation of self-organised peer learning systems)

It is found that peer interaction influences the students in positive as well as negative manner. Positive interactions help students to grow and negative interaction (page no.68) has potential to alienate student from learning process. Positive interaction is highly essential for self- organised peer learning among higher education students. (For more details refer to page no. 66 to 68) This finding of positive and negative peer interaction is well supported provided educational literature where it is reported that interaction with peers enhance learning of students and gain better understanding of knowledge and negative peer interaction can lead to isolation from learning. (Nortvig, Peterson & Balle 2018; Roksaa, Kilgob,Trolianc, Pascarellad, Blaiche & Wisee, 2017; Costaa, Cardosob, Limac, Ferrierad, Abrantese,2015)

The results from Category I named 'Social and Psychological support' indicates that students get support from their peer in social and psychological support, the similar findings by Quinlan, 2016 which says that peer interactions mediate a

number of key educational outcomes which includes changes in values and attitudes as well as peer relations helps students to create meaningful friendships and build a sense of belonging in new community.(For more details refer to page no. 70 to 77 under heading ‘ Social and Psychological Support to students’)

When students construct their learning by interacting with peers, they enhance their communication skills, this is supported by findings provided by Melander and Sahlstrom,2009 which have shown that peer interactions provide opportunities which is effective for learning language from peers. Further, Carver, 2011 suggested in his study that through discussion students develop competencies which is useful for workplace such as problem solving, analytical and critical thinking, oral and written communication, research skills and method and the ability to work productively in team as well as individual level. The findings provided by Carver gets confirmed in the study with the results of the factors examined under the second category of ‘support for professional learning and career’.(for more details refer to page 78 to 95 in chapter 5 named ‘Positive Influences of Peer Interaction on Students’ learning Experience and specifically can refer to page 94 & 95, table 5.31 and figure 5.16 which talks about all the positive influences examined in the study in aggregated manner)

While studying the process of self-organised peer learning in informal settings, which was the third objective of the study, the findings were obtained through content analysis of 25 interviews and from observation which was noted in daily diary in field. The conceptual framework of self -organised systems in education was quite useful and helped in understanding and analysing the whole process of self-organised learning among higher education students. It is found that, the positive influence of peer interaction is one of the important factors for creating feasible environment for self-organised learning (refer to fig. 6.01 ‘Self organising peer learning systems in higher education’ and page no. 99). The findings from the third objective can be located into broader context of self-organised systems in education which was initiated by Sugata Mitra in 1999. Findings indicates that self-organised systems are applicable on higher education students also but there are differences as well similarities in the context of higher education. The following major findings clearly indicates the applicability of it:

- The access to internet is fundamental for higher education students to learn in self-organised manner as it provides them global mind for knowledge access.(refer to page 108) The results found in the 'Hole in the experiment' conducted from 1999 to 2005 supports with similar finding as it suggests that with the use of internet and computers, learners who are children from age 6 to 13 can learn irrespective of who or where they are (Deobar,2009; Mitra 2005). However, there is age difference as in this age group of 17 to 23 year learner has been studied.
- The higher education students should have formed the peer learning groups on their own, where they can change the group anytime and can have free discussion with any of the peers. Usually these groups are of small size from three to six. However, this is not fixed number. The above findings are similar to the findings provided by Mitra,2006 where he suggested that there is free movement of learners from one group to other group in self-organised learning.
- Higher Education students who view a task as one they are confident about doing individually, they would work alone in order to get credit individually. On the other hand, if they view a task as difficult or near to impossible, they would work in groups, possibly to rise their chances of success and to lower any potential discredit for getting things wrong. The 'curiosity or interest or high level of difficulty' may work to increase the possibility of higher education students in taking the task to work in peer group. This result is similar to the finding reported on self-organising learning system in education. (Mitra, Kulkarni & Stanfield, 2016)
- When students have minimally invasive leaning environment, then self-organised peer learning becomes effective. Creating unsupervised learning environments for learner. This finding is supported by the finding which implies that self-organised peer groups emerges on their own while learning process (Mitra, Kulkarni & Stanfield,2016; Mitra & Dangwal 2010).

In the context of students in higher education, it is found that self-organised learning among peers is quite different, there are following factors which is unique to the self-organised peer learning systems in higher education such as:

- The self-organised learning mostly happens in public places of the campus of higher educational institutes which is safe and facilities like wi-fi connection, place to sit and discuss.
- Effectiveness and speed of learning can get affected if any single members' aim of learning is different from rest of the member of the group.
- When students learn in self- organised learning environment, they usually appreciate each other which leads in increasing motivation of the group while learning.
- In case of self-organised learning, students shift their competitive approach to collaborative approach to learning. The condition is that when educational objective is highly challenging.
- Self-organised learning happens among the students of higher educational institutions where facilities and resource are more, and where students resides in the campus while completing graduation. (Refer to chapter six named 'Self organised peer learning systems in higher education)

In the exploration of self-organising peer learning systems among students of IIT, Delhi, researcher found and got into depth of the nature of learning process and how students learn and implement the best ways of learning where students who are the learner enjoy the learning process as well as can learn efficiently. The application of self-organising learning on higher education students can provide us a method to create feasible environment for fast and effective learning. (For more details, you can refer to figure 6.01 page 97 and refer to chapter 6 'self-organising peer learning systems in higher education') The above finding is supported by the educational literature where it is concluded that self- organised groups of learners

enhance the effectiveness of learning. (Mitra, Kulkarni & Stanfield,2016; Mitra & Dangwal 2010, Mitra,2006).

Limitations of the study

The sample size used in the study is small in comparison of the population of students of undergraduates in IIT, Delhi. Profile of respondent is not highly diverse in nature as it is done in only one higher educational institution and this study need to be done in educational institutions of different geographical areas and of different context. The relies on self-reported data by students as it cannot be independently verified, therefore biases can be apparent. The self-organised systems have not been studied with in the context of higher education students, therefore there was limited literature available and there was lack of prior studies in this area. This study has initiated the investigation of self-organised peer learning systems in higher education and studies undergraduate students but time constraints were there for time spent on the field. This study only takes into account the perspective of students. Since the study focuses on positive peer interaction which is crucial for self-organised learning, it does not explore the consequences of negative peer interaction on self-organised learning.

Further Research

The study has explored peer interaction and peer learning, by using concepts of self- organising systems; it doesn't explore peer interaction in the context of gender perspective, exclusion perspective and role of teacher for self-organising systems. There is further to explore that what can be done to explore the role of teachers in facilitation while using self- organising systems. Also, this can be studied in other educational institutions by increasing population of students, researcher wasn't able to do the same due to time constraints. Since it is not always the case that if we provide similar feasible conditions for self-organising systems to students it will yield the same results but definitely it will enhance the learning of students to greater extent. Therefore, research need to be conducted to measure that how much learning can be fasten and at what extent time taken to learn can be reduced in self-organising learning among higher education students. Further, there is need to research extensively to design a

pedagogical method to practice in higher education by keeping in mind self-organised learning among peers.

Policy Recommendations

In the time we are living, it is the era of the fast-changing world in terms of technology and it is the time of the knowledge economy. We need to adapt new methods of learning and to bring change in traditional classroom teaching and learning methods. It is crucial to provide the enabling environment to students so that they can themselves learn effectively with their interest and curiosity.

The major lesson we learn from this study is that the learner does not need to know all but rather they should be equipped to find out on their own as in today's time technology specially internet has provided easy access to the knowledge. This is maybe the indication that we need to update our assessment methods which may examine the ability of students to solve problems and to think in critical way rather than testing how much information student remember. We need to take care of the interest and curiosity of higher education students in mind while designing the pedagogical method for higher education students. Self-organised peer learning is something which we need to pay attention as this may increase the effective learning among higher education students.

At the end, we can say that these initial developments in the area of self-organised learning among higher education students also indicates the complexities involved in this research. There is need to measure and re-examine these findings in different contexts of higher education students.

The findings on self-organised peer learning systems in higher education raises further challenging questions. For instance, what will be the academic achievement which we can measure due to self- organised peer learning. Can we encourage that we need to adapt and provide more feasible environment for self- organised peer learning in different contexts of higher education institutions? What this indicates towards role of teaching in context of higher education?

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Appendix

Semi-Structured Interview

Learning and Peer Interaction

1. What would you consider as Learning which is useful for your growth in career?
2. When you are in informal situation with your peers (Academic or non-academic), on what basis would you decide that you are learning from them?
3. Do you think that peer interactions are helpful for learning? And why it is so?
4. Please describe two of your best experiences of informal learning with peers while doing your graduation?
5. Why and how do you think that these experiences have helped you in your learning?
6. What are the different ways you felt that informal peer interaction has helped you in your learning which led to your growth?
7. What is the difference(s) you felt when you study alone and when you study with peers?
8. What are the motivating factors you feel when you study alone?
9. What are the motivating factors you feel when you learn with peers?
10. Please describe at least about three peers you found helpful for your learning process? What are the reasons due to which you consider them helpful for your learning? You can talk about their helpful behaviours.
11. What do you find encouraging in peer interactions (in groups or one to one) for your learning? Any related experience you want to mention?
12. What do you find discouraging in peer interactions (in groups or one to one) and not helpful for learning? Any related experience you want to mention?

Questionnaire

Peer Interactions and Learning Experiences in Higher Education

This form has two sections: Section 1- Profile of Respondent, Section 2- Positive Influence of Peer Interactions. This form will take just five minutes.

1. Name

2. Gender *

- ○ 1. Female
- ◉ 2. Male
- ○

3. Age *

4. Native Place *

Haryana

5. Graduation Course *

- ○ 1. Chemical Engineering
- ○ 2. Civil Engineering
- ○ 3. Computer Science and Engineering
- ○ 4. Electrical Engineering
- ◉ 5. Electrical Engineering(Power)
- ○ 6. Engineering Physics
- ○ 7. Mechanical Engineering

6. Year of Graduation *

- ○ 1. Ist Year
- ○ 2. IInd Year
- ◉ 3. IIIrd Year

7. Father's Name

.....

8. Father's Education *

- ○ 1. 10th
- ○ 2. 12th
- ◉ 3. Graduation
- ○ 4. Post Graduation
- ○ 5. Mphil
- ○

9. Father's Occupation *

Air Force Officer

10. Mother's Name

11. Mother's Education *

- ○ 1. 10th
- ○ 2. 12th
- ○
- ◉ 3. Graduation
- ○ 4. Post Graduation
- ○ 5. Mphil
- ○

12. Mother's Occupation *

Homemaker

13. Mother Tongue *

Hindi

14. Languages known *

Hindi,English

15. Community *

- (●) 1. General
- ( ) 2. OBC
- ( ) 3. SC
- ( ) 4. ST

Religion *

- (●) 1. Hindu
- ( ) 2. Muslim
- ( ) 3. Budhhism
- ( ) 4. Sikh
- ( ) 5. Christian

Positive Influence of Peer Interaction

You can click on the option which you find most appropriate on the basis of your learning experience with peers.

1. Positive Influence of Peer Interaction *

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Not Applicable
Increased Confidence	☑	☐	☐	☐	☐	☐
Improved Verbal Communication Skills	☑	☐	☐	☐	☐	☐
Improved Written Skills	☑	☐	☐	☐	☐	☐
Sense off Belongingness	☑	☐	☐	☐	☐	☐
Helped me working in collaboration with peers	☑	☐	☐	☐	☐	☐
Helped me working with productivity	☑	☐	☐	☐	☐	☐
FeltSupportive for learning	☐	☑	☐	☐	☐	☐
Good Understanding off different culture	☑	☐	☐	☐	☐	☐
Learned about career goals and opportunities	☑	☐	☐	☐	☐	☐
Identified the self–intereston career choice	☐	☑	☐	☐	☐	☐
Found classroom lectures interesting after peer interaction	☑	☐	☐	☐	☐	☐
Become more active in learning	☐	☑	☐	☐	☐	☐

process

Learned about new ways off learning	☑	☐	☐	☐	☐	☐
Enhanced tithe critical thinking	☑	☐	☐	☐	☐	☐
Enhanced the belief on my ability to learn	☑	☐	☐	☐	☐	☐

2. If you want to mention anything more about positive influence of peer interaction you can mention here.

Gathered random skills through interaction and collaboration
Got multiple perspectives

Got introduced to new areas of study