THE SIGNIFICANCE OF KNOWLEDGE SHARING TOOLS IN HIGHER EDUCATION INSTITUTIONS OF PUNJAB, PAKISTAN: MEDIATION MODEL OF SELF-DETERMINATION

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By

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No Part of this thesis has been submitted anywhere else for any other degree. This thesis is submitted to the Faculty of Business and Management Sciences, The Superior College, Lahore in partial fulfilment of the requirements for the degree of Doctor of Philosophy in field of Knowledge Management in Faculty of Business and Management Sciences at The Superior College, Lahore.

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DEDICATION

To Prophet Ibrahim and Prophet Yousuf (may Allah be pleased with them both).

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Abstract

This research endeavored to develop and empirically test a conceptual model examining the impact of knowledge sharing tools on students' knowledge through the intervening role of perceived competence, relatedness, and autonomy in higher education institutions (HEIs) of Pakistan, and it examines the applicability of the concepts in HEIs of Pakistan. One repercussion of globalization is the development of knowledge economies. The makeover and advancement process of knowledge less to knowledge based economies has been apparent as the only way to avoid them from becoming dependent on knowledgeable economies. Currently, knowledge management (KM), which is the handling of information and resources, is attracting attention. Among the most discussed and debated areas in KM are knowledge creation and knowledge use. Knowledge plays a key role in revolution; knowledge is neither data nor information, it is, though, both, which leads to wisdom (T. H. Davenport & Prusak, 1998).

This study was conducted with the aim to examine the effects of knowledge sharing tools (i.e. trust, motivation, technology, teacher role, and teacher enthusiasm) on students' tacit and explicit knowledge outcomes in HEIs of Pakistan. To examine the effects of the selected predictors on students' knowledge outcomes, a self-administered questionnaire was employed. The results were analyzed by applying different quantitative techniques. The sample size of this research was 4012 students from ten public and private HEIs in the Punjab province of Pakistan. The data were collected by using multi-stage sampling and the data were analyzed by applying regression analysis.

The empirical findings of this study demonstrate that utilization of knowledge sharing tools in HEIs is a significant driver for students' knowledge outcomes. In particular, it is probable that perceived competence, relatedness, and autonomy support knowledge outcomes through a more efficient application of knowledge sharing tools. In addition, the empirical findings illustrate that

knowledge sharing tools play an important role in enhancing students' knowledge outcomes in HEIs along with dimension of self-determination theory. This study concludes that KM should be fully integrated and it should be on the strategic agenda of HEIs in Pakistan. Thus, this study recommends that HEIs should prioritize KM practices to exploit knowledge and to explore new knowledge.

Keywords: Knowledge sharing tools, knowledge management, self-determination theory, higher education institutions, Pakistan.

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List of Acronyms

AJ&K	Azad Jammu and Kashmir
DAIs	Degree awarding institutions
DIKW	Data-Information-Knowledge-Wisdom
FA	Factor analysis
FATA	Federally Administered Tribal Areas
HEC	Higher Education Commission
HECPQAM	Higher Education Commission of Pakistan Quality Assurance Manual
HEIs	Higher education institutions
HU	Hajvery University
ICT	Islamabad Capital Territory
KM	Knowledge management
KMO	Kaiser-Meyer-Olkin
KMPI	Knowledge management performance index
KMS	Knowledge management system
PCA	Principal component analysis
POB	Positive organizational behavior
PU	Punjab University
SDT	Self-determination theory
SPSS	Statistical Package for the Social Sciences
T&V	Technical & vocational
UMT	University of Management and Technology

1 CHAPTER ONE: THE INTRODUCTION

World economies, whether developed, developing or underdeveloped, are ensuring that their strategies for obtaining higher standards are based on a model for the implementation of the concept of a knowledge-based economy (Balcerzak & Pietrzak, 2017). P. F. Drucker (1969) popularized the term knowledge economy in his book; *The Age of Discontinuity*. The desire to become a knowledge economy started with human history; economies are competing in knowledge competencies (Wioleta Kucharska & Rafał Kowalczyk, 2016). There is a consensus among social scientists that knowledge management (KM) is an effective credible tool for any economy that wants to be recognized as a knowledge economy. This consensus is also supported by a body of knowledge that accepts KM as an essential instrument for the acquisition of knowledge competencies and to be documented as a developed nation according to accepted world standards (Sinha & Sengupta, 2016; Wamalwa & Omallah, 2016). A knowledge economy is defined in the literature as an economy where growth is primarily dependent on a combination of intellectual and natural resources pertaining to quantity, quality and accessibility. Authenticated and time-tested KM practices are applied to achieve defined growth indicators (Awad & Hassan, 2011). An economy comprises various indicators such as economic, environmental, trade and social. This PhD study primarily focuses on education because education is an integral part of the social sector of an economy.

Recent studies have examined the effect of KM on educational institutions' productivity (Hossain, Bischoff, Willy, Roncace, & Walsh, 2015), and KM practices at corporate levels (APQC, 2016). Knowledge has progressively been observed as a key asset in organizations whether in the services, manufacturing, or educational sector and this has had an impact on selection and enrollment

practices in numerous associations (A. E. Roth, 2016; Wamalwa & Omallah, 2016; S. Wang & Noe, 2010). The importance of KM is greater in organizations other than universities, but universities are specifically responsible for creating quality knowledge that is used in other organizations (Demchig, 2015). Educational institutes are responsible for generating quality intellectual property, which is considered a major factor in the achievement of the goals to become a knowledge economy and to improve world development (Inkinen & Inkinen, 2016). Teachers and students are the key sources to create quality knowledge in universities. There is a need to explore the significance of KM, specifically knowledge sharing tools in universities, as a way to investigate the impact of teachers' role, teachers' enthusiasm, level of trust, motivation, and technology on students' tacit and explicit knowledge in the higher education sector of Pakistan, specifically in Punjab province, which has received relatively little attention. Furthermore, there is a gap in the literature on the study of the role of self-determination dimensions (i.e. competence, relatedness and autonomy) as mediators to enhance students' knowledge. Jang, Kim, and Reeve (2016) used self-determination theory (SDT) as a mediator to investigate students' classroom engagement and class participation behavior.

The first chapter is an introduction to the study. An overview of KM in higher education institutions (HEIs) is given in Section 1.1. Section 1.2 describes students as knowledge creators. Sections 1.3 and 1.4 present the research gap and the purpose statement, respectively. The objectives of the study are discussed in Section 1.5 and they are reflected in the research questions which are presented in Section 1.6. Section 1.7 describes the significance of the study. Delimitations of the study are presented in Section 1.8 and important terms used in the study are defined in Section 1.9. Section 1.10 is the researcher's brief account of personal interest in the topic. The last section, Section 1.11, summarizes the structure of the thesis.

1.1 KM in HEIs

Dalkir and Liebowitz (2011) characterized KM as “deliberate activities grasped to handle organizations’ assets more proficiently keeping in mind the end goal to enhance its execution”. The American Productivity and Quality Center characterizes KM as “systems and procedures distinguishing, capturing and utilizing knowledge” (Atefeh, McCamble, Moorchead, & Gitters, 1999). KM helps organizations to empower development, enhance customer benefits, and accomplish business greatness through the amassing, change of accessibility, availability, and compelling utilization of knowledge (Demchig, 2015). KM helps organizations to exploit their knowledge resources keeping in mind the end goal to build their effectiveness and profitability (Dalkir & Liebowitz, 2011). Nilsook and Sriwongkol (2009) stated that the use of KM in HEIs could enhance these key roles:

- Development of human capital at each level of organization
- Promotion of better quality and effectiveness in HEIs
- Enhancement of knowledge investment to develop a knowledge-based economy

A KM initiative will aid the detection of expert resources; experts could share their experiences and insights in an effective involvement with an education system (Jundale & Navale, 2009). Natek and Zwilling (2014) stated that HEIs promote KM as empowering information excavating the environment for teachers and analysts. KM helps organizations to fortify development, enhance client benefits, and accomplish business credibility through the aggregation, change of accessibility and openness, and powerful utilization of knowledge (Demchig, 2015). KM can boost a data mining environment in HEIs for researchers as well as professors (Natek & Zwilling, 2014). At the point of building up a KM technique in advanced education, the requirements of its stakeholders for knowledge must be considered, and the working forms should be set up keeping in mind the end goal of encouraging organizational learning (Gourova & Zografova, 2014). For

educational institutions, KM should serve the needs of its partners/stakeholders, such as managers, government offices, guardians and educational organizations, and actualize their mission to serve the economy and the public.

Consider an individual instructor who has knowledge on the most proficient method to enhance student knowledge. If the establishment depended on just this master individual to direct continuous activities in enhancing student learning results, it could hamper the adaptability and responsiveness of the association. The test is to make the knowledge that dwells in this individual broadly and effectively accessible to any instructor. KM can prompt knowledge sharing (tacit and explicit) which has an advantage for all the institution (Shiuan & Lee, 2009). KM in education can be considered to be an approach that empowers individuals inside the association to build up an arrangement of practices deliberately to gather information and share what they know (e.g. abilities, encounters, convictions, values and thoughts), prompting activity that enhances services and results (L. A. Petrides & Nodine, 2003).

Higher education is considered one of the primary instruments for the advancement of a thriving national development. It provides the human assets and scholarly capital that fulfills the fundamental social, financial and intellectual needs of society. HEIs create, prepare and sustain brains; they create demeanors, aptitudes and pride, and open another universe of chances for the nation (Shahid, Wahab, & Ahmed, 2016). Scholastic libraries are a source of knowledge to provide tools as per the requirements of researchers, technocrats, specialists and others involved in advanced education (M. A. Khan, 2014).

A definitive objective of education is the advancement of students' learning. An aim of higher education is to advance basic consideration, comprehension and resilience to suit different point of views (Wood, 2009). The societal idea of education entails the stretching out of knowledge to

the public (Kuhn, 2007). The Higher Education Commission of Pakistan Quality Assurance Manual (HECPQAM) concentrates on changing the worldview and adjusts higher education to a perspective to "outfit future pioneers, encourage an empowering learning environment, and enhance the scholarly scene. In this way, it powers the engine of economic and social improvement at the national, local and global levels" (Batool & Qureshi, 2007). The HECPQAM conceives an all-encompassing advancement of students for quality expansion into the nation (M. A. Khan, 2014). The basic role of education is to introduce advanced learning among students, to upgrade their understanding and to cultivate resilience so as to empower students to make a huge commitment towards society. As indicated by Wood (2009), higher education concentrates on scholarly learning and advancement of students' educational experience.

The quality of higher education has turned into a critical challenge. This challenge requires that fancied and real goals be distinguished from each other, that assessment is encouraged and that opportunities are available to influence change through proper intercessions. The results of changes to education should be assessed to maintain the viability of higher educational frameworks (M. A. Khan & Usman, 2015). Similar reviews have discussed the quality of students' education. These reviews were conducted in the setting of industrialized states (Clemes, Gan, & Kao, 2008). However, these reviews stated there is a need to additionally investigate the quality of students' education in various social settings for generalizability.

HEIs are in the knowledge business since they are included in knowledge creation, dispersal and learning. J. Rowley (2000) expressed that HEIs should be brimming with effective cases and best practices and that they should promote their learning, instructing, research and consultancy benefits through knowledge creation and applications. There is an alternative picture, however, in which higher education foundations have drawn fire for their poor education results and lack of quality for society (Demchig, 2015).

1.2 Why measure students' knowledge?

Students are important source of knowledge and students have positive attitude towards knowledge sharing (Jer Yuen & Shaheen Majid, 2007). It is also noticed that students are less interested/inclined to disseminate knowledge particularly in academic activities (Boateng et al., 2017). There is plethora of literature on knowledge sharing studies in organizational prospective that how employees' knowledge sharing promotes (Israilidis, Siachou, Cooke, & Lock, 2015; Zhang & Jiang, 2015). Knowledge sharing is not being studied enough in academic environment specially students' prospective (Boateng et al., 2017).

As indicated by McInerney (2002), KM helps to create and to disseminate knowledge, and identifies the sources of knowledge. Students are the main source of creating knowledge. The importance of students' knowledge cannot be underestimated because students are more critical thinker and learn more from different sources instead of what is being taught (Boateng et al., 2017). Many universities are restructuring curriculum to accelerate students' knowledge by facilitating knowledge sharing tools (Jer Yuen & Shaheen Majid, 2007).

Natek and Zwilling (2014) of view that HEIs want to know whether students perform well academically. Before or during their courses, the administration attempts to evaluate the students who perform well academically. This is one of the main challenges for HEIs to engage students in knowledge sharing, and it has been encouraging through personal contacts and social bindings (T.-C. Lin, Wu, & Lu, 2012) Students' knowledge sharing and learning is facilitated by collaborative activities and sharing information among students.

Students are main source of knowledge, because students perform in extraordinary way to produce first-hand knowledge. According to literature, trust, student's attitude, and behavior create impact on students' knowledge sharing practices. This is why previous studies have noticed that students'

knowledge outcomes uplift HEIs performance which ultimately contribute in economy development (Chin Wei, Siong Choy, Geok Chew, & Yee Yen, 2012; Yuan, Olfman, & Yi, 2016).

University culture, information resources, and university structure are the main dimensions are identified in Jordon as supporting factors for knowledge sharing in students (Wangpipatwong, 2009). On other side, postgraduate students are less inclined to sharing knowledge by attending conferences, and students are with view point that voluntarily sharing knowledge is hard and does not increase competitiveness (Jer Yuen & Shaheen Majid, 2007; Yaghi, Barakat, Alfawaer, Shkokani, & Nassuora, 2011). A successful collaborative learning is facilitated by active and voluntarily sharing of information among students. Such knowledge interactions help students answer questions, solve problems, learn new things and increase understanding regarding a particular subject, or merely act as means to help one another(Högberg & Edvinsson, 1998).

The faculty is custodian of the creation, improvement and dispersion of the knowledge; students absorb the knowledge. Students pick up knowledge from their faculty as well as from their associates and partners. Sometimes, the nature of tacit knowledge (knowhow) hinders improvement in the performance and restricts students' opportunities. However, this can be resolved by explicating that knowledge (tacit) so that it can be applied and shared among students to enhance performance (Songsangyos, 2012).

The limitations to students' learning can be controlled with the help of knowledge sharing (Alavi & Leidner, 2001). Knowledge-based organizations have a strong need for knowledge sharing. Maponya (2004) expressed that KM has turned into a fundamental approach in academic circle to enhance knowledge outcomes. Universities are fundamentally connected with the preservation of knowledge and use many procedures such as research, investigation and distribution (Ratcliffe-Martin, Coakes, & Sugden, 2000). So, sharing knowledge should be advanced in universities.

Currently, knowledge is an essential component of competition among HEIs (Tondeur, Hermans, van Braak, & Valcke, 2008).

Basu and Sengupta (2007) are of the view that the importance of knowledge cannot be denied. Awad and Hassan (2011) stated that the worldview has shifted from conventional management (arranging, sorting out, managing and controlling) to more effective practices. Basu and Sengupta (2007) emphasized that the distribution of employed knowledge is vital and that colleges and universities ought to realize its significance. Concluding, Students in classrooms or laboratories produce first-hand knowledge, and that knowledge helps to create harmony in the educational field. Students are being taught by teachers whatever they teach, but students perceive and produce what they actually want to discover. That is why students' knowledge is being tested in this research.

1.3 The Research Gap

Knowledge is a supreme asset for a state in this contemporary epoch. States who give worth to education constantly make improvements. Those nations that use brains always transform the future. As we can see from the past, the nations that gave priority to knowledge ruled over the world. Educational institutes can produce knowledgeable leaders and inventors; inventions have improved the life standards of human beings and living entities. In this way, if nations place importance on education, then they become more affluent and sturdier (Ahmed, 2012).

Educational organizations are under massive pressure for expanded responsibility from external and internal sources. External pressures are raised by partners like managers, government offices and guardians for quantifiable outcomes. Educational organizations are interested in getting information about student learning results. Internally, educational organizations are getting some information about responsibility: for instance, how might they enhance student knowledge? In this

atmosphere of external and internal requests for responsibility and results of student knowledge outcomes, colleges, schools and universities as associations are focused on educational missions that guarantee that students are learning by obtaining knowledge in the most effective and compelling environment (Shiuan & Lee, 2009). Organizations should be able to show outcomes of student learning and advancement. Hence, educational foundations may think that it is useful to embrace KM projects to enhance their exhibitions and results. Much empirical work has been reported in the literature on knowledge sharing tools to demonstrate the importance of achieving better organizational performance in the educational sector (Ahmed, 2012; Goh & Sandhu, 2013; Jer Yuen & Shaheen Majid, 2007; M. M. Khan, Rehman, & Dost, 2012; Manzoor, 2012). These researchers have taken different tools of knowledge sharing to check students' learning and knowledge sharing behavior in HEIs. Aslam, Rehman, Imran, and Muqadas (2016) also used knowledge sharing as a mediator to confirm the relationship between teachers' experience and students' satisfaction. A wide-ranging amount of literature has been done in the previous decade to enhance our understanding of this underlying relationship among knowledge sharing tools and student knowledge (Inkinen & Inkinen, 2016; A. E. Roth, 2016; Wamalwa & Omallah, 2016; S. Wang & Noe, 2010). After examining the available literature on tools for knowledge sharing and student knowledge in higher education, the following foremost gaps were identified with respect to tools for knowledge sharing and student knowledge.

Extensive literature is available on knowledge sharing tools that are dedicated to measuring only students' learning behavior or willingness to share specifically in Pakistani education sector (Ahmed, 2012; M. M. Khan et al., 2012; Manzoor, 2012). Researchers are of view that students have propensity to accept certain learning strategies as compare to others (Jer Yuen & Shaheen Majid, 2007). These stratagems describe how a student logically takes information and processes it according to his/her own individual observation when given a learning task. However, simply

generating and gathering more knowledge does not inevitably lead to better practice (Fazey et al., 2014). Subsequently, student knowledge, which is recognized by many researchers in KM, has been ignored (Ahmed, 2012; Jer Yuen & Shaheen Majid, 2007; M. M. Khan et al., 2012; T. H. Kim, Lee, Chun, & Benbasat, 2014; Manzoor, 2012). Many studies (Ahmed, 2012; Jer Yuen & Shaheen Majid, 2007; M. M. Khan et al., 2012; T. H. Kim et al., 2014; Manzoor, 2012) have recognized tools for knowledge sharing (technology, motivation, trust factors, teachers' role etc.) from the perspective of measuring students' learning and sharing behavior in HEIs. But there is a dearth in the literature in respect to exploring the effect of these factors on students' tacit and explicit knowledge.

However, a few studies have been conducted in the last decades to explore the overall performance at institutional level when KM strategies are applied in educational institutions to develop trust among individuals (I. Nonaka, 1994). Studies have examined the impact of trust, technology, teachers' role and motivational level on students' knowledge (tacit and explicit) in HEIs in Paksitan (Ahmed, 2012; M. M. Khan et al., 2012; Manzoor, 2012); however, either they are limited by a lack of strong literature support or fail to present a holistic view of knowledge sharing and its tools (i.e. trust, motivation, technology, teachers' role and enthusiasm) in educational institutions. So, there is a need to investigate how knowledge sharing tools (trust, motivation, technology, teachers' role and teachers' enthusiasm) effect students' tacit and explicit knowledge particularly in HEIs of Punjab province, Pakistan, because HEIs have a core responsibility to create knowledge which helps to boost the economy (Kapur & Crowley, 2008).

Studies examining the underlying relationship between knowledge sharing tools and students' tacit and explicit knowledge have used many different models of KM and student learning or sharing attitudes that encompass several mediating factors (Evans, 2008). Some studies have taken KM as mediating variable to enhance organizational performance (Lai, Hsu, Lin, Chen, & Lin, 2014), but

there is still a need to link knowledge sharing tools and student's tacit and explicit knowledge or employees' knowledge at an organizational level. Previous research was criticized for being too simple, missing the mediating effect in the study, lacking practical implication of those studies and the number of items included in the study (Ahmed, 2012; M. M. Khan et al., 2012; Shiuan & Lee, 2009). Many studies demonstrated a statistically significant association between technology and students' tacit and explicit knowledge (Shiuan & Lee, 2009), but slight attention was paid to exploring the relationship between knowledge sharing tools and students' knowledge sharing behavior in HEIs. The lack of studies on the mediating effect between knowledge sharing tools and students' knowledge is a gap that will be explored in this thesis in the context of HEIs of Punjab province, Pakistan.

Many researchers proposed that knowledge sharing tools are necessarily directed to overall organizational performance rather than to influencing individual knowledge and may lead to desirable new knowledge. Akram (2015) proposed a model by taking KM practices to investigate an individual's knowledge creating and sharing behavior. It is noted that an individual's knowledge is the most important factor influencing knowledge outcomes; therefore, there is a need to propose a model which will treat an individual's self-determination dimensions of competence (Harter, 1978; White, 1963), relatedness (Baumeister & Leary, 1995; Reis, 1994) and autonomy (DeCharms, 1968; E. L. Deci, 1975) as mediating variables to examine students' tacit and explicit knowledge in HEIs of Punjab province.

Despite the several studies on the learning and sharing behavior of students who employed knowledge tools, it is still difficult to generalize conclusions about KM because of the sectors studied, the nature of KM (i.e. dimensions and practices), different ways of collecting the data and targeted population (Akram, 2015; M. M. Khan et al., 2012; Mahmood, Ilyas, & Rehman, 2014).

This research uses competence, relatedness and autonomy as mediators in the framework and SDT as a theoretical lens. SDT has already been effectively applied in educational institutions (De Naeghel, Van Keer, Vansteenkiste, Haerens, & Aelterman, 2016; Hartnett, 2015; Hrbackova & Suchankova, 2016; Jeno, Grytnes, & Vandvik, 2017; Niemiec & Ryan, 2009); however, Y. Lee, Lee, and Hwang (2015) conducted research on SDT and technology acceptance and confirmed a relationship between these two variables. No research in the literature addresses students' tacit and explicit knowledge by taking dimensions of SDT as mediating variable.

1.4 Purpose Statement

As indicated by L. A. Petrides and Nodine (2003), the principal concerns in the advancement and utilization of KM in education are:

- *Be rigorous in associating KM approaches to deal with learning results*

  The general objective of KM in education is clear: enhanced basic leadership through the associations to progress and enhance student learning. This general objective will turn out to be progressively critical, as schools, colleges, and universities come under pressure for expanded responsibilities from stakeholders.

- *Evaluate the degree to which KM practices and values can keep on transforming the classroom experience*

  Information sharing, cooperation, and synergistic learning have been important curricular improvements during recent decades since students are currently the most critical partners for schools and universities. It is vital to help them build up the sorts of basic deduction and relational abilities that will empower them to prevail in a rich environment.

The rising field of KM is recognized by Done (2011) as a potential wellspring of knowledge that addresses knowledge sharing. H. L. Wang and Tsai (2010) stated that KM structures act as an association or platform between the knowledge seeker and supporter. KM can be one way through which tacit knowledge or explicit knowledge not only can be enhanced but can also develop motivation, competence, and trust between knowledge providers and knowledge seekers. Therefore, the objective of this study is, firstly, to advance the model by clarifying the mediating mechanism between knowledge sharing tools and students' knowledge by using the concept of SDT; secondly, to test this framework in the setting of the educational institutions of Punjab province, Pakistan, because less attention has been given to the impact of SDT's dimensions on knowledge sharing tools and students' knowledge.

1.5 Objectives of the Study

The main objective of the study is:

- To examine, weather competence, relatedness, and autonomy mediates the impact of knowledge sharing tools on students' tacit and explicit knowledge in HEIs of Punjab province, Pakistan

The sub-objectives are:

- to determine the mediating role of SDT's dimensions between the relationship of knowledge sharing tools and students' tacit and explicit knowledge in HEIs of Punjab province, Pakistan.
- to determine the impact of motivation on students' tacit and explicit knowledge in HEIs of Punjab province, Pakistan.
- to determine the effect of trust on students' tacit and explicit knowledge in HEIs of Punjab province, Pakistan.

- to examine the impact of technology on students' tacit and explicit knowledge in HEIs of Punjab province, Pakistan.
- to examine the effect of teachers' role on students' tacit and explicit knowledge in HEIs of Punjab province, Pakistan.
- to examine the effect of teachers' enthusiasm on students' tacit and explicit knowledge in HEIs of Punjab province, Pakistan
- to determine the relationship between SDT's dimensions (i.e. competence, relatedness, and autonomy) and students' tacit knowledge and explicit knowledge as a whole.
- to enable administrators and practitioners of educational institutions in recognizing and implementing necessary adjustments with respect to students' knowledge.
- to help policy implementers for making better policies to enhance students' knowledge not only in higher education sector but also for primary and secondary level educational sectors.
- to contribute in existing literature by checking the effect of knowledge sharing tools on students' knowledge with mediating effect of self-determination theory

1.6 Research Questions

Firstly, the study will investigate the impact of motivation, trust, technology, teachers' role and teachers' enthusiasm on students' knowledge (explicit and tacit). Then this study will examine the relationship between SDT's dimensions (i.e. competence, relatedness, autonomy) and student's knowledge (tacit and explicit). Finally, this study will investigate how SDT's dimensions mediate the relationship between knowledge sharing tools (i.e. motivation, trust, technology, teachers' role, teachers' enthusiasm) and students' knowledge (explicit and tacit). Managing the knowledge in

the education sector helps an administration to improve educational quality. Motivation and teachers' enthusiasm help students to absorb the available knowledge.

The following are the research questions of the study:

- Do competence, relatedness, and autonomy mediate the relationship between knowledge sharing tools (i.e. motivation, trust, technology, teachers' role, teachers' enthusiasm) and students' tacit knowledge and explicit knowledge?
- Does motivation affect students' tacit knowledge and explicit knowledge?
- Does trust affect students' tacit knowledge and explicit knowledge?
- Does teachers' role affect students' tacit knowledge and explicit knowledge?
- Does teacher's enthusiasm affect students' explicit knowledge and tacit knowledge?
- Do competence, relatedness, and autonomy affect students' tacit knowledge and explicit knowledge?

1.7 Significance of the Study

This study will make hypothetical comments in the following ways:

- The educational sector in any country is considered the main factor contributing to national growth and knowledge economy. Knowledge is a key source of survival of human beings which helps nations to rule the world. There has been a longstanding discussion on how to manage knowledge in order to create more ease for humans. The literature on knowledge sharing tools is basically framed on students' knowledge sharing and learning behavior in HEIs (M. M. Khan et al., 2012). Furthermore, the mediating mechanism between knowledge sharing tools and students' knowledge is missing in the literature (Ahmed, 2012; Manzoor, 2012; Shiuan & Lee, 2009). This lack is the reason why this study has

been done and it has been done with a strong theoretical background to contribute to the literature by proposing a mediating model of SDT in HEIs.

- It is a proven fact that knowledge contributes to the shaping of the one's attitudes and behavior, which lead to individual performance. This study has selected a set of knowledge sharing tools from different studies which contributes to an individual's knowledge; the study of these tools is underpinned by SDT theory to check the potential contribution towards students' knowledge (tacit and explicit). This study is limited to students' knowledge in HEIs because students are the core sources of creating and handling of new knowledge and this area has received less attention in the literature. This study is unusual because it is set in Pakistan which is a developing country in the educational field.
- Previous studies have used different knowledge sharing tools and conducted studies on HEIs in Lahore city of Punjab province, Pakistan. Lahore is one of the big cities of Pakistan and one of the most populated cities in Punjab also in respect to the educational sector. There are number of universities in Lahore but there are also a number of public and private universities in other cities of Punjab province. The government of Pakistan has allocated spending budgets to the education sector to improve quality research as per HECPQAM (Batool & Qureshi, 2007). Unlike previous research, this study used SDT as a theoretical lens to explore the mediating relationship between knowledge sharing tools and students' knowledge (explicit and tacit) in HEIs of Punjab province, Pakistan. This also makes a practical contribution to the administrators and practitioners of educational institutions in recognizing and implementing necessary adjustments with respect to students' knowledge.
- The measurement of students' knowledge sharing and learning behavior has received little consideration in the literature (M. M. Khan et al., 2012). The researcher was not able to find a single study in or outside Pakistan that addressed students' tacit and explicit

knowledge in HEIs with respect to the mediating effect of SDT's dimensions. So, this study makes a strong theoretical contribution to the exploration of the association between knowledge sharing tools and students' tacit and explicit knowledge. The significance of this study also includes its contribution to policy implications not only for the higher education sector but also for all educational sectors.

1.8 Delimitations

The delimitations depend on the decision that compelled conducting the research on the basis of inclusion and exclusion (Isaac & Michael, 1971). This study has the following delimitations:

- This research restricts the researcher to particular organizations: HEIs of Punjab province, Pakistan. The results and findings of the current research can be generalized but restricted to universities because this research has been conducted on private and public HEIs of Punjab province, Pakistan.
- The proposed model of knowledge sharing tools and an individual's knowledge in this research is designed to measure students' knowledge in HEIs. There are other individuals whose knowledge can be studied in this scope, such as teachers or administrative staff, who directly or indirectly enhance students' knowledge in HEIs.
- This study used knowledge sharing tools that had been studied previously as independent effects.
- Students' motivational level has been an area of discussion since the last decade and a number of studies have discussed it. In consideration of that, the mediating variable of SDT's dimensions was used to measure students' knowledge in this study.

1.9 Definitions of Important Terms

1.9.1 Tacit Knowledge

According to Cambridge University Press (2016), tacit knowledge is the knowledge that someone gets not from being taught by any person but from his or her experiences. This knowledge is difficult to transfer by means of verbalizing and writing. The knowledge that does not have words is called tacit knowledge (Flexner, 1987); we know more than we can communicate (Polanyi, 1966).

1.9.2 Explicit Knowledge

Explicit knowledge is knowledge that can be expressed verbally and can be stored in the form of documentation and codified electronically (Cambridge University Press, 2016). Know-what or precise knowledge is quickly imparted and shared with the help of print, electronic and other formal ways (E. A. Smith, 2001).

1.9.3 Trust

Inkpen and Currall (1998) indicated that trust is the reliance on each other if there is unclearness or danger. Trust is generally understood to be reliance on the character of a person or to have confidence in a person.

1.9.4 Motivation

Kleinginna Jr and Kleinginna (1981) described motivation as "the methodology through which behavior is fortified and thought towards a specific objective". Motivation is generally understood to be a reason for acting or behaving in a particular way.

1.9.5 Teacher's Enthusiasm

Enthusiasm is a high stimulating state which can originate from a positive outlook or the desire for a reward (A. C. Frenzel, Goetz, Lüdtke, Pekrun, & Sutton, 2009; Shiota, Neufeld,

Yeung, Moser, & Perea, 2011). Additionally, it can be considered a style of conveying information or as large amounts of engagement, excitement, and energy (Kunter, Frenzel, Nagy, Baumert, & Pekrun, 2011; Pekrun, 2006). It is also an arrangement of non-verbal practices and signals which can be effortlessly perceived as a show of eagerness (M. L. Collins, 1978).

1.9.6 Teacher's Role

As indicated by Vygotsky (1978), a teacher's role underscores teachers as advanced learners who manage students so that the students can become autonomous scholars (Daniel & Gagnon, 2011).

1.9.7 SDT

In SDT, the satisfaction of an individual's needs for competence, relatedness, and autonomy is a predictor of that individual's functioning in life (R. M. Ryan & Deci, 2000b):

Competence: A feeling of self-adequacy or perceived capacity to accomplish objectives.

Relatedness: A feeling of volitional control over one's behavior.

Autonomy: An essential sense of connection or need to belong to a larger group.

1.10 Personal Interest in the Topic

One of the major reasons for my choosing this topic is that I have been engaged with HEIs for the past 8 years. I have taught at graduate and undergraduate level and I have direct interaction with students. On the other side, I have administrative responsibilities to build a knowledge-oriented environment in my organization. Being a teacher of KM, my specialization compels me to choose this topic as I have published different researches on KM. Thus, this study has given me the enthusiasm to conduct research on students' knowledge that contributes towards a better HEIs

environment and helps practitioners and administration to produce quality knowledge in order to become a knowledge economy.

1.11 Structure of Remaining Chapters

The remaining chapters of the present study are organized as follows:

In **Chapter two**, Section 2.1 provides a brief introduction and background to the chapter. Section 2.2 presents a brief profile of Pakistan. Section 2.3 provides an overview of the education system in the country and Section 2.4 explains the education system from pre-primary to higher education and Deeni Madaris system. Section 2.5 provides a discussion on knowledge and its types and the journey from data to wisdom. Sections 2.6 and 2.7 present discussions on KM and knowledge sharing, respectively. Section 2.8 provides a review of knowledge sharing tools. Section 2.9 provides a detailed discussion of mediating variables and theoretical backing of SDT. Section 2.10 explains the proposed conceptual model of the study and Section 2.11 outlines the hypotheses for the study.

Chapter three describes the methods used in the present study. It also depicts the population on which the current study is based, and shows how the sample size of the present study was attained from the population. Moreover, this chapter also highlights the strategy of inquiry, methods to examine the hypotheses, and techniques used for data analysis.

Chapter four indicates the procedures for quantitative data analysis and results obtained from the data analysis. Moreover, the fourth chapter also indicates the validation and reliability testing of data collection instrument, and this chapter also provides statistical techniques used in data analysis namely regression analysis and correlational analysis.

Chapter five discusses the findings based on the results derived from quantitative analysis and it also explains the consistencies and variation in results in relation to previous studies.

Chapter six concludes the findings and presents the summary of the findings of the present study by highlighting the theoretical and practical contributions to the literature and web of knowledge. This chapter also presents recommendations for future studies, and outlines limitations of the study.

2 CHAPTER TWO: LITERATURE REVIEW

This study is about exploring the possible impact of knowledge sharing tools on students' tacit and explicit knowledge in HEIs of Punjab province, Pakistan. The current chapter presents a literature review that is an attempt to build a comprehensive theoretical framework, which also gives support to the main argument of the study that is established by it.

2.1 Introduction and Background to Chapter two

This chapter is a presentation of a literature review about overall KM in educational sector of Pakistan; it includes a brief history of higher education in Pakistan. This chapter also presents literature about knowledge, its type and the relationship between knowledge sharing tools and students' tacit and explicit knowledge. The main focus of this chapter is on knowledge sharing tools and students' tacit and explicit knowledge. In this perspective, knowledge is of two types: tacit and explicit knowledge. It is argued in the previous chapter and as discussed in conceptualization definition that tacit knowledge cannot be explained verbally or through writing whereas explicit knowledge can be codified and can be stored in soft or hard form. Knowledge sharing tools are presented in terms of this theoretical background as technology, motivation, trust (which is explained in contemporary measurement techniques), teacher's role, and teacher enthusiasm. In addition, the researcher also presented these terms in contemporary research. The literature on the relationship between knowledge sharing tools and students' knowledge and dimensions of SDT is also presented. The foundations of the current study emerge from the literature review.

This chapter also fills a significant gap in the literature; there is a paucity of research and little theoretical grounding on the relation between knowledge sharing tools and students' tacit and explicit knowledge, and no study was found that incorporated the mediating role of SDT. This

chapter also sets a contextual model with which the mediating mechanism can be viewed within HEIs. This chapter also establishes a model for examining and understanding the relationship between knowledge sharing tools and students' knowledge with mediating role of SDT. By examining this mechanism, this study has also contributed to the body of knowledge by understanding the nature and strength among specific connections leading to students' knowledge.

Finally, this chapter also compare possible literature reviews on the relationship between knowledge sharing tools and dimensions of SDT. By examining this connection, the results of this chapter contribute to the body of knowledge on improving students' outcomes in HEIs.

2.2 Pakistan in Overall Context

The Islamic Republic of Pakistan is located in South Asia. China lies to its north, Iran and Afghanistan are in the west, while India is in the east. Pakistan has eight regions, namely Punjab, Azad Jammu and Kashmir (AJ&K), Balochistan, Federally Administered Tribal Areas (FATA), Khyber Pakhtunkhwa, Sindh, Gilgit-Baltistan, and Islamabad Capital Territory (ICT). In 1947, British India was divided and Pakistan came into existence. Pakistan is one of the most multicolored countries in terms of landscape, culture, and climate.

Pakistan has one of the highest mountain ranges in the world, which is situated in the north of the country. Fertile plains of the Indus valley are in the west of its territory, and the western and southern areas of the country have arid deserts. The Arabian Sea (a historic sea route in Asia) borders with Pakistan territory; this sea helps to moderate the climate of the southern areas of Pakistan. The area of Pakistan is 796,096 km^2 while its population is more than 188 million (see Table 2.1). The population density is uneven as around 61% of the country's population lives in rural areas that lack sufficient resources.

Pakistan is an agricultural republic; its main exports consist of agricultural crops (i.e. sugar, cotton, rice and textiles). The literacy rate is nearly 58%. The national language of Pakistan is Urdu whereas English is spoken for education, trade, and other secretarial tasks. Pakistan was home to the earliest human civilization in the region of South Asia, including Indus Valley and Gandhara civilization. Pakistan is considered the second most populous Muslim country in the world, and is the declared sole nuclear power in the Muslim World which helps it to play an important role in the world.

Table 2.1: Population by Province/Region

Provinces/Regions	Population	Percentage (%)
Punjab	102,004,807	53
Sindh	45,032,216	22
KP	25,308,378	14
Baluchistan	9,717,006	5
AJ&K	3,858,240	2
Gilgit-Baltistan	1,253,223	1
FATA	4,515,555	2
ICT	1,440,608	1

Sources: Pakistan Education Statistics 2014–15 (Khichi et al., 2016)

Table 2.1 shows that Punjab has the largest population of the provinces of Pakistan.

2.3 Education System of Pakistan

> *"The State shall provide free and compulsory education to all children of the age of five to sixteen years in such manner as may be determined by law."*
>
> (Article 37-B, 1973, Constitution of Pakistan)

Education is a fundamental right of all human beings and this right is part of the constitution of Pakistan (1973): education is a right and every child of the country is entitled to education. It is basic to our advancement as people and as social orders, and it is the route to an effective and gainful future. We guarantee that youngsters have admittance to a quality education that is

established in sexual orientation balance. We also make an expansive influence of chance that effects times to come. Lamentably, Education is one of the denied field of nation and not able to get consideration by previous governments. Existing government has activities for building concrete educational establishment of the nation and gave significant regard for the improvement of education.

Table 2.2: Overall Educational Statistics Overview

	Public	Private	Total
Institutions	184,889 (69%)	83,066 (31%)	267,955
Students	27,994,524 (63%)	16,441,229 (37%)	44,435,753
Teachers	842,592 (49%)	809,549 (51%)	1,652,141

Sources: Pakistan Education Statistics 2014–15 (Khichi et al., 2016)

The public sector is an essential participant in education administrations; however, creating superior education that is open to everyone requires imaginative projects and activities notwithstanding public assets and authority. There are routes by which the public and private sectors can consolidate to supplement each other's qualities in education administrations and achieve the Millennium Development Goals for education and to enhance results.

As shown in Table 2.2, the education arrangement of Pakistan involves 267,955 institutions and supports 44,435,753 scholars with the assistance of 1,652,141 instructors. The framework is made up of 184,889 (69%) public foundations and 83,066 (31%) private foundations. The public sector has 27.99 million students (63% of total) and the private sector in Pakistan serves 16.44 million students (37% of total). Table 2.2 also indicates that private sector students, who make up 37% of the total student population, are taught by 809,549 (49%) private teachers in private institutes in Pakistan that make up 31% of the total number of institutions. On other hand, 842,592 (51%) teachers serve in public sector institutions to teach public sector students, who make up 63% of

the total student population, in public institutions in Pakistan that make up 69% of the total number of institutions.

If we calculate gender by percentage, 44% female students and 56% male students are enrolled and 58% female teachers and 42% male teachers are engaged in Pakistan to serve in educational fields. So, we witness that the public sector has a deficiency in comparison to the private sector in ratio of teachers to students (Khichi et al., 2016). The causes behind this deficiency should be investigated.

2.4 Categories of Educational Institutes in Pakistan

- Pre-primary
- Primary
- Middle
- High
- Inter-Colleges
- Degree Colleges
- Universities
- Technical & Vocational (T&V) Institutions
- Teacher Training Institution
- Non-Formal Basic Education
- Deeni Madaris

Table 2.3: Distribution of Educational Institutes by Level

Institutes	Percentage (%)
Primary	55
Middle	17
High	12
Inter-Colleges	2
Degree Colleges	1
Higher Education Institutes	1
Technical & Vocational Institutions	1
Teacher Training Institution	1
Non-Formal Basic Education	7
Deeni Madaris	6

Sources: Pakistan Education Statistics 2014–15(Khichi et al., 2016)

2.4.1 Pre-primary Education

It is compulsory to provide pre-primary education to every child. There is no separate public sector for pre-primary education in Pakistan. The total enrolments at pre-primary level are 8.635 million of which 53% are enrolments at public institutes and 47% are enrolments at private institutes. The first step of a child towards elementary education in Pakistan is primary education.

2.4.2 Primary Education in Pakistan

Table 2.4: Primary Level Distribution by Sector

	Public	Private	Total
Schools	127,829 (87%)	19,399 (13%)	147,223
Students	11,388,160 (62%)	5,877,760 (32%)	18,368,000

Sources: Pakistan Education Statistics 2014–15(Khichi et al., 2016)

The crucial stage of a child's formative development is primary schooling which is an important stage in the educational career of a child. There are 127,829 primary institutes in Pakistan of which 87% are public and 13% are in the private sector. 18.368 million are enrolled in public and 11.365 enrolled in private sector. Of the children at primary level, 56% are 46% are girls.

2.4.3 Middle Level Education

Table 2.5: Middle Level Distribution by Sector

	Public	Private	Total
Schools	16,820 (38%)	27,998 (62%)	44,818
Students	4,104,000 (64%)	2,315,000 (36%)	6,419,000

Sources: Pakistan Education Statistics 2014–15(Khichi et al., 2016)

Middle level education was planned in the mid-twentieth century and helped to work as an educational extension amongst essential and auxiliary schools. They incorporate Grades 6 to 8 and the age limit for this level is age 10 to 12 years. There are 44,818 middle schools in Pakistan, out of which 16,820 (38%) are in the public sector and 27,998 (62%) are from the private sector. There are 6.419 million students enlisted at middle level of which 4.103 million (64%) are in the public sector, while 2.315 million (36%) are in the private sector, as appeared in Table 2.5. Of the students enrolled in middle class, 43% of the total are girls and 57% are boys (Khichi et al., 2016).

2.4.4 High School Education in Pakistan

Table 2.6: High School Level Distribution by Sector

	Public	Private	Total
Schools	12,567 (39%)	18,688 (61%)	31,225
Students	2,189,000 (69%)	1,176,000 (31%)	3,366,000

Sources: Pakistan Education Statistics 2014–15(Khichi et al., 2016)

High school, to be recognized as secondary school, is a term used to depict an education foundation where the final phase of schooling takes place; it is named as secondary education and is normally mandatory up to a predefined age. High school follows elementary or primary school education and might be followed by higher secondary education. Higher secondary schools in Pakistan more often than excludes grades 9 and 10. The education structure of Pakistan contains 31,255 high

schools which is 11.70% of aggregate schools of both private and public sectors. Out of these, 12,567 schools are in the public sector and 18,638 are in the private sector (see Table 2.6). The cumulative registration at high level is 3.366 million, of which 2.189 million (69%) students are in the public sector and 1.176 million (31%) students are in the private sector (Table 2.6). The aggregate young men's registration at high level is 1.933 million (58%), while the young women's enrolment is 1.432 million (42%).

2.4.5 Higher Secondary Education in Pakistan

Table 2.7: Higher Secondary Level Distribution by Sector

	Public	Private	Total
Schools	1,810 (34%)	3,583 (66%)	5,393
Students	1,298,000 (78%)	336,000 (22%)	1,665,000

Sources: Pakistan Education Statistics 2014–15 (Khichi et al., 2016)

In Pakistan, the higher secondary schools/inter colleges usually comprise Grades 11 and 12. There are 5,393 higher secondary schools/inter colleges in the education structure of Pakistan. The share of these establishments in the overall education structure of the country is about 1.98%. The public sector share at higher secondary educational level is 34%; that is, 1,810 institutions work under the umbrella of the public sector. On the other hand, 3,583 (66%) higher secondary institutions working under the private sector as shown in Table 2.7. The total registration at higher secondary schools/inter colleges stage is 1.655 million out of which 1.298 million (78%) of students are in the public sector and 0.366 million (22%) are in the private sector. The total boys' registration at higher secondary schools/inter colleges level is 0.994 million (60%), and the girls' registration is 0.659 million (40%).

2.4.6 Degree College Education in Pakistan

Table 2.8: Degree Level Distribution by Sector

	Public	Private	Total
Colleges	1,252 (89%)	158 (11%)	1,410
Students	1,018,000 (89%)	126,000 (11%)	1,144,000

Sources: Pakistan Education Statistics 2014–15 (Khichi et al., 2016)

Undergraduate education (degree colleges) is an education level taken to be one's first tertiary degree. Undergraduate education is post-secondary education up to the level of a bachelor's degree. The graduation system is classified into two systems in Pakistan: undergraduate and postgraduate. It takes two or four years to complete the program. The two-year programs are commonly in the field of arts, humanities and science, and the four-year programs are commonly in the fields of technology, engineering, pharmaceutical sciences and agriculture; a five-year period is required in the areas of medicine, law and architecture.

2.4.7 HEIs (Universities) in Pakistan

The higher education sector of Pakistan received significant consideration from the legislature in previous years. Various projects were started to shape the country’s higher education sector and knowledge creation capacity: preparing, dispersal and use. The University Grants Commission was supplanted by Higher Education Commission (HEC) of Pakistan in September 2002, with upgraded command and expansive orders to assess, enhance and advance the higher education and research sector in Pakistan. The changed motivation was upheld through the conceding of a vast exhibit of forces to the Commission for fulfilling its orders and tapered increments in financial assets from the administration to bolster this procedure (Rafiq & Ameen, 2012). In the last decade, HEC has contributed a lot of assets to adjust the essential elements of universities. Emphasizing advancement of the culture of research, HEC started various appealing activities: it offered

research awards; it offered travel aids for teachers, and research students could exhibit their research papers at global meetings; supported state level and worldwide workshops, classes, and so on; it connected remote faculties in universities with degree awarding institutions (DAIs) on lucrative pay bundles; it offered a tenure track framework, a lucrative pay bundle of arrangements; and so forth. HEC also offered abroad grants for PhD and MS leading to PhD, post-doctoral cooperation, and neighborhood PhD grants to enhance the labor arrangement in the higher education sector of the nation. It was genuinely a time of diverse improvement in which higher education evolved from a fundamental framework to knowledge-based activities (Rafiq & Ameen, 2012).

Table 2.9: University Level Distribution by Sector

	Public	Private	Total
Institutes	91 (56%)	72 (44%)	163
Students	1,112,000 (86%)	186,000 (14%)	1,299,000

Sources: Pakistan Education Statistics 2014–15 (Khichi et al., 2016)

A total number of 163 universities provide services in both public and private sectors of education. Statistics shows that 91 (56%) work under the umbrella of the public sector, whereas 72 (44%) work under the supervision of the private sector, as reflected in Table 2.9. The total registration in the universities at the stage of postgraduate is 1.299 million. Out of these registrations, 1.112 million (86%) students are enrolled in public sector universities, whereas 0.186 million (14%) students are enrolled in private universities as exhibited in Table 2.9. The total male registration in the universities is 0.666 million (54%), whereas the female registration is 0.602 million (46%).

2.4.8 T&V Institutes in Pakistan

Table 2.10: T&V Level Distribution by Sector

	Public	Private	Total
Institutes	1,073 (30%)	2,506 (70%)	3,579
Students	135,000 (44%)	174,000 (56%)	309,000

Sources: Pakistan Education Statistics 2014–15 (Khichi et al., 2016)

Specialized and vocational education is an instructive movement that offers an arrangement of courses that furnishes people with the scholarly and specialized knowledge and abilities they need to plan for further training and for professions in present or emerging business areas (Khichi et al., 2016). There are 3,579 T&V institutions in Pakistan out of which 1,073 (30%) are in the public sector whereas 2,506 (70%) are in the private sector as exhibited in Table 2.10. A total number of 0.309 million registrations are in T&V institutions, of which 0.135 million (44%) are in the public sector and 0.174 million (56%) are in the private sector. It has been observed that 30% of T&V institutions (public) serve 44% of total T&V registrations while 70% of institutes (private) serve 56% of private sector enrolment. The total male enrolment in T&V institutions is 0.208 million (65%), whereas the female enrolment is 0.111 million (35%).

2.4.9 Deeni Madaris in Pakistan

Table 2.11: Deeni Madaris Distribution by Sector

	Public	Private	Total
Institutes	446 (3%)	14,771 (97%)	15,217
Students	39,353 (3%)	1,671,647 (97%)	1,711,000

Sources: Pakistan Education Statistics 2014–15(Khichi et al., 2016)

In adult education and learning, Deeni Madaris also play an important and significant role. The main emphasis of Madrassah education is Islamic Education and Teachings. However, most

Madaris also teach formal education subjects as well. Presently there are 15,217 Deeni Madaris working in Pakistan altogether, of which 446 (3%) are in the public sector and 14,771 (97%) are in the private sector (see Table 2.11). The total registration in the Deeni Madaris is 1.711 million of which 0.053 million (3%) is in the public sector and 1.661 million (97%) is in the private sector. The total male registration in Deeni Madaris is 1.091 million (64%), whereas the female registration is 0.620 million (36%).

2.5 Knowledge

It is indispensable to describe knowledge because the understanding of knowledge and its nature is essential to finding, using, determining, and working with it (Huseman & Goodman, 1998). Knowledge is as old as humans; considerations on knowledge are found in the recorded history of Plato and Aristotle. Knowledge is a key variable these days and considered to be wealth for associations and states (Awad & Hassan, 2011). The capacity to secure, adjust and sort out new knowledge from outside the firm has been widely thought to offer a firm important potential high ground (J. D. Collins, 2013). T. H. Davenport and Prusak (1998) characterized knowledge as "a liquid blend of surrounded involvement, values, relevant information, and master understanding that gives a system to evaluating and constructing new encounters and material. It begins and is linked in the psyches of knowers."

Shin (2004) claimed that the era of another and advanced world is conceivable in the presence of knowledge. Further, the associations and individuals who have knowledge can create better inventions for humankind. Knowledge can be separated into three classifications: instrumental, social, and systematized knowledge. Knowledge is considered and comprehended as normal property rather than one's close to private property in public sharing relationship (Boer, Berends, & van Baalen, 2011). A public sharing relationship is recognized as a combination of individuals

who are not distinctive and having regular objective and comparable. Different researchers have segregated information as disparaged, isolated, and major unpleasant substances. It is a masterminded of pictures that have not been deciphered, its recommendations rely upon the representation and structure utilization. T. H. Davenport and Prusak (1998) found that the information is the discrete and target confirmation that outlines what happened. Information says nothing as to its own specific hugeness or significance considering the way that it gives no judgment or representation and no money related reason of activity (Y. Li, Tarafdar, & Subba Rao, 2012).

Gao, Li, and Clarke (2008) says that the term knowledge has deciphered in diversified courses in particular times. Randeree (2006) says that the safety of knowledge is basic for the affiliations. Today's post-current "new economy" is knowledge fixated and in this way for organizations to work viably they should get the chance to be "knowledge handling processing plants" (Roth et al., 1994). "Knowledge handling plants" is a representation made to depict "an animated learning affiliation driven by component frames that make common knowledge and make an understanding of that knowledge into forceful limits and focus abilities" (A. V. Roth, Marucheck, Kemp, & Trimble, 1994).

Randeree (2006) underlined six attributes of knowledge: connection specificity, scattering, inferred quality, transferability, gathering or assimilation and multifaceted nature. Individuals and management blend the idea of information management with the help of KM. The acquiring and handling of statistics from spreadsheets, projects, applications and databases is data administration, while KM has diverse structure and its attention is on learning, development, and understanding. Knowledge is what we know: knowledge includes the mental procedures of appreciation, comprehension and discovering that go ahead in the psyche; however, much knowledge includes collaboration with the world outside the brain and association with others (Shiuan & Lee, 2009).

Instructors can express what they know by articulating oral messages, motion or even through 'non-verbal communication'. Such messages do not convey 'knowledge', they deliver 'information', which a knowing student brain may acclimatize, comprehend, fathom and consolidate into their own knowledge structures. These structures are not indistinguishable for the teacher articulating the message and the recipient (student), because every individual's knowledge structures are historically decided (Schutz, 1967).

Gao et al. (2008) stated that the word KM has more condensed importance than the words management and knowledge. Further, they stated that associations must devise clear objectives for KM in business. Randeree (2006) stated that the security of information administration is as yet not focused on by associations as they confront the controversy of information over-burdening. Knowledge helps associations and people to survey circumstances and oversee change. Knowledge gives a way to decipher data and information which later leads to “wisdom” (Newell, Robertson, Scarbrough, & Swan, 2002). KM strategy empowers universities to have a more compelling and dynamic part in society. KM advances the economy to an effective stage and enhances the associations among universities and the public (Trivella & Dimitrios, 2015). These strategies must be adaptable and versatile to meet the requests from society. Knowledge is characterized in the KM literature in several ways.

2.5.1 Data-Information-Knowledge-Wisdom Hierarchy

The Data-Information-Knowledge-Wisdom (DIKW) hierarchy can be traced back to the 1980s (Cleveland, 1982; Zeleny, 1987) as it is presented here in this study. But, let us go back to T. S. Eliot (1934) poem “The Rock” where he, for the first time, introduced DIKW in his poem:

Where is the LIFE we have lost in LIVING?

Where is the WISDOM we have lost in KNOWLEDGE?

Where is the KNOWLEDGE we have lost in INFORMATION?

As we can see, Eliot clearly mentioned the basic fundamentals of DIKW in 1934, which is presently interpreted in different ways and has several applications in life (Aven, 2013). Learning is neither information nor data, however it could be identified with both and contrasts among these words are frequently a matter of degree (T. H. Davenport & Prusak, 1998). The system has made a discrepancy between two elements of knowledge, that is, data and information, and furthermore, between information and knowledge (T. Davenport & Prusak, 2000). The researcher found the hierarchy of DIKW in a review of the literature, but wisdom is a far higher factor in the achievement of competence in education.

Data is an arrangement of discrete, target certainties about an occasion (T. H. Davenport & Prusak, 1998). It usually exists and has no centrality earlier in its reality (all by itself). It can occur in any frame, operable or not. It does not have implications (Bellinger, Castro, & Mills, 2004). Data portrays just a part of what happened; it gives no judgment or translation and no economical premise of activity. While the raw material of basic leadership may incorporate data, it cannot let you know what to do. Data says nothing in regard to its own significance or superfluity. Be that as it may, data is essential to associations since it is basic raw material for the making of information (T. H. Davenport & Prusak, 1998). Information is the regular portrayal of noticeable characteristics of the world (J. E. Rowley, 2007). Data are images that speak to properties of items, occasions, and their surroundings. They are results of observation.

Furthermore, data with setting is viewed as *information*, and knowledge is information loaded with understanding, intuition, connotation, and significance. Information is depicted as a message, as a

rule, as a record or capable of being heard or obvious correspondence. Likewise, with any message, it has a sender as well as a receiver. Data is proposed to modify the way the receiver sees something, to affect his or her judgment and conduct. It must illuminate. Information is intended to shape the individual who gets it, to have some effect on his or her standpoint or knowledge.

Further, Bellinger et al. (2004) described that information is data to which importance has been given by mode of social association. This "signifying" can be helpful; however, it may not be. Knowledge is the fundamental resource of any association, encouraging rivalry and advancement. In this situation, the procedure that penetrates knowledge is vital, because it is critical to manage knowledge from its creation to its dispersal (Torres, Ziviani, & SILVA, 2012).

Wisdom is a definitive end and is the assessed and refined mixture of understanding and knowledge (Singh, 2012). This term has not been concentrated on as much as the DIK components, yet it has been widely talked about of late; see for instance (J. E. Rowley, 2007; Zeleny, 2005). There are numerous definitions of wisdom. For example, J. E. Rowley (2007) proposed that wisdom is the ability to put forward without hesitation the most suitable conduct, considering what is known (knowledge) and moral and social contemplations. Aven (2013) suggested that wisdom is not about “On the grounds that I can” or “In light of the fact that it is there” or “On the grounds that I should”; the conventional clarifications of the imprudent. Many educated individuals comprehend what to do, many knowledgeable specialists know how to do it (Zeleny, 2005), however just a couple of insightful people understand and can completely explain why it ought to be finished. In accordance with these thoughts, the accompanying analogy applies, data: "know-nothing", information: “know-what”, knowledge: “know-how”, and wisdom: “know-why” (Zeleny, 2005).

DIKW is data, information, knowledge, wisdom: a four-layer pecking order (shown in Figure 2.1), where every layer includes certain traits. Data is the most fundamental stage; Information

comprises setting; Knowledge complements how to employ it; Wisdom supplements when and why to apply it. DIKW is utilized principally in the fields of Information Science and KM (Jifa, 2013).

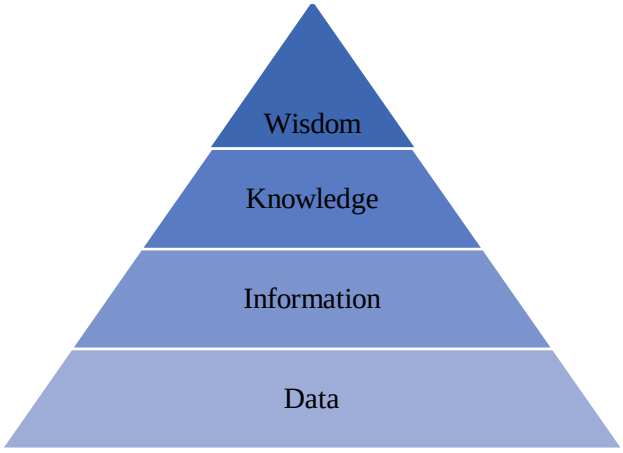

Figure 2.1: D-I-K-W Hierarchy
Source: Bellinger et al. (2004) and Jifa (2013)

2.5.2 Tacit and Explicit Knowledge

Gao et al. (2008) stated that knowledge can be characterized as subjective or objective, or explicit or tacit/implicit. Ikujiro Nonaka and Takeuchi (1995) added to the area of knowledge by presenting the comprehension and categorization of knowledge. Knowledge is grouped into two classifications: explicit and tacit; these groupings shape the basis of KM in capturing the part played by information frameworks and human systems (Ikujiro Nonaka, Nishihara, & Kawada, 2018). Polanyi (1966) categorized human knowledge into two measurements: explicit knowledge (formalized and composed knowledge, communicated as data, logical formulae, details, manuals, or reading material) and tacit knowledge (activity based and unformulated, exceedingly individual and difficult to share). Polanyi (1966) stated that knowledge is not the result of a decided logical attempt, but is grounded in such human conditions as the feeling of excellence and enthusiasm. This understanding reveals the puzzle of revelation, development, and creation by knowledge

specialists and accentuates the operators' reasoning, encountering and acting abilities (Swift & Virick, 2013).

Specifically, tacit knowledge, ideas and experiences are the main products of knowledge sharing from one to another student. (Boateng et al., 2017). Perceiving the significance of fresh ways and procedures of deduction and performing is the way to get present knowledge and create new knowledge (Gao et al., 2008). Implicit knowledge, another type of tacit knowledge, is the sort of knowledge that is shared or comprehended by individuals or gatherings who are either unwilling or not able to express it explicitly (Dalkir & Beaulieu, 2017; M. Li & Gao, 2003).

Explicit knowledge is knowledge which can be caught and put away as archives for record purposes (Cambridge University Press, 2016; Dalkir & Beaulieu, 2017; Ikujiro Nonaka & Takeuchi, 1995). Explicit knowledge by nature is representational and can be adjusted or changed according to use to improve its scope of significant worth (Wong, 2017). Its transformational procedure happens by changing over the knowledge into information and afterward information into data (Wioleta Kucharska & Rafał Kowalczyk, 2016). Tacit knowledge by nature lives in the astuteness of the beholder which can be an individual or a group. As it depends on involvement and wisdom, it is unrealistic to record it. It is called the "soft" part of knowledge and is normally embedded in a unique circumstance (Ikujiro Nonaka & Takeuchi, 1995). Sometimes the nature of tacit knowledge hinders the performance of an organization and restricts individual and organizational opportunities because they reflect what they know and want to share (Serrat, 2017). This could be resolved by explicating that knowledge (tacit) so that it can be applied and shared between individuals or group to enhance their performance (Songsangyos, 2012).

Tacit knowledge in HEIs cannot be caught, but just shown through social communication (Jin-Feng, Ming-Yan, Li-Jie, & Jun-Ju, 2017). However, tacit knowledge is essentially not in any way

being smooth. Coincidence in the middle of tacit and explicit knowledge is frequently referred to in the literature on KM (Grigoriou & Rothaermel, 2017; Ikujiro Nonaka et al., 2018). Knowledge is blooming in light of the fact that it changes ceaselessly exchanged through human association. I. Nonaka (1994) further explained that explicit knowledge can be communicated as information which is found in records, mails, and handbooks, Additionally, explicit and tacit knowledge cooperate with one another in innovative projects. Principal weakness of the explicit/tacit talk is many-sided quality in clarifying tacit knowledge, whether tacit knowledge is in expressive, or unbending to persuasive, and then this stage is just not workable. Therefore, normal way of doing things of KM is attempting and overseeing tacit knowledge explicit (Razak, Aziz, Rahman, & Ali, 2018).

According to Nonaka and Takeuchi (1995), tacit knowledge is the foundation of all hierarchical knowledge. Collins (2001) demonstrated that it is basic even in exercises such as investigative tests and proposed that it is a major part of all human knowing and knowledge. Past such broad assertions, we discover contrasting conclusions over numerous key parts of tacit knowledge, for example, the level at which it is shown, how it is gained, what its capacity is, and whether it can be made explicit (Addis, 2016; Bratianu, 2016; Wong, 2017). There are ambiguities concerning the level at which we may hope to discover tacit knowledge. As many researchers regarded it as individual knowledge, subsequently it was treated only at the individual level (Boiral, 2002). Others referred to aggregate tacit knowledge as something distinctive (Leonard & Sensiper, 1998); keeping in mind that Collins compares this with hierarchical ability, and others referred to schedules, techniques and so forth as hierarchical tacit knowledge (Panahi et al., 2016).

If we view people as basically mingled creatures, then this refinement might be a false or misdirecting one. There is a general assertion that tacit knowledge is obtained through a person's direct practice of whatsoever their tacit knowledge concerns (Herbig, Büssing, & Ewert, 2001). At

the workplace, for instance, on the job preparation and casual learning are critical methods for procurement (Kasemsap, 2016). Then again, some contend that we are organically inclined toward certain perspectives or sorts of tacit knowledge, proposing that background is not a matter of course but a component (Patel, Arocha, & Kaufman, 1999). While these distinctions could be accommodated inside a few models of human advancement (Richardson, 1998), there has been no endeavor to do as such for tacit knowledge procurement.

With regards to the accentuation of the individual, Horvath et al. (1999) stated that tacit knowledge is gained with little assistance from others. Nevertheless, they seem, by all accounts, to be in a minority as there are many assertions that individual contact with and perception of others are basic variables in its procurement (J. C. Collins, 2001). Examination of the capacity of tacit knowledge additionally uncovers important ambiguities. From one perspective, tacit knowledge is said to be crucial to the ability to execute in different circumstances (Wagner & Sternberg, 1991), to empower people to manage new circumstances, and to fill in the gaps in formal preparation (J. C. Collins, 2001). These comments indicate that tacit knowledge encourages adjustment to new circumstances especially since it empowers individuals to act rapidly without deliberating (Hermans & Castiaux, 2017; R. Wang & Lv, 2017).

Schön (1996) specifically notes the conflicting duality of tacit knowledge recommending it, is both the premise of fruitful administration, and of guarded schedules. Some perspective tacit knowledge is the wellspring of all knowledge and especially of imaginative thoughts in associations (Ikujiro Nonaka et al., 2018). Tacit knowledge is a moderate instead of an imaginative power (Johannessen, Olaisen, & Olsen, 2001). Undoubtedly, it might be, on the grounds that it is moderate and custom bound that tacit knowledge can be a wellspring of practical projects, definitely since customs cannot without much of a stretch be replicated (Dreyer, Wynn, & Bown, 2015; Park, Vertinsky, & Becerra, 2015).

There are contrasting views on whether tacit knowledge can be changed into explicit knowledge (Chin Wei et al., 2012; Hermans & Castiaux, 2017; Kasemsap, 2016; Ikujiro Nonaka et al., 2018; Swift & Virick, 2013; R. Wang & Lv, 2017). Some assert that tacit knowledge cannot be communicated in a composed or verbal structure since it is by definition non-verbal, cannot be articulated, insensible, or unspeakable (Patel et al., 1999). Furthermore, it is hard to express or essentially expect that it can be made explicit. Challenges incorporate the way that it is individual and setting based, that the holder may lose by making it explicit, and that explication requires a steady environment including trust and suitable hierarchical structures (Johannessen et al., 2001).

Nonaka and Takeuchi's model accept an unfaltering movement in the middle of tacit and explicit knowledge while Patel et al. (1999) autonomously compose of applied change emerging from a tacit-explicit-tacit cycle. In the light of these challenges with the idea, it is not shocking to discover that we just have an early comprehension of tacit knowledge and that it opposes operationalization (Ambrosini & Bowman, 2001). Tsoukas (2005) view differed in so far as Tsoukas contended that we have misconstrued Polanyi, who gave grounds to review tacit knowledge as "inexpressible". If it is asserted that tacit knowledge cannot be analyzed exactly on the grounds that it is oblivious or that it inexpressible, this lends backing to Donaldson's charge of confusion (Donaldson, 2001; Easterby & Lyles, 2003).

Wagner and Sternberg (1991) would apparently question many of these thoughts since they have operationalized a measure of tacit knowledge. The expression 'tacit knowledge' is additionally used to refer specialists' knowledge and aptitudes that “have gotten to be tacit through time” although they were obtained explicitly (Ambrosini & Bowman, 2001). Patel et al. (1999) utilized “tacit knowledge” to suggest the profoundly organized biomedical knowledge base of specialists procured through revised exercises in various connections that empowers them to make prompt non-explanatory reactions to issues displayed to them. While learners take part in moderately long

thinking procedures, specialists' induction chains are shorter and hard to "unload" because "the basic knowledge has ended up tacit". They discovered comparable qualities in medical attendants (Patel et al., 1999).

In educational settings, knowledge of overseeing oneself, one's assignments, and others, are parts of tacit knowledge, yet as individuals become prepared by business-related exercises, then quite a bit of this might be routinized through past explicit practice (Park et al., 2015; Schmitt & Zhang, 2017). Likewise, Spender (1993) said that accomplished typists cannot supplant the keys on a console and a gifted artist concentrates on translating the work, ignorant of the mechanics of playing. In any case, typists must have intentionally realized where every key is and performers will have needed to take care of the mechanics of playing. In the last arrangement of cases, tacit knowledge is utilized where the performing artist obviously knows about and is ready to verbalize his or her knowledge. Boiral (2002) depicted various cases of tacit knowledge in which the performing artists were entirely mindful of and could, under the right conditions, depict what they knew.

A foreman realized that the manufacturing plant was surpassing allowed dust emanation levels when he could no longer see the hands of a clock over the plant (Hau, Kim, Lee, & Kim, 2013). Calling this “perceived knowledge”, it is highlighted the thought that such knowledge can be made explicit when significant components can be demonstrated specifically (T.-C. Lin et al., 2012; Zhang & Jiang, 2015). There is no recommendation in these illustrations that those "having" tacit knowledge needed to or planned to withhold it from others. Nevertheless, tacit knowledge can be deliberately withheld or gathered from another. It is also indicated that tacit knowledge has been utilized to maintain competitive innovations. This appears to be associated to the idea of “knowledge as force” (Sitaraman, 2017).

Tacit knowledge is grasped without being clearly imparted (Flexner, 1987), Researchers portrayed tacit knowledge as knowing more than we can tell, or knowing how to finish something without considering it, similar to riding a bike (Bratianu, 2016; Dalkir & Beaulieu, 2017; Israilidis et al., 2015). This distinct and subjective type of knowledge is generally casual (Sternberg, 1997). Tacit knowledge has a neighborhood tendency. It is not found in handbooks, files, records, or brochures. Tacit knowledge is specialized or subjective and comprises intellectual models, values, convictions, recognitions, morsels of knowledge and suspicions.

Psychological tacit knowledge consolidates certain intellectual models or discernments which are so imbued they are underestimated (Sternberg, 1997). Psychological models influence how we comprehend occasions into reality. Tacit knowledge is frequently less demanding to recall and discuss as compared to explicit knowledge or substance (Wah, 1999). The estimation of tacit knowledge, similar to client cooperative attitude, is frequently underrated and underutilized in the working environment. About 66% of business-related data that is continuously changed into tacit knowledge originates from contacts, as easygoing discussions, stories, teaching, entry level positions and internships. Talented individuals are considered to be those who have specialized tacit knowledge (Bolisani, Bolisani, Bratianu, & Bratianu, 2017).

They recognize something so well that they are insensible of how they recognize it. Content information is used to administer oneself, others, or manage one's errands. Setting is portrayed similar to neighborhood and around the world. Neighborhood incorporates doing the present workload (Yang, Yu, Liu, & Rui, 2016). Overall depicts how the current situation fits into the master plan. Presentations are calm disapproved and great. A coherent presentation knows how workable a thinking is without regard to its ideal quality.

Most explicit knowledge is particular or insightful data or information that is depicted in formal vernacular, like handbooks, logical expressions, copyright and licenses. This exact information is immediately shared through print, electronic modes and other formal means. Unequivocal information is specific and requires a level of academic learning or understanding that is expanded through formal preparation (Dalkir & Liebowitz, 2011). Unequivocal learning is intentionally masterminded, secured in a chain of significance of databases and is gotten to with high gauge, tried and true, snappy information recuperation systems. Once masterminded, explicit knowledge assets can be reused to handle various practically identical sorts of issues or join people with huge, reusable learning (Bratianu, 2016; T.-C. Lin et al., 2012).

2.6 Knowledge Management

Gartner Research (2016) defined KM as “a discipline that promotes an integrated approach to identifying, capturing, evaluating, retrieving, and sharing all an enterprise’s information assets”. The prevalence of KM has expanded quickly, especially since 1995, and it has turned into a focal subject of management theory and management tools. This notoriety is reflected in the developing number of articles and books on the subject; special journals have additionally been published on the subject (Eðvarðsson, 2004). Patrick Ngulube (2005) defined KM as all the procedures that encourage the creation, validation, approval, obtaining, sharing, utilization, and retention of knowledge assets in an association, regardless of their area and position, and with a specific end goal to enhance the association's productivity and viability. Administration of information, data and learning and to utilize this information, data and learning to get an aggressive edge for the association has built up the progress of KM (Randeree, 2006).

KM assumes a crucial part in advanced education: 1) for building superior quality and adequacy, 2) for the improvement of human resources at all stages, and 3) for creating "knowledge base" of

the associations to head the upgraded knowledge investment of the association (Nilsook & Sriwongkol, 2009). Two contemplations can prompt the choice to utilize KM to assist other educator programs to enhance the way upcoming educators are set up to utilize innovation. In the first place, without knowledge an association cannot work. The way of tacit knowledge frequently squares open doors for an association and its representatives to reveal and share what they know and do in the association. The final product may be an association upsetting its own execution. Impressive performance in an association can be improved through elucidating tacit knowledge so it can be shared and connected, particularly externally to starting individuals. Second, learning assumes a vital part in knowledge archive advancement and performance. The knowledge repository approach considers figuring out how to consistently transform tacit knowledge to explicit knowledge. By elucidating tacit knowledge to explicit knowledge in an open knowledge archive, individuals from a group can share and ponder their comprehension of what they know and what they do, and can learn from others (Songsangyos, 2012; Wedman & Wang, 2005).

As indicated by Mattheou (2012), European state-funded colleges that have confronted the emergency of trailing students and their aggressiveness in the worldwide era of education in correlation with the Americans, have actualized KM Strategy viably, for example, Southampton Solent University of United Kingdom. (Rees & Protheroe, 2009). Considering this, Greek state-funded colleges convey an out-of-date educational framework which creates researchers suited to the requests of nineteenth century society; therefore, they are outdated and not in concordance with their varying surroundings and the knowledge culture (Mattheou, 2012). So, they are confronting a twofold emergency and a twofold observation both inward and outside and they must oversee knowledge diversity to defeat these challenges and to propel their new part to join the nature of their administration (Trivella & Dimitrios, 2015).

However, KM is a hybrid of discipline and it is a practice. A KM group of people perceive that KM is profoundly integrative. It advances coordinated effort and the creation, capturing, association, and utilization of information resources, including the tacit, uncaptured knowledge of its group. In spite of the fact that discipline and process are essential, with today's quick paced innovation cycles and developing online networking applications, KM includes more than discipline and process. It requires promotion by the association's constituents and the iterative characteristics of practice to be completely compelling (Mendoza, Bischoff, & Willy, 2016).

KM includes complex and multidisciplinary attributes that influence all offices in a business. The merging between KM models and the practice of creating, catching, sharing and applying knowledge requires viable management and an intense comprehension of each contributing part (de Almeida Lima, de Vasconcelos, Maccari, & Dias, 2014). Bock, Zmud, Kim, and Lee (2005) expressed that the procedure of procuring, utilizing, and sharing of knowledge is eluded as KM. KM is not a propensity for an individual rather it compasses everywhere throughout the general public in diverse ways. KM is not just archives or stores, but also management schedules, procedures, practices, and standards (T. H. Davenport & Prusak, 1998).

Utilizing KM procedures and innovations in advanced education is essential as it is in the commercial division. It is with KM that universities will be able to build pupil maintenance and qualification rates, hold an innovative staff even with extreme staff deficiencies, extend new online offerings and contend in a domain where foundations cross over states and domestic borders to address the issues of scholars at whatever time or place (Songsangyos, 2012). KM activity will recognize master assets, filter through material about various learning procedures, and share their encounters and experiences into fruitful learning frameworks (Jundale & Navale, 2009).

The roots of KM can be identified in the Anglo-American writing of the late 1960s and the mid-1970s. Up until 1990, KM does not have a precise interpretation. Sometimes it was called innovation and in some cases information (i.e. exchange of information starting with one individual then onto the next). It was also described as information management. Zand, Steele, and Zalkind (1969) thought that the progressions arose from knowledge society development; they utilized the term knowledge management association rather than KM (Mayer-Schönberger & Lazer, 2007).

KM differs from physical resources such as hardware. KM is an arrangement of procedures intended to augment the results of the knowledge fabricated in a specialty unit. KM has been conjectured in diverse ways; however, the accepted goal is to provide knowledge to an individual in the correct way, at a correct time and at an opportune spot. A large volume of KM writing is available on the concept that knowledge-focused industry has supplanted the assembling business, setting off an essential modification in the nature of fiscal and social life (Hislop, 2013).

Hislop (2013) expressed that knowledge workers are educated, imaginative and unscheduled in nature, such as architects, specialists, legal counselors and bookkeepers. As knowledge workers are costly in nature, they will become a major financial issue in the future (T. H. Davenport, 2005). Gao et al. (2008) found that an important part of KM in a business association is the support of knowledge specialists and outfitting a domain which is appropriate for their work setting. K. C. Lee, Lee, and Kang (2005) recognized five parts of knowledge handling: formation, aggregation of knowledge, disseminating, using knowledge and disguising it. It is elected that in a dynamic environment with tough rivalry, an upper hand can be accessed through KM (H. L. Wang & Tsai, 2010).

Research was directed by Renzl (2008) in Austria to check the impact of representatives in knowledge distribution. For this research, data was gathered from two organizations, one in the utility sector and the other in product counseling industry. In this work, Renzl (2008) discovered and cleared up the association by giving a demonstration that there is an intervening part of knowledge records and stress over trailing one's exceptional quality on management trust and dissemination of knowledge. To begin with, he accepts that knowledge recording is a small issue and it can be tackled effectively by management statistics framework; however, results were contrary to what was expected. The study elucidated that records of knowledge are not just the tally of capacity (i.e. "exactly how to articulate knowledge"), however to further abnormal state matters that how to include the willingness of workers that are included during the time spent knowledge distribution. He inferred that in a climate that is more trust commendable people are highly willing in recording of knowledge. The stress of dropping one's exceptional value can be reduced during the time spent knowledge circulation by upgrading the faith in management (Renzl, 2008).

C.-H. Tsai, Zhu, Ho, and Wu (2010) described KM frameworks' function as a connection or extension between the knowledge seeker and the knowledge giver. Basic and imperative knowledge is created in groups and afterward this knowledge can be imparted (Matzler, Renzl, Müller, Herting, & Mooradian, 2008). Hew and Hara (2007) reported that cooperation, correspondence, unselfishness, innovation and deferential environment and enthusiasm of seeker are key viewpoints for knowledge sharing and the absence of knowledge, absence of time and innovation were additionally recognized as barriers to the sharing of knowledge. Virtual communities have been recognized by associations as the main component or instrument with the end goal of division of the knowledge (Hsu, Ju, Yen, & Chang, 2007).

S. Wang and Noe (2010) contributed as the KM arrangements go about as an affiliation or stage among the knowledge hunter and knowledge follower. Fundamental knowledge is made in social occasions and a brief span later this knowledge can be given to accomplices (Matzler et al., 2008). This is suggested in KM look as a structure presentation, which obliges prioritization of work, a huge valuation for associate criteria, a capacity to make an interpretation of these necessities into specific or execution requisites for suppliers, and a depicted framework opening up to administrators how to perform these portions (Monczka, Handfield, Giunipero, & Patterson, 2015).

2.7 Knowledge Sharing

A basic step in knowledge acquirement is knowledge distribution. As indicated by Brown (1988) scholars in educational groups are required to be dependable of their learning proactively by "learning with both individual duty and mutual sharing" (Brown, 1988). This thought recommends the significance and estimation of knowledge distribution among scholars. Knowledge sharing is a basic component of scholarly talks. In any case, knowledge sharing is a requesting assignment that requires some serious energy and exertion and obliges scholars to be determined and keen to interface with one and other. Perceiving elements that effect knowledge sharing in educational groups is basic (Ghadirian, Ayub, Silong, Bakar, & Zadeh, 2014).

A noteworthy challenge in KM includes motivating individuals to share knowledge with others. Hall (2001) contended that the principle battle of KM is to share knowledge and data. The point of KM is to recognize and apply the distinct and aggregate knowledge, ability and outcomes that are internal and external to the organization to achieve maximum advantage (Quaddus & Xu, 2005). As the principle accentuation of KM is both sided unsaid and unequivocal, which is the

reason behind most administrative activities and vitalities are on flattening the dissemination of both sorts of knowledge (Alavi & Leidner, 2001).

A vital profitable resource of a firm is human knowledge which much of the time is not disseminated. Knowledge distribution has an indispensable role in firms. Knowledge sharing is the transmission of data as well as expertise so that in a joint effort, processes like thinking, application of methods and problem solving may be possible productively and adequately (S. Wang & Noe, 2010). As indicated by (King & Marks, 2008), the sharing of knowledge by the knowledge source and afterward the utilizing of knowledge by the beneficiary is termed as knowledge sharing. While development of knowledge among diverse substances, divisions and associations instead of persons is knowledge exchange trade or exchange (Szulanski, Cappetta, & Jensen, 2004).

Knowledge distribution is the crucial mode through which people re-adjust and recreate knowledge by introducing numerous points of view and to test one's understanding while considering associates' viewpoints. Co-development of knowledge occurs when students ponder recently shared knowledge, legitimize it, characterize it, rethink their considerations, and externalize them by changing inward procedures into open procedures (Choi, Land, & Turgeon, 2005). Every one of these procedures prompts further understanding and learning of both the substance and the procedures through which learning happens (Rogers, 2000).

Lord and Farrington (2006) expressed in knowledge sharing target and bearing is transparent although in knowledge sharing the allocation is done in unprepared without containing a reasonable goal. Inferred and unequivocal knowledge are available in individual mind and they stream open correspondence. An individual's alliance has significance on the grounds that individuals get solid information from their colleagues. Databanks are significant on the grounds

that they store knowledge and help with picking up, putting away, sharing and displaying the knowledge. An extraordinary amount of knowledge is available in the task strategies and support frameworks of an association. Similarly, a solid knowledge volume occur in the item and administrations to whom association offers (McKenzie & Van Winkelen, 2004).

Ribière and Román (2011) notified sorts of methodologies known to be personalization approach and codification methodology. The knowledge is put in a structure which assist everybody can get to it effectively in codification approach. Thorough utilization of personalization methodology focusing so as to share of inferred knowledge is finished on associating individuals and building up systems. Utilization of methodology utilized exchanges from association to association as indicated by need. Both methodologies can be joined and connected by (Fink & Disterer, 2006). A methodology of sharing invigorates knowledge. When knowledge is shared, its quality is never diminished or lost rather its quality as well as volume is enhanced (Ahmed, 2012).

In HEIs, knowledge distribution has substantial significance (Ahmed, 2012; M. M. Khan et al., 2012; Manzoor, 2012). Knowledge sharing raises learning (Antonio, 2001). Knowledge sharing is a basic need of a knowledge-based association. HEIs are fundamentally connected with the protection of knowledge and musings by utilizing numerous procedures of exploration, examination, and distribution (Ratcliffe-Martin et al., 2000). Knowledge has become a critical factor for associations particularly for HEIs (Stuart et al., 2008). Knowledge is considered an authoritative asset. Knowledge distribution is an essential and vital action. Knowledge sharing is a channel via which individuals can utilize, hold, enhance and imagine new ideas which may turn into a focused edge over others (S. Wang & Noe, 2010).

Hendricks, Piccione, and Tan (1999) suggested a model for viable knowledge sharing of two key types: diffusion and ingestion. The knowledge proprietor distributes his or her knowledge via

different procedures (i.e. order, intensification, and exhibition). Knowledge is imparted to recipient through legitimate network. Recipient obtains knowledge by perusing, considering and training. So it can be stated that knowledge dissemination involves a few convoluted and various variables (Ahmed, 2012). A major gap in research is to find out the components that help knowledge sharing among students in HEIs.

G. P. Huber (1991) stated that sometimes organizations do not have the vaguest idea of "the amount of knowledge they hold" and "what's the proficiency of the framework to spare and recognize the learning". Correspondence procedures and knowledge developments drive information distribution in a company. Gupta and Govindarajan (2000) described five components: observation about estimation of information of sender, status of information shared by the sender, legitimate network of correspondence, preparation to procure knowledge by the recipient, and limit of the beneficiary to utilize knowledge. Vance and Eynon (1998) identified that knowledge handling basically relies on the intelligence of the receiver.

There is much research on appropriate networks of correspondence. Different types of networks of correspondence are available, such as authorized, easygoing, private and impartial (Bawden, Holtham, & Courtney, 1999). Unintended mechanisms incorporate spontaneous gatherings, unplanned courses, meal time talks and have extraordinary significance. In small associations these sorts of methods are extremely agent (Fahey & Prusak, 1998). These kinds of systems may have a few cones in light of the fact that these are unplanned not proper. It is uncertain that learning is precisely divided and has come to legitimate individual. Authorized mechanisms in corporate trainings and arrange visits. These are commendable strategies however they have a low inventiveness level. Private mechanisms share knowledge while nonpartisan component illustration is knowledge vaults(Ahmed, 2012).

T. H. Davenport and Prusak (1998) stated that personal events have prime significance in knowledge sharing. They emphasized the significance of water cooler correspondence, conversation room correspondence, information celebrations and free gatherings. Japanese companies praise celebrations of knowledge and broad gatherings, with the goal that specialists meet one another casually; they are an enormous hotspot for knowledge sharing. It assumes as a key part for viable KM improves in most of associations particularly in training organizations. For the accomplishment in useful life, knowledge distribution has basic essentialness. Scholars have enthusiasm to get information as opposed to knowledge. A significant impact of scholars is noticed towards knowledge division. It is exceptionally fascinating that individuals consider knowledge division as a piece of obligation. They do not ponder it as an additional weight or interval squandering action (Noorman Masrek, Shahriza Abdul Karim, & Hussein, 2007).

2.8 Knowledge Sharing Tools

2.8.1 Trust

Jolaee, Md Nor, Khani, and Md Yusoff (2014) stated that the absence of belief to distribute knowledge are reason of the absence of unwavering quality on the awareness assets and instability. In the world of literature, the thought of trust in worldwide business has been utilized at abnormal state (L. Li, 2005). Trust/belief is focal word and has numerous extensions (C.-H. Tsai et al., 2010). belief between untouchable undertaking accomplices and colleagues of central firm (the primary and fundamental firm that is completing the venture) for the achievement and accomplishment of tasks of association is vital (Kadefors, 2004). Trust is distinctive and had numerous extensions that's why it got considerations of scientists of diverse orders (Maurer, 2010). Through the trust vital knowledge can be gotten to and access for the outside. Various variables influence interpersonal trust. Maurer (2010) concluded that trust between hierarchical colleagues cannot be

made effectively. The trust has numerous significance and numerous definitions much of the time and connections; he clarifies the trust as a brain research condition as the idealistic trust from different gatherings without the checking, ascertaining and having eyes over them (T.-Y. Chen, Chen, Lin, & Chen, 2010). Trust is an imperative determinant in the public with the end goal of sharing of the knowledge (Chai & Kim, 2010).

Trust has an essential significance in individual or business relationships (Hsu et al., 2007). (McEvily, Perrone, & Zaheer, 2003) stated that trust is an "organizing principal"; they announced that trust can improve the response of accomplices and correspondence. Trust may be an asset of quality for associations. They (Yli-Renko, Autio, & Sapienza, 2001) begin from their research that obtaining of information from outdoor equalities is surely extended by the element of belief. They also end up that numerous fresh probabilities for upgrading corporate and present fresh items may raise the aftereffect of trust/belief in knowledge distribution strategies. Trust is essential element for the sharing of the knowledge (T.-Y. Chen et al., 2010); they additionally described two primary types of trust: psychological and emotional. Nahapiet and Ghoshal (1998) state that the setting in which trust occurs, individuals are additional pleasing in the division of knowledge and collaboration in trust commendable setting. The authoritative (society originates from the upper management) is likewise crucial in workers activities, if the way of life is useful and cheer the trust and collaboration than representatives will help and distribute the knowledge and thoughts (Awad & Hassan, 2011). Trust is indispensable for obtaining assets, collaboration and dissemination of knowledge (Chang & Chuang, 2011).

Renzl (2008) extracted from his research work that the one and only component at the back of the decision of the general population to share knowledge is interpersonal trust. He additionally said that trust can change work environment states of mind, performance of representatives and behavior. Learning and interpersonal sharing of knowledge are two things that occur when there

is trust. Trust in management results in more participation and along these lines persons feel more comfortable about the distribution of their knowledge, which leads to expansions in achievement. A high level of inclusion and relations are the consequences of a high level of trust in relationships (Chang & Chuang, 2011).

Susan and Holmes (1991) contended that trust and contentions of trust were focused on danger. They expressed that trust in someone else occurs when one forecasts hazard in an upcoming situation and the other feels certain of positive results in the same circumstance. Roger C Mayer, James H Davis, and F David Schoorman (1995) stated "expectation of powerlessness in certain upcoming occasion makes trust". A few writers expressed that belief does not sense as taking hazard rather it implies availability to receipts hazard. Roger C Mayer et al. (1995) expressed in similar setting as trust does not intend to take hazard generally it implies preparation to include in danger with the anxious party. Mayer and Davis (1999) demonstrated trust as the availability of gathering to rely upon else activities that he will function specific activities critical for trusted individual in any case having capacity to screen.

As per I. Nonaka (1994), if individuals from an association have trust between them then knowledge division will be expanded. Numerous specialists contended that to advance knowledge division between individuals we need to construct trust between them. If we need individuals to work more proficiently then there is a necessity to upgrade trust among them (Roger C Mayer et al., 1995). Nooteboom and Six (2003) identified that with the assistance of trust individuals collaborate with one another inside an association and crosswise over other associations. Trust impacts working environment conduct, enactment and methodology (Jones & George, 1998). In a virtual ventures investigation, (T.-Y. Chen et al., 2010) concluded that among diverse variables influencing knowledge dissemination, trust is an important one. However, individuals frequently

are not prepared to distribute their knowledge (Hew & Hara, 2007). Trust has been measured in literature with several dimensions:

Ability: Ability is a critical measurement of trust (Roger C Mayer et al., 1995). Roger C Mayer et al. (1995) claimed that the element of aptitude influences trust. They added that the trust variable is emphatically connected with the component of ability.

Benevolence: Roger C Mayer et al. (1995) stated in their research work that a significant measurement of trust is benevolence. L. Li (2005) stated that altruism is critical in making trust in the vertical association between headquarters and the backup organizational relations. An essential measurement of trust is kindheartedness in the learning and sharing procedure (Abrams, Cross, Lesser, & Levin, 2003).

Integrity: Integrity is an important measurement of trust (Roger C Mayer et al., 1995). According to L. Li (2005), integrity along with other characteristics such as generosity and capacity is noteworthy for creating trust in backup and headquarter connections.

Trustors' Propensity: Roger C Mayer et al. (1995) said that amid states of trust like social differences, trading encounters, correspondence, trustor's propensity to trust is critical. Siemsen, Roth, and Balasubramanian (2008) stated that an individual's inclination is crucial in the dispersion of learning.

Self-efficacy: Self-efficacy was initially characterized by Bandura in a compelling *Psychological Review* article (Bandura, Adams, & Beyer, 1977). Late ideas on self-efficacy incorporate references to judge one's capacity to execute game-plans and to manage certain circumstances (Bandura, 1982) and trust in one's capacity to arrange the approaches that are required to create given achievements (Bandura, 1997). Self-efficacy convictions refer to an individual's capacity to do (Maddux, Snyder, & Lopez, 2002).

2.8.2 Technology

The utilization of computerized learning devices in teaching has expanded in recent years (Peña-López, 2015; Sung, Chang, & Liu, 2016), thus it has an effect on forms of teaching and learning in classrooms. It is important to assess the impacts of knowledge sharing tools (Faber, Luyten, & Visscher, 2016), and how they can be actualized best. Meta-analysis found that computerized learning devices had a positive impact on achievement (Cheung & Slavin, 2013). Specifically, the utilization of these tools for developmental assessment can be appreciated (De Witte, Haelermans, & Rogge, 2015; Sung et al., 2016). With advanced learning tools like cell phones or individualized web-based learning, students can prepare assignments adjusted to their needs (Faber et al., 2016). In addition, students can get input instantly after assignments or evaluations are completed (Van der Kleij, Feskens, & Eggen, 2015). Teachers can get feedback on the progress of their students, at the level of the individual student, and at the classroom level (Pape et al., 2012).

A superior comprehension of the determinants of knowledge sharing among students and valuable technology will take into consideration more educated choices to actualize the privilege educational technologies in HEIs (Moghavvemi, Sharabati, Paramanathan, & Rahin, 2017). A few studies were conducted to empower the achievement of this goal including the development of instructive technology framework, foundation of expert advancement projects, and acquaintance of motivational techniques with support experimentation with inventive thoughts that enhance teaching and learning (Alaeddine, Parsaei, Kakosimos, Guo, & Mansoor, 2015). While the human perspective is essential, technological features also justify attention. Hendriks (1999) proposed that information and communication technology might be useful to upgrade knowledge sharing by enhancing access to information about knowledge. Cabrera and Cabrera (2002) expressed that latest information and media transmission technology are accessible to bolster knowledge sharing crosswise over time and distance. However, the research disregards when and how the nature of

knowledge sharing will be upgraded. The adjustment of new technology should encourage, empower and bolster knowledge sharing among students (Cabrera & Cabrera, 2002; Han & Anantatmula, 2007). Hence, Y. Kim and Jarvenpaa (2008) highlighted the significance of innovative viewpoints to empower knowledge-sharing exercises in an organization. Sabbir Rahman et al. (2014) additionally found that innovative support, sharing information and level of rivalry assume noteworthy parts in affecting knowledge-sharing behavior among university students. Jer Yuen and Shaheen Majid (2007) conducted an investigation in Singapore and Chin Wei et al. (2012) led an exploration in Malaysia to examine university students' knowledge-sharing behavior. Both studies found that students widely utilized the Internet as an apparatus to share significant information.

Learning, student motivation, and mobile technology are three parts of most modern classrooms. Arguments for incorporating mobile technology in a learning situation incorporate giving more access to information to students and expanded student engagement (S. Chen, Chen, & Zhu, 2012), and giving students the flexibility and obligation of decision (Copeland, 2015).

The modern era has come into being due to internationalization (Friedman, 2005). Internationalization is helped by the escalated transformation in technology. Internationalization has altered everything. It has altered the correspondence and affiliation procedure of individuals. Business processes are additionally altered. Indeed, even the procedure of employment and occupation formation has been altered.

Scholars prepared themselves for this fresh technology period. They prepared to get familiar with the utilization of contemporary technology. Along these lines, they can enhance their skills. In the second half of the twentieth century, knowledge played a huge part in the advancement of people. That is the reason why the twenty first century is known as "knowledge era". Imaginative

technology has had an incredible effect on all areas of education. In 1980 when everybody began possessed his/her own PC, the nature of education was improved (IBE., 1997). The Web is named as an image of progress. Isman and Dabaj (2004) stated that the Web provides distinctive and imaginative educating strategies for students.

A. Ersoy and Yaşar (2003) stated that the Web is a kind of net of nets with which all PCs on the planet are linked with each other. So it can be stated that the Web is the most beguiling component of this knowledge era (Ahmed, 2012). Utilization of a PC has become a vital piece of our lives. Y. ERSOY (2005) examined the effects of the Web on the lives of individuals; it might affect through correspondence, educational strategies and learning systems. We can attain information at any time over the Web. Additionally, significance is given to seeking, assessing, molding, utilizing and sharing knowledge with others (Karhan, Kalkan, Yokeş, Balkis, & Dalyan, 2010). The Web is a capable wellspring of knowledge and via it we can distribute information effectively, quickly and inexpensively (Akkoyunlu, 2002).

Aslan, Oral, Menşur, Gül, and Başaran (2004) stated that if we complete teaching with up-to-date , it will create endless outcomes, for example, students will focus effectively, sharing will have additional features, pupils will feel autonomy, correspondence will be coordinated amongst educators and students will become more aware via pupil-based learning materials and their abilities will increase. **Error! Hyperlink reference not valid.** reported that by utilizing this method pupils can increasingly acquire knowledge that is more identified with their subject more effectively and quickly. Technology can assist information sharing; many associations have utilized the sort of technology via which individuals can interface and team up with the association.

There are two schools of thought in KM with respect to technology featuring communication and one-to-one interaction. Technology featuring cooperation is named cybernetic communication

while one-to-one communication is named actual collaboration in the literature. Megan Santosus and Surmacz (2001) contended that cybernetic communication needs passionate emotions, friendliness and profundity associations and it is not ready to develop real interactions and comprehension in multifaceted conditions. Fresh technologies are altering the interactions and correspondence technique between people (Ahmed, 2012).

Bullock (1975) demonstrated that in classrooms in England and Wales students invested next to no energy in perusing but an excessive measure of their time composing. This inquisitive irregularity can better be comprehended in the light of Tabberer (1987) exploration into students' utilization of learning assets. Tabberer (1987) portrayed the classroom as disengaged and needing pertinence to the more extensive world.

A teacher should stay in control and guarantee the organized conduct of the considerable number of students (N. Davis & Morrow, 2010). Jackson (1968) in his exemplary work on classrooms found that teachers are liable to be occupied with ‘upwards of 1000 interpersonal sharing every day’, and that in classrooms students learn most importantly how to adapt to disavowal, interference, diversion, and dissatisfaction.

As indicated by the work of K. V. Petrides and Furnham (2001), at the start of 1990s, KM focused on the administration of information featured assets. Thus, technology changed into a tool to make and limit information into knowledge. Nowadays, the arrangement, emission, and association of information is known to be of vital concern in KM. Studies reported that technology was being utilized just to arrange, administer, and hold information for information distribution (Hedelin & Allwood, 2002). Ruggles (1997) proclaimed the Web to be a valuable and positive tool for sharing of information. An investigation by Flanagin (2002) likewise discusses the probable preferred standpoint of technology as impetus for knowledge distribution and information distribution

procedure. Technology is a vital or basic part of information administration that gathers, arranges or abridges information as well as helping with quick transmission of information starting with one individual then onto the next individual.

M Santosus (2001) suggested that feelings, real interpersonal sentiment and cooperation are not accessible in such knowledge sharing procedure. (Warkentin, Sayeed, & Hightower, 1997) suggested that cybernetic correspondence is as capable and successful as one-to-one knowledge sharing.

Investigation of Palincsar and Brown (1988) proposes that flourishing knowledge sharing fascinate complete learning process rather than simple correspondence process. Fast web technology with light speed information transferring gadgets, knowledge distribution has outperformed all measurements of time and space. Soller (2004) brings up that team exertion, in lecture room recognized itself as a fruitful and momentous predominant educating framework. The investigation of Cabrera and Cabrera (2002) recommends a fence critical to information dissemination in form of useless statement and uncertain information of everyone's issues. While (V. A. Martin, Hatzakis, Lycett, & Macredie, 2005) discourses that technology in more extensive range has a limit of broadening specific knowledge and has a more extensive observation and it incorporate various components of political, social and social viewpoints since adapting through knowledge sharing which is for the most part dependent on trust among students.

2.8.3 Teacher's Role

Since the initial times of information sharing procedure, as we cross via the hallways of olden times, we discover one novel character liable for the prosperous accomplishment of knowledge. The world perceives this identity by the name of the teacher. Strangely, humans have just depended on the characteristic ability of teachers for them to conduct information dissemination. No devices

have been produced by an individual which can create a normal individual equipped for instructing students with an indistinguishable ability from that held by the teacher (Peter F Drucker, 2008; M. M. Khan et al., 2012). The state of mind of the teacher has extraordinary significance on pupil's inspirational method.

(Krajcik, Blumenfeld, Marx, & Soloway, 1998) remarked that the teachers' new role includes helping students to be knowledgeable about substance, gifted in utilizing request procedures, capable in utilizing innovative instruments, and profitable in working together with others. A term used to depict the teacher's role is that of "orchestrator of learning movement" to express this duty to make students aware of what their objectives are, the manner by which they must connect, potential innovative concerns, and characterize the time span for the work (Prieto, Holenko Dlab, Gutiérrez, Abdulwahed, & Balid, 2011).

D. Patterson et al. (2002) expressed that enthusiasm is a give and take connection amongst pupils and lecturer; they inspire each other. Educating and training are instruments which are executed in educational institutions campuses. Here, pupils impart awareness to each other and lecturers keep in mind the end goal to upgrade learning. G. Patterson (1999) expressed that because of swift variation in the contemporary market, colleges are becoming training associations.

Fleece, Linton, and Dudley (1988) say that learning coalition is to help students to handle their sentiments of unmindful or wrong, students and teachers’ acknowledgment for one another and to make students competent to guarantee their subjective aptitudes to improve their learning encounters. Curran (1978) says that it is the obligation of the teacher to concede a sort of essential symbiosis in which the student may not be arranged for self-rule, and help the apprentice through raising self-statement and self-sufficiency.

Rich learning material is valuable for fast increment in practices of information (Ten Brummelhuis & Van Amerongen, 2010). Classroom practice is impacted by presentation and teachers' perceptiveness (Tondeur et al., 2008). Numerous researchers have given confirmation that reflexivity is a fundamental component of compelling proficient practice. Elliott (1976) added to the idea of the 'self-observing teacher' who embraced a scientist's position to his or her own particular practice with a specific end goal to make it progressively powerful.

Dreyfus (1982) added to a model of teacher advancement from inexperienced to master through a progression of stages, and recognized 'situational understanding' as the key part of master performance: 'situational comprehension' is the ability to examine and react to every one of the complexities of a social circumstance, comprehensively, with top to bottom comprehension (acting clearly intuitively however as a general rule on the premise of comprehension increased through related knowledge). Elliott (1976) expands upon the work of every one of these essayists in his idea of the great teacher's 'reasonable intelligence' which creates from reflexive self-observing in the light of both explicit and tacit teacher knowledge, and coordinates situational understanding with pragmatic activity.

Learning is an imperceptible procedure inside the learner's mind and it is vital to have the capacity to derive that it has occurred. Tasks which can be checked and evaluated, give some proof at any rate. In any case, Doyle (1979) has demonstrated that in classrooms this incorporation of evaluation with assignment setting can genuinely undermine the nature of students' learning. At the very least it might imply that barely any learning happens by any stretch of the imagination. In an investigation of classroom undertakings Doyle demonstrated that just when assignments place students in some level of what he calls "vagueness" and "danger" do they make the sort of intellectual requests that have an outcome in learning. Uncertainty exists when the student needs to take choices and take care of issues: danger happens when the student is not certain at the start

of having the capacity to finish the assignment effectively. This sort of subjective disharmony and investigation is fundamental for figuring out how to occur. Doyle's exploration demonstrates that there are numerous different tasks in classrooms which keep students hectically involved. They happen when the teacher has cleared up and/or organized the undertaking to a point where the student has practically no reasoning to do.

Doyle tracked the procedure whereby students frequently arrange classroom assignments with their teachers to decrease any components of equivocalness or danger. Through a procedure of 'trading execution for evaluations' Doyle's work suggests that students and teachers consistently intrigue in lessening the quality and scope of learning in classrooms. This clarifies exceptionally well Tabberer's recognition that few teachers overcome student troubles by neglecting to set them (Tabberer, 1987). However, it appears to be likely that students frequently induce teachers to believe that they are less proficient than they really are. A student was satisfied when she had arranged to do a straightforward replicating assignment as opposed to the first more difficult undertaking recommended by the teacher: 'since it didn't require any brains' (Somekh, 1980).

Students think that it is hard to remain keen on their classes. This battle turns out to be particularly valid in the auxiliary environment when students have numerous obligations. Teachers utilize methods and exercises to help all students succeed notwithstanding when they are uninterested. Regularly, adults recall a favorite teacher who made a class more pleasant than others; enthusiasm is a typical credit attributed to such teachers (Griffin, 2016).

2.8.4 Teacher’s Enthusiasm

The last review on teacher enthusiasm was 45 years past, and teacher enthusiasm remains a convincing but complex variable in the teaching settings (Keller, Hoy, Goetz, & Frenzel, 2015). Since Rosenshine’s (1970) review, the conceptualizations, definitions, philosophy, and results

have turned out to be more scattered. Teacher enthusiasm has caught the attention of specialists, teachers, and laypersons for most of the recent century and for a justifiable reason: Enthusiasm has results for both students and teachers. Enthusiastic teachers do not just spur, rouse, and energize students (Keller, Goetz, Becker, Morger, & Hensley, 2014; Kunter, 2013), but they additionally advance learning and student accomplishment (Keller et al., 2015; Kunter, 2013). Enthusiastic teachers additionally seem, by all accounts, to be more joyful (Kunter, 2013) and teachers seem to trust that being enthusiastic makes them more practical (Sutton, 2005). As Oliver Wendell Holmes, Sr. stated, its confidence in and enthusiasm for something that make a life worth living.

B.C. Patrick et al. (2000) investigated the role of instructor role in pupils' enthusiasm. The study demonstrated that the natural enthusiasm of pupils is profoundly connected with instructor's ability. Wiig (1994) stated that learning is a real fact and perceptions, observations and thoughts, results and possibilities, strategies and each individual of an association can be comprehended as a conservative of information and in this learning facts, morals, encounters and employed strategies are incorporated (Moenaert & Caeldries, 1996). Inherent motivation has been connected to an assortment of positive instructive results, including accomplishment test scores and report card grades (Gottfried, 1990), sum and expansiveness of perusing (Wigfield & Guthrie, 1997), object acknowledgment and review (Renninger & Wozniak, 1985), content review and appreciation (R. M. Ryan, Connell, & Plant, 1990), innovativeness (Koestner, Ryan, Bernieri, & Holt, 1984), and positive feelings in school (Brian C Patrick, Skinner, & Connell, 1993).

Another apparently encouraging course that has seen some support includes the impacts of interpersonal signs on characteristic motivation. The late studies of (Cellar & Wade, 1988; Enzle & Nix, 1997) stated that interpersonal indicators with respect to the motivation of others toward an action can influence the motivation of the perceiver. Connected to an instructive setting, that implies that a student's natural motivation can be encouraged through the simple observation that

the teacher is inherently encouraged or it can be weakened by the discernment that the teacher is externally persuaded. For instance, Wild, Enzle, and Hawkins (1992) demonstrated that students were inherently inspired when they saw their teacher as volunteering to show them versus being paid to show them. The idea of the adequacy of a teacher who models natural motivation is not by any means new to the universe of instructive exploration. Teacher enthusiasm is a variable that has an impact on accomplishment (Brigham, Scruggs, & Mastropieri, 1992), exam performance (Marlin, 1991), review (Stewart, 1989), student demeanors toward learning (McMillan, 1976), and appraisals of teacher adequacy (Feldman, 1976). It appears to be sensible to expect that an eager teacher may give interpersonal signs proposing natural motivation, in this way giving students a model with the possibility of influencing their own motivation to learn.

M. L. Collins (1978) viewed enthusiasm as a conclusion of expressive nonverbal practices and characterized teacher enthusiasm with eight indicators. As per her operationalization, an enthusiastic teacher utilizes a vivacious, lively, and abundant showing style, which is equitably identifiable as the frequent and thoughtful utilization of: 1) vocal activity, 2) wide-open eyes and eye contact, 3) definite signals, 4) body developments, 5) outward appearance, 6) an enlightening choice of words, 7) acknowledgment of students' thoughts and emotions, and 8) a general abnormal state of vitality. Emulating Collins' example, a few further reviews additionally conceptualized teacher enthusiasm as nonverbal practices of expressiveness (B.C. Patrick et al., 2000; Schmidt & McCutcheon, 1994).

In this literature, teaching enthusiasm is connected with teaching behaviors that incorporate viable methods of information conveyance (Brophy & Good), synchronize teaching (Walberg & Paik, 2000) or instructional practice (M. C. Wang, Haertel, & Walberg, 1993). Other research conceptualized teacher enthusiasm as instructional behavior that is vivacious and engaging (Kunter, 2013; B.C. Patrick et al., 2000)

Rosenshine (1970) described enthusiastic teaching as a teaching style portrayed by catchphrases, unwinding, portability, expressiveness and invigorating, which is the inverse of a dreary and dull teaching style.

Teacher immediacy by and large indicates nonverbal behaviors of physical or mental closeness between conveying individuals (McCroskey, Richmond, Sallinen, Fayer, & Barraclough, 1995). In spite of the fact that the operationalization of immediacy with behaviors, for example, utilization of motions, outward appearance, eye contact, or manner of speaking (Richmond, McCroskey, & Johnson, 2003) seems to cover the operationalization of nonverbally communicated teacher enthusiasm (M. L. Collins, 1978), these two research conventions exist separately. Babad (2007) clarifies this by highlighting the distinctive elements of immediacy and enthusiasm in the classroom: Enthusiasm would appear to underline educators' expressive style in teaching their topic, while immediacy would appear to be based on teacher–student collaboration and closeness.

Deviating from behavioral conceptualizations of teacher enthusiasm some researchers (Decker, Kunter, & Voss, 2015; Hachfeld, Hahn, Schroeder, Anders, & Kunter, 2015; Kunter, 2013; Richter et al., 2013) supply a reconceptualization of teacher enthusiasm as experienced enthusiasm. Kunter et al. (2011) characterize teacher enthusiasm as feeling which imitates the level of happiness, energy, and delight that teachers normally involve in their expert activities. They translate the term enthusiasm synonymously with happiness and relate it to the emotional but not intellectual and components of awareness (Krapp, 2007). These researchers additionally theoretically and experimentally distinguish two types of experienced enthusiasm: point-related enthusiasm in which teachers can be amped up for the subject that they teach and action-related enthusiasm in which teachers are amped up for teaching itself (interfacing with students); both need not coexist inside the individual (Kunter, 2013).

The tactic of Kunter et al. (2011) to consider the effective mechanism of enthusiasm is generally new yet it has been connected to various research (Decker et al., 2015; Hachfeld et al., 2015; Keller et al., 2014; Kunter et al., 2011; Richter et al., 2013). Anyhow, the actual conceptualization of experienced enthusiasm and, all the more critically, its variation from comparative concepts are still unsettled (Keller et al., 2015).

Teacher satisfaction is one feeling that seems to assume an expansive role in both teachers' and students' lives. For instance, A. C. Frenzel et al. (2009) found that teachers' satisfaction is communicated to students by means of their enthusiastic teaching behaviors. This conceptualization and, significantly more along these lines, this operationalization of teacher satisfaction firmly parallels that of Kunter et al. (2011) idea of experienced enthusiasm in that it catches the passion, positive effect, and stimulating excitement connected with enthusiasm..

Although, different studies conducted in the field of teacher enthusiasm have given causal proof of the impacts of teacher enthusiasm on student results (Brigham et al., 1992; B.C. Patrick et al., 2000), it is as likely that teacher enthusiasm and student results correspondingly impact each other. That is, does teacher enthusiasm influence students and does the level of student accomplishment and motivation affect teachers' enthusiasm? (Keller et al., 2014; B.C. Patrick et al., 2000). In a correlational review drawing on three diverse teacher and student tests, (Kunter et al., 2011) demonstrated that classroom accomplishment and student motivational level identified with teachers' accomplished enthusiasm, and a study by Stenlund (1995) found that teachers' enthusiasm relied on whether their students were learning and improving.

Deci and Ryan's self-determination hypothesis (R. M. Ryan, 1991) holds that any social connection that advances an individual's feeling of self-determination, ability, and/or interpersonal relatedness is prone to encourage characteristic motivation. That position proposes that there are motivational

advantages of advancing a solid, fulfilling teacher–student relationship. There is so far moderately slight observational support for the speculated relatedness-natural motivation relationship, however, this is a promising new region of examination (Wentzel, 1998).

The impact of teacher enthusiasm on student achievement is purportedly circuitous and works either by a) expanding students' consideration or (b) expanding students' motivation. For example, it is conceivable that nonverbal (enthusiastic) behaviors excite and maintain audience's consideration (Babad, 2007). Brigham et al. (1992) revealed expanded levels of students' on-task attitude in a high teacher-enthusiasm condition. (Kunter et al., 2011) found a negative relationship between teachers' enthusiasm and problematic student behavior.

2.8.5 Motivation

For over thirty years, instructive analysts have demonstrated extraordinary enthusiasm for the procedures and results connected with intrinsic motivation and extrinsic motivation in classrooms (Nishimura & Sakurai, 2017). Typically, motivation is characterized as control of behavior. The behavior of a human fluctuates as indicated by some external forces. Yet, motivation is an inward constraint which manages behavior. In basic words, we can say the forces which follow up on or are within a person to do a particular behavior is motivation. Motivation is the essential part which starts the learning procedure. Kleinginna Jr and Kleinginna (1981) stated that motivation is "the method via which behaviors are invigorated and thought towards a definite objective".

Motivation makes vitality, coordinates activity and gives industriousness. This implies motivation strongly affects proficiency and operations in associations (Koskialho, 2017). Motivation is a confounded and complex idea. There is a mix of a few motivations hidden in a particular behavior. Needs, wishes, endeavors, desires and drives influence a person's motivation. Everything

empowering a forward movement and creating activity is motivation (Liukkonen, Jaakkola, & Kataja, 2007; R. M. Ryan & Deci, 2000a).

Motivation can be partitioned into intrinsic and extrinsic motivation. Extrinsic motivation refers to activities that generate rewards that originate from outside, for example, cash and reverence. In intrinsic motivation, the activity itself is fulfilling. Intrinsic motivation is associated with positive sentiments, thought and behavior (Koskialho, Einolander, & Vanharanta, 2017). As per E. L. Deci (1975), the fulfillment originates from the activity itself, not from its outcomes. Deci and his partners expressed that external awards could even decrease the willingness to perform.

Motivation is a key for achievement and prosperity. Motivation gives mindfulness to people by invigorating them (Gelona, 2011). Motivation is essential in the learning procedure and a critical part of scholarly achievement (Acat & Köşgeroğlu, 2006; Kosgeroglu, Acat, Ayranci, Ozabaci, & Erkal, 2009). Motivation is said to be identified with outcomes such as learning, execution, interest, and progression in training. Accordingly, teachers ought to decide the connections among motivation, scholastic achievement and learning and the variables that influence those subjects (Yoshida et al., 2008).

Slavin (2001) described motivation as any inward method which empowers, directs and sustains. With the help of motivation a person is stimulated and upheld to perform a particular assignment. Santrock (2004) contended that motivation incorporates the method which empowers, manages, and keeps up a behavior. We can say that a motivation state is a guided, engaged and goal-arranged state. Stones (2012) stated similarly that motivation is an interior procedure which fortifies control and holds behavior.

Observational research on the relationship between student teachers' teaching motivation and expert capability has essentially centered on classroom skill. Investment in extracurricular exercises is a promising road for improving students' motivation (Hodis, Hattie, & Hodis, 2017).

Learning procedure is empowered through motivation and top level outcomes cannot be procured in the absence of motivation. Kreps and Baron (1999) portrayed two types of motivation: intrinsic and extrinsic. If a person is occupied in an assignment on the ground that is intriguing and pleasant to him or her, this kind of activity is denoted as intrinsic motivation (the individual works themself and has self-defined goals and methods to satisfy assignment).

Student engagement is important to universities around the globe. Research has demonstrated that students' mental connection to their university and their dedication can be an indicator of retention, and influence numerous different states of mind and behaviors. Student engagement is not just a vital matter for universities, it is also important to the social, financial, and political development of the nation concerned (Einolander, Vanharanta, & Visa, 2017).

Past research about student retention has focused on students' scholarly capacities to anticipate their retention. However, research has demonstrated that scholarly objectives, institutional duty, self-assurance, social support, institutional selectivity, money-related support, and social contribution have positive association with student retention. Students who cannot build up these variables are more inclined to drop out (Einolander et al., 2017). Past reviews have demonstrated that the most grounded variables appear to be identified with academic skills, academic self-confidence, and academic goals (Lotkowski, Robbins, & Noeth, 2004). Furthermore, prior research has demonstrated that students who are focused on a university are more liable to graduate than the individuals who have the objective of graduating yet feel no dedication to an educational institution.

As indicated by Tinto (2003), students will probably stay and graduate in a setting 1) that anticipates that they will succeed, 2) that gives scholarly, social, and individual support, (3) that gives early criticism about their performance as they are attempting to learn and hold on, 4) that includes them as esteemed individuals from the establishment (e.g. regular and quality communication with staff and different students), and 5) in particular, students will probably hold on and graduate in settings that encourage learning.

Students can have intrinsic and extrinsic motivation. Intrinsic motivation is when students express enthusiasm for and internal acknowledgment of the esteem or utility of their studies and think the tasks are essential since they empower learning and inventiveness (R. M. Ryan & Deci, 2000a). In any case, since many of the tasks students need to do to achieve their end goal of achieving a degree are not fascinating, teachers must have the capacity to advance more dynamic and volitional types of extrinsic motivation (R. M. Ryan & Deci, 2000a). Understanding these diverse sorts of motivation and what promotes them is significant for universities so they can improve their responsive environment. Consequently, universities require viable measures to assess student duty and engagement (Einolander et al., 2017).

McNally and Louro (1992) stated that motivation has numerous measurements on the grounds that individuals are motivated by distinctive elements. This implies that distinctive sorts of motivations cannot be dispensed with as autonomous factors. A few studies demonstrated that intrinsic and extrinsic variables influence hierarchical performance. Kochhar (2002) talked about the following different elements of motivation:

- To empower pupils to have enthusiasm for learning
- To direct the pupil's enthusiasm for learning
- To do endeavors so pupils may have enthusiasm for learning

- To do endeavors so that enthusiasm of learning may be maintained between pupils
- To give exercises that may expand learning in pupils
- To inspire, direct and support the state of mind of the learner
- To alert the learner to perform and yield the results
- To give alleviation to learner if there should arise an occurrence of pressure

2.8.5.1 Factors Impacting Student Motivation

Different variables influence student motivation which was also stated by (Ahmed, 2012) in his study. A few are discussed below:

i. ***Parent involvement:*** In the first place, parents are the teacher. Before school life they instruct the child. Guardian inclusion in the training procedure has incredible significance (Ahmed, 2012). Brown and Campione (1990) indicated that if parents educate their child, it will assist the youngster in institute and additionally in family. Dynamic support of parent impacts particularly on child education process. There must be division of ability and inspiration in institute for the youngsters (Drew, Olds, & Olds, 1974).

ii. ***Teachers' enthusiasm:*** The state of mind of the teacher has great significance for student's motivational procedure. B.C. Patrick et al. (2000) demonstrated that intrinsic motivation of students is related to instructor's energy. D. Patterson et al. (2002) found that motivation is a two-way connection between pupils and teachers and both rouse each other.

iii. ***Peers and societal environment:*** Peers are an important part of a student's societal environment and effect a student's convictions and exercises. The societal environment affects a person at many levels. Kolesnik (1978) specified that things that fulfill a singular requirement for gratefulness, love, acknowledgment, association, or uprightness are social strengths. Social strengths act until the need is not fulfilled (D. Patterson et al., 2002).

iv. ***Experience of the student:*** Constructive or adverse experience influences beginners in numerous ways. Pupils' experience influences their information dissemination behavior. Beers (1996) stated that experience varies assessment or morals.

v. ***Attitude:*** Attitude and motivation are interconnected concepts. Attitude portrays interests, leadership, wishes, and goals. Pupil attitude facing a particular topic can be inspected in connection with outcome. Firth, Mellor, Moore, and Loquet (2004) contended that achievement is connected with examining so as to learn it can be arbitrated by attitude. Learning attitude is inherent element and we cannot generally arbiter it via conduct, particularly if there should be an occurrence of students.

vi. ***Competence:*** Competence is incorporated into internal motivation. Proficiency leads a person towards an inspiring state.

If students are encouraged with elements that foster intrinsic motivation, then there is a danger that they will incline toward individual targets as opposed to hierarchical goals. It will become difficult to control them. At the point when hierarchical objectives and targets become individual objectives and destinations then extrinsic motivation turns out to be less important. When individuals are freely encouraged then their performance will improve and knowledge sharing will increase. Work contribution and performance will be supported if autonomous motivation is given. An organizational culture of cooperation, autonomy, and support promotes knowledge sharing (Ahmed, 2012).

Motivational elements do change in response to fluctuations in money-related framework. There is a straight relationship between the result of apparatuses of motivation and employee viewpoints, just a suitable favored method for motivation can persuade people at work spot lastly pacified workers arranged to carry out their employments will utilize their capacity in their working environments, which will conceal the methods for comprehension authoritative goals (Senol,

2011). Ashford, Lee, and Bobko (1989) looking into that pay and employer stability are the fundamentally critical extrinsic helpers.

Bakan and Büyükbeşe (2004) prescribed that employer stability is a standout amongst the most noteworthy ways of fulfillment and motivation of work power in the time of budgetary droop. Ashford et al. (1989) proposed that workers are confronting authoritative change, restoring, or reduce event instability about the prolongation of one's employment.

2.9 SDT

SDT is used as a theoretical lens which underpins the current study. SDT is a macro-theory of human inspiration, identity improvement, and well-being (R. M. Ryan & Deci, 2000a). The theory concentrates particularly on volitional or self-determined behavior and the social conditions. As indicated by R. M. Ryan, Kuhl, and Deci (1997), SDT is a move towards human identity and motivation which incorporates customary experiential techniques while utilizing organismic metatheory, which examined centrality of people's innovative inward properties for behavioral self-regulation and identity improvement. SDT explores mental needs and development propensities of individuals which are fundamental for their self-motivation and identity coordination. With the end goal of social improvement and individual prosperity and necessary development, there are three needs recognized by R. M. Ryan et al. (1997) for social advancement and regular desires for development: competence (Harter, 1978), relatedness (Baumeister & Leary, 1995) and autonomy (DeCharms (1968).

Intrinsic motivation refers to accomplishing something in light of the fact that it is intrinsically intriguing or charming, and extrinsic motivation refers to accomplishing something on the grounds that it prompts a detachable result. Many years of exploration have demonstrated that the nature

of experience and performance can be altogether different when one is carrying on for intrinsic versus extraneous reasons.

Intrinsic motivation has risen as a vital prodigy for teachers a characteristic source of learning and achievement that can be efficiently catalyzed or undermined by guardian and educator hones (R. M. Ryan & Stiller, 1991). Since intrinsic motivation results in excellent learning and innovativeness, it is particularly essential to the components and forces that cause versus undermine it. On the other hand, just as vital in the present review is the clarification of the altogether different types of motivation that fall into the classification of motivation. In the exemplary writing, extrinsic motivation has normally been described as a light and devastated (regardless of the possibility that intense) type of motivation that appears differently in relation to characteristic motivation (DeCharms, 1968).

Then again, SDT recommends that there are types of extrinsic motivation, some of which do, without a doubt, speak to ruined types of motivation and some of which speak to dynamic, agentic states. Students can perform extraneously propelled activities with hatred, resistance, and lack of engagement or, on the other hand, with a demeanor of ability that mirrors an internal acknowledgment of the quality or utility of at ask. In the previous case the excellent instance of extrinsic motivation one feels remotely pushed vigorously; in the last case, the extraneous objective is self-supported and along these lines embraced with a feeling of volition (R. M. Ryan & Deci, 2000b). SDT is a way to deal with human inspiration and identity that uses customary observational routines while utilizing an organismic meta theory that highlights the significance of people's advanced internal assets for identity improvement and behavioral self-regulation (R. M. Ryan et al., 1997).

In this way, the field of SDT is the examination of individuals' characteristic development propensities and intrinsic mental needs that are the premise for their self-inspiration and identity incorporation, and additionally for the conditions that cultivate those positive procedures. The most focal qualification in SDT is between intrinsic motivation and extrinsic motivation (R. M. Ryan, Patrick, Deci, & Williams, 2008). At the point when individuals are intrinsically persuaded, they encounter self-support of their activities. Extrinsic motivation comprises both outside regulation, in which one's behavior is an element of outside possibilities of discipline, also, introjected regulation, in which the regulation of activity has been mostly disguised and is invigorated by variables, for example, an endorsement intention, evasion of disgrace, unforeseen self-regard.

SDT separates the substance of objectives or results and the administrative procedures through which the results are required after making forecasts for various substances and for various procedures. Further, it utilizes the idea of intrinsic mental needs as the premise for coordinating the separations of objective substance and administrative procedures and the forecasts because of those separations. In particular, as indicated by SDT, a basic issue in the impacts of objective interest and achievement concerns the extent to which individuals can fulfill their fundamental needs as they seek after and achieve their esteemed results. The idea of requirements was once generally utilized in observational brain science to arrange the investigation of motivation.

Albeit differently characterized at the physiological or mental levels and as intrinsic, the idea of requirements determined the substance of motivation and gave a substantive premise to the stimulation and bearing of activity. Starting around the 1960s, the emotional movement toward intellectual theories prompted the idea of necessities being denied and supplanted by the idea of objectives as the prevailing motivational idea. The focus turned into the procedures of objective choice and interest as opposed to the substance of the objectives being chosen. The idea of valence

(or mental worth) of results was characterized practically (and subsequently was not identified with need fulfillment), much as the idea of support had been characterized practically in operant psychology research (B. F. Skinner, 1953), disregarding the necessities that had given the fortifications in ongoing speculations (Hull, 1943).

SDT indicated that a full comprehension of objective coordinated behavior, as well as of mental improvement and prosperity, cannot be accomplished without tending to the necessities that give objectives their mental intensity and that impact which administrative procedures direct individuals' objective interests. Before delineating the SDT point of view on the substance and procedure of objective coordinated behavior, we start with the idea of requirements.

At the point when connected to the classroom setting, the source of support for students' needs is frequently the teacher's encouraging style (Reeve, 2009). At the point when students require support, the teacher acts as a social-logical facilitator of students' need fulfillment and ideal working; however, while controlling, the teacher goes about as a social-relevant defeat of these same procedures. Inside such a theoretical structure, a teacher's propelling style is comprehended as autonomy bolster versus teacher control; student motivation is comprehended regarding need fulfillment versus requirement disappointment; and student working is regularly comprehended regarding engagement vs. disengagement (E. A. Skinner, Kindermann, & Furrer, 2008).

As confirmed by both exploratory controls and longitudinal studies (Cheon, Reeve, & Moon, 2012; Jang, Kim, & Reeve, 2012), autonomy-strong teaching improves students' classroom working (engagement, theoretical adapting, prosperity), and it does as such in light of the fact that it sustains and backs students' autonomy, competence, and relatedness. The essential reason why students demonstrate strong classroom engagement is on account of the first experience engagement empowering mental need fulfillment (Cheon et al., 2012; Jang et al., 2012), and the essential

motivation behind why students encounter requirement fulfillment is on the grounds that their teachers embrace an autonomy style toward them (Reeve, 2009).

SDT mediation clarifies that students' classroom engagement is positively influenced by teachers' supportive autonomy (Jang et al., 2016). Researchers found that the essential reasons why students experienced withdrawal, negative impact, deliberate non-interest, depletion burnout, tormenting, hostile to social behavior, unfriendly physical side effects and other broken behaviors were less due to low need fulfillment but to high need disappointment (Hein, Koka, & Hagger, 2015).

The need for autonomy is defined as "the necessity of experiencing a sense of choice, willingness, and volition as one behaves" (Edward L Deci, Ryan, & Guay, 2013). Lamentably, numerous individuals participate in behavior changes simply because of what SDT describes as extrinsic motivation.

One basic type of extrinsic motivation is external regulation, in which a person maintains a strategic distance from a discipline or agrees to social weights just to get an external prize (R. M. Ryan & Deci, 2000a). Another type of extrinsic motivation is introjections, in which an individual may act to get endorsement or acclaim, or to maintain a strategic distance from dissatisfaction or sentiments of blame. Interestingly, change can be an element of intrinsic motivation.

One type of intrinsic motivation is identified regulation, in confirmation when one actually underwrites or relates to the worth or significance of a behavior or wellbeing (R. M. Ryan & Deci, 2000a).

The second kind of extrinsic motivation is introjected regulation, in which behaviors are performed to avoid blame and disgrace or to accomplish a sense of self upgrade and sentiments of worth. As indicated by SDT, external and introjected direction constitute controlled motivation, since they

have an outer seen locus of causality and are joined by experience and commitment (R. M. Ryan & Deci, 2009).

The third kind of extrinsic motivation is identified regulation, which speaks to cognizant valuation of a behavioral objective and acknowledgment of the behavior as important. With respect to external and introjected regulation, behavior that stems from distinguished direction has a tendency to be more self-decided. Moreover, intrinsic regulation is autonomous, relating to intrinsic motivation on the direction style; along these lines, recognized and intrinsic direction constitute self-governing motivation since they have an inward seen locus of causality and are joined by a feeling of self-determination (R. M. Ryan & Deci, 2009). Past research has given confirmation to a relationship between autonomous motivation and accomplishment (Hardre & Reeve, 2003).

In SDT, support for competence is managed when professionals give effective important inputs and criticism. This implies the individual managed the aptitudes and instruments for change, and is supported when competence or control-related boundaries rise. Individuals are not over tested. In the SDT model of progress, picking up a feeling of competence is encouraged via autonomy. That is, once individuals are volitionally connected with and have a high level of ability to act, they are then most well-suited to learn and apply new systems and capabilities (Markland, Ryan, Tobin, & Rollnick, 2005). In addition, in contradistinction to SDT (Bandura, 1989), SDT predicts that competence alone is not adequate to guarantee adherence; autonomy must join it.

To achieve an objective, SDT highlights the importance of one's motivation (R. M. Ryan & Deci, 2000a). As per SDT, humans can be motivated to fulfill three psychological needs: competence, autonomy, and relatedness (R. M. Ryan & Deci, 2000a). An increase in motivation (R. M. Ryan, 1982) is mediated by competence (Mouratidis, Vansteenkiste, Michou, & Lens, 2013; Vallerand & Reid, 1984) and is accompanied by a sense of autonomy that further shows its mediating effect

on motivation (Edward L Deci, Connell, & Ryan, 1989; Reeve & Deci, 1996). Although, competence and autonomy were found to be the most powerful mediating factors effecting motivation in the education sector as well as at the workplace (Edward L Deci & Ryan, 2000), relatedness also plays an important role to enhance motivation as described in attachment theory (Bowlby, 1979). Further, Grolnick, Ryan, and Deci (1991) took dimensions of SDT (i.e. competence and autonomy) as mediators to investigate the relationship between students' achievements and students' perceptions of their parents. SDT theory might be applied to understanding the factors contributing to one's motivation and transformational leadership and to see its effect on organizational outcomes (Sheldon, Turban, Brown, Barrick, & Judge, 2003).

The recent study of Nikou and Economides (2017a) discovered that SDT dimensions (competence, autonomy, and relatedness) have a mediating role to influence new technology acceptance in students. SDT has been a robust topic in the education sector to enhance students' motivation for better outcomes as well as teachers' role; some research (Hartnett, 2015; Jang et al., 2016; Kelley & Alden, 2016; Y. Lee et al., 2015; Niemiec & Ryan, 2009; Sørebø, Halvari, Gulli, & Kristiansen, 2009) used SDT dimensions (i.e. competence, autonomy, and relatedness) as an independent or mediating variable.

2.10 Proposed Conceptual Model

The projected conceptual model is substantiated by one theoretical lens which is SDT and this model is a comprehensive approach to understanding the knowledge sharing tools that lead to students' tacit and explicit knowledge in HEIs. The researcher has done an extensive review of the literature and identified knowledge sharing tools to be added to the theoretical model which was studied separately in previous studies (Ahmed, 2012; Aslam et al., 2016; Goh & Sandhu, 2013; Inkinen & Inkinen, 2016; Jer Yuen & Shaheen Majid, 2007; M. M. Khan et al., 2012; Manzoor, 2012; Shiuan & Lee, 2009; Wamalwa & Omallah, 2016; S. Wang & Noe, 2010). The proposed

conceptual model imitates with knowledge sharing tools including trust, motivation, technology, teachers' role, and teachers' enthusiasm that ultimately these knowledge sharing tools affect students' tacit and explicit knowledge. Based on SDT, which refers to human motivational aspects (Edward L Deci & Ryan, 2013; Edward L Deci et al., 2013; Markland et al., 2005; Niemiec & Ryan, 2009; R. M. Ryan et al., 1990; R. M. Ryan & Deci, 2000b; R. M. Ryan et al., 2008; R. M. Ryan & Stiller, 1991), three dimensions of SDT are taken as mediating variable: Competence (Harter, 1978; White, 1963), Relatedness (Baumeister & Leary, 1995; Reis, 1994) and Autonomy (DeCharms, 1968; E. L. Deci, 1975). The three dimensions of SDT will be core mediators of the mechanism between knowledge sharing tools and students' tacit and explicit knowledge and SDT dimensions empirically signal to students' knowledge. For this study, the two-dimensional concept of knowledge is divided into two: tacit knowledge and explicit knowledge. Tacit knowledge is the background against which all activities are comprehended (Polanyi, 1966) and comprises aptitudes and abilities, encounters, connections, convictions and qualities, and thoughts which are exceptionally hard to explain and systematize. Explicit knowledge can be more effectively enunciated and classified, and it can be effortlessly transmitted formally crosswise to people. Explicit knowledge is formal knowledge that is easy to transmit from teachers to learners. This framework is designed with the supposition that SDT can be useful as a theoretical lens which looks at the underlying mechanism of knowledge sharing tools and students' tacit and explicit knowledge in HEIs in Punjab province, Pakistan.

The extant literature review supports the identified gap and the current proposed conceptual model is a holistic effort from the perspective of SDT and knowledge sharing tools at individual level (students in our case) by combining all three main variables of the study: knowledge sharing tools, SDT's dimensions, and knowledge (tacit and explicit). The mediating factor of this study (i.e. competence, relatedness, autonomy) has never been studied at the level of an individual's

knowledge in HEIs. This is part of a long debate in the literature to enhance student–teacher outcomes which will be fulfilled by applying the proposed model in HEIs.

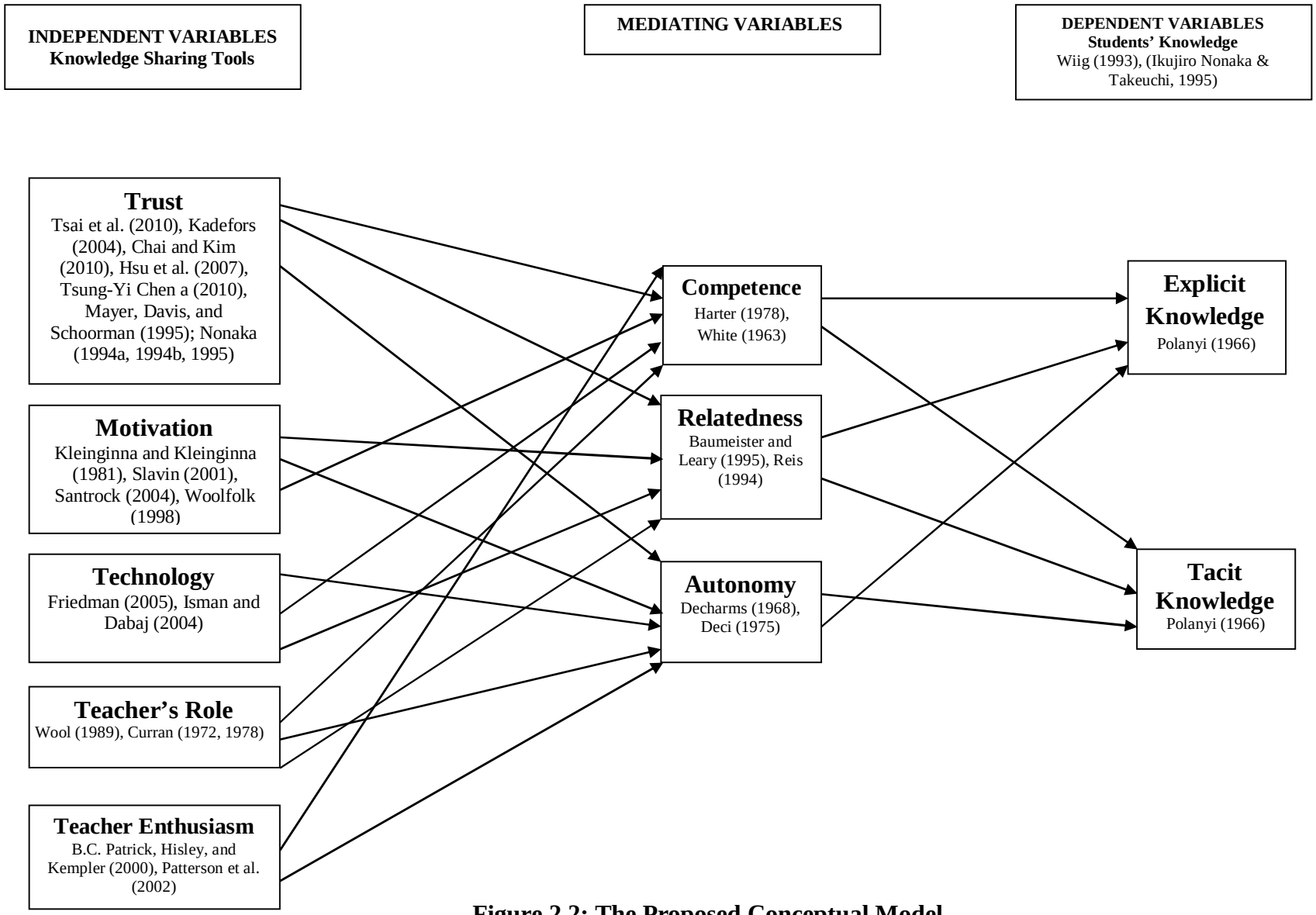

Figure 2.2: The Proposed Conceptual Model

2.11 Development of the Hypotheses

The proposed model was directed to frame the following hypotheses:

H_1: A positive and statistically significant relationship exists between trust and student's tacit knowledge.

H_2: A positive and statistically significant relationship exists between trust and student's explicit knowledge.

H_3: A positive and statistically significant relationship exists between trust and competence.

H_4: A positive and statistically significant relationship exists between trust and relatedness.

H_5: A positive and statistically significant relationship exists between trust and autonomy.

H_6: Competence mediates the relationship between trust and student's tacit knowledge.

H_7: Relatedness mediates the relationship between trust and student's tacit knowledge.

H_8: Autonomy mediates the relationship between trust and student's tacit knowledge.

H_9: Competence mediates the relationship between trust and student's explicit knowledge.

H_{10}: Relatedness mediates the relationship between trust and student's explicit knowledge.

H_{11}: Autonomy mediates the relationship between trust and student's explicit knowledge.

H_{12}: A positive and statistically significant relationship exists between motivation and student's tacit knowledge.

H_{13}: A positive and statistically significant relationship exists between motivation and student's explicit knowledge.

H_{14}: A positive and statistically significant relationship exists between motivation and competence.

H_{15}: A positive and statistically significant relationship exists between motivation and relatedness.

H_{16}: A positive and statistically significant relationship exists between motivation and autonomy.

H_{17}: Competence mediates the relationship between motivation and student's tacit knowledge.

H_{18}: Relatedness mediates the relationship between motivation and student's tacit knowledge.

H_{19}: Autonomy mediates the relationship between motivation and student's tacit knowledge.

H_{20}: Competence mediates the relationship between motivation and student's explicit knowledge.

H_{21}: Relatedness mediates the relationship between motivation and student's explicit knowledge.

H_{22}: Autonomy mediates the relationship between motivation and student's explicit knowledge.

H_{23}: A positive and statistically significant relationship exists between technology and student's tacit knowledge.

H_{24}: A positive and statistically significant relationship exists between technology and student's explicit knowledge.

H_{25}: A positive and statistically significant relationship exists between technology and competence.

H_{26}: A positive and statistically significant relationship exists between technology and relatedness.

H_{27}: A positive and statistically significant relationship exists between technology and autonomy.

H_{28}: Competence mediates the relationship between technology and student's tacit knowledge.

H_{29}: Relatedness mediates the relationship between technology and student's tacit knowledge.

H_{30}: Autonomy mediates the relationship between technology and student's tacit knowledge.

H_{31}: Competence mediates the relationship between technology and student's explicit knowledge.

H_{32}: Relatedness mediates the relationship between technology and student's explicit knowledge.

H_{33}: Autonomy mediates the relationship between technology and student's explicit knowledge.

H_{34}: A positive and statistically significant relationship exists between teacher's role and student's tacit knowledge.

H_{35}: A positive and statistically significant relationship exists between teacher's role and student's explicit knowledge.

H_{36}: A positive and statistically significant relationship exists between teacher's role and competence.

H_{37}: A positive and statistically significant relationship exists between teacher's role and relatedness.

H_{38}: A positive and statistically significant relationship exists between teacher's role and autonomy.

H_{39}: Competence mediates the relationship between teacher's role and student's tacit knowledge.

H_{40}: Relatedness mediates the relationship between teacher's role and student's tacit knowledge.

H_{41}: Autonomy mediates the relationship between teacher's role and student's tacit knowledge.

H_{42}: Competence mediates the relationship between teacher's role and student's explicit knowledge.

H_{43}: Relatedness mediates the relationship between teacher's role and student's explicit knowledge.

H_{44}: Autonomy mediates the relationship between teacher's role and student's explicit knowledge.

H_{45}: A positive and statistically significant relationship exists between teacher's enthusiasm and student's tacit knowledge.

H_{46}: A positive and statistically significant relationship exists between teacher's enthusiasm and student's explicit knowledge.

H_{47}: A positive and statistically significant relationship exists between teacher's enthusiasm and competence.

H_{48}: A positive and statistically significant relationship exists between teacher's enthusiasm and relatedness.

H_{49}: A positive and statistically significant relationship exists between teacher's enthusiasm and autonomy.

H_{50}: Competence mediates the relationship between teacher's enthusiasm and student's tacit knowledge.

H_{51}: Relatedness mediates the relationship between teacher's enthusiasm and student's tacit knowledge.

H_{52}: Autonomy mediates the relationship between teacher's enthusiasm and student's tacit knowledge.

H_{53}: Competence mediates the relationship between teacher's enthusiasm and student's explicit knowledge.

H_{54}: Relatedness mediates the relationship between teacher's enthusiasm and student's explicit knowledge.

H_{55}: Autonomy mediates the relationship between teacher's enthusiasm and student's explicit knowledge.

H_{56}: A positive and statistically significant relationship exists between competence and student's tacit knowledge.

H_{57}: A positive and statistically significant relationship exists between relatedness and student's tacit knowledge.

H_{58}: A positive and statistically significant relationship exists between autonomy and student's tacit knowledge.

H_{59}: A positive and statistically significant relationship exists between competence and student's explicit knowledge.

H_{60}: A positive and statistically significant relationship exists between relatedness and student's explicit knowledge.

H_{61}: A positive and statistically significant relationship exists between autonomy and student's explicit knowledge.

3 CHAPTER THREE: METHODOLOGY

3.1 Introduction

In the literature, there are many terms to describe methodology, for example, approach, procedure, method of enquiry, strategy, system, and paradigm. Keeping in mind the end goal to build up association among these expressions researchers have integrated research approaches (qualitative, quantitative), paradigms (positivist, interpretive,) investigation approaches (deductive, inductive), purpose of the study (contextual analysis, experimental investigation), research methods (questionnaire, survey, experiment) with the assistance of utilizing research tools (human, pencil and paper etc.) (Pickard, 2013). Chapter three aims to describe the research methods, approaches and techniques utilized for conducting the current study. Chapter three highlights the philosophy of research employed (i.e. interpretive and positivism) and explains the methodological approaches used (namely quantitative and qualitative). This chapter explains research methods (i.e. deductive and inductive). Further, the purpose of the study (explanatory, descriptive, exploratory) is also described in the current chapter. Subsequent sections describe the study population, including sampling techniques and selection of sample, the instrumentation for the current study, the validity and reliability of the instrument, which is followed with factor analysis (FA) and Cronbach's alpha, data collection procedure, methods of data analysis and closes with a summary of the chapter.

3.2 Philosophy of the Research

Philosophically, ontology involves individuals making claims about what knowledge is, epistemology is the manner by which individuals know it, axiology is the study of the effect of the researcher's values on the research, rhetoric examines the researcher's language and writing approach, and methodology is the procedure for examining it (Creswell, 2013). Along these lines, there are different approaches, for example, paradigm, mode of enquiry, method, technique,

strategy, and approach in multidisciplinary research in connection with a researchers' philosophical perspectives of the world and distinctive strategies for inquiry. Pickard (2013) proposed a research pecking order which incorporated research paradigms (positivism, interpretivism), research systems (qualitative, quantitative), research strategies (contextual analysis, study, trial research, ethnography, Delphi technique, activity-based research, historical research, grounded theory), research procedures (survey, examination, interviews), and research instrument (human, pencil and paper, etc.).

A paradigm can be categorized as interconnected assumptions regarding the societal domain which provides a philosophical and applied system for exploration of that world (Filstead, 1979). Research is characterized as a disciplined investigation of issues (Gay, Mills, & Airasian, 2011), implying that it is a vigilant and deliberate method. Fellows and Liu (2015) characterized research as a “voyage of disclosure”, for which the reason is to find the truth and to build a reality. Research is established on philosophical assumptions, which are identified with the researcher’s view or impression of what the truth is. Easterby-Smith and Thorpe (2002) indicated that such philosophical assumptions can be comprehended as far as epistemology and ontology. Epistemology, which is the subdivision of philosophy that deals with the examination of knowledge, is about how individuals have come to comprehend what they claim to know (A. B. Ryan, 2006). Interestingly, ontology is concerned with the way of reality or, as Easterby-Smith and Thorpe (2002) put it, ontology is the art of being and presence. In this manner, ontology is the researcher’s discernment of this present reality. There are different diverse philosophical assumptions in research in regards to the three ideal paradigms: positivism, interpretivism and pragmatism.

Ontology, what is the way of reality, was identified with positivism (Lincoln, Lynham, & Guba, 2011). Exploration concentrated on a particular truth that is separated from a scholar’s recognition

and social predispositions is objectivism. This study aims for truth administered by unalterable common cause and effect rules. The study comprised of established prior examples and requests which were attempted to find with communication of members of the study. The substances of lifecycle are neither time bound nor setting bound. The consequences of the study can be summed up.

Research in the circle of the characteristic and social sciences has accepted alternative points of view with regards to the above philosophical assumptions. Thus, two streams of research, with various methodological underpinnings, have developed: positivism and interpretivism. Positivism and interpretivism are examined below. The determination of a paradigm aides a researcher about philosophical assumptions, choice of devices, instruments, members and techniques to be utilized as a part of the research (Denzin & Lincoln, 2002).

3.2.1 Positivism and Interpretivism Research Paradigms

A research paradigm is a far-reaching conviction framework which guides research and practice in the field. The positivism paradigm is usually referred to as normalizing and quantitative, while the interpretivism paradigm is frequently referred to as social constructivism and qualitative by various researchers. Positivists contend that the world is concrete and genuine, and that a partition is vital between the researcher and the research question keeping in mind the end goal to keep subjective sentiments from influencing the research procedure. Positivists have confidence in induction, which depends on the conviction that perceptions and estimations constitute the center of every single logical attempt (Turyasingura, 2011). Interpretivism researcher have confidence that the world is, by nature, qualitative, in light of the fact that it is dictated by individuals as opposed to remotely recognizable truths (Easterby-Smith & Thorpe, 2002).

In support of such a contention, Fellows and Liu (2015) stated that reality and the truth are socially developed and cannot, accordingly, exist autonomously. Interpretivism, in this manner, maintains that the key part of the researcher in the research procedure is to pick up a general outline of the setting of the point which is being explored. Positivists argued that qualitative information does not really exist exclusively, and that all information can be measured. Interpretivists argued that all information is essentially qualitative.

Table 3.1: Various Research Approaches in Terms of the Positivist Paradigm

Research approach	Questions	Main features
Surveys	How much, who, what, where, how many	Observations, interviews, questionnaires
Forecasting future research	What, how much	Intuitions of future outcomes
Archival analysis	Who, what, where, how many	Quantitative and qualitative investigation
Experiments (field)	How, why	Real-life situation
Simulation, game, playing, role	What, how	Simulating the behavior of a framework by creating and presenting arbitrary factors
Experiments (laboratory)	How, why	Quantitative variables; accurate relationship; rigorous study

Source: Adopted from Galliers (1990)

Creswell and Clark (2007) recommended that the choice of a suitable methodology depends on the research issue addressed in the study. For example, if the issue is to recognize the components that impact the results, the utility of a mediation, understanding the best indicators of results and to examine a theory/hypothesis or clarification, then utilization of the positivism method is appropriate for the study (Creswell & Clark, 2007). Notwithstanding, if an idea or notion should be comprehended (because of constrained extent of research already led on it) then it justifies an interpretivism approach. A realism approach configuration is helpful for the situation in which a researcher needs to investigate and generalize a few phenomena utilizing successive and transformative methods (Creswell & Clark, 2007). So, the propriety of the research configuration

is justified by how it most successfully and proficiently achieves the objectives of the study (W. Neuman, 2006).

The current study incorporates the positivism paradigm based on quantifiable variables, existing theory, statistical analysis, objective reality and accepted and unbiased knowledge (Bryman & Bell, 2015; Creswell, 2013), in light of the understanding that researching knowledge sharing tools and student's knowledge is profoundly established in the social context. Such practices can be measured to a specific degree on a scale reflecting the view of the respondents. The decision of following such an approach is likewise educated by the way that aggregate objectivity is regarded to be outlandish in social science research (Turyasingura, 2011). Furthermore, it is accepted that subjectivity is innate in the social world, in spite of the fact that it can be limited by method for the triangulation of the techniques utilized, independent from anyone else addressing it and by the enticing of investigation of the point secured. The objective of the current study is to propose a theoretical model and to test that model with mediating mechanism of SDT on knowledge sharing tools and students' knowledge across the HEIs of Punjab province, Pakistan. An additional objective is to generalize the findings of the current study by using a large sample from HEIs. So, the positivism paradigm seems the most suitable paradigm to provide insights for the current study and to fulfill the objectives set.

3.3 Methodological Approaches to Research

Social science research is typically partitioned into two general classes: Quantitative and qualitative research, in spite of the fact that, as of late, another approach that consolidates both quantitative and qualitative techniques called mixed methods has emerged (Creswell, 2013). Moreover, quantitative research includes numbering connections between factors and utilizes objective estimations and measurable examination of data, which are gathered from an all-around

controlled environment. As per Ary, Jacobs, Sorensen, and Walker (2013), quantitative research falls into either the experimental or the non-experimental class. In experimental research, which is thought to be the most precise and intense strategy of all research techniques, a researcher controls treatment keeping in mind the end goal to set up the circumstances and end results of the wonder contemplated. Conversely, in non-experimental research, no endeavor is rolled out to improvement the behavior or status of the subjects of research, with the researcher measuring existing marvels as they are discovered (Sekaran, 2006). Major types of non-experimental research include survey research (f, exploratory reviews), relationship studies, and causal similar reviews. Survey research is used to quantify the qualities of various groups, or their disposition towards, or view of, a specific item (Sekaran, 2006). Correlation research is utilized to decide, and additionally to inspect the qualities and bearing of the relationship between at least two factors in connection to a similar gathering of individuals (Ary et al., 2013). Causal relative research endeavors to examine the reason for, or the outcomes of, contrasts between specific groups of individuals.

3.3.1 Qualitative Methods

The strategies and methods that are appropriate for a specific study rely on the research issue and motivation behind a study (Ghauri & Grønhaug, 2005). Qualitative studies are described by research in words and plans and are viewed as a suitable strategy for attaining significant knowledge about a phenomenon (Bryman, Bell, & Nilsson, 2005). A qualitative study focuses on exploring and deciphering the social reality, for example, culture and workplace environment. Its focus is around various individuals' sentiments and clarifications, which frequently make interviews a suitable method. A quantitative study, in contrast, concentrates more on numbers and estimation of factors, which makes it more appropriate when managing a substantial number of research articles.

Stangor (2014) depicted qualitative research as descriptive study that is centered around observing and portraying events as they happen, with the objective of capturing the majority of the indulgence of everyday behavior. Qualitative research happens in a characteristic setting of the phenomenon to be studied (P Ngulube, 2009). While in quantitative research, the questionnaire is the primary data-gathering tool, in qualitative research, researchers are the principle data accumulation apparatus. By utilizing their aptitudes, minds and human relations abilities instead of instruments to comprehend phenomenon they accumulate direct information (Pilsmo, 2010).

The data shaping the premise of qualitative research can incorporate field notes, audio sound or video recordings (Stangor, 2014) and is introduced in a story frame which tries to capture the natural settings (P Ngulube, 2009). Qualitative research includes the utilization of qualitative data, for example, interviews, report and member observation, and ethnography to comprehend and clarify social phenomena (P Ngulube, 2009). Qualitative research stresses words as opposed to evaluation in the accumulation and examination of data and the data are communicated in words, with information about emotions, qualities and states of mind (Babbie, 2015). Qualitative research has a tendency to be related with the possibility that social life is the result of social connections and relationships and activities portray the social world (Babbie, 2015). In fact, it frequently concentrates on reviewing encounters from the point of view of those included.

One of the significant weaknesses or disadvantages of qualitative data gathering strategies, for example, in-depth interviews, observations, and substance examination, is that they are time-taking activities. Qualitative research is additionally connected with researcher inclination. The quantitative procedure of utilizing surveys are appreciated for this shortcoming of the qualitative research method (Pilsmo, 2010; Zikmund, Babin, Carr, & Griffin, 2013). In any case, both quantitative and qualitative techniques supplement each other.

Qualitative technique is utilized to accumulate in-depth data on a specific point. This approach accepts a solitary individual represents a group of people and that it is critical to decipher the sentiments and feelings of a person which are disregarded by the quantitative technique (Creswell, 2013). This approach is normally utilized by interpretivists. Newman and Benz (1998) clarified that this approach is utilized when researcher needs to capture or translate a situation with the goal to build a hypothesis. As the researcher in the current study aims to check the assumptions of SDT about motivational factors which appreciate student's knowledge influenced by knowledge sharing tools and researcher is focusing on a singular reality, the qualitative technique is not suitable for the current study because researcher is not looking to deeply examine participants' feeling, emotions, environment, and the researcher is not going to develop or propose a new theory. So the qualitative method is not recommended for the current study.

3.3.2 Quantitative Methods

In quantitative research, experts verify a theory, deduce research questions/hypotheses from the theory, operationalize and elaborate the variables derived from the theory, and obtain results by measuring the variables via statistical instruments (Creswell, 2013). This research depended more on quantitative approaches. Stangor (2014) stated that quantitative research is descriptive research that utilizes more formal measures of convictions, dispositions, expectations and behavior, including surveys and methodical perception of behavior that is subjected to statistical investigation. As a rule, quantitative research places emphasis on measurement in the collection and examination of data and the data can be communicated in numbers, ratios, tables etc. (Babbie, 2015). It incorporates the utilization of closed survey techniques (Myers, 1997).

Babbie (2015) concurred that quantitative research is related with deductive approach. Quantitative researchers stress that research should be solid and generalizable and the outcomes

from the restricted sample should apply to the populace from which the sample was drawn. As per P Ngulube (2009), one of the qualities of quantitative data technique is to arrange unclear data in graphical shape or numerical details. Quantitative research is more formalized and controlled than qualitative research and it has the likelihood of replication (Babbie, 2015; P Ngulube, 2009). Be that as it may, quantitative research has its own particular shortcomings.

Quantitative research makes utilization of analyses yet social procedures observed in a lab setting may not really happen inside normal settings (Weingand, 1993). Quantitative research concentrates more on quantity than quality. Quantitative method is a logical approach and its grounds can be acknowledged in positivism (Grinnell Jr & Unrau, 2010); this approach is for the most part utilized by positivists. This technique concentrates on new data accumulation in agreement to the issue from large populace and analysis of the data but ignores an individual's feelings and sentiments or natural setting (Bryman & Bell, 2007). Stangor (2014) discussed that the quantitative method takes a shot at objectivity and quantifies it via the undertakings and suppositions which assists a researcher to portray data rather than to decipher data.

Observation permits the researcher to watch and record the behavior of others without depending on reports from respondents (Zikmund et al., 2013). Observation can be structured or unstructured. An unstructured approach is proper when a research address has not yet been formalized and the researcher might plan to build a hypothesis of what is happening in a specific circumstance, while a structured approach might be more appropriate when the researcher is attempting to test hypotheses (Manning & Munro, 2007). A standout amongst the most prevalent research strategies in quantitative business research is the survey (Manning & Munro, 2007) in which “the researcher deliberately solicits an extensive number from individuals similar inquiries and after that records their answers” (Punch, 2013). Further we can say, it is a research method in which information is collected from a sample of individuals by utilizing a questionnaire (Zikmund et al., 2013). Surveys

and experiments are the most widely recognized methodological techniques in quantitative studies; survey research is regularly found under the flag of descriptive research (Manning & Munro, 2007). The last essential type of quantitative research techniques is secondary data analysis which utilizes data already gathered and collected for some project other than the current one (Zikmund et al., 2013).

Among the above strategies, survey research was used for the research inquiries and hypotheses in this study for two primary reasons. To begin with, surveys give an effective and exact method for evaluating information about a populace, and are more suitable where there is an absence of secondary data (Zikmund et al., 2013), which is the situation in the current study. Furthermore, a review of empirical researches on KM demonstrates that the survey has been the most prevalently utilized strategy to measure this idea in the literature. Punch (2013) described four fundamental sorts of surveys: face to face interviews, telephonic interviews, web surveys, and self-administered questionnaire. Face-to-face interviews, which is otherwise called the individual interview, is a flexible overview strategy in which an immediate correspondence between the investigator and the respondent happens (Zikmund et al., 2013). It is viewed as the most seasoned type of interview since it does not depend on new correspondence technologies (Biemer & Lyberg, 2003). The telephonic interview is a prominent overview strategy in which a questioner calls a respondent, makes inquiries, and records answers (Punch, 2013). Web surveys are the most generally utilized data accumulation strategy (Kotler, 2011) in which a self-managed questionnaire is sent to potential respondents who assume the liability of perusing and noting the inquiries. Finally, a developing approach to the dissemination of questionnaire includes the Internet with two techniques generally utilized: email or website page, in which the questionnaire is either conveyed as an email and returned by means of email or is posted as a website page (or sets of pages) and the respondent goes to the site and finishes the web-based survey (Manning & Munro, 2007).

It has been proposed that electronic or Internet survey has a few points of interest contrasted with the above strategies, and is thought to be the most cost proficient and quickest data collection system (Punch, 2013; Summers, Gardiner, Lamb, Hair, & McDaniel, 2006) and, along these lines, the sample can be bigger than others (Zikmund et al., 2013). Furthermore, because of programmed data gathering and direct data selection into a database, potential errors are limited (Brennan, Rae, & Parackal, 1999) and it helps data analyses (Zikmund et al., 2013). But, the most serious issue of the website page survey is a probability of unequal access to and utilization of the Internet (Punch, 2013). The mail survey is generally a cheap data gathering technique (Ilieva, Baron, & Healey, 2002) and is likewise appropriate if the researcher needs to achieve a broadly geographically scattered sample (Zikmund et al., 2013). Additionally, this technique may yield more precise outcomes since respondents can answer at their will without the nearness of questioners. They can likewise counsel with other staff for important information. All the more significantly, respondents can completely control their protection and secrecy by not uncovering their own subtle elements on mailing questionnaire (Nguyen, 2010). Moreover, a long survey would be an issue because of the constrained period of time accessible to spend on a call (Zikmund et al., 2013). It may be likewise hard to achieve the correct respondents via the telephone.

Surveys are for the most part used to capture the views of a large populace and to gather descriptive information (Stangor, 2014). Survey research is by all accounts the most widely recognized in the field of Library and Information Science. Babbie (2015) contended that it is the best study outline as it uses more than one research technique, in this manner taking advantage of their different qualities. Stangor (2014) stated that surveys are the broadly utilized strategies for gathering descriptive information about a group of individuals inside a short space of time.

In this study, data were collected from the HEIs through a self-report measure directed through a questionnaire. The researcher thought that it was reasonable to utilize the survey technique in this

study since surveys are primarily utilized as a part of studies that have a large number of individuals as the unit of analysis (Babbie, 2015). The basic point of a survey is to deliver a depiction of the conclusions, states of mind, and behaviors of a group of individuals at a given time (Stangor, 2014). The survey technique was found to be very suitable for use in this study considering the populace and sample size and the short span of time available for finishing this study.

The questionnaire survey is one of the instruments utilized by researchers to affirm, deny or improve what was at that point accepted or known. The survey system is mainstream in light of its capacity to characterize and detail different qualities of key issues that can be essential and fascinating for specific associations (Chauvel & Despres, 2002). It gives the capacity to amplify the outcomes from a sample of respondents to a bigger populace when it is not possible to work with the whole population. It additionally gives quick and direct outcomes in contrast to other research techniques which permits researchers and specialists to act in a generally fast and professional way (Chauvel & Despres, 2002).

In view of the different components, for example, the costs included, accessibility of time, openness of research offices, the skill of the researcher, the research objective, the accessibility and qualities of respondents, and the sample design, the current study utilizes a self-administered questionnaire survey to conduct the research, as the study purpose is not to generate any theory but to test the hypotheses derived from the theory, so the current study will utilize quantitative methods to tackle the objectives of the current study. Further, the current study's objectives are not to observe respondents' behavior and sentiments over several periods; that is a cross-sectional study. So, the current study utilizes survey technique as a strategy of inquiry.

3.3.3 Mixed Methods Approach

Onwuegbuzie, Johnson, and Collins (2009) characterized a mixed strategy as the class of research where the expert mixes or consolidates quantitative and qualitative research strategies, techniques, approaches, ideas, or language into a single study. Contrasted with qualitative and quantitative approaches, it is a new method (Creswell, 2013). Typically, the researcher triangulates the two strategies so as to be aware of the precision of the data accumulated by every strategy, to diminish shortcomings in a study, and to answer more extensive research inquiries (McNeill & Chapman, 2005). These purposes have been clearly expressed by Gorman, Clayton, Shep, and Clayton (2005) as below:

- Firstly, when at least two strategies are utilized together, the researcher can address distinctive parts of a similar research question, in this way augmenting the depth of the project.
- Secondly, by utilizing strategies from various research paradigms (positivist and interpretivist), the researcher can make up for inborn shortcomings in every approach (Tan, 2009).

Mixed strategies approach is based on pragmatic knowledge; it privileges and gathers various sorts of data consecutively and simultaneously, which bests give a comprehension of a research issue (Creswell, 2013). There is a general understanding about the potential advantages and obstructions of utilizing mixed approaches. Mixed approach is utilized when researcher needs to study and observe respondents' feelings, emotions, and sentiment in natural settings by interviewing them and then developing a questionnaire to test the hypotheses created before in a qualitative way. In the current study there is no need to utilize mixed methods approach because the researcher is verifying a theory by testing hypotheses by collecting data through a questionnaire.

3.4 Research Methods

3.4.1 Inductive Method

Collis and Hussey (2013) portrayed inductive study as a study in which theory is in every way, “made from the perspective of precise reality; thusly sweeping interpreting are incited from specific occasions, which is the inverse of the deductive method since it joins moving from individual acumen to statements of general examples or laws”. In inductive strategy, the researchers do not make prior guesses. The inductive technique depends on instruments like interviews. It is utilized as a part of research where theories and hypotheses come after the collecting and examination of some or of a majority of the data (Robson & McCartan, 2016).

At the point when examiners make a generalization or find connections among phenomena on the premise of observations or other confirmations, they utilize inductive approach (Duvenage, 2010). Normally, this comes because of a learnt experience or intuitionally where the examiner can propose causal relationships (Krizan, 1999). Experts have utilized inductive thinking since that is the thing that they have been instructed at college in the social sciences. Most experts still utilize this strategy, fundamentally in light of the fact that is the thing that they are used to, and furthermore in light of the fact that they have not been made aware of different strategies and their related tools and techniques (Collier, 2005). Duvenage (2010) developed the inductive approach by showing that examiners have a two-stage systematic approach. They utilize intuitive "trend and pattern investigation", comprising the ID of rehashed behavior after some time and an expansion or lessening in that behavior to reveal changes in some part of universal behavior that could have suggestions.

When patterns are recognized, they depend on specially appointed standards or mental models to decide the significance of the patterns. Collier (2005) contended that the inductive strategy leaves

a lot of space for presumption, superstition and sentiment. Most inductive investigations need methodical strategies and accordingly give little premise to building up the dependability and legitimacy of their research findings. Another issue may be the linearity of the inductive approach (Duvenage, 2010).

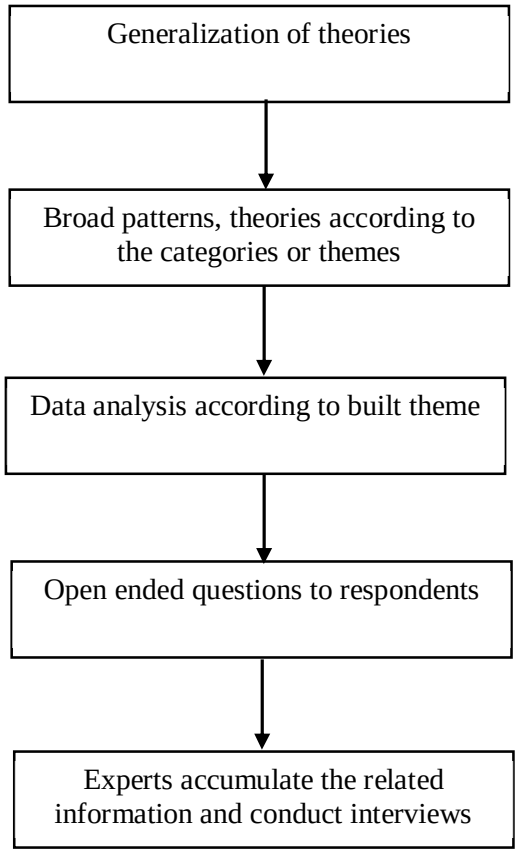

Figure 3.1: Inductive Logic of Research
Source: Adopted from Creswell (2013)

3.4.2 Deductive Method

The deductive technique depends on instruments like surveys and examination. It is utilized as a part of research where questions created by hypotheses, that are found from theory, should be tested (Haji, 2006). Robson and McCartan (2016) depicted the procedure of deduction as comprising five successive stages:

- Derive hypotheses from the theory
- Data collection – comes after hypotheses are written in operationalization of terms
- Findings – results from the analysis of the hypotheses
- Based on the findings – acceptance or rejection of the hypotheses
- Amendment to the theory – if needed

The fundamental difference between the two strategies is that the deductive strategy tests hypotheses and the inductive technique creates theory (Haji, 2006).

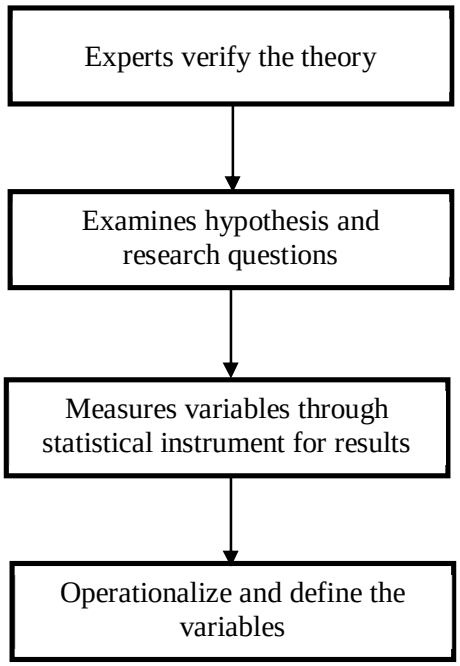

Figure 3.2: Deductive Logic of Research
Source: Adopted from Creswell (2013)

Deduction is the way toward thinking from general standards to particular cases (Krizan, 1999), where the theory is tested. As demonstrated by Collis and Hussey (2013), deductive research is "a study in which a figured and theoretical structure is made which is then endeavored by trial acumen; subsequently specific representations are deducted from general impacts." In this study, the researcher wants to test hypotheses derived from theory by collecting information from

respondents and analyzing their disclosures by applying assorted quantifiable tests. In this study, the researcher is expecting that knowledge sharing tools have an impact on students' tacit and explicit knowledge based on SDT, so the deductive approach is the more reasonable approach because it is aimed at testing the proposed hypotheses relationship (Fraenkel, Wallen, & Hyun, 2012).

3.5 Purpose of the Study

Research is a procedure of inquiry which aims to add to existing body of knowledge. Basically, there are three fundamental purposes behind research: clarifying how another issue can be organized and distinguished, portraying how an answer to an issue can be produced, or surveying how attainable an answer is to a given issue by giving empirical confirmation. Business research can be arranged into three basic types: exploratory, descriptive, or causal studies (Robson & McCartan, 2016; Zikmund et al., 2013).

3.5.1 Exploratory Research

An exploratory study is "initial research directed to illuminate and characterize the way of a problem" (Zikmund et al., 2013) or "an important method for discovering what is going on and picking up bits of knowledge to evaluate phenomena in another way" (Saunders, Lewis, & Thornhill, 2011). In this manner, exploratory research is generally assumed when there is insufficient information accessible regarding the research subject. A quantitative researcher may utilize this approach to characterize certain ideas, to plan theories, or to operationalize factors. Accordingly, in this explorative study, hypotheses are created and tested. Qualitative studies where data are gathered from library examinations, contextual analyses, expert counsels, interviews, focus group discussions, or perceptions and are typically exploratory in nature (Sekaran, 2006).

3.5.2 Descriptive Research

Descriptive research is “designed to depict the qualities of a populace or phenomena” (Zikmund et al., 2013), exhibiting “a photo of the particular elements of a circumstance, social settings, behaviors or association” (W. Neuman, 2006). Descriptive research is less ambivalent and requires a more organized plan than exploratory studies. The most regularly utilized research procedure for this type of research is a survey questionnaire (D. L. Davis, 1998), which is used in the current research. Completed against a setting of earlier knowledge of the research issue, a descriptive study tries to address why, where, how, whom, and when (Sekaran, 2003). As per Cavana, Delahaye, and Sekaran (2001), the aims of descriptive research are to get awareness of distinct attributes of a group or circumstance, to have the capacity to gage parts of a circumstance, to give material to supplementary research, and to collect data around conceivable change. The current study has employed descriptive research because it utilized survey questionnaire to test a theory.

3.5.3 Explanatory Research

Causal or explanatory research is directed to recognize circumstances and cause and effect connections among factors (Sekaran, 2006; Zikmund et al., 2013). It expands on exploratory and descriptive research and goes ahead to search for causes and reasons to clarify why events happen and to construct, expound, develop, or test a theory (W. Neuman, 2006). At the point when the associations have been demonstrated, the found connection can be utilized to comprehend and foresee results of the examined issue (Zikmund et al., 2013). The most widely recognized methodological utensils of this kind of research are tests and investigations.

3.6 Description of Population and Sampling

Population is defined as "each conceivable case that could be incorporated into a study" (David & Sutton, 2011). A population is a whole group of individuals that the researcher wishes to

investigate (Stangor, 2014), any arrangement of people or objects that have at least one common or equal characteristic (Busha & Harter, 1980) or a particular set of people who might, in a perfect world, be the subject of the research, and about whom one is attempting to describe/state something (Punch, 2013). Mills and Gay (2015) further described a population as a gathering of interest to the expert or the group about which the researcher might want the outcomes to be generalized. As indicated by Connaway and Powell (2010), the population ought to be chosen with care regarding the choice criteria, the size and the limitations of the survey. The number of inhabitants (population) in the study is that group about whom we need to make inferences, or basically every conceivable case that could be incorporated into your study (Babbie, 2015).

The target population of the current study was the students of HEIs in Punjab province of Pakistan. The HEIs term refers to "universities" engaged with educational purposes in Punjab province. As per HEC of Pakistan, 57 HEIs are registered in HEC under "general category" in the Punjab province at the time of data collection, which took place in 2017. There is only one university (Fatima Jinnah Medical University, Lahore) recognized by HEC Pakistan under "medical' category. There are other categories according to HEC Pakistan (i.e. business education, engineering & technology, medicine & health, and science & technology), but all the universities of Punjab province come under "general" category, so, the researcher of the current study included all general category universities (57) in this study as a population and excluded Fatima Jinnah Medical University which is not included in general category as per HEC Pakistan. As shown in Table 3.2, out of 57 HEIs, 32 institutes are public sector and remaining 25 institutions are working under the umbrella of private bodies.

Table 3.2: Higher Education Institutes in Punjab

Sector	Public	Private	Total
No.	32	25	57

Source: Higher Education Commission (HEC) (2017) Pakistan

No study can include everything or anything (Punch, 2013). To conduct the research successfully, a sample is needed. Sampling is a process of choosing research members from a whole population, and includes selections about which individuals, settings, occasions, behaviors, or social procedures to observe (Blanche, Durrheim, & Painter, 2006). A subset refers to a sample from a population and alludes to a small number of cases, units or locales chosen from a much bigger population. The strategy for finding the subset to study is sampling (Bryman & Bell, 2015). Sampling has two purposes: to permit the experts to assess the representativeness of the cases they observe, and along these lines to evaluate the level of trust in any deductions they draw from the cases (Silverman, 2016).

Mouton (1996) depicted sampling as a research approach to study items or phenomena as characteristics of cases of a bigger population of comparable items or objects. Mouton (1996) stated that it is essential to differentiate between targeted population and sample frame. A targeted population is a whole group of individuals that the researcher wishes to investigate (Stangor, 2014) and any arrangement of people or objects that have at least one common or equal characteristic (Busha & Harter, 1980), while the sampling outline (unit of investigation) alludes to the arrangement of cases from which the sample will be chosen. Keeping in mind the end goal to accomplish a legitimate sample, two criteria should be fulfilled: the sample must be illustrative and representative, the perceptions and the significant connections between them are deliberately defined, and secondly the sample ought to be sufficient, taking into account sufficient confidence to exist in the solidness of its qualities (Chorn, 1987).

As per Emory and Cooper (2003), by selecting part of the elements in the populace (i.e. sampling), conclusions might be generalized about the whole population. There are two classifications of sampling in the literature: probability sampling and non-probability sampling. Probability sampling is further classified in the following manner: simple random, cluster and stratified random and complex random sampling (Emory & Cooper, 2003). In contrast, non-probability sampling involves convenient sampling, snowball sampling, and purposive sampling. Non-probability sampling is usually used in qualitative studies with inductive approaches. The current study utilized random sampling. There are two reasons why random sampling is widely utilized (Black, 1999): a) random sampling ensures that the sample will be illustrative and representative for the whole population, b) the random sampling strategy permits the evasion of cluttering free variables with extraneous factors which may have impacted perceptions that were not unequivocally controlled for during the investigation. Further, in probability sampling, all possible elements of the population have an equal chance of being selected as a sample. There is less researcher biasness as compared to non-probability sampling in which biasness chances are high because it refers to any sampling technique where population selection is unknown (i.e. this sampling technique is better for qualitative research where selection of sampling technique totally depends on researcher's biasness) (Babbie, 2015). Probability sampling also makes possible criteria to generalize the results conducted after detailed statistical analysis by the researcher to the whole population from which the sample was selected.

The current study is utilizing "cluster and stratified random sampling" that is a type of probability sampling. This type of sampling is utilized where selection of respondents is chosen on a random basis and where it is impossible to compile the respondents list for sample selection (Babbie, 2015). First, the cluster is selected from the population on a geographical basis, as in the current study; the researcher made two geographical clusters because it was difficult to target the whole

population from Punjab province: a) HEIs inside Lahore (Lahore is a capital city of Punjab province and is called the “hub” of the education sector in Punjab province) and, b) HEIs outside Lahore. The target population was students who are studying in the higher education sector of Punjab province at undergraduate and graduate level. Punjab is the most populated province of Pakistan population and there are 57 HEIs in Punjab province: 32 universities are public and 25 universities are in private sector. Of the HEIs, 13 public sector universities are in Lahore city and remaining 19 public sector universities are situated outside Lahore in other cities of Punjab province. Out of 25 private sector universities, 20 universities are located inside Lahore city and the remaining 5 universities are located outside Lahore in other cities of Punjab province.

As mentioned before, this study has divided population into two clusters on geographical basis (Lahore and outside Lahore). Further, this study subdivided the population into two strata on demographical basis: public sector universities and private sector universities. Stratified random sampling is used when the population of the study encompasses homogeneous subsets and these subsets do not overlay upon each other and are called “strata”. Homogeneous elements are normally mentioned in demographical section of questionnaire and classified as education, gender, age, location, income level etc. Stratification helps to maximize selection of sample on probability basis which represents the whole population. Table 3.3 shows a summary of number of universities falling in all clusters and strata. These HEIs are the sample from the targeted population that were selected so that the result could be generalized to the whole population.

Table 3.3: HEIs in Each Cluster and Strata

Strata / Cluster	Public	Private	Total
Lahore	13	20	33
Outside	19	5	24
Total	32	25	57

Source: Higher Education Commission (HEC) (2017) Pakistan

As per the Higher Education Commission (HEC) (2017) website, the following HEIs are recognized as universities/DAIs under general categories:

Public Sector Universities in Lahore:

1. Government College University, Lahore
2. King Edward Medical University
3. Kinnaird College for Women
4. Lahore College for Women University
5. Information Technology University of the Punjab
6. National College of Arts
7. Pakistan Institute of Fashion & Design
8. University of Education
9. University of Engineering & Technology
10. University of Health Sciences
11. University of the Punjab
12. University of Veterinary & Animal Sciences
13. Virtual University of Pakistan

Private Sector Universities in Lahore:

1. Ali Institute of Education
2. Beaconhouse National University
3. Forman Christian College
4. Global Institute
5. Hajvery University
6. Imperial College of Business Studies

7. Institute of Management Sciences
8. Lahore Garrison University
9. Lahore Leads University
10. Lahore School of Economics
11. Lahore University of Management Sciences
12. Minhaj University
13. National College of Business Administration & Economics
14. Nur International University
15. Qarshi University
16. The Superior College
17. University of Central Punjab
18. University of Lahore
19. University of Management & Technology
20. University of South Asia

Public Sector Universities outside Lahore:

1. Bahauddin Zakariya University, Multan
2. Fatima Jinnah Women University, Rawalpindi
3. Government College University, Faisalabad
4. Government College for Women University, Faisalabad
5. Ghazi University, Dera Ghazi Khan
6. Government College for Women University, Sialkot
7. Government Sadiq College Women University, Bahawalpur

8. Islamia University, Bahawalpur

9. Khawaja Freed University of Engineering & Information Technology, Rahim Yar Khan

10. Muhammad Nawaz Shareef University of Agriculture, Multan

11. Pir Mehr Ali Shah Arid Agriculture, University Rawalpindi

12. University of Agriculture, Faisalabad

13. University of Engineering & Technology, Taxila

14. University of Gujrat, Gujrat

15. University of Sargodha, Sargodha

16. The Women University, Multan

17. Muhammad Nawaz Sharif University of Engineering & Technology, Multan

18. NFC Institute of Engineering & Technology, Multan

19. National Textile University, Faisalabad

Private Universities outside Lahore:

1. HITEC University, Taxila

2. Institute of Southern Punjab, Multan

3. The GIFT University, Gujranwala

4. The University of Faisalabad, Faisalabad

5. University of Wah, Wah

3.6.1 Stage One: Sample Design and Selection

3.6.1.1 Multi-stage Stratified Cluster Random Sample Design

Public Sector University, Lahore	Public Sector University Outside
N_{11}=13	N_{12}=19
n_{11}=02	n_{12}=03
Private Sector University, Lahore	Private Sector University Outside
N_{21}=20	N_{22}=5
n_{21}=03	n_{22}=2

If 'N' is equal or less than 18 then 'n' will be 2: N18=n2

If 'N' is greater than 18 and equal to 23 then the value of 'n' will be 3: N23=n3

If 'N' is greater than 23 and equal to 36 then the value of 'n' will be 5: N16=n5

Source:(Bryman & Bell, 2015; Emory & Cooper, 2003; Ghauri & Grønhaug, 2005)

3.6.1.2 Selection Procedure

According to above selection criteria, the researcher of current study developed two strata (private and public) in each cluster (Lahore and outside Lahore) and the following universities were selected for data collection on a random basis:

Public Sector University, Lahore 9, 11

1. University of Engineering & Technology
2. University of the Punjab

Public Sector University Outside 1, 3, 14

1. Bahauddin Zakariya University, Multan
2. Government College University, Faisalabad
3. University of Gujrat, Gujrat

Private Sector University, Lahore 3, 5, 16

1. Forman Christian College
2. Hajvery University
3. The Superior College

Private Sector University Outside 2, 4

1. Institute of Southern Punjab, Multan
2. The University of Faisalabad, Faisalabad

Based on above information, 2 (n) public sector universities were selected out of 13 (N) from Lahore and 3 (n) private sector universities were selected out of 20 (N) from Lahore. Similarly, out of 19 (N), 3 (n) public sector universities were selected from outside Lahore and 2 (n) private sector universities were selected out of 5 (N) from outside Lahore. The population was too large for this study for the survey (i.e. 57 HEIs in Punjab province), so a representative sample (group) was chosen to make data collection possible to generalize the results (Babbie, 2015). First of all, the researcher compiled the list of each stratum on cluster basis and then selected the universities randomly for data collection. From the first group, 9,11 number universities were randomly nominated from public sector from Lahore as sample 'n', further, 1, 3, 14 number universities from private sector of Lahore were selected randomly as sample 'n'. Similarly, 3, 5, 16 number universities from public sector outside Lahore were chosen as sample 'n' and 2, 4 were selected as sample 'n' from private sector outside Lahore. In multi-stage sampling, it is preferable to draw multiple samples; every sample becomes population for next stage, and for next stage we draw sample from current population which was actually a sample of previous stage. In the current situation, the researcher developed two clusters and then 2, 2 strata were made from each cluster out of population of 57. So, after stratification, 10 universities in total are selected as sample for next stage of sampling.

3.6.2 Stage Two: Multi-Stage Sampling

According to the demographic profile of the population, the total number of students studying in educational institutes of Punjab either in public or private institutions is not countable. However, the number of students in HEIs of the sample is countable. This study set high and low range according to Punjab University (PU) and Hajvery University (HU).

This study distributed 450 questionnaires to each sample university (total 10 universities): a total of 4500 questionnaires. From these, 4026 questionnaires were ready to use for data analysis. From these 10 universities, the number of students in PU are 42,663 (PU Publicatoin Dpt., 2016) as per "Fact Book" of the university, this is high limit of respondents in selected strata as compared to other universities in the sample. HU is the smallest in the sample regarding number of students with 5,500 enrollments (HU Prospectus, 2015) as compared to the other 9 universities from the sample. Before collecting the data, it is essential to determine the minimum sample size for collecting data so that an accurate statistical analysis takes place to generalize the results to whole population (McQuitty, 2004; Zikmund et al., 2013).

There are several techniques in determining the sample size. Firstly, as per Krejcie and Morgan (1970), if the population is 5000 to 5999 then the sample size should be 357 and for above 40,000 to 74,999 it comes to 380. If I consider each university in the selected sample as a population for selecting students as a sample, then the smallest in this case is HU Lahore with 5,500 students enrolled (HU Prospectus, 2015) and University of the Punjab is the biggest with 42,663 students enrolled (PU Publicatoin Dpt., 2016). Based on this the sample from each university must be from 357 to 380 and by taking an average of these two it comes to 368, according to the further clarification given by (The Reseach Advisors, 2006). A sample size of 368 is the minimum which justifies the whole population at 95% of level of confidence with 0.05 degree of accuracy and

margin of error. As a precautionary measure, the researcher added 52 to 368 and distributed about 420 questionnaires to each university from the sample of 10 universities by considering them a singular population.

Clemes et al. (2008) conducted research to check students' level of satisfaction in response to academic university experience and distributed 470 questionnaires to collect data from a university. ABC (2015) and Ling, Chai, and Piew (2010) also conducted research on HEIs in Malaysia and distributed 500 questionnaires among students of business institute of one university. Similarly, different researches have been conducted on students' perspectives related to knowledge sharing patterns in the past decade which is sufficient justification for selecting minimum sample size of 420 (Boateng, Dzandu, & Agyemang, 2015; Chin Wei et al., 2012; Jer Yuen & Shaheen Majid, 2007; Sabbir Rahman et al., 2014; Zaqout & Abbas, 2012).

By considering 42,663 high population (PU enrollments) in selected statistics of sample and if I apply formula provided by Yamane (1967) to draw minimum sample, which is as follows:

$$\boldsymbol{n = \frac{N}{1 + Ne^2}}$$

Where:

n = the sample size

N = the population of the study

e = level of significance (0.05 set in current research)

To arrive at sample size the above formula is used to attain minimum quantities as follows:

$$n = \frac{42863}{1 + 42863\ (0.05)^2}$$

$$n = \frac{42863}{1 + (42863 \times 0.0025)}$$

$$n = \frac{42863}{1 + (107.1575)}$$

$$n = \frac{42863}{108.1575}$$

$$n = 396$$

And, if we consider lowest population in sample statistics is 5,500 enrollments in HU then by applying the same formula provided by Yamane (1967) to draw minimum limit for sample:

$$\boldsymbol{n = \frac{N}{1 + Ne^2}}$$

$$n = \frac{5500}{1 + 5500\ (0.05)^2}$$

$$n = \frac{5500}{1 + (5500 \times 0.0025)}$$

$$n = \frac{5500}{1 + (13.75)}$$

$$n = \frac{42863}{14.75}$$

$$n = 372$$

So, upper and lower limit of sample is 396 and 372 respectively. By taking average, we have 384 as the minimum sample that should be taken. But in the current study, the researcher distributed 450 questionnaires in each university for data collection so that the sample error can be decreased by increasing sample size (Ary et al., 2013).

Joseph F Hair, Black, Babin, Anderson, and Tatham (2006) introduced a technique to satisfy the conditions for FA. They recommended that sample size must be at least five times greater than the items (observations of variables) involved in the study, this implies 5:1 ratio for the sample selection. In this regard, 35 items were utilized in the current study. By taking the ration of 5:1, 175 observations are expected (35 x 5). According to Joseph F Hair et al. (2006), the appropriate sample must be 175 respondents. According to Hoelter (1983) and Garver and Mentzer (1999), a minimum sample size for structural equation models is 200. And for principal component analysis (PCA), the sample size must be more than 300 as suggested by Stevens (1996). Further, Joe F Hair, Ringle, and Sarstedt (2011) suggested that it is sufficient to have a minimum sample at least 10 to 20 times more than variables for statistical analysis. Identical representation of each parameter in a population minimizes coverage error which acknowledges the strength of sampling. Sufficient size of sample incorporates sampling error.

3.7 Instrumentation

A questionnaire is an arrangement of a settled configuration of self-report things that is completed by respondents at their own particular pace, frequently without supervision (Stangor, 2014). A questionnaire is the best way to collect data from a large population (Babbie, 2015). A portion of the appropriate responses were controversial so a questionnaire ensured the respondent' secrecy to improve the probability of acquiring information in a less undermining way. Additionally, the questionnaires empowered frankness of respondents' feelings. Previous studies proposed that the self-revealing questionnaire is usually utilized as a part of knowledge sharing patterns to gather a large amount of data, get forthright reactions from knowledge seekers, and support sensitive reactions as the questionnaire supports anonymity (Ahmed, 2012; Boateng et al., 2015; Chin Wei et al., 2012; Jer Yuen & Shaheen Majid, 2007; Jolaee et al., 2014; M. M. Khan et al., 2012; W. Kucharska & R. Kowalczyk, 2016; Moghavvemi et al., 2017; Sabbir Rahman et al., 2014; Zaqout

& Abbas, 2012). Surveys utilize questionnaires to gather real time data in large amounts (Babbie, 2015). By keeping in mind the objectives of the study, data were collected on the variables including knowledge sharing tools (trust, motivation, technology, teachers' role and teachers' enthusiasm), competence, relatedness, autonomy, tacit knowledge, and explicit knowledge. The survey questionnaire is divided into four parts. The first part of the survey questionnaire starts with demographical information of respondents covering gender, level of education, discipline, sector, city, and university name. A five-point Likert scale (1=strongly disagree to 5=strongly agree) is utilized to obtain students' response to test the hypothesized conceptual model in the current study (Likert, 1932). Following are the details of variable measures.

3.7.1 Operationalization of Measures

3.7.1.1 Independent Variables

Trust: Trust assumes a noteworthy part in knowledge sharing activities. Jones and George (1998) characterized trust as "a psychosomatic approach, the experience of which is the result of the association of individuals' qualities, attitudes, and moods and feelings". At the point when trust is established, those included in the association are prepared to share their assets (that is, their own knowledgeable, enthusiastic, and physical resources) with others in the association. As such, people who are included in a trust-based communication eagerly impart their assets or aptitude to each other on the grounds that this sentiment of trust relieves their feelings of nervousness of being exploited (W. Tsai & Ghoshal, 1998). Further, Chiu, Wang, Shih, and Fan (2011) called attention to the idea that the nature of knowledge sharing will be expanded by the nearness of trust. Trust has all the earmarks of being important in the building of constructive interpersonal connections which support knowledge sharing (Jer Yuen & Shaheen Majid, 2007).

A number of researchers consider that trust is a critical factor in the creation of a knowledge-sharing environment. Researchers trust that when there are trust-connections, singular individuals in an association are more ready to share valuable knowledge among themselves (W. Tsai & Ghoshal, 1998). Adopting the scale developed by Manzoor (2012) and Roger C Mayer et al. (1995) that was also used by Cook and Wall (1980), the current study measures trust with five items as indicated in Table 3.4.

Table 3.4: Item Measures of Trust

Item code	Item wording
Tr1	Our classmates are very capable of solving their own exercises.
Tr2	I trust that our faculty also shares their personal experiences with their trustworthy students.
Tr3	My needs and desires in regard to understanding the problem are very important to my friends.
Tr4	I trust that faculty share ordinary things with them.
Tr5	The faculty of my department can be trusted to approach their duties with professionalism and dedication.

Source: Roger C Mayer et al. (1995) and Manzoor (2012)

Motivation: Typically, motivation is characterized as an inward constraint that manages behavior. In basic terms, we can say that the power within a person to follow up on or to perform a particular act is motivation. Motivation is the essential part that starts the education procedure. Student motivation means students' preparation, goals and impulses to learn effectively (E. A. Skinner & Belmont, 1993). Research has demonstrated that students' mental connection to their university, at the end of the day, their dedication, can be a noteworthy indicator of retention, and in addition influencing numerous different states of mind and behaviors. Adopting the scale developed by Siemsen et al. (2008) and (Jer Yuen & Shaheen Majid, 2007), this study measures motivation with four items as indicated in Table 3.5.

Table 3.5: Item Measures of Motivation

Item code	Item wording
Mt1	Motivational behavior of teachers can also motivate me to share my knowledge with others.
Mt2	My inner drive and feeling helps me to share my knowledge with others.
Mt3	I have no intention to share my knowledge with others.
Mt4	I want to share my knowledge with others when I am motivated.

Source: Siemsen et al. (2008) and Jer Yuen and Shaheen Majid (2007)

Technology: Technology alludes to the arrangements of the educational institutes that permit the creation and utilization of knowledge (T. A. Smith, 2006). The technological infrastructure inside an organization controls how knowledge flows and how knowledge is accessed (Voyiatzaki & Avouris, 2014). It is important to concentrate the impacts of knowledge sharing tools (Faber et al., 2016). As indicated by the work of K. V. Petrides and Furnham (2001), at the start of 1990s, KM focused on the management of information-based assets; thus, technology changed into an instrument making and shortening information into knowledge. Twelve items were developed by Gold and Arvind Malhotra (2001) as a measure of technology, which were refined by Chuang (2004) and T. A. Smith (2006) in various settings. In the current study, I utilized technology measures adopted and adapted from T. A. Smith (2006) and (M. M. Khan et al., 2012) and developed five items of technology as indicated in Table 3.6.

Table 3.6: Item Measures of Technology

Item code	Item wording
Tc1	Use of modern technology can help me to share my knowledge with others.
Tc2	Ease of access to technology can be helpful for knowledge sharing.
Tc3	There must be proper concealing for the use of modern technology.
Tc4	Use of modern technologies in education enhances my capabilities and quality of knowledge.
Tc5	I can easily access multiple resources (database, study material etc.) to learn at a single point in time.

Source: T. A. Smith (2006) and M. M. Khan et al. (2012)

Teachers' Role: A term used to depict the teacher's role is that of "orchestrator of learning movement" (Prieto et al., 2011). In the literature, there are a number of studies on teachers' role impacting students' motivation and satisfaction. The current study adopted three items developed by Koç (2008) and modified them according to the study as indicated in Table 3.7.

Table 3.7: Item Measures of Teachers' Role

Item code	Item wording
Tro1	Teachers give feedback on how to establish classroom discipline.
Tro2	Teachers guide us to establish close relationships with students to share knowledge.
Tro3	Our teachers' role in delivering good knowledge helps us to focus on class participation.

Source: Koç (2008)

Teacher's Enthusiasm: Enthusiasm is a high state of stimulation which can originate from a desire of a reward (A. C. Frenzel et al., 2009; Shiota et al., 2011). Additionally, it can be considered a style of conveying information, described by large amounts of engagement, excitement, and energy (Kunter et al., 2011; Pekrun, 2006), and by an arrangement of non-verbal practices and signals which can be effortlessly perceived as a show of eagerness: differed vocal conveyance, wide-open eyes and illustrative motions (M. L. Collins, 1978). Enthusiastic teachers not only spur, rouse, and energize students (Keller et al., 2014; Kunter, 2013), but they additionally advance learning and student accomplishment (Keller et al., 2015; Kunter, 2013). Adopting the scale on teachers' enthusiasm developed by (Kunter et al., 2011), the current study measures teacher's enthusiasm with four items as indicated in Table 3.8.

Table 3.8: Item Measures of Teacher's Enthusiasm

Item code	Item wording
Ten1	I always enjoy when teachers teach new things.
Ten2	I enjoy when teachers interact with students.
Ten3	I find our teachers excited when they teach.
Ten4	My teachers always teach with enthusiasm.

Source: Kunter et al. (2011)

3.7.1.2 Mediating Variables

SDT is a macro-theory of human inspiration, identity improvement, and well-being. The theory concentrates particularly on volitional or self-determined behavior and the social conditions. As indicated by R. M. Ryan et al. (1997), SDT is a move toward human identity and motivation which incorporates customary experiential techniques while utilizing organismic metatheory which examined centrality of people's innovative inward properties for behavioral self-regulation and identity improvement. With the end goal of social improvement and individual prosperity and necessary development, there are three needs recognized by R. M. Ryan et al. (1997) for social advancement and regular desires for development, one is competence (Harter, 1978), second need is relatedness (Baumeister & Leary, 1995) and third need is autonomy, proclaimed by DeCharms (1968). In the current study, the researcher has taken the three dimensions of SDT to measure and test the mediating model to get end results of the study. The following are the SDT dimensions:

Competence: A feeling of self-adequacy or perceived capacity to accomplish objectives (R. M. Ryan & Deci, 2000b). In SDT, support for competence is managed when professionals give effective important inputs and criticism. In the SDT model of progress, picking up a feeling of competence is encouraged via autonomy. That is, once individuals are volitionally connected with and have a high level of ability to act, they are then most well-suited to learn and apply new systems and capabilities (Markland et al., 2005). Adopting the scale of competence developed by (Williams & Deci, 1996) and used in previous researches (Hrbackova & Suchankova, 2016; Jang et al., 2012,

2016; Niemiec & Ryan, 2009) and after modification, the current study measured competence with five items as indicated in Table 3.9.

Table 3.9: Item Measures of Competence

Item code	Item wording
Cmt1	I struggle with tasks that I should be good at in class.
Cmt2	I think I am good in preparing class assignments.
Cmt3	I feel good about my class assignments.
Cmt4	I do well preparing my tasks as compared to other fellows.
Cmt5	I am satisfied with my abilities and skills to prepare good assessments.

Source: Williams and Deci (1996)

Relatedness: Relatedness is a feeling of being connected to other people. It is contended that relatedness is a major need (Ainsworth, Blehar, Waters, & Wall, 1978). Many empirically based hypotheses expect a craving or inclination for relatedness regardless of the possibility that it is not expressly detailed as a need. Adopting the scale of competence developed by (Williams & Deci, 1996) and used in previous studies (Hrbackova & Suchankova, 2016; Jang et al., 2012, 2016; Niemiec & Ryan, 2009), the current study modified most cited items with highest factor loading used in previous studies and measured relatedness with two items as indicated in Table 3.10. It is evident in literature that variables can be measured with two items as an interest of researcher (Ambos, Ambos, & Schlegelmilch, 2006; Beierlein, Davidov, Schmidt, Schwartz, & Rammstedt, 2012; S.-S. Chen, Chuang, & Chen, 2012; Ginestet, Emsley, & Landau, 2017; M. Huber, Lechner, & Strittmatter, 2017; Prodan, Maxim, Manolescu, Arustei, & Guta, 2015; Young, Jeganathan, Houtzager, Di Guilmi, & Purnomo, 2009).

Table 3.10: Item Measures of Relatedness

Item code	Item wording
Ret1	I really enjoy interacting with my classmates.
Ret2	I can really trust my classmates.

Source: Williams and Deci (1996)

Autonomy: Autonomy refers to volition - the organismic yearning to self-organize involvement and behavior and to have action be concordant with one's incorporated feeling of self (Angyal, 1965; Sheldon & Elliot, 1999). The idea of autonomy is far less predominant in empirical psychology than are competence and relatedness. What is more, when it is talked about it is regularly inaccurately likened with the thoughts of inside locus of control, autonomy, or independence (R. M. Ryan, 1991). Autonomy concerns the experience of coordination and flexibility, and it is a basic part of sound human working. Adopting the scale of competence developed by (Williams & Deci, 1996) and used in previous researches (Hrbackova & Suchankova, 2016; Jang et al., 2012, 2016; Niemiec & Ryan, 2009). In current study, autonomy is measured with two items with highest factor loading consistently reported in previous studies (see Table 3.11). Evidence is found in literature that variables could be measured with two items (Coman, Thoemmes, & Fifield, 2017; Figueredo, Garcia, Cabeza De Baca, Gable, & Weise, 2013; IAguinis, Edwards, & Bradley, 2016; Plummer & Tanis Ozcelik, 2015; van Griethuijsen et al., 2015).

Table 3.11: Item Measures of Autonomy

Item code	Item wording
Atnm1	I feel free to express myself, my opinions, and my concerns in class.
Atnm2	I feel comfortable participating in class.

Source: Williams and Deci (1996)

3.7.1.3 Dependent Variables

Tacit Knowledge: According to Cambridge University Press (2016), tacit knowledge is the knowledge that someone gets from not being taught by any person but from his or her experiences.

This knowledge is difficult to transfer by means of verbalizing and writing. It is called the "soft" part of knowledge and is normally embedded in a unique circumstance (Ikujiro Nonaka & Takeuchi, 1995). Nonaka and his partners see it as the foundation of all hierarchical knowledge (Ikujiro Nonaka & Takeuchi, 1995). Collins demonstrated that it is basic even in exercises such as investigative tests (J. C. Collins, 2001) and he, alongside others, see tacit knowledge as a major component of all human knowing and knowledge. Adopting the scale on tacit knowledge developed by (C.-P. Lin, 2007) which was further utilized by (Zaqout & Abbas, 2012), the current study measured tacit knowledge with five items as shown in Table 3.12.

Table 3.12: Item Measures of Tacit Knowledge

Item code	Item wording
Tk1	I share my knowledge based on my experience with my fellows.
Tk2	I share my expertise at the request of my fellows.
Tk3	I share my ideas about my research with my classmates.
Tk4	I talk about my tips on subjects with my fellows.
Tk5	I convey my thoughts on subject matter to my teacher.

Source: C.-P. Lin (2007); (Zaqout & Abbas, 2012)

Explicit Knowledge: The knowledge that can be expressed verbally and can be stored in print, documentation and codified electronically is called explicit knowledge (Cambridge University Press, 2016). Adopting the scale on tacit knowledge developed by (Bock et al., 2005) which was further utilized by (Zaqout & Abbas, 2012), the current study measured tacit knowledge with five items as shown in Table 3.13.

Table 3.13: Item Measures of Explicit Knowledge

Item code	Item wording
Ek1	I frequently collect reports, papers, and notes from all teachers.
Ek2	I share my reports, papers, and notes with other students.
Ek3	I frequently share reports, papers, and notes prepared by others with other fellows.
Ek4	I frequently share research techniques based on my experience.
Ek5	I frequently share knowledge based on my experience with other students.

Source: Bock et al. (2005) and Zaqout and Abbas (2012)

The full questionnaire of current study is attached in Annexure A.

3.8 Instrument Validity and Reliability through Pilot Testing

After preparing a questionnaire, it must be pre-tested. A pilot study ensures the instrument's validity and reliability. The main objective of a pilot study is to perceive any possible errors in the design of data collection instrument (questionnaire) and remedy it before conducting the main survey (Malhotra, 2008; Polit, Beck, & Hungler, 2006); also, normally, to refine and change the questionnaire to confirm the validity and reliability of the instrument (and measures), and in addition making it easier to use (Flynn, Sakakibara, Schroeder, Bates, & Flynn, 1990). Moreover, the pre-test can likewise be utilized to gauge reaction rates for the questionnaire and decide the sample size of the main survey. Subsequently, the pilot study is generally perceived as a vital part of the development of survey instruments (P. E. Green, Tull, & Albaum, 1988). The main reasons (Van Teijlingen & Hundley, 2010) to conduct a pilot study are summarized in Table 3.14.

Table 3.14: Reasons for Conducting a Pilot Study

- Designing a research process
- Creating and testing sufficiency of research instruments
- Evaluating the practicality of a survey
- Evaluating whether the research process is sensible and practical
- To ensure that the sampling frame is operative
- To ensure the sampling technique is effective
- Assessing the presumable accomplishment of proposed approaches
- Identifying strategic issues which may happen when utilizing proposed techniques
- Estimating inconstancy in results to help decide sample size
- Preliminary data gathering
- Predisposing what assets (fund, staff) are required for an arranged study
- Evaluating the proposed data examination strategies to reveal potential issues
- Training a researcher in whatever number of components of the research procedure could be allowed
- Convincing financing bodies that the research group is skillful and knowledgeable
- Convincing financing bodies that the primary study is achievable
- Convincing different partners that the fundamental study is worthy

Source: Van Teijlingen and Hundley (2010)

Joe F Hair et al. (2011) highlighted that pilot testing is especially important when measures of the study are taken from other studies and to be applied in specific settings. Statistical Package for the Social Sciences (SPSS) version 20 was utilized to provide detailed assessment of evaluation of data collection tool (measurement scale) of the questionnaire draft; Cronbach alpha and PCA were applied to ensure the instrument's validity and reliability. P. E. Green et al. (1988) imparted the insight that pre-test subjects ought to be as comparative as conceivable to the final group yet with outrageous respondents, or more briefly, ought to reflect the composition of the main study survey in terms of sample size. Additionally, convenience sampling is frequently used to produce a sample

for the pilot testing (Calder, Phillips, & Tybout, 1981) with a suggested size of 12 to 30 (Hunt, Sparkman Jr, & Wilcox, 1982) or 25 to 100 (Emory & Cooper, 2003). Along these lines, for pilot testing, the researcher distributed 200 questionnaires in randomly selected public sector university from outside Lahore (i.e. Islamia University, Bahawalpur) and 200 questionnaires were distributed in private sector university from Lahore: University of Management and Technology (UMT), Lahore. A total of 400 questionnaires were distributed in public and private universities to ensure the validity and reliability of the instrument. Amazingly, the respondents took part with great enthusiasm as shown by the response rate of pilot testing questionnaire distribution: the response rate was 95% (380 questionnaires were received from respondents).

3.8.1 Validity

Validity alludes to how much a measuring instrument really measures and depicts the idea it was intended to (David & Sutton, 2011). It is the degree to which the research results are complete (Blanche et al., 2006) and recommends honesty (W. L. Neuman & Robson, 2012). Validity alludes to "the degree to which the exact measure reflects the actual importance of the underlying idea" (Babbie, 2015). Validity gives confirmation that the instrument does not unintentionally gauge anything else (Churchill Jr, 1979). An instrument used to gauge a phenomenon must be evaluated as for its content validity and its construct validity. As mentioned in "instrumentation", the current study utilized a questionnaire that was developed and used in other countries in higher education sectors other than Pakistan; the researcher believed it to be asses the validity.

The validity of an instrument can be induced from three points of view: face or content validity and construct validity (A. M. Smith, 2012). *Content validity* alludes to the judgment made of the instrument in regard of the logical linkage between the inquiries asked. Content validity alludes to the content and organization of the instrument. It analyzes whether the content and configuration

of items cover the whole area of the construct being measured. Content validity is as often as possible assessed from a review of the literature on the theme or through interviews with specialists in the field. After the literature has been basically investigated, inquiries or instruments are constructed to cover the known content represented in the literature. Additionally, a subject expert ought to have the capacity to judge whether the instrument sufficiently tests the known content.

The face validity was established with the help of one professor who teach KM at higher education level, one survey experts, one registrar, mediator and one student; they were selected from sample universities. Additionally, the instrument was given to them to read and give an opinion as to whether they understood it or not; they were asked to review the items and they were assessed the extent to which they reflected with the meaning. After review and interview with experts, some statements that were not accurate as per their suggestions were reworded. However, content validity is subjective; accordingly, it is not an adequate measure of validity (Fraenkel et al., 2012; Malhotra, 2008). To conquer the issue of content validity, we ought to utilize construct validity which gives the largest amount of validation.

Construct validity (both discriminant and convergent) alludes to the way of the mental construct or attributes being measured by the instrument. It analyzes the degree to which the construct clarifies the distinctions in the behavior of people or their performance on specific tasks and it incorporates both convergent and discriminant validity (Fraenkel et al., 2012; Malhotra, 2008). Fiske and Campbell (1992) expressed that the convergent and discriminant validity of sets of items in the instrument can be measured utilizing factual means. Construct validity, which is the most advanced technique for testing validity, finds out the commitment which every construct makes to the aggregate variance assessed in the phenomenon. Evaluating discriminant validity is less clear than surveying convergent validity, and there are contrasts of supposition as for what constitutes a proper strategy (Fiske & Campbell, 1992). The FA approach (Babbie, 2015; David & Sutton, 2011;

Fraenkel et al., 2012; Malhotra, 2008; A. M. Smith, 2012) is a generally prescribed strategy for construct validity.

The present study utilized the PCA method for FA with varimax rotation to ensure the uni-dimensionality of the constructs and for validation of the instrument. PCA is a sort of FA approach that can be utilized to 'summarize the connections among factors showed in a relationship matrix' (Manning & Munro, 2007). If the items of a variable are computing a solo fundamental idea (concept), PCA extracts one component with eigenvalues higher than 1.0 with the loading of at least 0.40 and no cross-loading of items above 0.04 (Straub, Boudreau, & Gefen, 2004). It is recommended that items with component loading with an absolute value higher than 0.50 (Joseph F Hair et al., 2006) or 0.40 (Gerbing & Anderson, 1988) give better computations of the construct and, therefore, each item with component loadings less than this must be erased from the instrument. In contrast, if PCA extracts greater than one component with eigenvalues more than 1.0, the score plot would regularly be utilized to additionally diminish the quantity of the component from the number that may be acknowledged on the premise of eigenvalues. Varimax pivot would then be executed to decipher the importance of hypothetical fundamental parts (or 'dimensions' or 'factors') extracted by PCA (Joseph F Hair et al., 2006; Manning & Munro, 2007).

3.8.2 Reliability

Reliability is the degree to which the instrument indicates how much the responses over time are consistent (David & Sutton, 2011). Reliability is about trustworthiness and consistency (W. L. Neuman & Robson, 2012). It is a degree which shows how much the responses are repeatable (Blanche et al., 2006). Punch (2013) asserted that reliability essentially implies consistency and it is the focal idea in estimation. Moreover, reliability alludes to the consistency of scores or replies (reactions) given by an instrument (Fraenkel et al., 2012). W. L. Neuman and Robson (2012)

contended that it is hard to achieve perfect reliability. As indicated by Nunally and Bernstein (1978), four strategies are regularly used to evaluate the reliability of instruments:

- The *test–retest technique* requires that a similar tool be regulated to a similar sample of individuals at various times to test the level of stability of reactions, and to figure out if their reactions continue as before after some time. The computation of the correlation coefficients of the reactions concerned is done after such testing. If the correlation of the reactions acquired in the main test and those obtained in the second test is 0.70 or above, the instrument is considered reliable (Nunally & Bernstein, 1978).
- In the *alternate form technique*, the instrument is initially directed to a sample of respondents after they have completed and given back the surveys. The positions of the words and their arrangement in the instrument are then changed, however the meaning and significance of the sentences remain the same. After the change, the instrument is distributed again to a similar sample once more. As in the past case, the correlation is then processed on both the responses. If the correlation coefficient between the first and second set of reactions is observed to be above .70, the instrument is regarded as reliable.
- The *split halves technique* involves a large sample, which can be divided (split) into two parts (halves). Every half is given a re-worded instrument. Once every instrument is completed and given back, the correlation coefficients are then calculated, which, if observed to be above .70, demonstrates that the instrument is reliable.
- The *internal consistency technique* is the most ordinarily psychometric measure of evaluating instruments and scales. This technique strategy demonstrates how well items on a scale measure the ideas which they are implied to measure. Such estimation is fundamental and essential, in light of the fact that distinctive items which are considered to have the ability to measure one variable ought to unmistakably concentrate on the

variable concerned. Inner consistency is ascertained by a measurement known as Cronbach's alpha (Cronbach, 1951; Nunally & Bernstein, 1978), which shows the homogeneity of an instrument. As indicated by (Nunally & Bernstein, 1978), Cronbach's alpha is viewed as a good measure of reliability in social science research when it is observed to be .70 or above and this is a rule of thumb. The higher the Cronbach's alpha (near 1) in relation to a scale is observed to be, the more reliable the scale concerned is.

An examination of the four techniques highlighted above uncovers that the initial three present methodological impediments. The test–retest is tedious (time consuming), and the respondents may display reaction weakness after being subjected to rehashed testing by similar instruments. The utilization of the alternative form method is hard to direct, and additionally tedious with respect to the reformulation of the items on the instrument, although the split halves strategy is liable to variety in the distinctive parts of the sample concerned. The internal consistency strategy does not have such issues, as it requires just a single organization, and does not require the rephrasing of items. Much more significantly, such a technique gives a novel test of reliability from just the administration of one sample. The current study, along these lines, embraced such a technique for evaluating the reliability of the instruments utilized. Cronbach's alphas for all factors of this research were tested utilizing SPSS, Version 20.0.

3.8.3 Descriptive Statistics

Table 3.15: Demographic Profile of Respondents

Respondent Demographics	Frequency	%
Gender (N = 380)		
• Male	186	48.9
• Female	194	51.1
Level of Education (N = 380)		
• Graduation	201	52.9
• Post-Graduation	179	47.1
Discipline (N = 380)		
• Social Sciences	200	52.6
• Applied Sciences	180	47.4
Sector (N = 380)		
• Public	187	49.2
• Private	193	50.8
City (N = 380)		
• Lahore	193	50.8
• Others	187	49.2
University Name (N = 380)		
• UMT	193	50.8
• Islamia University Bahawalpur	187	49.2

Source: Own calculation through SPSS 20.

Table 3.15 shows that out of 380 respondents, 186 (48.9%) are male students and 194 (51.1%) are female students who responded through questionnaire. Further, 201 (52.9%) out of 380 are studying at graduation level and 179 (47.1%) are at post-graduation level. The above table also shows that out of 380 respondents who filled a full questionnaire, 200 (52.6%) are studying social sciences and 180 (47.4%) are from applied sciences. The above table also shows that 187 (49.2%) students are studying in a public sector university and 193 (50.8%) are from private sector.

Moreover, the above table shows that 193 (50.8%) respondents are from UMT and Lahore city and 187 (49.2%) are from a university (i.e. Islamia University Bahawalpur) outside Lahore.

3.8.4 Descriptive Summary

Table 3.16: Descriptive Statistics of Questioner Items

Items	N	Minimum	Maximum	Mean	Std. Deviation
Trust					
Tr1	376	1	5	3.49	.949
Tr2	380	1	5	3.46	1.012
Tr3	377	1	5	3.51	.951
Tr4	376	1	5	3.68	.984
Tr5	378	1	5	3.52	.890
Motivation					
Mt1	380	1	5	3.21	1.155
Mt2	378	1	5	3.33	1.223
Mt3	372	2	5	4.48	.799
Mt4	378	1	5	3.09	1.210
Technology					
Tc1	376	1	5	2.72	.882
Tc2	378	1	5	2.85	.765
Tc3	376	1	4	2.82	.846
Tc4	372	1	5	3.60	1.016
Tc5	380	1	5	2.63	.919
Teacher Role					
Tro1	380	2	5	4.07	.853
Tro2	378	1	5	4.08	1.235
Tro3	378	1	5	4.00	1.222
Teacher Enthusiasm					
Ten1	376	1	5	3.33	1.162
Ten2	262	2.00	5.00	4.1145	.84092
Ten3	376	1	5	3.33	1.119
Ten4	260	1.00	5.00	4.1154	1.19287
Competence					
Cmt1	380	1.00	5.00	3.2053	1.15545
Cmt2	378	1.00	5.00	3.3307	1.22276
Cmt3	372	2.00	5.00	4.4758	.79889
Cmt4	378	1.00	5.00	3.0926	1.20977
Cmt5	380	1.00	5.00	3.0632	1.10943
Relatedness					
Ret1	380	2.00	5.00	4.0737	.85327
Ret2	378	1.00	5.00	4.0847	1.23530
Autonomy					

Atnm1	376	1.00	5.00	3.3271	1.16248
Atnm2	376	1.00	5.00	3.3324	1.11886
Tacit Knowledge					
Tk1	378	1	5	4.11	1.204
Tk2	378	1	5	4.06	1.150
Tk3	378	1	5	3.96	1.240
Tk4	377	1	5	4.11	1.137
Tk5	378	1	5	3.87	1.254
Explicit Knowledge					
Ek1	378	1	4	2.56	.848
Ek2	378	1	4	2.62	.793
Ek3	378	1	4	2.75	.870
Ek4	376	2	5	4.25	.831
Ek5	380	1	4	2.50	.888

Source: Own calculation through SPSS 20.

The data for the pilot study was collected through a questionnaire consisting of 10 variables: Trust, Technology, Motivation, Teacher's Role, Teacher's Enthusiasm, Competence, Relatedness, Autonomy, Tacit Knowledge, and Explicit Knowledge. There were a total of 40 questions to measure the reaction of respondents. Respondents were questioned on a five-point Likert scale and average scores of diverse items range from 2.50 to 4.48. (See Table 3.16)

Table 3.17: Reliability of Measurement

Constructs	Valid N	Number of Items	Cronbach's alpha
Trust	369	5	.923
Motivation	368	4	.910
Technology	362	5	.753
Teacher's Role	376	3	.800
Teacher's Enthusiasm	254	4	.775
Competence	368	5	.931
Relatedness	378	2	.685
Autonomy	372	2	.966
Tacit knowledge	369	5	.880
Explicit knowledge	370	5	.825
Overall reliability (all questions)	220	40	.979

Source: Own calculation through SPSS 20.

Table 3.17 demonstrates each measure of reliability of the questionnaire. For the agreed sample, Cronbach's Coefficient alpha ranges from .996 to .685; trust with 92.3%, technology with 75.3%, motivation with 91%, teacher's role with 80%, teacher's enthusiasm with 77.5%, competence with 93.1%, relatedness with 68.5%, autonomy with 96.6%, tacit knowledge with 88%, and explicit knowledge with 82.5%, which shows that every multi-item construct holds great reliability. The high Cronbach's alpha value for every construct suggests that they are consistent internally. The total reliability of the questionnaire is 97.9%.

3.8.5 FA

To authenticate the construct validity (convergent and discriminant validity), I employed FA by utilizing the PCA technique along with varimax rotation method. Outcomes of PCA are displayed in Tables 3.18, 3.19, and 3.20. To check whether the data is appropriate for FA or not, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy test and Bartlett's test of sphericity is applied.

Table 3.18: KMO and Bartlett's Test

Constructs	No of items	KMO Measure of Sample adequacy	Bartlett's Test of Sphericity Chi-Square	Bartlett's Test of Sphericity Significance
Trust	5	.874	1371.40	.000
Motivation	4	.837	1040.31	.000
Technology	5	.784	385.94	.000
Teacher's Role	3	.683	378.769	.000
Teacher's Enthusiasm	4	.588	583.814	.000
Competence	5	.894	1516.298	.000
Relatedness	2	.500	118.988	.000
Autonomy	2	.500	758.181	.000
Tacit knowledge	5	.859	950.032	.000
Explicit knowledge	5	.814	693.382	.000

Source: Own calculation through SPSS 20.

A KMO=0.5 value is considered poor, KMO=0.6 is acceptable and KMO=1 is very suitable for FA. However, Hutcheson and Sofroniou (1999) further clarified that KMO=0.5 and 0.7 are

unacceptable and KMO=0.7 and 0.8 and KMO=0.8 and 0.9 as adequate whereas a value above 0.9 is regarded as unconditionally perfect. Based on Hinton, Bedford, Congdon, and Whicker (2004), it is found via Table 3.18 that value of KMO for every construct is adequate: KMO=.874 for trust, KMO=.837 for motivation, KMO=.784 for technology, KMO=.683 for teacher's role, KMO=.588 for teacher's enthusiasm, KMO=.894 for competence, KMO=.500 for relatedness, KMO=.500 for autonomy, KMO=.859 for tacit knowledge and KMO=.814 for explicit knowledge. It is shown that all the KMO values fulfil the minimum criteria for further analysis.

Bartlett's test of sphericity was utilized to inspect the relationship among items of the construct. There is a rule of thumb that if significance value is less than 0.05 (p-value <0.05) that shows there is relationship between all items of the construct. In Table 3.18, all the constructs have a significance value lower than 0.05 that offers evidence that there is correlation among the items of the construct so we can perform the FA.

Table 3.19: Eigen Values and Total Variance Explained

Constructs	Components	Initial Eigenvalues		
		Total	% of variance explained	Cumulative % of variance explained
Trust	Comp 1	3.824	76.486	76.486
Motivation	Comp 1	3.157	78.839	78.839
Technology	Comp 1	2.525	50.503	50.503
Teacher's Role	Comp 1	2.148	71.594	71.594
Teacher's Enthusiasm	Comp 1	2.410	60.259	60.259
Competence	Comp 1	3.929	78.574	78.574
Relatedness	Comp 1	1.521	76.057	76.057
Autonomy	Comp 1	1.934	96.677	96.677
Tacit knowledge	Comp 1	3.387	67.750	67.750
Explicit knowledge	Comp 1	2.976	59.514	59.514

Source: Own calculation through SPSS 20.

Normally, components of a construct are considered the principal components if they have an eigenvalue higher than 1 and they are utilized for further analysis. Table 3.19 contains all eigenvalues and shows overall variance calculated for the constructs. Only a single principal component was extracted from all of the 11 (except teacher enthusiasm) constructs by utilizing the PCA extraction technique: Trust (contains 5 items describing 76.486% discrepancy), Motivation (contains 4 items describing 78.839% discrepancy), Technology (contains 5 items describing 50.503% discrepancy), Teacher's Role (contains 3 items describing 71.594% discrepancy), Teacher's Enthusiasm (contains 4 items describing 60.259% discrepancy), Competence (contains 5 items describing 78.574% discrepancy), Relatedness (contains 2 items describing 76.057% discrepancy), Autonomy (contains 2 items describing 96.677% discrepancy), Tacit knowledge (contains 9 items describing 67.750% discrepancy) and Explicit knowledge (contains 9 items describing 59.514% discrepancy).

Table 3.20: Factor Loadings

Items		Loadings
Trust		
Tr1	Our classmates are very capable of solving their own exercises.	.826
Tr2	I trust that our faculty also shares their personal experiences with their trustworthy students.	.883
Tr3	My needs and desires in regard to understanding the problem are very important to my friends.	.865
Tr4	I trust that faculty share ordinary things with them.	.916
Tr5	The faculty of my department can be trusted to approach their duties with professionalism and dedication.	.879
Motivation		
Mt1	Motivational behavior of teachers can also motivate me to share my knowledge with others.	.901
Mt2	My inner drive and feeling helps me to share my knowledge with others.	.931
Mt3	I have no intention to share my knowledge with others.	.819
Mt4	I want to share my knowledge with others when I am motivated.	.896
Technology		
Tc1	Use of modern technology can help me to share my knowledge with others.	.732
Tc2	Ease of access to technology can be helpful for knowledge sharing.	.634
Tc3	There must be proper concealing for the use of modern technology.	.789

Tc4	Use of modern technologies in education enhances my capabilities and quality of knowledge.	.658
Tc5	I can easily access multiple resources (database, study material etc.) to learn at a single point in time.	.730
Teacher's Role		
Tro1	Teachers give feedback on how to establish classroom discipline.	.784
Tro2	Teachers guide us to establish close relationships with students to share knowledge.	.877
Tro3	Our teachers' role in delivering good knowledge help us to focus on class participation.	.873
Teacher's Enthusiasm		
Ten1	I always enjoy when teachers teach new things.	.870
Ten2	I enjoy when teachers interact with students.	.650
Ten3	I find our teachers excited when they teach.	.868
Ten4	My teachers always teach with enthusiasm.	.692
Competence		
Cmt1	I struggle with tasks that I should be good at in class.	.899
Cmt2	I think I am good in preparing class assignments.	.921
Cmt3	I feel good about my class assignments.	.801
Cmt4	I do well preparing my tasks as compared to other fellows.	.898
Cmt5	I am satisfied with my abilities and skills to prepare good assessments.	.907
Relatedness		
Ret1	I really enjoy interacting with my classmates.	.872
Ret2	I can really trust my classmates.	.872
Autonomy		
Atnm1	I feel free to express myself, my opinions, and my concerns in class.	.983
Atnm2	I feel comfortable participating in class.	.983
Tacit Knowledge		
Tk1	I share my knowledge based on my experience with my fellows.	.893
Tk2	I share my expertise at the request of my fellows.	.771
Tk3	I share my ideas about my research with my classmates.	.813
Tk4	I talk about my tips on subjects with my fellows.	.783
Tk5	I convey my thoughts on subject matter to my teacher.	.850
Explicit Knowledge		
Ek1	I frequently collect reports, papers, and notes from all teachers.	.795
Ek2	I share my reports, papers, and notes with other students.	.781
Ek3	I frequently share reports, papers, and notes prepared by others with other fellows.	.885
Ek4	I frequently share research techniques based on my experience.	.587
Ek5	I frequently share knowledge based on my experience with other students.	.778

Source: Own calculation through SPSS 20.

The minimum value for factor loading should be greater than 0.04 (Straub et al., 2004). As it is shown in Table 3.20, all the items' factor loading values are loaded greater than 0.04; they range from 0.587 to 0.983.

The above illustrated results of reliability and validity (both discriminant and convergent) are fulfilled, this mean the drafted questionnaire (data collection instrument) is a reliable and valid instrument (Cronbach, 1951; Joseph F Hair et al., 2006; Hinton et al., 2004; Nunally & Bernstein, 1978; Straub et al., 2004).

3.9 Data Collection Procedure

A self-administered questionnaire was developed based on the previous literature and as per the objectives of the present study. Questionnaires required minimum resources (i.e. time, cost, and human capital) to get response from respondents. For this purpose, written surveys are the best suited method for the current study and provide confidential information (Dillman, 2000; Salant & Dillman, 1994). The first section of the questionnaire was confined to demographical questions related to respondents' gender, level of education, field of education, type of institution (public or private), city name, and university name. The second part of the questionnaire contained questions regarding knowledge sharing tools (i.e. trust, motivation, technology, teacher role, teacher enthusiasm and competence, relatedness, autonomy and tacit and explicit knowledge). The questionnaire was pilot tested with 400 students from two universities, one a public university (Islamia University Bahawal Pur) and one a private university (i.e. UMT). A total of 380 questionnaires were returned fully completed; the response rate for pre-test was 95%. The findings of the pre-test found nothing to reduce the items of the questionnaire, although the questionnaire is lengthy since it was a combination of questions used in previous instruments.

Serving as a lecturer for nine years in one of the oldest universities in Pakistan (i.e. University of the Punjab), and having many students from different areas of Punjab, and friends and personal contacts in universities of Punjab province, I used the self-administered survey approach to distribute 4500 questionnaires to a sample of ten public and private universities. Of these, 4026 questionnaires were returned fully completed in all respects, which is an unusually high response rate of with 89.5%, but due to my wide span of personal contacts in universities, the objective to get a high rate of response was achieved. According to a previous study, this response rate is good (Babbie, 2015). A high responses rate is good because many statistical tools require an appropriate response rate and number of cases for better analysis (Frohlich, 2002). Questionnaires were distributed to the students. As has already been stated above, ten institutions were targeted for data collection from students, and a contact person was approached to whom the questionnaires were sent for distribution among students. The questionnaires were given to those who were willing to participate in the study. The respondents were asked to reply on the spot, and most respondents filled the survey and returned it on the spot. This is a reason for the unusually high response rate of 89.5%. The function of voluntarism was maintained in filling in the questionnaires, and the information received from participants was kept confidential.

3.10 Data Analysis

The completed questionnaires were coded and entered into SPSS version 20.0. The data were collected from self-administered questionnaire, so no opportunity existed to ensure that all items were filled correctly, however, incomplete forms were dropped from the analysis. The current study utilized PCA using SPSS to combine responses to different items on each construct (i.e. knowledge sharing tools of trust, motivation, technology, teacher's role, teacher enthusiasm, and competence, relatedness, autonomy, tacit knowledge and explicit knowledge) into their respective reliable scales. PCA uses optimal weights to develop principal components which account for

maximum amount of variance in the data set. According to Snyder (1984), PCA reduces information to the few common uncorrelated components or higher level relationships. PCA is the variable reduction method that helps to avoid redundancy. Various components equal to number of observed variables provided by PCA, however the researchers keep those components out of the total number of components. The current study employed Kasier criterion which is also known as 'eigenvalue-one criterion' which indicates how many components will be retained out of total components. According to the suggestion of Kaiser (1960), it is recommended to retain those components with a value greater than 1.0, and a value greater than 1.0 shows greater variance. The rationale for this criterion is that each of the observed variables contributes one unit of variance to the total variance in the data set. The component with a value greater than 1.0 should be retained and has more value and meaningful amount of variance. By contrast, the component with an eigenvalue less than 1.0 is less valuable to retain in the data set with less variance.

The current study also incorporated factor loadings that are loaded on each component. To check the internal consistency, the values of Cronbach's alpha were also measured on each scale which is presented in the next chapter. After factor loadings and PCA, multiple regression analyses were executed to test the hypotheses of the study. To test the mediation analysis, the current study utilized method proposed by Baron and Kenny (1986). To follow Baron and Kenny, the current study fulfilled four assumptions of mediation i.e. effect of ; X on Y (i), X on M (ii), M on Y (iii), and X on Y by indirect effect of M, should be significant.

X = independent variable

Y = dependent variable

M = mediating variable

This study used Barron and Kenny's method because this is widely acceptable approach to test mediating effects, this method follows confirmatory approach step by step. This approach also

helps to remove path inconsistency. This is pioneer method in this field which is not obsolete and still researchers are using this method and latest studies are being published in high impact factor journals (Akgunduz & Eryilmaz, 2018; Coman et al., 2017; Ginestet et al., 2017; M. Huber et al., 2017). As per Barron and Kenny, it is necessary all variables must have significant relationship with each other, but

3.11 Summary of the Chapter

Chapter three indicated the research methodology applied in the study to examine the proposed hypotheses and test the conceptual model. The chapter explained the justification of choosing quantitative methodology approach, and a description of sampling techniques adopted in the current study was presented. Further, the chapter highlighted the study population, sample size, study design, determining sample procedures, and data collection process. This chapter also presented the instrument development, the pilot study, and validity and reliability of the instrument. In addition, ethical considerations were presented in the chapter. The chapter closed with an explanation of the data collection procedure and data analysis techniques used in the study.

4 CHAPTER FOUR: ANALYSIS AND RESULTS

This chapter presents a detailed data analysis and its interpretation. In the first part, the demographic profile of the respondents is discussed, a descriptive summary is presented that includes mean and standard deviations of all variables under consideration, and this is followed by reliability and validity of measures of constructs. The second part explains the results of regression analysis and hypothesis testing in order to examine the relationships hypothesized in the conceptual framework.

4.1 Data Screening and Descriptive Statistics

4.1.1 Primary Case Analysis of Survey Items

Tables 4.1 and 4.2 show the details of primary case analysis of data collected from 4500 questionnaires. After data screening, some responses in the questionnaires were found to be duplicated and these were later removed from the main data file. Moreover, questionnaires that were less than 50% completed were also discarded from main data file. After data screening, 4026 questionnaires were used in further analysis. Tables 4.1 and 4.2 show that no duplication occurred in each last and first matching cases.

Table 4.1: Indicator of Each Last Matching Case as Primary

	Frequency	Percent	Valid Percent	Cumulative Percent
Primary Case	4026	100	100	100

Table 4.2: Indicator of Each First Matching Case as Primary

	Frequency	Percent	Valid Percent	Cumulative Percent
Primary Case	4026	100	100	100

4.1.2 Demographic Profile of Respondents

A total number of 4500 questionnaires were distributed to different HEIs in Punjab out of which 4026 questionnaires were returned providing a high response rate of 89.5% which is considered to be a good response rate in a quantitative study. The demographic summary of respondents is shown in Table 4.3; the demographics are: gender, educational level, discipline, sector, city and name of the university.

Table 4.3: Demographic Profile of Respondents

Respondent demographics	Frequency	%
Gender (N = 4026)		
• Male	2061	51.2
• Female	1965	48.8
Level of Education (N = 4026)		
• Undergraduate	2052	51
• Post-Graduate	1974	49
Discipline (N = 4026)		
• Applied Sciences	1979	49.2
• Social Sciences	2047	50.8
Sector (N = 4026)		
• Public	2010	49.9
• Private	2016	50.1
City (N = 4026)		
• Lahore	2014	50
• Outside Lahore	2012	50
University name (N = 4026)		
• University of Engineering and Technology, Lahore	400	9.9
• University of the Punjab, Lahore	403	10
• Government College University, Faisalabad	402	10
• Bahauddin Zakariya University, Multan	403	10
• University of Gujrat, Gujrat	402	10
• Forman Christian College, Lahore	404	10
• Hajvery University, Lahore	403	10
• The Superior College, Lahore	404	10
• Institute of Southern Punjab, Multan	403	10
• The University of Faisalabad, Faisalabad	402	10

Source: Own calculation through SPSS 20.

Table 4.3 shows that out of 4026 total respondents, 2061 (51.2%) are male and 1965 (48.8%) are female. All of the respondents provided information regarding their gender. While describing level of education, out of the 4026 respondents, 2052 (51%) are undergraduates and 1974 (49%) are postgraduates or above postgraduate level. This information also verifies that we have taken data from both undergraduates (which includes intermediate and graduation level) and postgraduates (which includes masters, M.Phil. and PhDs as well); all of the respondents discussed their educational level. Out of 4026 respondents, 1979 (49.2%) are taking applied sciences and 2047 (50.8%) are taking a social sciences discipline. This information reveals that our respondents belong to both types of disciplines (social sciences and applied sciences) and we have not ignored the disciplines of applied sciences which are usually ignored by social sciences researchers. Out of total sample of 4026, 2010 (49.9%) respondents studied in public sector universities and 2016 (50.1%) of respondents studied in private sector HEIs. This data shows that our study is focused on public sector students as well as private sector students.

Out of total respondents, 2014 (50%) respondents studied in Lahore and 2012 (50%) studied in other cities of Punjab. Out of 4026 respondents: 400 (9.9%) belongs to University of Engineering and Technology; 403 (10%) respondents belongs to University of the Punjab; 402 (10%) belongs to Government College University, Faisalabad; 403 (10%) belongs to Bahauddin Zakariya University, Multan; 402 (10%) belongs to University of Gujrat, Gujrat; 404 (10%) belongs to Forman Christian College, Lahore; 403 (10%) belongs to HU Lahore; 404 (10%) belongs to The Superior College Lahore; 403 (10%) studied at Institute of Southern Punjab, Multan; and 402 (10%) belongs to the University of Faisalabad, Faisalabad.

At this stage, it is essential to describe whether the sample utilized in this study is demonstrative of the population or not. According to the demographic profile of the population, the total number of students studying in educational institutes of Punjab either in public or private institutions is not countable.

However, the number of students in HEIs of the sample is countable. This study set a high and low range according to PU (42,663) and HU (5,500); details of these calculations are given in Section 3.6.2. This study distributed 450 questionnaires to each sample university (a total of 10 universities): a total of 4500 questionnaires. From these, 4026 questionnaires were ready to use for data analysis.

An essential part of the analysis of this study is FA, where sample size of 300 respondents is considered a sound rule of thumb (Tabachnick & Fidell, 1996). A more specific convention is N>50+8X where N signifies sample size and X denotes the number of independent variables in the conceptual framework (S. B. Green, 1991). In this study, a maximum number of 8 variables is considered helpful in multiple regression analysis. In other words, a sample size above 130 is considered to be sufficient to acquire statistical power. The number of students in Punjab is higher which demonstrates that the sample utilized in the current study is descriptive of the population.

4.1.3 Descriptive Summary

The current research is founded on 40 survey items of which responses to 39 items vary from one to five and only one item varies from two to five on a five-point Likert scale. Average values of diverse items vary from 2.83 to 4.27. Table 4.4 shows percentage count for missing value of survey items varies from 0 to 2.4 which shows the missing values in survey items are less than 5% and is not recommended for missing value analysis (Mertler & Vannatta, 2005).

Table 4.4: Descriptive Statistics of Survey Items

Items Code	N	Min.	Max.	Mean	Std. D.	% of missing value
TR 1	3982	1	5	3.28	1.02	1.1
TR 2	4026	1	5	3.39	1.04	0
TR 3	3985	1	5	3.49	1.02	1
TR 4	3986	1	5	3.59	1.08	1
TR 5	4006	1	5	3.48	1.01	.5
MT 1	4005	1	5	3.21	1.20	.5
MT 2	3970	1	5	3.29	1.26	1.4
MT 3	3928	1	5	4.27	.99	2.4
MT 4	4006	1	5	3.17	1.27	.5
TC 1	3986	1	5	3.10	1.26	1.0
TC 2	4006	1	5	3.27	1.19	.5
TC 3	3985	1	5	3.21	1.23	1
TC 4	3945	1	5	3.75	1.12	2
TC 5	4026	1	5	2.93	1.27	0
TRO 1	4026	1	5	4.17	.96	0
TRO 2	4006	1	5	4.09	1.27	.5
TRO 3	4006	1	5	4.00	1.27	.5
TEN1	3941	1	5	3.29	1.19	2.1
TEN 2	3939	1	5	3.21	1.27	2.2
TEN 3	3982	1	5	3.32	1.16	1.1
TEN 4	3986	1	5	3.39	1.27	1
CMT 1	4026	1	5	2.95	1.16	0
CMT 2	3999	1	5	3.07	1.21	.7
CMT 3	3937	1	5	4.15	.88	2.2
CMT 4	4004	1	5	2.90	1.22	.5
CMT 5	4026	1	5	2.83	1.10	0
RET 1	4026	1	5	3.56	1.19	0
RET 2	4006	1	5	3.49	1.29	.5
ATNM 1	3946	2	5	4.20	.78	2
ATNM 2	4006	1	5	3.33	1.22	.5
TK1	4006	1	5	2.69	1.33	.5
TK 2	4006	1	5	3.71	1.28	.5
TK 3	4006	1	5	3.63	1.34	.5
TK 4	4006	1	5	3.74	1.28	.5
TK 5	4006	1	5	3.59	1.34	.5
EK 1	4006	1	5	2.90	1.04	.5
EK 2	4006	1	5	2.99	.98	.5
EK 3	4006	1	5	2.98	1.02	.5
EK 4	3986	1	5	3.79	.93	1
EK 5	4026	1	5	2.86	1.07	0

Source: Own calculation through SPSS 20.

4.1.4 Reliability

The results of reliability estimates are represented in Table 4.5., where the value of Cronbach's alpha shows the internal consistency and reliability of measures. The values of Cronbach's alpha for trust, motivation, technology, teacher role, teacher enthusiasm, competence, relatedness, autonomy, explicit knowledge and tacit knowledge are .838, .785, .727, .798, .906, .918, .457, .489, .674, and .928 respectively. The higher value of Cronbach's alpha denotes higher consistency for each construct as well as each construct entirely measuring the same content. The values of alpha of relatedness and autonomy are less because of the high number of responses (N=4026) and less number of items in current study; two items on each variable.

It is also recommended that there is no lower limit to reliability coefficient, and high value of coefficient depends upon high number of items in scale and low number of respondents (Gliem & Gliem, 2003). However, the reliability of relatedness and autonomy is confirmed in Chapter three by the pilot study which is 68.5% and 96.5% respectively (see Table 3.17). In final analysis, table 4.5 shows alpha values of relatedness and autonomy .457 and .487.

According to previous researches, the low Cronbach's alpha value is acceptable in case of low number of items used in the study (Prodan et al., 2015; Taber, 2017; van Griethuijsen et al., 2014). Alpha value .45 is acceptable and sufficient for further analysis (Taber, 2017), and study on students also reported that alpha value .446 for "interest in domestic activities" (van Griethuijsen et al., 2014). The study also evidenced that response with two items on variable does not disturb the reliability of the scale (Y.-H. Li, Huang, & Tsai, 2009).

Table 4.5: Reliability of Measurement

Constructs	Valid N	Number of items	Cronbach's alpha
Trust	3881	5	0.838
Motivation	3837	4	0.785
Technology	3844	5	0.727
Teacher's Role	3986	3	0.798
Teacher's Enthusiasm	3776	4	0.906
Competence	3889	5	0.918
Relatedness	4006	2	0.457
Autonomy	3926	2	0.489
Explicit Knowledge	3926	5	0.674
Tacit Knowledge	3926	5	0.928
Overall reliability	3286	40	0.958

Source: Own calculation through SPSS 20.

4.1.5 Correlation

The use of correlation analysis is to authorize shared connotation between the construct items individually. Outcomes identified that correlation coefficient values for all items of each construct are positively and significantly correlated with each other ranging from .402 to .617 for trust, .370 to .59 for motivation, .270 to .407 for technology, .484 to .715 for teacher role, .667 to .766 for teacher enthusiasm, .575 to .764 for competence, .297 for relatedness, .358 for autonomy, .042 to .470 for explicit knowledge and .659 to .786 for tacit knowledge (see Annexure B).

4.1.6 FA

FA is used for the confirmation of the validity of constructs (both convergent and discriminant validity) by using PCA technique; FA was conducted along varimax rotation method. Tables 4.6, 4.7 and 4.8 represent the results of PCA. Bartlett's test of sphericity and KMO measure of sampling adequacy is also employed to verify whether the data is adequate for applying FA or not. Sphericity shows the orthogonality of component of construct and sampling adequacy refers to the strength of connection of variables. So, we can say that these two tests provided us with confirmation regarding whether it is worthwhile to proceed with FA or not.

FA reduces data into a small number of uncorrelated factors from a large number of items. Maximum information of original dimensions is covered in these uncorrelated factors so that interpretations of complex phenomena are simplified. Simply, we can say that if FA reduces five dimensions of trust into one factor then any change in trust can be analyzed and interpreted through that one factor (independent variable) rather than identifying that specific dimension which is causing change in trust. It is worth noting that the reason behind using FA is to reduce correlated dimensions of construct.

4.1.6.1 KMO Measure of Sampling Adequacy and Bartlett's test of Sphericity

The KMO measure of sampling adequacy is used to verify the suitability of FA. The value of KMO may vary from 0 to 1. A value of 0 depicts that there is a large scattering in pattern of correlation, and it is inappropriate to apply FA. A value of 1 shows that data is appropriate to employ FA as the correlation is relatively compact. Briefly, values in the middle of 0.5 to 0.7 are considered ordinary, 0.7 to 0.8 are considered upright, 0.8 to 0.9 are considered considerable and above 0.9 are outstanding (Hutcheson & Sofroniou, 1999). The outcomes shown in Table 4.6 identify that KMO is acceptable for autonomy and relatedness at ordinary acceptable level that is .50 for both (see Section 4.1.6.1), and all other variables range from upright to outstanding level, that is they range from .70 to .89 (Hutcheson & Sofroniou, 1999). The value of KMO for trust, motivation, technology, teacher role, teacher enthusiasm, competence, relatedness, autonomy, explicit knowledge and tacit knowledge are .846, .779, .778, .668, .833, .893, .500, .500, .762, and .900 respectively. The results indicate that we can proceed with FA.

Bartlett's test of sphericity is used to verify the association among the items of a construct. If no relation exists between items of a construct there is no point in proceeding with FA (Hinton et al., 2004). In Bartlett's test, a null hypothesis of no association among variables is assumed. Generally, the significance of association between variables is confirmed through a p-value of <0.05. Table 4.6 verifies

that the p-value in the case of all constructs is less than 0.001 which gives us the confirmation in the contradiction of null hypothesis of no correlation, so that we are able to proceed with FA.

Table 4.6: KMO and Bartlett's Test

Constructs	No. of Items	KMO Measure of sample adequacy	Bartlett's Test of Sphericity Chi-square	Bartlett's Test of Sphericity Sig.
Trust	5	.846	7171	.000
Motivation	4	.779	4301	.000
Technology	5	.778	3400	.000
Teacher's Role	3	.668	4184	.000
Teacher Enthusiasm	4	.833	9887	.000
Competence	5	.893	14011	.000
Relatedness	2	.500	370	.000
Autonomy	2	.500	538	.000
Explicit Knowledge	5	.762	3306	.000
Tacit Knowledge	5	.900	15020	.000

Source: Own calculation through SPSS 20.

4.1.6.2 Eigenvalues

Constructs having eigenvalues greater than 1 are considered principal components and are used for further analysis. Table 4.7 holds eigenvalues and indicates total explained variance for each construct as well. One principal component is extracted for each of the constructs by employing PCA extraction technique: trust contains five items describing 60.78% discrepancy, motivation contains four items describing 60.79% discrepancy, technology contains five items describing 47.83% discrepancy, teacher's role contains three items describing 71.37% discrepancy, teacher's enthusiasm contains four items describing 78.07% discrepancy, competence contains five items describing 75.50% discrepancy, relatedness contains two items describing 64.87% discrepancy, autonomy contains two items describing 67.90% discrepancy, explicit knowledge contains five items describing 45.42% discrepancy and tacit knowledge contains five items describing 77.61% variance.

Table 4.7: Eigenvalues and Total Variance Explained

Construct	Components	Total	Initial Eigenvalues	
			% of variance explained	Cumulative % of variance explained
Trust	Comp 1	3.039	60.78	60.78
Motivation	Comp 1	2.432	60.79	60.79
Technology	Comp 1	2.392	47.83	47.83
Teacher's Role	Comp 1	2.141	71.37	71.37
Teacher Enthusiasm	Comp 1	3.121	78.07	78.07
Competence	Comp 1	3.775	75.50	75.50
Relatedness	Comp 1	1.297	64.87	64.87
Autonomy	Comp 1	1.358	67.90	67.90
Explicit Knowledge	Comp 1	2.271	45.42	45.42
Tacit Knowledge	Comp 1	3.881	77.614	77.614

Source: Own calculation through SPSS 20.

4.1.6.3 Factor Loading

As claimed by Straub et al. (2004), the minimum value of the factor loading of each item must be higher than 0.40 and cross-loading of items must not be greater than 0.40. Outputs of Table 4.8 component matrix indicate that for all of the constructs (trust, motivation, technology, teacher role, teacher enthusiasm, competence, relatedness, autonomy, explicit knowledge and tacit knowledge), all linked items are loaded on just one component along varying factor loading ranges from .879 to .837, .669 to .823, .644 to .730, .763 to .881, .860 to .908, .778 to .902, .805, .824, .217 to .775, and .841 to .905 respectively. Results indicated and verified that the criterion of construct validity which includes both convergent and discriminant validity is satisfied. Convergent validity is confirmed through eigenvalues and factor loading of at least 1 and 0.40 for items loaded on posited constructs respectively. A discriminant validity loading of 0.40 and no cross-loading of items greater than 0.40 confirm that composed data obtained from the instrument are effective.

Table 4.8: Component Matrix

Items Code	Component
TR 1	.679
TR 2	.813
TR 3	.755
TR 4	.837
TR 5	.804
MT 1	.800
MT 2	.823
MT 3	.669
MT 4	.818
TC 1	.730
TC 2	.644
TC 3	.724
TC 4	.655
TC 5	.700
TRO 1	.763
TRO 2	.885
TRO 3	.881
TEN1	.877
TEN 2	.888
TEN 3	.860
TEN 4	.908
CMT 1	.887
CMT 2	.902
CMT 3	.776
CMT 4	.887
CMT 5	.886
RET 1	.805
RET 2	.805
ATNM 1	.824
ATNM 2	.824
TK1	.905
TK 2	.841
TK 3	.894
TK 4	.878
TK 5	.885
EK 1	.775
EK 2	.680
EK 3	.754
EK 4	.217
EK 5	.770

Source: Own calculation through SPSS 20.

Extraction Method: *Principal component analysis.* Rotation Method: *Varimax with Kaiser normalization.*

4.2 Analysis

4.2.1 Regression Analysis

Regression analysis is used to determine the effect of mediating variable (i.e. competence, relatedness, and autonomy) on dependent variable (i.e. tacit knowledge). Outcomes expressed a positive and significant impact of competence (β=0.574, p <0.01), relatedness (β=0.473, p<0.01) and autonomy (β=0.446, p<0.01) on tacit knowledge. From these results we can extract that competence has the maximum effect on tacit knowledge whereas autonomy has the minimum impact.

Table 4.9: Direct Relationship of Mediating Variable and Dependent Variable (in case of tacit knowledge)

Dependent variables	Independent variable		
	Competence	**Relatedness**	**Autonomy**
Tacit knowledge	.574**	.473**	.446**
Adjusted R^2	.333	.225	.201
F-Statistics	1904	1134	969

Source: Own calculation through SPSS 20.
** Significant at 1% level of significance

Similarly, in Table 4.10, the study used mediating variables (competence, relatedness and autonomy) as independent variables and explicit knowledge as dependent variable. Through the results, it is deduced that all three mediating variables significantly and positively explain dependent variable (i.e. explicit knowledge). Outcomes expressed a positive and significant impact of competence (β=0.582, p<0.01), relatedness (β=0.463, p<0.01) and autonomy (β=0.473, p<0.01) on explicit knowledge. Results also illustrated that competence explains dependent variable explicit knowledge more than relatedness and autonomy.

Table 4.10: Direct Relationship of Mediating Variable and Dependent Variable (In Case of Explicit Knowledge)

Dependent variables	Independent variable		
	Competence	Relatedness	Autonomy
Explicit Knowledge	.582**	.463**	.473**
Adjusted R^2	.343	.215	.227
F-Statistics	1987	1072	1131

Source: Own calculation through SPSS 20.
** Significant at 1% level of significance

In the next phase of regression analysis, this study took all mediating and dependent variables as dependent variable and trust as independent variable to check the impact of trust on all these variables. Results (see Table 4.11) show that trust has a positive and significant impact on all mediating and dependent variables competence (β=0.587, $p<0.01$), relatedness (β=0.352, $p<0.01$), autonomy (β=0.409, $p<0.01$), tacit knowledge (β=0.341, $p<0.01$) and explicit knowledge (β=0.477, $p<0.01$). It is also verified through the results that competence has maximum explanation and tacit knowledge is least explained by trust.

Table 4.11: Direct Relationship of Independent Variable with Mediating and Dependent Variables (In Case of Trust)

Independent variable	Dependent variables				
	Competence	Relatedness	Autonomy	Tacit knowledge	Explicit knowledge
Trust	.587**	.352**	.409**	.341**	.477**
Adjusted R^2	.346	.124	.165	.117	.226
F-Statistics	1978	546	749	501	1111

Source: Own calculation through SPSS 20.
** Significant at 1% level of significance

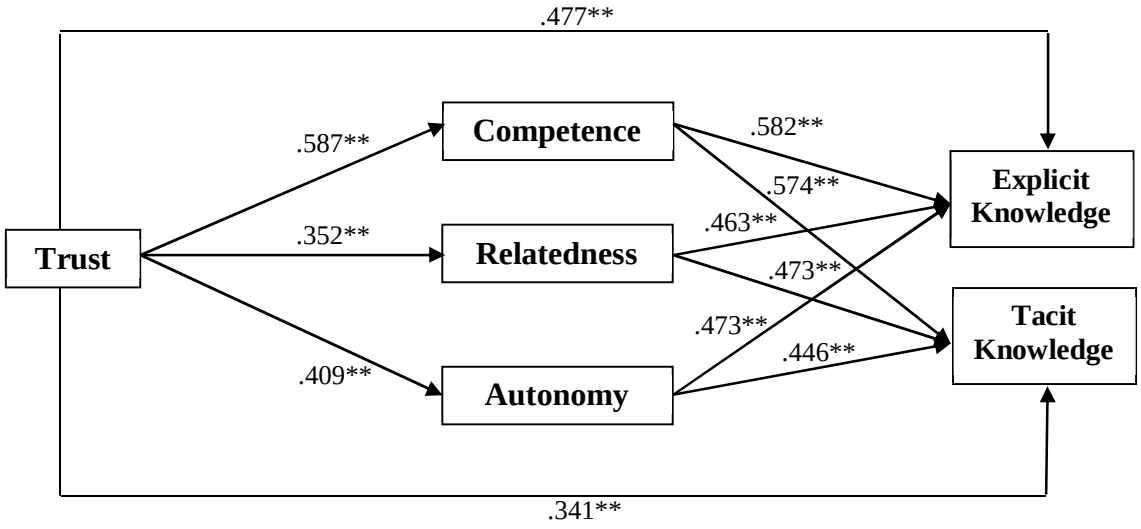

Figure 4.1: Direct Relationship Pathway in Case of Trust

Note: The R^2 values are reported in Table 4.11; they do not appear in Figure 4.1 to avoid cluttering the figure.

As shown in Table 4.12, this study took motivation as an independent variable and all dependent and mediating variables were considered dependent variable. Results verified that motivation has a positive and significant effect on all variables under consideration: competence (β=0. 753, p<0.01), relatedness (β=0.446, p<0.01), autonomy (β=0.586, p<0.01), tacit knowledge (β=0.452, p<0.01) and explicit knowledge (β=0.553 p<0.01). It is also testified that motivation explains competence at highest level and relatedness at lowest level.

Table 4.12: Direct Relationship of Independent Variable with Mediating and Dependent Variables (in case of motivation)

Independent variable	Dependent variables				
	Competence	Relatedness	Autonomy	Tacit knowledge	Explicit knowledge
Motivation	.753**	.446**	.586**	.452**	.553**
Adjusted R^2	.563	.197	.344	.205	.308
F-Statistics	4918	940	2012	969	1677

Source: Own calculation through SPSS 20.
** Significant at 1% level of significance

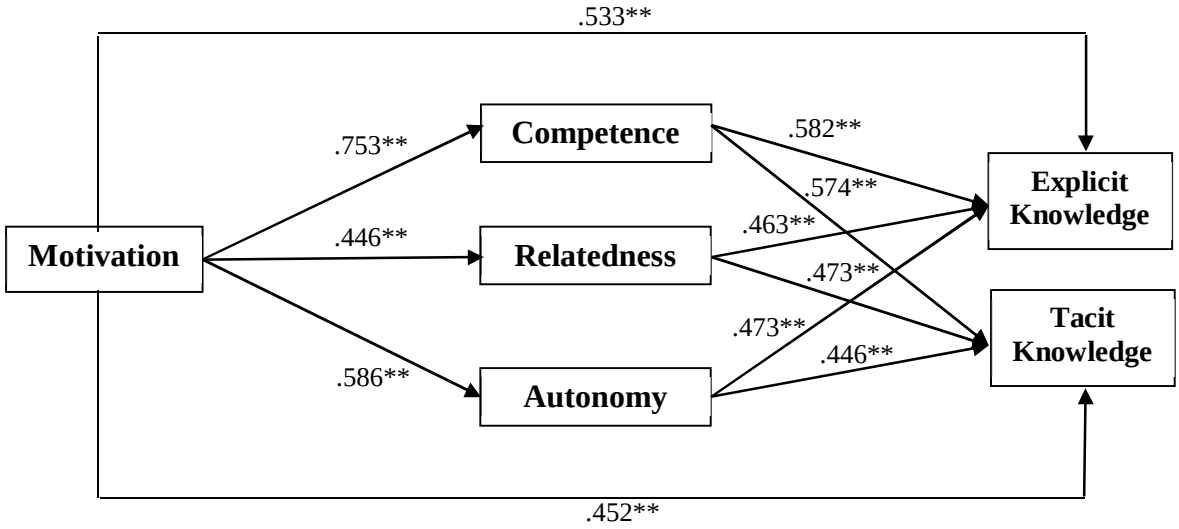

Figure 4.2: Direct Relationship Pathway in Case of Motivation

Note: The R^2 values are reported in Table 4.12; they do not appear in Figure 4.2 to avoid cluttering the figure.

Now mediating and dependent variables are taken as dependent variable and technology as independent variable to measure the impact of technology on all these variables. Results (see Table 4.13) show that technology has a positive and significant impact on all mediating and dependent variables: competence (β=0.416, $p<0.01$), relatedness (β=0.347, $p<0.01$), autonomy (β=0.351, $p<0.01$), tacit knowledge (β=0.363, $p<0.01$) and explicit knowledge (β=0.566, $p<0.01$). Here, the results also confirmed that explicit knowledge is most explained by technology and relatedness is least explained by technology.

Table 4.13: Direct Relationship of Independent variable with Mediating and Dependent Variables (in case of technology)

Independent variable	Dependent variables				
	Competence	Relatedness	Autonomy	Tacit knowledge	Explicit knowledge
Technology	.416**	.347**	.351**	.363**	.566**
Adjusted R^2	.172	.121	.121	.131	.321
F-Statistics	777	528	518	570	1778

Source: Own calculation through SPSS 20.
** Significant at 1% level of significance

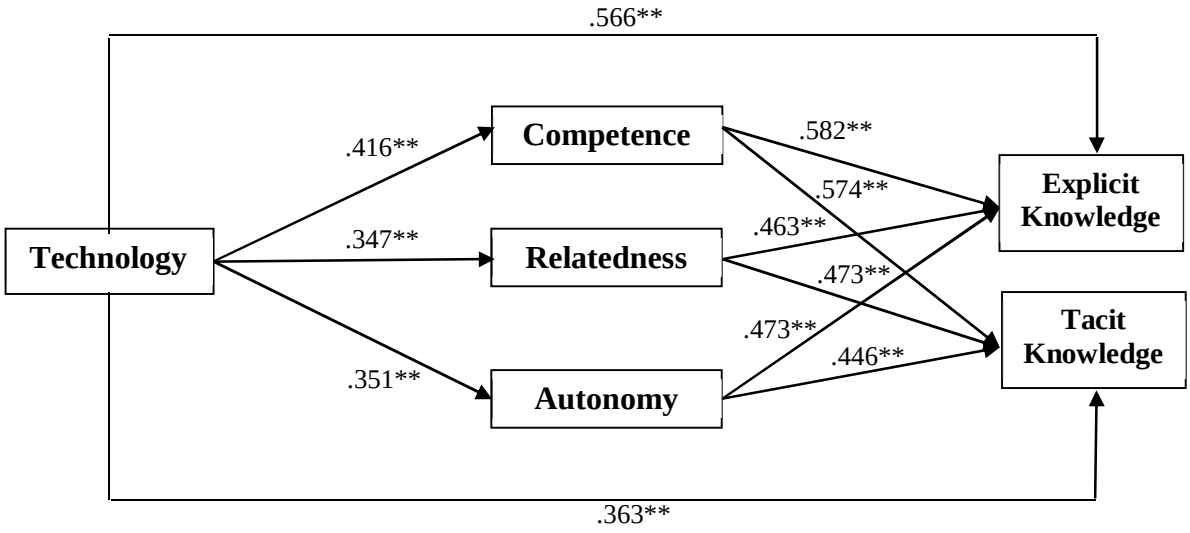

Figure 4.3: Direct Relationship Pathway in Case of Technology

Note: The R^2 values are reported in Table 4.13; they do not appear in Figure 4.3 to avoid cluttering the figure.

By taking all mediating variables (competence, relatedness, and autonomy) and dependent variables (tacit and explicit knowledge) as dependent variable and teacher role as independent variable, a regression analysis is run to check the impact of teacher's role on all these variables. Results (see Table 4.14) showed that teacher role positively and significantly explains all mediating and dependent variables: competence (β=0.520, $p<0.01$), relatedness (β=0.335, $p<0.01$), autonomy (β=0.396, $p<0.01$), tacit knowledge (β=0.499, $p<0.01$) and explicit knowledge (β=0.542 $p<0.01$). It is also demonstrated through the results that teacher role explains explicit knowledge the most and relatedness is least explained by teacher role.

Table 4.14: Direct Relationship of Independent Variable with Mediating and Dependent Variables (in case of teacher's role)

Independent variable	Dependent variables				
	Competence	Relatedness	Autonomy	Tacit knowledge	Explicit knowledge
Teacher role	.520**	.335**	.396**	.499**	.542**
Adjusted R^2	.273	.112	.158	.253	.295
F-Statistics	1452	499	731	1313	1637

Source: Own calculation through SPSS 20.
** Significant at 1% level of significance

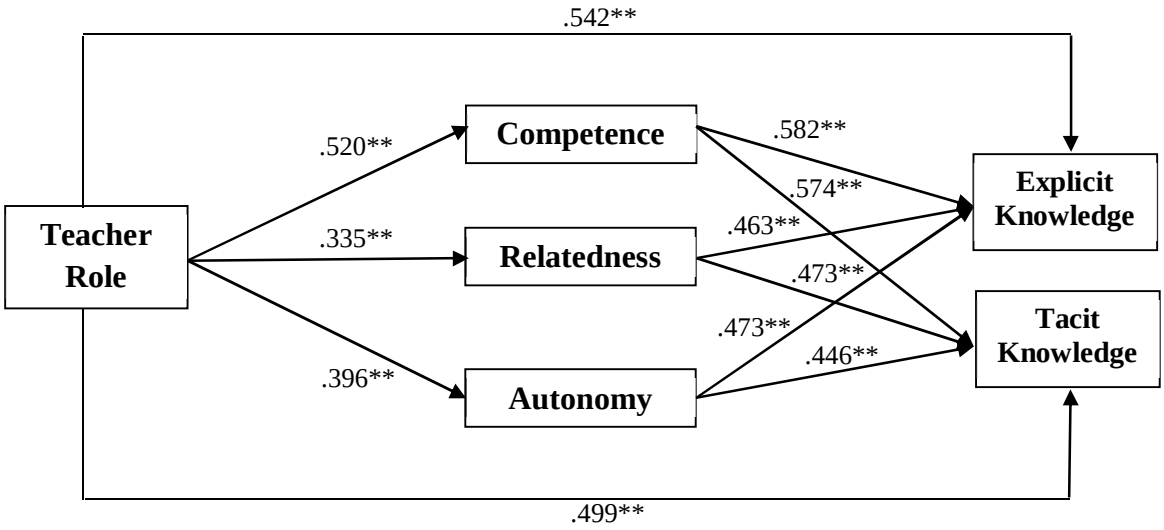

Figure 4.4: Direct Relationship Pathway in Case of Teacher Role

Note: The R^2 values are reported in Table 4.14; they do not appear in Figure 4.4 to avoid cluttering the figure.

As analyzed previously, I took teacher enthusiasm as independent variable and all dependent and mediating variables were considered dependent variable. Results, as shown in Table 4.15, confirmed that teacher enthusiasm has a positive and significant effect on competence (β=0.729, $p<0.01$), relatedness (β=0.538, $p<0.01$), autonomy (β=0.560, $p<0.01$), tacit knowledge (β=0.505, $p<0.01$) and explicit knowledge (β=0.705, $p<0.01$). It is also testified that competence is highly explained and tacit knowledge is least explained by teacher enthusiasm.

Table 4.15: Direct Relationship of Independent Variable with Mediating and Dependent Variables (in Case of Teacher Enthusiasm)

Independent variable	Dependent variables				
	Competence	Relatedness	Autonomy	Tacit knowledge	Explicit knowledge
Teacher Enthusiasm	.729**	.538**	.560**	.505**	.705**
Adjusted R^2	.531	.291	.317	.255	.492
F-Statistics	4124	1542	1711	1259	3579

Source: Own calculation through SPSS 20.
** Significant at 1% level of significance

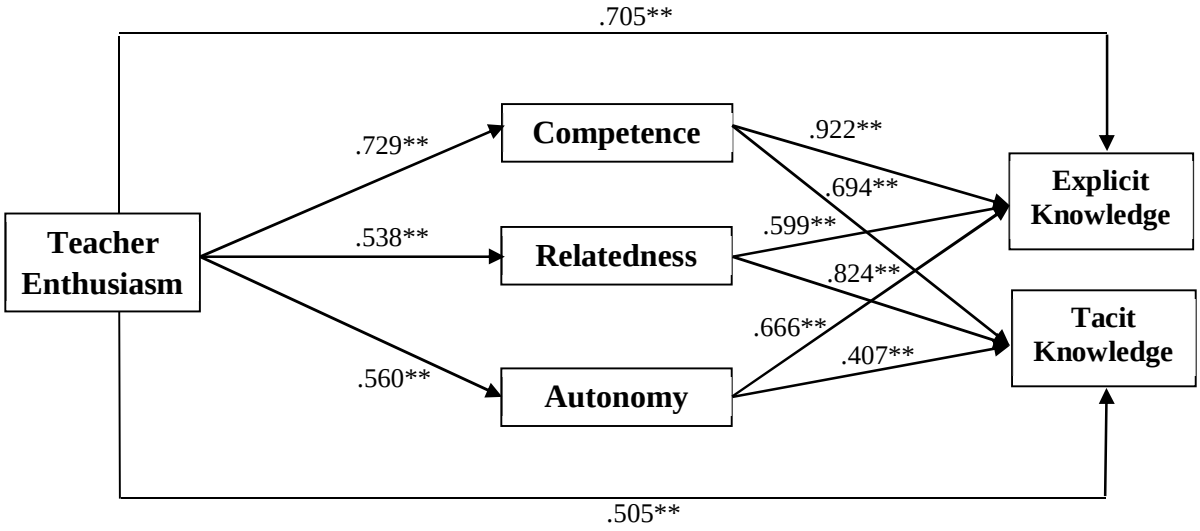

Figure 4.5: Direct Relationship Pathway in Case of Teacher Enthusiasm

Note: The R^2 values are reported in Table 4.15; they do not appear in Figure 4.5 to avoid cluttering the figure.

This study contains five independent variables (trust, motivation, technology, teacher's role and teacher enthusiasm), three mediating variables (competence, relatedness and autonomy) and two dependent variables (explicit knowledge and tacit knowledge). Results authenticated that positive and significant relationships exist between all these variables with a significance level of 0.01. The values of R^2 show how much variation in dependent variable is explained by independent variable whereas F-statistics identify whether the model is a good fit or not.

4.2.2 Mediation Analysis

If there is a direct and significant impact of an independent variable on a mediating variable, independent variable on dependent variable, and mediating variable on dependent variable then mediation can be verified (Baron & Kenny, 1986). To test this relationship, mediating (competence, relatedness, and autonomy) and independent (trust, motivation, technology, teacher role, and teacher enthusiasm) variables were both entered as independent variable and dependent variables (tacit knowledge and explicit knowledge) as dependent variables in the same regression window. In results, if the coefficients of both variables (independent and mediating) show significant relationships then we conclude that partial mediation exists between the independent and dependent variables under discussion. The other choice is either the results explain coefficients of mediating variable are significant whereas independent variable turns into insignificant, then we conclude that full mediation of mediating variable exists between our independent and dependent variable under consideration; in the second case, if the independent and mediating variables are entered into the same regression window and results infer that independent variable has significant relationship with dependent variable but mediating variable shows insignificant relationship with the dependent variable, then we conclude that no mediation exists between them (Goodman, 1960).

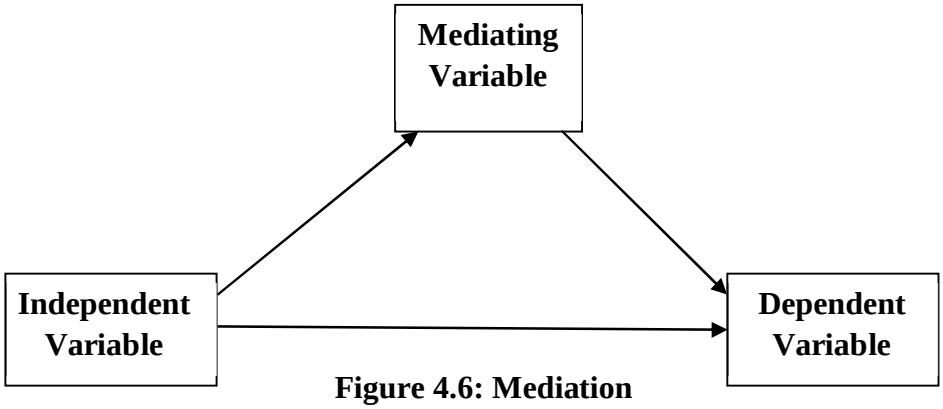

Figure 4.6: Mediation

4.2.2.1 Mediation Analysis in Case of Trust

Table 4.16 shows that direct impact of trust on both dependent variables (tacit knowledge and explicit knowledge) is positive and significant and conditions of mediation are satisfied. However, trust illustrates variation in explicit knowledge more than in tacit knowledge. The values of adjusted R^{2} = 0.117 identify that 11.7% variation in tacit knowledge is explained by trust and 22.6% variation in explicit knowledge is explained by trust. The F-statistics results show that the model is good fit.

Table 4.16: Mediation Analysis in Case of Trust (A)

Independent Variable	Dependent variables	
	Tacit knowledge	**Explicit knowledge**
Trust	.341** (22.404)	.477** (33.343)
Adjusted R^2	.117	.226
F-Statistics	501	1111

Note: ** represents significance at less than 0.01, value in parenthesis represents *t*-statistics.
Source: Own calculation through SPSS 20.

The study used multiple regression analysis to test the hypothesized mediating relationship among dependent variable and independent variable. Table 4.17 shows the multiple regression analysis where each mediating variable as independent variable was entered along trust and once used against tacit knowledge and once against explicit knowledge. It is confirmed through analysis that the mediating role of competence is not similar in both cases: for tacit knowledge (competence β=0.578, sig. <0.01) with full mediation and explicit knowledge (competence β=0.475, sig. <0.01) with partial mediation. Relatedness also partially mediates the relationship of trust and tacit knowledge (relatedness β=0.406, sig. <0.01) and explicit knowledge (relatedness β=0.349, sig. <0.01). In the case of autonomy, regression analysis verifies that partial mediation exists between trust and tacit knowledge (autonomy β=0.364, sig. <0.01) and explicit knowledge (autonomy β=0.342, sig. <0.01).

Table 4.17: Mediation Analysis in Case of Trust (B)

Independent variable Trust	Dependent variable Tacit knowledge			Dependent variable Explicit knowledge		
Trust	.001*** (.084)	.198** (13.292)	.189** (12.02)	.194** (12.02)	.351** (24.58)	.333** (22.60)
Competence	.578** (34.698)			.475** (29.48)		
Relatedness		.406** (27.064)			.349** (24.36)	
Autonomy			.364** (23.17)			.342** (23.30)
Adjusted R^2	.336	.262	.228	.374	.332	.324
F-Statistics	927	667	546	1101	940	893

Note: ** represents significance at less than 0.01, value in parenthesis represents *t*-statistics
*** represents no significance
Source: Own calculation through SPSS 20.

For the confirmation of above discussed mediation, the current study used Sobel test, Aroian test and Goodman test; the results are indicated in Tables 4.18, 4.19 and 4.20, respectively. In all three tests, the null hypothesis of no mediation between dependent variable and independent variable under discussion is assumed. Under all these tests similar results are produced as discussed previously. As claimed by outcomes of analyses, null hypothesis of no mediation is excluded in all mediating variables (i.e. competence, relatedness, and autonomy).

Table 4.18: Sobel Test in Case of Trust

Independent variable	Mediating	Dependent	Sobel test value	P-value
Trust	Competence	Student Tacit Knowledge	18.21	0.000
Trust	Relatedness	Student Tacit Knowledge	17.25	0.000
Trust	Autonomy	Student Tacit Knowledge	16.10	0.000
Trust	Competence	Student Explicit Knowledge	22.08	0.000
Trust	Relatedness	Student Explicit Knowledge	19.66	0.000
Trust	Autonomy	Student Explicit Knowledge	19.09	0.000

Source: Own calculation through SPSS 20.

Table 4.19: Aroian Test in Case of Trust

Independent variable	Mediating	Dependent	Aroian test value	P-value
Trust	Competence	Student Tacit Knowledge	18.81	0.000
Trust	Relatedness	Student Tacit Knowledge	17.25	0.000
Trust	Autonomy	Student Tacit Knowledge	16.09	0.000
Trust	Competence	Student Explicit Knowledge	22.07	0.000
Trust	Relatedness	Student Explicit Knowledge	19.66	0.000
Trust	Autonomy	Student Explicit Knowledge	19.09	0.000

Source: Own calculation through SPSS 20.

Table 4.20: Goodman Test in Case of Trust

Independent variable	Mediating	Dependent	Goodman test value	P-value
Trust	Competence	Student Tacit Knowledge	18.82	0.000
Trust	Relatedness	Student Tacit Knowledge	17.26	0.000
Trust	Autonomy	Student Tacit Knowledge	16.11	0.000
Trust	Competence	Student Explicit Knowledge	22.09	0.000
Trust	Relatedness	Student Explicit Knowledge	19.67	0.000
Trust	Autonomy	Student Explicit Knowledge	19.10	0.000

Source: Own calculation through SPSS 20.

4.2.2.2 Mediation Analysis in Case of Motivation

The direct impact of motivation on dependent variables (tacit knowledge and explicit knowledge) has been checked to ensure that the conditions of mediation analysis stated by Baron and Kenny (1986) are satisfied. The results of direct impact of motivation on dependent variables are given in Table 4.21. The

results identified that $R^{2 =}$ 0.205 for tacit knowledge and R^2 = 0.308 for explicit knowledge which means 20.5% variation in tacit knowledge and 30.8% variation in explicit knowledge is explained by motivation. F statistics confirms that the model is good fit.

Table 4.21: Mediation Analysis in Case of Motivation (A)

Independent variable	Dependent variables	
	Tacit knowledge	**Explicit knowledge**
Motivation	.452** (31.13)	.553** (40.96)
Adjusted R^2	.205	.308
F-Statistics	969	1677

Note: ** represents significance at less than 0.01, value in parenthesis represents *t*-statistics
Source: Own calculation through SPSS 20.

The current study conducted multiple regression analysis for the verification of mediating relationship. In Table 4.22, the results of mediation analysis are well explained: each mediating variable as independent variable along motivation against dependent variables (tacit knowledge and explicit knowledge) is entered. Competence fully mediates the relationship of motivation and students' tacit knowledge (β=0.543, sig. <0.01), partially mediates with students' explicit knowledge (β=0.380, sig. <0.01). However, relatedness partially mediates the relationship of motivation and tacit knowledge (β=0.336, sig. <0.01) as well as explicit knowledge (β=0.274, sig. <0.01). The analysis also verifies that autonomy also partially mediates the relationship between motivation and students' tacit knowledge (β=0.285, sig. <0.01) as well as students 'explicit knowledge (β=0.234, sig. <0.01).

Table 4.22: Mediation Analysis in Case of Motivation (B)

Independent variable Motivation	Dependent variable Tacit knowledge			Dependent variable Explicit knowledge		
Motivation	.047 (2.34)	.301** (19.78)	.284** (16.36)	.268** (13.71)	.430** (29.82)	.414** (25.47)
Competence	.543** (27.03)			.380** (19.51)		
Relatedness		.336** (22.18)			.274** (18.99)	
Autonomy			.285** (16.41)			.234** (14.50)
Adjusted R^2	.337	.297	.258	.373	.369	.345
F-Statistics	953	794	654	1116	1099	990

Note: ** represents significance at less than 0.01, value in parenthesis represents *t*-statistics.
Source: Own calculation through SPSS 20.

Sobel, Aroian and Goodman tests are employed for the confirmation of mediating relationship as discussed above (see Tables 4.23, 4.24 and 4.25, respectively). In all the three tests, the null hypothesis of no mediation is considered among independent and dependent variables under discussion. Similar results are produced in the case of all three mediating variables. For competence, we are able to reject null hypothesis of no mediation in the case of tacit knowledge because full mediation exists between competence and students' tacit knowledge; however, the null hypothesis is rejected for explicit knowledge as there exists partial mediation. For relatedness, null hypothesis of no mediation is rejected in both cases (mediation between motivation and tacit knowledge, mediation between motivation and explicit knowledge). Autonomy also gave similar results, as discussed previously, null hypothesis of no mediation is rejected for motivation and tacit knowledge and explicit knowledge.

Table 4.23: Sobel Test in Case of Motivation

Independent variable	Mediating	Dependent	Sobel test value	P-value
Motivation	Competence	Student Tacit Knowledge	20.40	0.000
Motivation	Relatedness	Student Tacit Knowledge	18.06	0.000
Motivation	Autonomy	Student Tacit Knowledge	14.51	0.000
Motivation	Competence	Student Explicit Knowledge	17.61	0.000
Motivation	Relatedness	Student Explicit Knowledge	17.22	0.000
Motivation	Autonomy	Student Explicit Knowledge	13.66	0.000

Source: Own calculation through SPSS 20.

Table 4.24: Aroian Test in Case of Motivation

Independent variable	Mediating	Dependent	Aroian test value	P-value
Motivation	Competence	Student Tacit Knowledge	20.40	0.000
Motivation	Relatedness	Student Tacit Knowledge	18.05	0.000
Motivation	Autonomy	Student Tacit Knowledge	14.51	0.000
Motivation	Competence	Student Explicit Knowledge	17.60	0.000
Motivation	Relatedness	Student Explicit Knowledge	17.22	0.000
Motivation	Autonomy	Student Explicit Knowledge	13.66	0.000

Source: Own calculation through SPSS 20.

Table 4.25: Goodman Test in Case of Motivation

Independent variable	Mediating	Dependent	Goodman test value	P-value
Motivation	Competence	Student Tacit Knowledge	20.41	0.000
Motivation	Relatedness	Student Tacit Knowledge	18.07	0.000
Motivation	Autonomy	Student Tacit Knowledge	15.52	0.000
Motivation	Competence	Student Explicit Knowledge	17.61	0.000
Motivation	Relatedness	Student Explicit Knowledge	17.23	0.000
Motivation	Autonomy	Student Explicit Knowledge	13.67	0.000

Source: Own calculation through SPSS 20.

4.2.2.3 Mediation Analysis in Case of Technology

Regression analysis confirms the direct and positive relationship of independent variable and dependent variable for further use in mediation analysis. Beta values identified that one unit change in technology causes 0.363 unit change in tacit knowledge and 0.566 unit change in explicit knowledge, which confirms that a higher level of association exists between technology and explicit knowledge (see Table 4.26). It is also verified through the results that technology explains explicit knowledge (R^2=0.321) more than tacit knowledge (R^2=0.131) as technology explains 32.1% variation in explicit knowledge as compared to 13.1% variation in tacit knowledge. F statistics confirms that the model is good fit.

Table 4.26: Mediation Analysis in Case of Technology (A)

Independent variable	Dependent variables	
	Tacit knowledge	**Explicit knowledge**
Technology	.363** (23.67)	.566** (42.17)
Adjusted R^2	.131	.321
F-Statistics	570	1778

Note: ** represents significance at less than 0.01, value in parenthesis represents *t*-statistics
Source: Own calculation through SPSS 20.

Multiple regression analysis is selected to confirm the mediating relationship of the variables. Table 4.27 represents the multiple regression analysis results where the current study entered each mediating variable as independent variable along technology against tacit knowledge as well as explicit knowledge. Results indicate that competence partially mediates relationship of technology and tacit knowledge (β = 0.529, sig. <0.01) as well as explicit knowledge (β = 0.422, sig. <0.01). Relatedness also shows partial mediation in case of technology and tacit knowledge (β = 0.408, sig. <0.01) and explicit knowledge (β = 0.512, sig. <0.01). Moreover, analysis also shows that autonomy partially mediates in the case of technology and tacit knowledge (β = 0.378, sig. <0.01) and explicit knowledge (β = 0.317, sig. <0.01).

Table 4.27: Mediation Analysis in Case of Technology (B)

Independent variable Technology	Dependent variable Tacit knowledge			Dependent variable Explicit knowledge		
Technology	.146** (9.96)	.222** (14.96)	.231** (15.15)	.389** (29.36)	.457** (33.88)	.453** (33.65)
Competence	.529** (36.18)			.422** (31.97)		
Relatedness		.408** (27.34)			.312** (23.06)	
Autonomy			.378** (25.04)			.317** (23.79)
Adjusted R^2	.363	.278	.259	.469	.406	.410
F-Statistics	1040	720	643	1619	1281	1287

Note: ** represents significance at less than 0.01, value in parenthesis represents *t*-statistics
Source: Own calculation through SPSS 20.

To confirm the above discussed mediation, this study engaged Sobel, Aroian and Goodman tests. Analysis confirmed the above discussed results and verifies the existence of partial mediation in all above cases. In all three tests, the study assumed null hypothesis of no mediation among dependent variables and independent variables. Results (see Tables 4.28, 4.29 and 4.30) indicated that for technology and competence partial mediation exist in both cases (mediation between technology and tacit knowledge, technology and explicit knowledge) and null hypothesis of no mediation is rejected. Relatedness also partially mediates the relationship of technology and tacit knowledge as well as technology and explicit knowledge. Again, similar to the above two mediation analyses, autonomy indicates partial mediation for both dependent variables tacit knowledge and explicit knowledge and null hypothesis of no mediation is rejected.

Table 4.28: Sobel Test in Case of Technology

Independent variable	Mediating	Dependent	Sobel test value	P-value
Technology	Competence	Student Tacit Knowledge	19.92	0.000
Technology	Relatedness	Student Tacit Knowledge	17.78	0.000
Technology	Autonomy	Student Tacit Knowledge	17.27	0.000
Technology	Competence	Student Explicit Knowledge	25.47	0.000
Technology	Relatedness	Student Explicit Knowledge	20.23	0.000
Technology	Autonomy	Student Explicit Knowledge	20.72	0.000

Source: Own calculation through SPSS 20.

Table 4.29: Aroian Test in Case of Technology

Independent variable	Mediating	Dependent	Aroian test value	P-value
Technology	Competence	Student Tacit Knowledge	19.91	0.000
Technology	Relatedness	Student Tacit Knowledge	17.97	0.000
Technology	Autonomy	Student Tacit Knowledge	17.27	0.000
Technology	Competence	Student Explicit Knowledge	25.47	0.000
Technology	Relatedness	Student Explicit Knowledge	20.22	0.000
Technology	Autonomy	Student Explicit Knowledge	20.71	0.000

Source: Own calculation through SPSS 20.

Table 4.30: Goodman Test in Case of Technology

Independent variable	Mediating	Dependent	Goodman test value	P-value
Technology	Competence	Student Tacit Knowledge	19.92	0.000
Technology	Relatedness	Student Tacit Knowledge	17.98	0.000
Technology	Autonomy	Student Tacit Knowledge	17.28	0.000
Technology	Competence	Student Explicit Knowledge	25.48	0.000
Technology	Relatedness	Student Explicit Knowledge	20.23	0.000
Technology	Autonomy	Student Explicit Knowledge	20.72	0.000

Source: Own calculation through SPSS 20.

4.2.2.4 Mediation Analysis in Case of Teacher Role

Direct impact of teacher role is investigated through regression analysis as presented in Table 4.31. In both cases a positive and significant association exists which satisfies the condition for testing mediation. For teacher role and tacit knowledge ($\beta = 0.499$, sig. <0.01) one unit change in teacher role causes 0.499 unit change in tacit knowledge and for second dependent variable one unit change in teacher role causes 0.542 unit change in explicit knowledge ($\beta = 0.542$, sig. <0.01). Values of adjusted

R^2 indicate that teacher role explains variation in tacit knowledge (0.253 or 25.3%) which is higher than variation explained by teacher role in explicit knowledge (0.295 or 29.5%). F-statistics confirm that the model is a good fit.

Table 4.31: Mediation Analysis in Case of Teacher Role (A)

Independent variable	Dependent variables	
	Tacit knowledge	**Explicit knowledge**
Teacher role	.499** (36.24)	.542** (40.47)
Adjusted R^2	.253	.295
F-Statistics	1313	1637

Note: ** represents significance at less than 0.01, value in parenthesis represents *t*-statistics
Source: Own calculation through SPSS 20.

The below analysis illustrates that teacher role contributes more to tacit knowledge more to explicit knowledge or we can say that the strength of the relationship is stronger towards tacit knowledge as compared to explicit knowledge. For applying mediation analysis, the study used regression analysis where each mediating variable is entered along with teacher role against both dependent variables separately: once for tacit knowledge and once for explicit knowledge (see Table 4.32). In case of competence, partial mediation exists in the case of tacit knowledge ($\beta = 0.427$, sig. <0.01) and explicit knowledge ($\beta = 0.408$, sig. <0.10). The results revealed that mediation is stronger for tacit knowledge as compared to explicit knowledge. For the second mediating variable, relatedness, partial mediation exists in the case of tacit knowledge ($\beta = 0.342$, sig. <0.01) which help us to reject null hypothesis of no mediation and the same applies to explicit knowledge ($\beta = 0.314$, sig. <0.01). Last but not least, the mediating variable autonomy entails partial mediation in case of tacit knowledge ($\beta = 0.292$, sig. <0.01) and explicit knowledge ($\beta = 0.307$, sig. <0.01). Results indicate that level of association is stronger for explicit knowledge as compared to tacit knowledge in case of autonomy as mediating variable.

Table 4.32: Mediation Analysis in Case of Teacher Role (B)

Independent variable Teacher role	Dependent variable Tacit knowledge			Dependent variable Explicit knowledge		
Teacher role	.278** (18.80)	.382** (28.02)	.384** (26.18)	.351** (23.07)	.436** (32.63)	.419** (30.51)
Competence	.427** (28.71)			.408** (28.37)		
Relatedness		.342** (25.01)			.314** (23.45)	
Autonomy			.292** (20.35)			.307** (22.25)
Adjusted R^2	.390	.356	.328	.424	.385	.380
F-Statistics	1210	1071	934	1398	1214	1171

Note: ** represents significance at less than 0.01, value in parenthesis represents *t*-statistics
Source: Own calculation through SPSS 20.

To confirm the above discussed results, the study employed three tests: Sobel, Aroian and Goodman (see Tables 4.33, 4.34 and 4.35, respectively). All three tests authenticated the previous results that partial mediation exists for competence (mediation between teacher role and tacit knowledge, teacher role and explicit knowledge). For the second mediator, relatedness, partial mediation is present for tacit knowledge and for explicit knowledge. In the last, partial mediation exists for both dependent variables (mediation between teacher role and tacit knowledge, teacher role and explicit knowledge).

Table 4.33: Sobel Test in Case of Teacher Role

Independent variable	Mediating	Dependent	Sobel test value	P-value
Teacher Role	Competence	Student Tacit Knowledge	22.50	0.000
Teacher Role	Relatedness	Student Tacit Knowledge	20.58	0.000
Teacher Role	Autonomy	Student Tacit Knowledge	17.74	0.000
Teacher Role	Competence	Student Explicit Knowledge	23.23	0.000
Teacher Role	Relatedness	Student Explicit Knowledge	20.26	0.000
Teacher Role	Autonomy	Student Explicit Knowledge	19.49	0.000

Source: Own calculation through SPSS 20.

Table 4.34: Aroian Test in Case of Teacher Role

Independent variable	Mediating	Dependent	Aroian test value	P-value
Teacher Role	Competence	Student Tacit Knowledge	22.49	0.000
Teacher Role	Relatedness	Student Tacit Knowledge	20.57	0.000
Teacher Role	Autonomy	Student Tacit Knowledge	17.73	0.000
Teacher Role	Competence	Student Explicit Knowledge	23.22	0.000
Teacher Role	Relatedness	Student Explicit Knowledge	20.28	0.000
Teacher Role	Autonomy	Student Explicit Knowledge	19.49	0.000

Source: Own calculation through SPSS 20.

Table 4.35: Goodman Test in Case of Teacher Role

Independent variable	Mediating	Dependent	Goodman test value	P-value
Teacher Role	Competence	Student Tacit Knowledge	22.50	0.000
Teacher Role	Relatedness	Student Tacit Knowledge	20.58	0.000
Teacher Role	Autonomy	Student Tacit Knowledge	17.74	0.000
Teacher Role	Competence	Student Explicit Knowledge	23.23	0.000
Teacher Role	Relatedness	Student Explicit Knowledge	20.29	0.000
Teacher Role	Autonomy	Student Explicit Knowledge	19.50	0.000

Source: Own calculation through SPSS 20.

4.2.2.5 Mediation Analysis in Case of Teacher Enthusiasm

To satisfy mediation conditions for teacher enthusiasm, a simple regression analysis is used where the study applied regression by using SPSS for both dependent variables. Positive and significant results for both dependent variables allowed us to proceed (see Table 4.36). Similar results were found for explicit knowledge as well as tacit knowledge, beta values notify us that one unit change in teacher enthusiasm causes 0.505 unit change in tacit knowledge ($\beta = 0.505$, sig. <0.01) and 0.705 unit change in explicit knowledge ($\beta = 0.705$, sig. <0.01). Whereas the values of R^2 report that teacher enthusiasm causes 0.255 or 25.5% variation in tacit knowledge and 0.492 or 49.2% variation in explicit knowledge. Goodness of fit is also confirmed through F-statistics.

Table 4.36: Mediation Analysis in Case of Teacher Enthusiasm (A)

Independent variable	Dependent variables	
	Tacit knowledge	Explicit knowledge
Teacher Enthusiasm	.505** (35.48)	.705** (59.83)
Adjusted R^2	.255	.492
F-Statistics	1259	3579

Note: ** represents significance at less than 0.01, value in parenthesis represents *t*-statistics
Source: Own calculation through SPSS 20.

This study employed multiple regression analysis after satisfying the mediation conditions (see Table 4.37). The results show that competence partially mediates the relationship between teacher enthusiasm and tacit knowledge (β=0.464, sig. <0.01) and explicit knowledge (β = 0.156, sig. <0.01); this relationship is stronger for tacit knowledge. In the case of relatedness, partial mediation exists between teacher enthusiasm and tacit knowledge (β = 0.277, sig. <0.01) and for explicit knowledge (β = 0.119, sig. <0.01). It is also verified through analysis that the strength of mediating relationship is higher for tacit knowledge as compared to explicit knowledge. For autonomy, partial mediation exists in the case of tacit knowledge (β = -0.243, sig. <0.01) and for explicit knowledge (β = -0.119, sig. <0.01).

Table 4.37: Mediation Analysis in Case of Teacher Enthusiasm (B)

Independent variable Teacher Enthusiasm	Dependent variable Tacit knowledge			Dependent variable Explicit knowledge		
Teacher Enthusiasm	.160** (8.05)	.355** (21.68)	.636** (21.31)	.586** (33.96)	.640** (45.77)	.634** (44.41)
Competence	.464** (23.33)			.156** (9.03)		
Relatedness		.277** (16.81)			.119** (8.45)	
Autonomy			.243** (14.13)			.119** (8.26)
Adjusted R^2	.350	.309	.290	.501	.502	.499
F-Statistics	962	819	734	1806	1855	1802

Note: ** represents significance at less than 0.01, value in parenthesis represents *t*-statistics
Source: Own calculation through SPSS 20.

This study employed Sobel, Aroian and Goodman tests for the confirmation of mediating relationship as discussed above (see Tables 4.38, 4.39 and 4.40, respectively). For all of the three tests, the null hypothesis of no mediation is considered among independent and dependent variables under discussion. For competence, null hypothesis of no mediation is rejected in both cases (mediation between teacher enthusiasm and tacit knowledge, mediation between teacher enthusiasm and explicit knowledge). Relatedness and autonomy gave similar results where null hypothesis of no mediation is rejected for tacit knowledge which confirms existence of partial mediation and fails to reject null hypothesis of no mediation for tacit knowledge.

Table 4.38: Sobel Test in Case of Teacher Enthusiasm

Independent variable	Mediating	Dependent	Sobel test value	P-value
Teacher Enthusiasm	Competence	Student Tacit Knowledge	19.49	0.000
Teacher Enthusiasm	Relatedness	Student Tacit Knowledge	15.19	0.000
Teacher Enthusiasm	Autonomy	Student Tacit Knowledge	13.12	0.000
Teacher Enthusiasm	Competence	Student Explicit Knowledge	8.92	0.000
Teacher Enthusiasm	Relatedness	Student Explicit Knowledge	8.36	0.000
Teacher Enthusiasm	Autonomy	Student Explicit Knowledge	8.18	0.000

Source: Own calculation through SPSS 20.

Table 4.39: Aroian Test in Case of Teacher Enthusiasm

Independent variable	Mediating	Dependent	Aroian test value	P-value
Teacher Enthusiasm	Competence	Student Tacit Knowledge	19.48	0.000
Teacher Enthusiasm	Relatedness	Student Tacit Knowledge	15.18	0.000
Teacher Enthusiasm	Autonomy	Student Tacit Knowledge	13.12	0.000
Teacher Enthusiasm	Competence	Student Explicit Knowledge	8.92	0.000
Teacher Enthusiasm	Relatedness	Student Explicit Knowledge	8.36	0.000
Teacher Enthusiasm	Autonomy	Student Explicit Knowledge	8.18	0.000

Source: Own calculation through SPSS 20.

Table 4.40: Goodman Test in Case of Teacher Enthusiasm

Independent variable	Mediating	Dependent	Goodman test value	P-value
Teacher Enthusiasm	Competence	Student Tacit Knowledge	19.49	0.000
Teacher Enthusiasm	Relatedness	Student Tacit Knowledge	15.19	0.000
Teacher Enthusiasm	Autonomy	Student Tacit Knowledge	13.13	0.000
Teacher Enthusiasm	Competence	Student Explicit Knowledge	8.93	0.000
Teacher Enthusiasm	Relatedness	Student Explicit Knowledge	8.36	0.000
Teacher Enthusiasm	Autonomy	Student Explicit Knowledge	8.18	0.000

Source: Own calculation through SPSS 20.

The hypothesis summary is given in Table 4.41**,** which clarifies that all mediators used in this study performed quite well. All mediating variables (competence, autonomy and relatedness) mediate the relationship of dependent and independent variable association. However, the mediating variable competence shows us supportive results in all hypotheses as compared to relatedness and autonomy. The next chapter discusses the findings of study and relates them to the existing literature and current scenario of HEIs in Pakistan.

Table 4.41: Summary of Results of Hypotheses

Sr. No	Hypothesis	Results
1	**H_1:** A positive and statistically significant relationship exists between trust and student's tacit knowledge.	Supported $\beta = 0.341^{**}$
2	**H_2:** A positive and statistically significant relationship exists between trust and student's explicit knowledge	Supported $\beta = 0.477^{**}$
3	**H_3:** A positive and statistically significant relationship exists between trust and competence.	Supported $\beta = 0.587^{**}$
4	**H_4:** A positive and statistically significant relationship exists between trust and relatedness.	Supported $\beta = 0.352^{**}$
5	**H_5:** A positive and statistically significant relationship exists between trust and autonomy.	Supported $\beta = 0.409^{**}$
6	**H_6** Competence mediates the relationship between trust and student's tacit knowledge.	Supported with full mediation $\beta = 0.578^{**}$
7	**H_7:** Relatedness mediates the relationship between trust and student's tacit knowledge.	Supported $\beta = 0.406^{**}$

8	**H_8:** Autonomy mediates the relationship between trust and student's tacit knowledge.	Supported β = 0.364**
9	**H_9:** Competence mediates the relationship between trust and student's explicit knowledge.	Supported β = 0.475**
10	**H_{10}:** Relatedness mediates the relationship between trust and student's explicit knowledge.	Supported β = 0.349
11	**H_{11}:** Autonomy mediates the relationship between trust and student's explicit knowledge.	Supported β = 0.342**
12	**H_{12}:** A positive and statistically significant relationship exists between motivation and student's tacit knowledge.	Supported β = 0.452**
13	**H_{13}:** A positive and statistically significant relationship exists between motivation and student's explicit knowledge.	Supported β = 0.553**
14	**H_{14}:** A positive and statistically significant relationship exists between motivation and competence.	Supported β = 0..753**
15	**H_{15}:** A positive and statistically significant relationship exists between motivation and relatedness.	Supported β = 0.446**
16	**H_{16}:** A positive and statistically significant relationship exists between motivation and autonomy.	Supported β = 0.586**
17	**H_{17}:** Competence mediates the relationship between motivation and student's tacit knowledge.	Supported with full mediation β = 0.543**
18	**H_{18}:** Relatedness mediates the relationship between motivation and student's tacit knowledge.	Supported β = 0.336**
19	**H_{19}:** Autonomy mediates the relationship between motivation and student's tacit knowledge.	Supported β = 0.285**
20	**H_{20}:** Competence mediates the relationship between motivation and student's explicit knowledge.	Supported β = 0.380**
21	**H_{21}:** Relatedness mediates the relationship between motivation and student's explicit knowledge.	Supported β = 0.274**
22	**H_{22}:** Autonomy mediates the relationship between motivation and student's explicit knowledge.	Supported β = 0.234**
23	**H_{23}:** A positive and statistically significant relationship exists between technology and student's tacit knowledge.	Supported β = 0.363**
24	**H_{24}:** A positive and statistically significant relationship exists between technology and student's explicit knowledge.	Supported β = 0.566**
25	**H_{25}:** A positive and statistically significant relationship exists between technology and competence.	Supported β = 0.416**
26	**H_{26}:** A positive and statistically significant relationship exists between technology and relatedness.	Supported β = 0.347**
27	**H_{27}:** A positive and statistically significant relationship exists between technology and autonomy.	Supported β = 0.351**
28	**H_{28}:** Competence mediates the relationship between technology and student's tacit knowledge.	Supported β = 0.529**
29	**H_{29}:** Relatedness mediates the relationship between technology and student's tacit knowledge.	Supported β = 0.408**

30	**H_{30}:** Autonomy mediates the relationship between technology and student's tacit knowledge.	Supported β = 0.378**
31	**H_{31}:** Competence mediates the relationship between technology and student's explicit knowledge.	Supported β = 0.422**
32	**H_{32}:** Relatedness mediates the relationship between technology and student's explicit knowledge.	Supported β = 0.312**
33	**H_{33}:** Autonomy mediates the relationship between technology and student's explicit knowledge.	Supported β = 0.317**
34	**H_{34}:** A positive and statistically significant relationship exists between teacher's role and student's tacit knowledge.	Supported β = 0.499**
35	**H_{35}:** A positive and statistically significant relationship exists between teacher's role and student's explicit knowledge.	Supported β = 0.542**
36	**H_{36}:** A positive and statistically significant relationship exists between teacher role and competence.	Supported β = 0.520**
37	**H_{37}:** A positive and statistically significant relationship exists between teacher role and relatedness.	Supported β = 0.335**
38	**H_{38}:** A positive and statistically significant relationship exists between teacher role and autonomy.	Supported β = 0.396**
39	**H_{39}:** Competence mediates the relationship between teacher's role and student's tacit knowledge.	Supported β = 0.427**
40	**H_{40}:** Relatedness mediates the relationship between teacher's role and student's tacit knowledge.	Supported β = 0.342**
41	**H_{41}:** Autonomy mediates the relationship between teacher's role and student's tacit knowledge.	Supported β = 0.292**
42	**H_{42}:** Competence mediates the relationship between teacher's role and student's explicit knowledge.	Supported β = 0.408**
43	**H_{43}:** Relatedness mediates the relationship between teacher's role and student's explicit knowledge.	Supported β = 0.314
44	**H_{44}:** Autonomy mediates the relationship between teacher's role and student's explicit knowledge.	Supported β = 0.307**
45	**H_{45}:** A positive and statistically significant relationship exists between teacher enthusiasm and student's tacit knowledge.	Supported β = 0.505**
46	**H_{46}:** A positive and statistically significant relationship exists between teacher enthusiasm and student's explicit knowledge.	Supported β = 0.705**
47	**H_{47}:** A positive and statistically significant relationship exists between teacher enthusiasm and competence.	Supported β = 0729**
48	**H_{48}:** A positive and statistically significant relationship exists between teacher enthusiasm and relatedness.	Supported β = 0.538**
49	**H_{49}:** A positive and statistically significant relationship exists between teacher enthusiasm and autonomy.	Supported β = 0.560**
50	**H_{50}:** Competence mediates the relationship between teacher enthusiasm and student's tacit knowledge.	Supported β = 0.464**
51	**H_{51}:** Relatedness mediates the relationship between teacher enthusiasm and student's tacit knowledge.	Supported β = 0.277**
52	**H_{52}:** Autonomy mediates the relationship between teacher enthusiasm and student's tacit knowledge.	Supported β = 0.243**

53	**H_{53}:** Competence mediates the relationship between teacher enthusiasm and student's explicit knowledge.	Supported β = 0.156**
54	**H_{54}:** Relatedness mediates the relationship between teacher enthusiasm and student's explicit knowledge.	Supported β = 0.119
55	**H_{55}:** Autonomy mediates the relationship between teacher enthusiasm and student's explicit knowledge.	Supported β = 0.119
56	**H_{56}:** A positive and statistically significant relationship exists between Competence and student's tacit knowledge.	Supported β = 0..574**
57	**H_{57}:** A positive and statistically significant relationship exists between relatedness and student's tacit knowledge.	Supported β = 0.473 **
58	**H_{58}:** A positive and statistically significant relationship exists between autonomy and student's tacit knowledge.	Supported β = 0.446**
59	**H_{59}:** A positive and statistically significant relationship exists between Competence and student's explicit knowledge.	Supported β = 0.582**
60	**H_{60}:** A positive and statistically significant relationship exists between relatedness and student's explicit knowledge.	Supported β = 0.463**
61	**H_{61}:** A positive and statistically significant relationship exists between autonomy and student's explicit knowledge.	Supported β = 0..473**

5 CHAPTER FIVE: DISCUSSION

In the environment of demand for improvement in and enhancement of students' knowledge, HEIs are striving to find ways in which they can be more efficient in disseminating, transferring and collecting knowledge and to understand how to make students effective decision makers in order to improve their learning outcomes. This study was conducted to apply knowledge sharing tools in order to enhance students' knowledge. The main objective of the current study was to examine the possible relationship between knowledge sharing tools and students' tacit and explicit knowledge, with the intervening role of competence, relatedness, and autonomy. This relationship was examined through SDT as a theoretical lens. It examined the nature of the relation between knowledge sharing tools and students' knowledge outcomes (i.e. tacit and explicit knowledge) by presenting a theoretical model of the relationship and by conducting empirical analysis to envisage students' knowledge through knowledge sharing tools. The proposed model is tested in public and private HEIs of province Punjab, Pakistan. The current chapter discusses the findings of the study and explains the detailed results of the analysis in relation to previous findings.

The structure of this chapter is as follows. Section 5.1 discusses the results and findings of the study on knowledge sharing tools, competence, and students' knowledge. Section 5.2 is a discussion on the findings of the relationship of knowledge sharing tools, relatedness, and students' knowledge. Section 5.3 provides a discussion on the results of the study with respect to knowledge sharing tools, autonomy, and students' knowledge. Section 5.4 discusses the findings on knowledge sharing tools regarding tacit and explicit knowledge and students' knowledge sharing, and presents theoretical similarities with previous literature. The chapter closes with a chapter summary in Section 5.5.

5.1 Knowledge Sharing Tools, Competence, and Students' Knowledge

The discussion of the influence of the knowledge sharing tools as independent variable, competence as mediator, and students' knowledge (tacit and explicit) as dependent variable is based on the results of the regression analyses and mediation analyses. With respect to direct and mediating relationship among knowledge sharing tools, competence, and students' knowledge, the hypotheses were developed. The analysis of direct effects of knowledge sharing tools reveals that all factors of knowledge sharing tools statistically and significantly determine the students' competence level and also affect the tacit and explicit knowledge of the students. It is also to be noted that all direct effects proved significant at 1% level of significance (sig. <0.01). The results also explain that the mediating variable of competence significantly contributes to dependent variables, that is, students' explicit knowledge more than tacit knowledge at 1% level of significance (sig. <0.01). Competence helps to improve students' motivational level as well as enhance their knowledge outcomes and class engagement (Niemiec & Ryan, 2009). It is also to be noted that competence has a significantly stronger relationship with explicit knowledge (β=0. 582) as compared to student's tacit knowledge (β=0. 574).

The direct relationship of trust with students' knowledge is statistically significant which is the same finding of the study of (Chai & Kim, 2010). Trust is an important determinant of students' sharing of knowledge (Chai & Kim, 2010). The stress of losing one's unmatchable value can be minimized during the time spent knowledge sharing by upgrading the trust (Renzl, 2008). The direct effect of motivation is statistically proved in this study which is also supported in previous studies (Ahmed, 2012; M. M. Khan et al., 2012; Manzoor, 2012). These studies confirm that motivation contributes to knowledge sharing and enhances students' learning behaviour (Ahmed, 2012; M. M. Khan et al., 2012; Manzoor, 2012). On the other hand, Shiuan and Lee (2009) held the view that regardless of quality, the literature demonstrates a statistically significant association between technology and students' tacit and explicit

knowledge. This means, the usage of innovative technology in classrooms may help the university management to bolster students' knowledge. However, in the current study, the results reveal that technology makes a stronger contribution to students' explicit knowledge as compared to tacit knowledge. However, Y. Lee et al. (2015) confirmed the relationship of competence and technology acceptance in HEIs of the USA. This finding is the same as the finding of the current study that technology helps to enhance students' knowledge and increases their competence level.

The current study also reveals that a direct relationship exists between teachers' role and students' tacit and explicit knowledge. The teachers' role also directly affects students' competence level in HEIs of Pakistan. As highlighted by Vygotsky (1978), the role of teachers as advanced instructor in managing students to wind up their class assignments distinctly is autonomous through joint examinations (Daniel & Gagnon, 2011). B.C. Patrick et al. (2000) researched the role of teachers in students' motivation and found it had a positive impact on students' motivational level. Similarly, studies have found that teacher's role is important to enhance students' efficiencies and knowledge outcomes (Jer Yuen & Shaheen Majid, 2007; Sabbir Rahman et al., 2014; Sabbir Rahman & Hussain, 2014; E. A. Smith, 2001). Further, the current study also found a positive and statistically significant direct relationship between teachers' enthusiasm and students' knowledge. Comparable results were found in other studies (Keller et al., 2014; Kunter et al., 2011; B.C. Patrick et al., 2000; Stenlund, 1995). This finding revealed that teachers are pretty much enthusiastic relying on whether their students are learning and creating new knowledge. Additionally, teachers' enthusiasm is reinforced by students' behavior, for example students' accomplishment level or motivation (A. Frenzel, 2014; A. C. Frenzel et al., 2009).

The analysis of direct effect of knowledge sharing tools (i.e. trust, motivation, technology, teachers' role, teacher enthusiasm) confirmed their significance in determining the competence of students in HEIs of Pakistan. Among the aforementioned factors of knowledge sharing tools, motivation (β=0.753,

sig. <0.01) played the most significant part in determining students' competence level at 1% level significance. The possible reason for this result is that the motivation from a teacher toward students helps them to complete their task on time and students have the self-confidence to participate in extracurricular activities (Ahmed, 2012; Manzoor, 2012). The desire to achieve a position in classrooms and competence leads to an improvement in their skills. Therefore, it is expected that motivation from teachers may encourage the students and helps them to feel more competent in their educational activities (Niemiec & Ryan, 2009; R. M. Ryan & Deci, 2009). However, competence is a factor that helps individuals to be engaged in innovative activities that ultimately help them to complete their tasks on time. So, the current study confirms and validates the previous studies that students' motivational level and their competence level has an effect on their knowledge (Ahmed, 2012; Manzoor, 2012; Niemiec & Ryan, 2009; R. M. Ryan & Deci, 2009).

It is also noticed that competence significantly and partially mediates the relationship between trust and students' tacit (β=0.578, sig. <0.01) and explicit knowledge (β=0.475, sig. <0.01). Trust is a significant factor among students of HEIs to improve their knowledge capabilities (Abrams et al., 2003; Cooper & Schindler, 2002; Maurer, 2010; R.C. Mayer, J.H. Davis, & F.D. Schoorman, 1995; T. Wang & Thornhill, 2017; Yu, Lu, & Liu, 2010). Trust contributes to knowledge sharing behavior of students in Pakistani HEIs (Manzoor, 2012). The results of the current study also revealed that competence partially mediates the relationship of students' motivation and their explicit knowledge at 1% level of significance (β=0.380, sig. <0.01). Findings also revealed that competence significantly and fully mediates the relationship of motivation and students' tacit knowledge at 1% level of significance (β=0.543, sig. <0.01). Several other studies have argued that motivation is linked to knowledge enhancement with the symbolic properties of competence level (Edward L Deci & Ryan, 2013; Niemiec & Ryan, 2009; R. M. Ryan & Deci, 2009). This shows that motivation may result in students with better competence level

which helps them to improve their knowledge. In addition, researchers and practitioners as well as academic scholars also agree that motivation in students enhances their knowledge, leading to increased competence level in students (Niemiec & Ryan, 2009; J. Rowley, 2000; E. A. Smith, 2001; Svanström, Lozano-García, & Rowe, 2008).

Further, the findings of the current study also indicate that competence partially and significantly mediates the relationship between technology and students' tacit knowledge (β=0.529, sig. <0.01) and explicit knowledge (β=0.422, sig. <0.01) at 1% level of significance. As previously stated, the studies demonstrate a statistically significant association between technology and students' tacit and explicit knowledge (Shiuan & Lee, 2009). Y. Lee et al. (2015) confirmed the relationship between competence and technology acceptance in students of HEIs in Singapore. Similarly, technology improvement, motivational level and trust also affect the perception of competence in students that leads to an enhancement of their knowledge. Technology acceptance in students enhances their competence level (Nikou & Economides, 2017b). In assessment contexts, it was found that competence improves students' involvement and engagement in knowledge and learning process (Edward L Deci & Ryan, 2016). However, the results also reveal that competence mediates the relationship between students' perception towards their teachers' role and students' tacit and explicit knowledge. The findings also reveal that competence partially mediates the relationship of teacher role and explicit knowledge (β=0.408, sig. <0.01) and tacit knowledge (β=0.427, sig. <0.01). The teachers' role also directly affects students' competence level in HEIs of Pakistan. As highlighted by Vygotsky (1978), the role of teacher is significant to engage students in education activities and to enhance their competence level, these results are also supported by (Daniel & Gagnon, 2011).

B.C. Patrick et al. (2000) investigated teacher role and students' motivation and found that teacher role had a positive impact on students' motivational level. In this case, students considered their teacher's

role positively which ultimately contributed to enhancing their explicit knowledge. Students in HEIs share their knowledge and participate in educational activities if their teachers play a role in enhancing their competence level. Meanwhile, it is also found that teachers' enthusiasm is associated with students' tacit knowledge and explicit knowledge, and competence partially mediates these relationships. The current study also found a positive and statistically significant direct relationship between teachers' enthusiasm and students' knowledge. Comparable results were found in previous studies (Keller et al., 2014; Kunter et al., 2011; B.C. Patrick et al., 2000; Stenlund, 1995). Hew and Hara (2007) highlighted that the cooperation, innovation and enthusiasm of a seeker are key characteristics for knowledge sharing. The desire to get a reward contributes to the enthusiastic behavior of teachers, which ultimately helps students to improve their skills.

B.C. Patrick et al. (2000) also highlighted that the teacher's role is a significant contributor to students' motivation. Their research indicated that intrinsic motivation of students is exceedingly connected with teacher's enthusiasm, and enthusiasm is a typical credit attributed to teachers (Griffin, 2016).

Universities are supposed to contribute to economic growth and social development through providing knowledge, so HEIs are not only responsible for providing knowledge, but also for making students marketable by teaching them updated phenomena in order to take the economy upwards. Students are the main knowledge creators in HEIs and they play a role in the achievement of institutional goals. They are a valuable asset of the nation; therefore, it is important to improve the competence level of students to increase their knowledge so that HEIs achieve a sustainable performance. Based on SDT, the findings of the current study support the view that motivation, trust, teachers' role and their enthusiasm and usage of new technology in HEIs could be the source to enhance students' competence level that ultimately improves their knowledge.

5.2 Knowledge Sharing Tools, Relatedness, and Students' Knowledge

Hypotheses were developed with respect to finding out the influence of knowledge sharing tools, relatedness, and students' tacit and explicit knowledge. The findings of direct and mediating relationships are based on the results of regression and mediation analysis. The results confirm a direct relationship between relatedness and students' tacit and explicit knowledge in HEIs of Pakistan. It is noted that relatedness significantly contributes to students' tacit knowledge (β=0.473) more than explicit knowledge (β=0.463), although both direct effects are significant at 1% level of significance (sig. <0.01). The findings are in agreement with previous studies which highlighted that relatedness is associated with students' knowledge (A. E. Black & E. L. Deci, 2000; Niemiec & Ryan, 2009). The findings of a direct relationship among knowledge sharing tools and relatedness revealed a positive and statistically significant relationship at 1% level of significance level (sig. <0.01). Moreover, it is also noted that teachers' role in HEIs is a vital predictor of students' relatedness level as compared to other independent variables.

The analysis of direct relationship revealed that teachers' role in HEIs of Pakistan significantly contributes to students' relatedness at 1% level of significance (β=0.335, sig. <0.01). These findings are in agreement with previous studies which show that teacher's role has a strong impact on students' relatedness towards their role (Ahmed, 2012; Edward L Deci & Ryan, 2016; Hrbackova & Suchankova, 2016; M. A. Khan, 2014; M. M. Khan et al., 2012; Manzoor, 2012). The results of the current study support the notion of SDT that when students feel motivated, their teachers' role plays a significant part in the enhancement of the students' knowledge outcomes; it is reported that teachers enhance students' class engagement and knowledge (Griffin, 2016; Keller et al., 2014; Kunter et al., 2011; Locke & Woods, 1982). Moreover, SDT also signals that students' intrinsic and extrinsic motivation contribute to their class project outcomes (Edward L Deci & Ryan, 2016; Hrbackova & Suchankova, 2016; Jang

et al., 2016), and students become more engaged during their class activities. Trust is a dynamic factor which allows students to participate in knowledge sharing activities. It is seen that trustworthiness among students motivates them and contributes to their knowledge enhancement (Wioleta Kucharska & Rafał Kowalczyk, 2016; Y. Li et al., 2012; Maurer, 2010). The results provide considerable support to the findings of previous studies with respect to technology acceptance and students' knowledge (Y. Lee et al., 2015; Pedrotti & Nistor, 2016; Randeree, 2006). Y. Lee et al. (2015) also confirmed that technology improves students' knowledge outcomes in HEIs.

The findings of mediating effects reveal that relatedness partially mediates the relationship between trust and students' tacit knowledge (β=0.406, sig. <0.01) and students' explicit knowledge (β=0.349, sig<0.01) at 1% level of significance. According to SDT, relatedness in classrooms enhances students' knowledge by applying SDT practices (Niemiec & Ryan, 2009). Furthermore, the mediating analysis of the current study also reveals that relatedness partially mediates the relationship of motivation and students' tacit knowledge (β=0.336, sig. <0.000) as well as relationship of motivation and students' explicit knowledge (β=0.274, sig. <0.01). The results also verified that the mediating effect of relatedness makes a stronger contribution to tacit knowledge than to explicit knowledge. As per the theoretical lens of SDT, students' motivation is influenced by their relatedness attitudes towards their achievements level (Hrbackova & Suchankova, 2016; Jeno et al., 2017). The results are also in support of previous studies that relatedness mediates students' knowledge (Jang et al., 2012; Standage, Duda, & Ntoumanis, 2006). Similarly, motivated students not only put great effort into enhancing their knowledge outcomes, but also extend their efforts to performance in order to perform beyond the expected targets (Jang et al., 2012; Jeno et al., 2017; Nishimura & Sakurai, 2017; Standage et al., 2006).

The findings of mediating effects also revealed that relatedness also partially mediates the relationship between technology and students' tacit knowledge and explicit knowledge. The results indicate that the

effect of mediating role of relatedness in transmitting the effect of technology towards tacit knowledge is more significant (β =0.408, sig. <0.000) as compared to explicit knowledge (β=0.312, sig. <0.000). These results are consistent with the findings of Y. Lee et al. (2015) who found that relatedness plays a vital role in the adoption of new technology; Y. Lee et al. (2015) found that relatedness influences technology acceptance and its impact on individual knowledge. Previous studies also highlighted that technology accelerate students' learning level (Alaeddine et al., 2015), and technology enhances students' collaborative behavior in classrooms (Voyiatzaki & Avouris, 2014). Pedrotti and Nistor (2016) also found that the use of technology in classrooms makes students more motivated and enhances their learning level. Prior research in Pakistan (Ahmed, 2012; M. M. Khan et al., 2012; Manzoor, 2012) also highlighted that the use of latest technology enhanced students' knowledge level and made them more motivated in daily class activities. They further found a positive relationship between knowledge sharing tools and students' learning behavior and their willingness to share their knowledge in HEIs of Pakistan.

The results also indicate that the effect of relatedness on the relationship of teacher's role and students' tacit knowledge is significant at 1% level of significance. The mediating variable relatedness shows partial mediation exists in the case of tacit knowledge (β=0.342, sig. <0.01) at 1% level of significance. The finding of the current study that the role of teacher is important to enhance students' knowledge and their level of relatedness is in line with the findings of previous research (Jer Yuen & Shaheen Majid, 2007; Koç, 2008; Pekrun, 2006; E. A. Smith, 2001; Svanström et al., 2008; Wentzel, 1998). Knowledge sharing tools (i.e. teachers' role) in HEIs play a vital role in motivating students; teachers as mentors contribute towards students' knowledge (Jer Yuen & Shaheen Majid, 2007; E. A. Smith, 2001). Students who feel more attached to their teachers and make their teachers mentors show relatedness which ultimately enhances their knowledge level and knowledge sharing behavior in HEIs. The discussion on the findings of the mediating effect of relatedness between teacher enthusiasm and students' knowledge

revealed that partial mediation exists between teacher enthusiasm and tacit knowledge (β=0.277, sig. <0.01) and explicit knowledge at 1% level of significance (β=0.119, sig. <0.01) in HEIs of Pakistan. The strength of mediating role of relatedness in relationship between teacher enthusiasm and tacit knowledge is stronger as compared to explicit knowledge. The results of this mediation are the same as those found by previous studies (Griffin, 2016; Keller et al., 2015; Kunter, 2013). Perceived teacher enthusiasm connects the knowledge transfer process among students (Griffin, 2016). The effect of teacher enthusiasm is to increase students' motivation (Kunter, 2013); a previous study also found a positive effect of teacher enthusiasm on students' motivation (B.C. Patrick et al., 2000). Teacher enthusiasm also affects students' learning capabilities and motivates them to share their knowledge with classmates (Brigham et al., 1992).

To sum up the findings, it can be stated that with support of SDT, knowledge sharing tools (trust, motivation, technology, teacher role, teacher enthusiasm) lead to enhancement of students' relatedness which ultimately positively and significantly affects students' tacit and explicit knowledge in HEIs of Pakistan. The findings also affirm that knowledge sharing tools signal an investment in better understanding of students' knowledge sharing patterns in HEIs. In return, students exhibit commitment and relatedness with the HEIs which strengthens universities' sustainability in their rankings with the enhancement of students' tacit and explicit knowledge. The results also support the partial mediation role of relatedness between trust and students' explicit knowledge, which needs to be explored further in future.

5.3 Knowledge Sharing Tools, Autonomy, and Students' Knowledge

With respect to direct relationship of knowledge sharing tools, autonomy, and students' knowledge, hypotheses were developed to test the direct effects. The findings of direct relationship are based on the

results of regression analysis and mediation analysis. The results revealed a positive relationship exists among autonomy and students' tacit and explicit knowledge in HEIs of Pakistan. It is also noted that autonomy significantly (sig. <0.01) contributes to tacit and explicit knowledge, however the strength of relationship is stronger in the case of explicit knowledge (β=0.666) as compared to tacit knowledge (β=0.407). The direct relationship of autonomy with tacit and explicit knowledge is positive and significant at 1% level of significance. The results are in agreement with previous studies that autonomy enhances knowledge outcomes of students and increases their class participation (A. E. Black & E. L. Deci, 2000; Niemiec & Ryan, 2009). The positive relationship between autonomy and students' tacit and explicit knowledge suggests that an increase in students' autonomy leads to an increase in students' knowledge, because when students are given some independence in their participation in classroom activities or projects, their knowledge increases in HEIs of Pakistan. The findings also revealed a positive and statistically significant relationship among knowledge sharing tools and relatedness. All the independent variables were regressed and correlated with autonomy at 1% level of significance (sig. <0.01). Previous research showed a positve relationship between knowledge sharing tools and students' learning behavior (Ahmed, 2012; Boateng et al., 2015; M. M. Khan et al., 2012; Manzoor, 2012; Sabbir Rahman et al., 2014).

The findings of mediating effects of autonomy towards the relationship between knowledge sharing tools and students' tacit and explicit knowledge reveal that autonomy partially mediates the relationship between trust and students' tacit and explicit knowledge. In the case of autonomy, regression analysis verifies that partial mediation exists between trust and tacit knowledge (β=0.364, sig. <0.01), and trust and explicit knowledge (β=0.342, sig. <0.01). However, the level of mediation is much stronger with explicit knowledge as compared to tacit knowledge. Trust is a dynamic factor which enables students to participate in knowledge sharing activities. It is seen that trustworthiness among students motivates them

and contributes to their knowledge enhancement (Wioleta Kucharska & Rafał Kowalczyk, 2016; Y. Li et al., 2012; Maurer, 2010). When students feel more independent, their tacit knowledge increases. Therefore, the role of autonomy to enhance students' knowledge should not be ignored and must be investigated in future.

The mediating analysis of the effects of autonomy between motivation and students' tacit and explicit knowledge also revealed that a partial mediation exists between motivation and tacit knowledge (β= 0.285, sig. <0.01) and explicit knowledge (β= 0.234, sig. <0.01) (Nishimura & Sakurai, 2017). These results confirm previous findings where the effect of motivation was found to be greater on students' knowledge and their knowledge sharing behavior (Ahmed, 2012; Edward L Deci & Ryan, 2016; Hrbackova & Suchankova, 2016; Jang et al., 2016; M. M. Khan et al., 2012; Manzoor, 2012). The mediating analysis also revealed that autonomy shows partial mediation between technology and students' tacit and explicit knowledge in HEIs of Pakistan. For technology and tacit knowledge, the mediating effect of autonomy is much weaker (β=0.378, sig. <0.01) as compared to technology and explicit knowledge (β = 0.317, sig. <0.01). This is consistent with the findings of previous studies that highlighted that technology is a key factor linked to students' knowledge enhancement and their satisfaction (Ahmed, 2012; M. M. Khan et al., 2012; Manzoor, 2012). Although researchers argue that most students respond positively towards perception of technological use in HEIs, Y. Lee et al. (2015) confirmed the relationship between autonomy and technology acceptance in students of HEIs. Edward L Deci and Ryan (2016) suggested that there is a little space for students' perception about use of technology in classrooms and their involvement for using it in HEIs. However, the current study provides support to the view that students feel independent and motivated when they are engaged in new technological projects which leads to enhancement of their knowledge.

Similarly, consistent with expectations and hypothesized relationship, the mediating effects of autonomy between teacher role and students' tacit knowledge revealed partial mediation. Autonomy entails partial mediation for both tacit knowledge and explicit knowledge (Hernández-López, García-Almeida, Ballesteros-Rodríguez, & De Saá-Pérez, 2016; Koç, 2008; Lotkowski et al., 2004; Wentzel, 1998). Results indicate that level of association is stronger for explicit knowledge (β=0.307, sig. <0.01) as compared to tacit knowledge (β =0.292, sig. <0.01). The positive and significant relationship suggests that teacher as mentor plays a vital role in making students independent which leads to increased knowledge capacity in students in HEIs of Pakistan. The results of the current study are in agreement with previous studies on the relationship between teachers' role and the enhancement of students' knowledge sharing behavior (Ahmed, 2012; M. M. Khan et al., 2012; Manzoor, 2012). Further, the mediating effect of autonomy in the relationship of teacher enthusiasm and students' tacit and explicit knowledge also revealed that partial mediation exists in the case of tacit knowledge (β= 0.243, sig. <0.01) and explicit knowledge (β= 0.119, sig. <0.01) at 1% level of significance (Aslam et al., 2016; Hachfeld et al., 2015; Hill, Umland, Litke, & Kapitula, 2012; Manzoor, 2012; Voyiatzaki & Avouris, 2014). Autonomy in students is an important factor that relates to their personal attachment to their mentors on the basis of various factors such as teacher role, teacher enthusiasm, and their education level. It is regarded as being important and is also influenced by the circumstances faced by the students. Therefore, these factors should not be ignored and must be explored in future. The implications of these findings are discussed in the next chapter.

In summary, using the theoretical lens of SDT, the empirical results of the study provide support to the mediating relationship of autonomy, knowledge sharing tools, and students' tacit and explicit knowledge hypothesized in this study. However, the results also support the partial mediation role of autonomy

between teacher enthusiasm and students' explicit knowledge, motivation and students' explicit knowledge which needs to be explored further in future.

5.4 Knowledge Sharing Tools and Tacit and Explicit Knowledge

Based on the review of related literature, the assumptions in this study adopted as the knowledge sharing patterns/tools can be applied to different contexts the impact of knowledge sharing tools in all is more significant as compare to individual practices of implementation of these tools, and with the notion of SDT, the knowledge sharing tools place greater emphasis on enhancing students' competence level, relatedness, and autonomy and achieving favorable attitudes of students resulting in the positive effect on their tacit and explicit knowledge (A. Black & E. Deci, 2000; Edward L Deci & Ryan, 2013; Hrbackova & Suchankova, 2016; Jang et al., 2016; Y. Lee et al., 2015; Niemiec & Ryan, 2009; Zaqout & Abbas, 2012). To this end, the analysis of the data reveals that on an individual basis, each of the knowledge sharing tools statistically and significantly affects the students' tacit and explicit knowledge through the mediating role of competence, relatedness, and autonomy, which also confirms the applicability of knowledge sharing tools in educational sector. The applicability of knowledge sharing tools adopted in the current study has been supported by previous studies (Ahmed, 2012; Ainsworth et al., 1978; Bellinger et al., 2004; Boateng et al., 2017; Boateng et al., 2015; Chin Wei et al., 2012; T. H. Davenport & Prusak, 1998; Gao et al., 2008; Jer Yuen & Shaheen Majid, 2007; Kleinginna Jr & Kleinginna, 1981; Y. Li et al., 2012; Pekrun, 2006; Sabbir Rahman et al., 2014; Sabbir Rahman & Hussain, 2014; E. A. Smith, 2001; Svanström et al., 2008; Zaqout & Abbas, 2012). Zaqout and Abbas (2012) argued that knowledge sharing tools are important and widely applicable in educational sector to measure students' tacit and explicit knowledge. Prior researchers also highlighted that knowledge sharing tools empirically achieve a better response if they are all applied in a group rather than applied individually (Ahmed, 2012; M. M. Khan et al., 2012; Manzoor, 2012). The applicability of knowledge

sharing tools also argued that students are passionate for high education, quality education, and towards learning outcomes in Pakistan (M. A. Khan, 2014; M. A. Khan & Usman, 2015). So, the SDT notion with these knowledge sharing tools can be investigated the applicability in other settings.

Analysis of the current study reveals that the values of coefficients of direct relationship of knowledge sharing tools with students' tacit and explicit knowledge differ with the value of indirect relationship when measured with mediating variables (i.e. competence, relatedness, and autonomy). For example, the coefficient in the case of direct effect of trust and tacit knowledge is 0.341, and 0.477 for explicit knowledge. However, the coefficient values differ in case of mediating analysis when it comes with mediating role of competence in the relationship of trust and tacit knowledge 0.578, for explicit knowledge 0.475, relatedness also mediates this relationship with 0.406 in case of trust and tacit knowledge, 0.349 in case of trust and explicit knowledge, and for the autonomy, the coefficient also differs in case of trust and tacit knowledge 0.364 and 0.342 in case of trust and explicit knowledge. Similarly, the change in coefficients is also noted in the case of direct and indirect effects among motivation, tacit and explicit knowledge and mediating variables. For example, the coefficient for motivation and tacit knowledge is 0.452 and for explicit knowledge is 0.553, these coefficients differ in case of mediating variables. In the case of motivation and tacit knowledge, 0.543 for competence, 0.336 for relatedness, and 0.285 for autonomy, and the coefficients in the case of motivation and explicit knowledge are 0.380 for competence, 0.274 for relatedness, and 0.234 for explicit knowledge.

Based on the results, the direct coefficients in the case of technology and tacit knowledge is 0.363 and explicit knowledge 0.566, in the case of teacher role and tacit knowledge 0.499 and for explicit knowledge it is 0.542, in the case of teacher enthusiasm and tacit knowledge the coefficient is 0.505 and 0.705 for explicit knowledge. Similarly, it can be noted in the analysis chapter of this study, Chapter four, that the mediating coefficients vary with direct effects in the case of mediating role of technology,

teacher role, and teacher enthusiasm. This shows that the effects of knowledge sharing tools differ in the case of direct and indirect relationships, which is also supported by previous studies (Ahmed, 2012; Boateng et al., 2017; Boateng et al., 2015; M. M. Khan et al., 2012).

5.5 Chapter Summary

This chapter has presented a discussion of the results of the study that were provided in the previous chapter. The notion of SDT provided empirically which supports that knowledge sharing tools contribute to students' tacit and explicit knowledge in HEIs of Pakistan, which also can be improved through SDT dimensions utilized in this study. With the lens of SDT, the results of the current study suggest that the competence of students can be a useful factor in transmitting knowledge sharing tools to increase students' knowledge in HEIs (Hrbackova & Suchankova, 2016; Jang et al., 2012, 2016; Jeno et al., 2017; Niemiec & Ryan, 2009). Similarly, according to the notion of SDT, the students' relatedness behavior and their self-independence (autonomy) towards their education can be a critical factor serving as a mediating mechanism though which tacit and explicit knowledge can be improved (Brooks & Young, 2011; Jang et al., 2016; Niemiec & Ryan, 2009). Hence, these results are aligned with and support the theoretical lens of SDT which is developed and tested in educationally developed countries.

This study also provides evidence that knowledge sharing tools directly incline towards increasing students' knowledge as compared to indirectly when applied in HEIs of Pakistan. In relating to the ongoing discussion over the extent to which knowledge sharing patterns or tools generate more valuable outcomes, the current study provides evidence by investigating the influence of knowledge sharing tools on students' tacit and explicit knowledge with the intervening role of competence, relatedness, and autonomy in HEIs of Pakistan. HEIs must incorporate these factors in order to improve educational

outcomes of Pakistani students which will ultimately contribute to economic growth (Ahmed, 2012; M. M. Khan et al., 2012; Manzoor, 2012).

6 CHAPTER SIX: CONCLUSION

This chapter presents conclusion and recommendations by incorporating findings of the current study. This chapter also summarizes the results and provides implications for practitioners and academicians. Section 6.1 summarized the key findings; theoretical implications are incorporated in Section 6.2 and practical implications are presented in Section 6.3. Moreover, the limitations of the current study and recommendations for future research are presented in Section 6.4. At the end, in Section 6.5, the concluding remarks are presented.

6.1 Summary of the Findings and Conclusion

Knowledge sharing tools and dimensions of SDT, as discovered in the current study, have been treated as independent concepts by some authors in previous studies. The thrust of the current study and main objective was to go through the reality of KM and SDT concepts and to uncover the existing literature on both concepts which was taken for granted in existing literature. Previous studies have revealed the importance of KM and SDT and have explored the association among these concepts (Boateng et al., 2017; Jang et al., 2016; Jeno et al., 2017; Y. Lee et al., 2015; Nishimura & Sakurai, 2017; Sabbir Rahman et al., 2014; Sabbir Rahman & Hussain, 2014). However, the main focus on the two concepts of KM and SDT was set in other sectors of the economy and business organizations while the education sector received less attention.

The meagerness of the literature on KM and SDT to provide strong theoretical understanding of KM and SDT, and the dearth of literature exploring the mechanism of said relationship in educational sector directed the author of the current study to explore and address these two broad concepts, namely knowledge sharing tools and SDT, and the operationalization of dimensions of SDT in HEIs in

developing country context like Pakistan. By considering the key role of students in contributing to the web of knowledge and higher education, the main objective of the current study was to propose and test a mediating model by investigating the impact of knowledge sharing tools on students' tacit and explicit knowledge through intervening role of dimensions of SDT. The notion of SDT is utilized in order to achieve the main objective of the study and to test the mediating model in HEIs of Pakistan. The remainder of Section 6.1 reviews the findings and draws a conclusion from the results. The results of the influence of knowledge sharing tools on students' knowledge are summarized below. Based on the notion of SDT, the main objective and theoretical model of the current study concentrated on individual level, that is, students in the current study. After factor analyses, mediating analysis helped the researcher to achieve the objectives of the study.

In respect of the impact of knowledge sharing tools on students' knowledge in HEIs of Pakistan, the empirical results presented in Chapter four reveal the direct positive influence exerted by all five knowledge sharing tools, namely trust, motivation, technology, teacher role, and teacher enthusiasm. More specifically, the results present an empirical explanation for the sub-questions posted in Chapter one of the current study. The results reveal that knowledge sharing tools directly affect students' tacit and explicit knowledge in HEIs of Pakistan. Moreover, the results of the current study also reveal that knowledge sharing tools are also directly associated with mediating variables, namely competence, relatedness, and autonomy. Additionally, the findings of direct effects between mediating variables and dependent variables reveal a positive relationship exists. The findings of this study in this regard indicate that HEIs at students' level should implement knowledge sharing tools to enable the development of knowledge economy by means of new technology, by rendering such knowledge for the world.

With reference to the main research question of the study related to the mediating of SDT's dimensions, the empirical results of the current study reveal that competence, relatedness, and autonomy showed

full, partial and no mediation in different cases. For example, to address the main question of the study, competence fully mediates the relationship between trust and students' tacit knowledge and partially mediates the relationship between trust and explicit knowledge. The results also revealed that competence partially mediates the relationship of motivation and explicit knowledge, and fully mediates the relationship of motivation and students' tacit knowledge in HEIs. Further, the empirical findings also reveal that competence partially mediates the relationship of technology, teacher role and teacher enthusiasm affecting the students' tacit knowledge and explicit knowledge in HEIs of Pakistan. Moreover, the empirical analysis also reveals that relatedness partially mediates the relationship of trust and tacit knowledge and explicit knowledge. Additionally, the empirical results also indicate partial mediation of relatedness in the relationship of motivation and technology with students' tacit and explicit knowledge.

The empirical findings also reveal that relatedness partially mediates the relationship of teacher role and teacher enthusiasm and students' tacit knowledge and explicit knowledge. Similarly, the empirical findings of the current study explain that autonomy partially mediates the relationship of trust, technology, teacher role and students' tacit and explicit knowledge in HEIs of Pakistan. Moreover, the findings also reveal that autonomy partially mediates the relationship of motivation and teacher enthusiasm and students' tacit knowledge and explicit knowledge. From these empirical findings, it can be concluded that in the case of students' tacit and explicit knowledge, the installing of knowledge sharing tools in HEIs positively enhances perceived competence, relatedness, and autonomy level of students towards their knowledge in HEIs of Pakistan. The empirical findings are consistent with the suggestions of previous studies that knowledge sharing tools should be implemented in HEIs (Ahmed, 2012; Boateng et al., 2017; Boateng et al., 2015; Jer Yuen & Shaheen Majid, 2007; M. M. Khan et al.,

2012; Manzoor, 2012; Sabbir Rahman et al., 2014; Sabbir Rahman & Hussain, 2014; Zaqout & Abbas, 2012).

Moreover, the results also answer the remaining questions and support the assertion of SDT that level of competence, feeling of being autonomous, and relatedness behavior shape students' learning attitude and create favorable outcomes at individual level (Edward L Deci & Ryan, 2016; Hrbackova & Suchankova, 2016; Jang et al., 2016; Jeno et al., 2017; Standage et al., 2006). According to SDT, perceptions of self-competence enhance motivational level among students resulting in improvement in their learning outcomes. The notion of SDT also provides strong support to empirical results of the current study and also focuses by incorporating the results and making strategies which enhance the knowledge sharing behavior. The results of the current study are also consistent with organizational learning theory that organizations learn from individuals (Argyris & Schön, 1978) because individuals are the main source of knowledge in organizations. The knowledge creation is dependent on its source, so organizations make policies for continue flow of knowledge within individuals.

6.2 Theoretical Implications

The theoretical contribution of this research is that the direct relationship between knowledge sharing tools and tacit and explicit knowledge has been mostly discussed at conceptual level as well as theoretical level (Jer Yuen & Shaheen Majid, 2007; Y. Li et al., 2012; E. A. Smith, 2001). Additionally, SDT's dimensions had not previously been undertaken as mediator and tested empirically in the same context whereas the current study operationalized this. Limited studies in literature have been undertaken these both concepts together empirically, as well as to measure the SDT' dimensions independently, especially in the HEIs in developing countries like Pakistan. Most importantly, the current research incorporated knowledge sharing tools together independently on the call of previous researches and answer partly by integrating knowledge sharing tools in order to strengthen educational

sector (Ahmed, 2012; M. M. Khan et al., 2012; Manzoor, 2012). The current study provides support to the view that the implementation of knowledge sharing tools should be synergized in order to have a greater impact on knowledge. Previous studies also discussed that motivation, competence, relatedness, and autonomy in students are the key elements to enhance their productivity and effect intrinsic or extrinsic motivation (A. Black & E. Deci, 2000; A. E. Black & E. L. Deci, 2000; Brooks & Young, 2011; Edward L Deci & Ryan, 2016; Hrbackova & Suchankova, 2016; Jang et al., 2016; Jeno et al., 2017; Standage et al., 2006; Williams & Deci, 1996); however, the mediating effect of SDT's dimensions on students' knowledge or on their performance is considered to be faded in previous studies (Hachfeld et al., 2015; Hartnett, 2015; Hernández-López et al., 2016; Jang et al., 2016; Niemiec & Ryan, 2009). For example, Niemiec and Ryan (2009) incorporated SDT as mediating variable and suggested that these variables still has thirst to explore.

The prime objective of the current study is to reveal the mechanism through which knowledge sharing tools and SDT's dimensions affect students' tacit and explicit knowledge, theoretically; the current study also contributes to the KM literature by exploring the phenomena where students' competence, relatedness, and autonomy level mediate relationship of knowledge sharing tools and students' tacit and explicit knowledge in HEIs of Pakistan. Moreover, it is noted that the literature on the relationship of KM and SDT is largely discussed in business firms and manufacturing organizations and not in the education sector (Akram, 2015; Gartner Research, 2016; Hau et al., 2013; Hislop, 2013; Inkinen & Inkinen, 2016; T. H. Kim et al., 2014; Wioleta Kucharska & Rafał Kowalczyk, 2016; Mahmood et al., 2014; Mendoza et al., 2016; Moghavvemi et al., 2017; Singh, 2012; Sinha & Sengupta, 2016; Wamalwa & Omallah, 2016). The effect of knowledge sharing tools on students' knowledge has been less investigated, especially in the context of Pakistan as a developing country (Ahmed, 2012; M. A. Khan,

2014; M. A. Khan & Usman, 2015; M. M. Khan et al., 2012; Mahmood et al., 2014; Manzoor, 2012; Rafiq & Ameen, 2012; Shafique & Mahmood, 2010; Shahid et al., 2016).

In a review of the literature, the author of the current study could not find a single study that incorporated SDT's dimensions as mediator as well as impact of knowledge sharing tools on students' tacit and explicit knowledge; however, a few studies have investigated students' learning and sharing behavior (Ahmed, 2012; M. M. Khan et al., 2012; Manzoor, 2012). Thus, not only is the current study a pioneering study by enabling future researchers to debate this phenomenon and knowledge outcomes of students in HEIs of Pakistan, it also makes a theoretical contribution to the literature of KM as well.

From another perspective, the underlying study also encompasses the literature by supporting empirically the notion of SDT that knowledge sharing tools affect student's competence, relatedness, and autonomy level which ultimately contributes to students' tacit and explicit knowledge. According to the findings of the current study, SDT's dimensions (i.e. competence, relatedness, and autonomy) play a vital role as a mediating mechanism in which knowledge sharing tools influence students' tacit and explicit knowledge in HEIs.

Additionally, the categorization of knowledge, tacit and explicit, has provided the author of the current study with the chance to study the impact of knowledge sharing tools on students' tacit and explicit knowledge in education context which is a significant and important contribution to the subject of KM and to the body of knowledge. The results of this study have revealed that all the mediating variables (i.e. competence, relatedness, and autonomy) play a full and partial mediation role in the relationship between knowledge sharing tools and students' tacit and explicit knowledge. So, these findings are the most significant contribution and achievement of current study.

By utilizing SDT as the theoretical grounding in the current study, the research investigated the relationship of knowledge sharing tools, SDT's dimensions, and students' tacit and explicit knowledge in HEIs of Pakistan. SDT assertion has been used in observing the motivational elements of individuals in organizations, however, few studies have utilized SDT as theoretical lens for understanding students' motivational factors and their intrinsic and extrinsic motivation (Edward L Deci & Ryan, 2016; Hrbackova & Suchankova, 2016; Jang et al., 2016; Jeno et al., 2017; Standage et al., 2006). Only one study has been found in the literature which adopted SDT's dimensions as mediating variable and conducted research with SDT assortation (Jang et al., 2016). But, the theoretical lens used in the current study contributes to the literature by adding insights into the description of possible relationship between knowledge sharing tools and students' knowledge. The findings of the current study provide empirical support to the notion of SDT that its dimensions individually can be factors that influence an individual's performance, especially knowledge outcomes.

The results of the current study, based on the findings, also established a link between knowledge sharing tools and tacit and explicit knowledge and that when the education sector implements these tools which show concern for students, students will show better outcomes, and this is also a significant contribution to the literature of KM. The current research is the first study in the field of KM which used notion of SDT in HEIs of Pakistan and incorporated SDT and knowledge sharing tools together. In previous studies, the notion of SDT has been used to investigate teachers' satisfaction and motivational level, and the studies were criticized for lack of empirical support in Pakistan (Ahmed, 2012; Ghazi & Khan, 2013; M. M. Khan et al., 2012). The findings of the current study revealed a mediating relationship between knowledge sharing tools, competence, relatedness and autonomy and tacit and explicit knowledge, which provides an empirical stance to validate the assertions of SDT. Therefore, in the current study, up to some extent, based on the findings, the author fulfilled the lack found in the literature regarding

empirical evidence on the relationship of knowledge sharing tools and tacit and explicit knowledge in HEIs of Pakistan.

Similarly, the findings of the current study revealed some unique results with respect to the direct effects of the knowledge sharing tools that make a significant contribution to the body of knowledge. For example, the knowledge sharing tool, trust, appears to be more significant in the case of students' competence level as compared to other mediating variables, which means that trust in students increased their competence level which ultimately increased their explicit knowledge. These results support the findings of M. M. Khan et al. (2012) that trust is a factor in students that increases their willingness to share knowledge with others. The more that students feel trustworthiness, the more they are willing to share their knowledge and the more their knowledge will increase (Ahmed, 2012; Manzoor, 2012). Another result of direct effect revealed that motivation also strongly contributes to competence level of students as well as in explicit knowledge of the students. These results are in line with the findings of previous studies (A. E. Black & E. L. Deci, 2000; Brooks & Young, 2011; De Naeghel et al., 2016; Edward L Deci & Ryan, 2016; Hodis et al., 2017): that is, motivated students may perform beyond their expected behavior and that contributes to enhancement of their explicit knowledge outcomes.

Additionally, technology remains the most significant mediating variable in determining explicit knowledge and competence level. This shows that when technology is used for educational purposes in HEIs, students' competence level increases and their explicit knowledge as compared to tacit knowledge is enhanced (Y. Lee et al., 2015). However, teacher role also significantly contributes to students' tacit knowledge as well as their relatedness level as compared to other mediating variables. This shows that the role of their mentors and teachers towards their knowledge enhancement increases their relatedness level where students feel close to their teachers and motivated which ultimately increases their tacit knowledge (Daniel & Gagnon, 2011). These results support the findings of previous studies (Jer Yuen

& Shaheen Majid, 2007; Koç, 2008; Pekrun, 2006; E. A. Smith, 2001; Svanström et al., 2008; Wentzel, 1998). Moreover, teacher enthusiasm remains more significant in determining students' autonomy level and remains significant in determining students' explicit knowledge in HEIs of Pakistan. Previous researches have highlighted that teacher enthusiasm increases individual autonomy level (Aslam et al., 2016; Hachfeld et al., 2015; Hill et al., 2012; Manzoor, 2012; Voyiatzaki & Avouris, 2014). Moreover, out of five knowledge sharing tools, motivation remains more significant in determining students' competence level with (β = .991), and explicit knowledge (β = .940). Teacher role, one of the five knowledge sharing tools, plays a significant role in determining students' relatedness level with (β = .946) and tacit knowledge of the students (β = .892). And, teacher enthusiasm significantly contributes as compared to other knowledge sharing tools to determining students' autonomy level (β = .851).

6.3 Practical Implications

The findings of the study suggest that improving students' knowledge outcomes through knowledge sharing tools within HEIs requires the development of a holistic view of KM. In this regard, the value of the guidelines stated below may be of help to practitioners and policy makers in HEIs as well as in the education sector to understand what is required to be done to improve students' knowledge and to make knowledge sharing smooth.

The findings of the current study can help researchers of KM as well as practitioners in HEIs to develop a better understanding of the role of knowledge sharing tools in the successful improvement of students' knowledge and their positive outcomes. The study also could help the researchers studying SDT in practice in education or psychology in the implementation of its practices in other fields of education like the current study has utilized.

The findings also suggest some key attributes of HEIs that practitioners could accommodate during initiatives for policy making.

The development and the validation of an empirical based study of measuring students' knowledge through knowledge sharing tools and SDT' dimensions in HEIs of Pakistan and the adaptation and validation of the instrument in this context is the major step towards empirical investigators of this mix phenomena in Pakistan and its impact on HEIs performance within the HEIs. These knowledge sharing tools can be useful for practitioners to assess and measure the success of KM process in HEIs.

HEIs can fulfill their role of being high learning organizations by implementing the knowledge sharing tools and KM practices in the functioning of HEIs. By employing such practices, HEIs will be able to ensure their sustainability within the competitive environment, which is shown by the increasing competition in the education sector of Pakistan. These implementations require the creation of an enabling environment for knowledge sharing among students of HEIs.

Educators can get benefits from the findings of the current study, albeit, the findings should be regarded as somewhat preliminary. The current study demonstrates to researchers and educators the various relationship aspects between knowledge sharing tools and students' tacit knowledge and explicit knowledge outcomes. Educators may also get benefit by undergoing the definite empirical results of the current study in the development of theoretical or conceptual models to examine this or similar phenomena. As such, the findings of the current study can impart a valuable starting point for future empirical studies.

The findings of the current study also provide insights for policy makers in the way that students' perception with regard to the five knowledge sharing tools (i.e. trust, motivation, technology, teacher role, and teacher enthusiasm) proved to be significant factors which are associated with students' tacit

and explicit knowledge as well as in their competence, relatedness, and autonomy outcomes as discovered in the study.

Trust is the key element and facilitator in knowledge sharing patterns in HEIs (Boateng et al., 2017; Boateng et al., 2015; Jer Yuen & Shaheen Majid, 2007; Manzoor, 2012; Sabbir Rahman et al., 2014). To increase interaction among students and teachers, trust has many practices for educators and policy makers; reciprocal knowledge sharing among students helps to develop an atmosphere of trust among them. Trust establishes community behavior and creates interaction to increase trustworthy behavior. Trust provides opportunities to share knowledge and experiences, and face to face meetings. University management can take actions to ensure that teachers in universities develop trust and motivation among students that create a sense of attachment and increase their competence level which ultimately contribute to students' knowledge.

Another finding of the current study which can support university management in their attempt to increase students' outcomes is the significance of the teacher's role in the higher education sector. The findings suggest that teacher role is one of the important knowledge sharing tools that strongly affects students' competence level and increases their explicit knowledge. It is also suggested that, in the light of the findings, policy makers should consider this factor to link with the students' performance. University management should make criteria to measure teacher performance that is directly associated with students' motivational level to perform efficiently. In this regard, teachers would enhance their part in contributing to students' motivation which ultimately increases students' knowledge by doing good in classroom (Koç, 2008; Wentzel, 1998). Therefore, universities should provide safeguard for teacher to make students motivated. As a result, teacher's role as an information transmitter would be appreciated where group participation among students will increase and communication skills, learning process and active information and knowledge sharing will be increased (Emmer & Gerwels, 2002).

Because, students interact with teachers and other students, which make their learning style much similar to their learning style to whom they interact.

As per the aforementioned implications, the findings of the current study can be used to foster wider discussion and investigation of teacher role towards students' competence level for sustainable students' outcomes, and further work on teachers' role and capacity building as well as for the assessment needed in future professionals in HEIs. The findings show that the main motivators for knowledge sharing and knowledge outcomes among students are the teachers who create a trustworthy environment and become mentors and motivators.

SDT theory implies that the positive value of teacher role and teacher enthusiasm should be fostered; teachers and parents deliver direct messages about educational values by the learning assignments provided to students. Three important ways to foster students' academic values are: teacher role to enhance students' competence level positively, their relatedness behavior towards class assignments, and last but not least, autonomy to perform assignments significantly contributes to their tacit and explicit knowledge. These values should foster students' academic values and can be considered practically while policy making in HEIs.

Although the knowledge sharing patterns of students has been already investigated by Jer Yuen and Shaheen Majid (2007) and Chin Wei et al. (2012), the major difference between these two studies and the current study is the use of a bundle of knowledge sharing tools together as independent variables. This difference is another contribution to the literature as well as to policy making.

This study provided many practical implications. For example, students' knowledge is difficult to measure with statistical indicators, and students' performance is also impossible to measure with any statistics. This study proposed that technology use bolsters student performance and contributes

positively to their knowledge. Nowadays, the major indicators for HEIs rankings are the research outcomes of faculty members as well as of students' research publications. The current study is helpful for practitioners who seek to enhance their institute's rankings in the shape of efficient outcomes of students because the management of HEIs can utilize this study to consider knowledge sharing tools in HEIs as a means to increase students' knowledge outcomes.

Perceived autonomy relates to feedback from teachers, perceived competence is attributed to the content provided in classrooms, and relatedness depends upon the trustworthy environment in the classroom created among students. These implications are supported by previous studies and relevant to the practical contribution of the current study (Edward L Deci & Ryan, 2016). These outcomes can be fostered by meaningful feedback, technology support, trustworthy communication among students, and teacher–student integration which are the main contributors and determinants of students' motivation and needs of competence, relatedness, and autonomy (Hartnett, 2015; Niemiec & Ryan, 2009).

Based on previous research and findings of the current study, the technology acceptance in HEIs in based on motivation which is integrated with SDT (Edward L Deci & Ryan, 2016; Niemiec & Ryan, 2009). It is confirmed that there is positive relationship between motivation and students' competence level and intention to adopt technology in education. So, it is useful for practitioners to utilize these findings in order to enhance students' adaptation regarding technology acceptance in HEIs.

6.4 Limitations and Recommendations for Future Research

The findings of this study were based on five public sector universities and five private sector universities from Punjab province which represented the category of HEIs. The number of institutions and selection of province might be limitations of this study. The number of institutions and the targeted sample investigated in this study was restricted by resources, time constraints and available respondents.

Future research is recommended to increase sample size and include universities from other provinces of Pakistan. It is also suggested to include faculty members to check the impact of knowledge sharing patterns on their knowledge.

The current study incorporated only students from HEIs. Future research could extend and replicate the findings of the current study by exploring different education levels (i.e. elementary, high school, and/or Deeni Madaris).

The validated instrument of the current study could be upgraded further by recognizing additional knowledge sharing tools that could be explained and testify the underlying phenomena.

The survey tool was utilized in the current study to collect data at institutional level, but the research used responses at individual level for the analysis, which used a large data set. However, despite some redundant responses from the sample set, the data was gathered at institutional level for descriptive and quantitative analysis. Future studies could undergo an in-depth qualitative analysis by conducting interviews for better understanding of SDT and knowledge sharing tools.

Albeit, there was evidence available in the literature on knowledge sharing tools, not together, applied at educational sector and on students at institutional level, but no evidence on knowledge sharing tools and SDT dimensions and tacit and explicit knowledge was recognized at any of the institutional surveyed. If knowledge sharing tools and SDT's dimensions can be considered to uplift the students' outcomes in HEIs, no doubt, the results of the study could be different.

The current study found a positive impact of trust on students' tacit and explicit knowledge and on students' competence, relatedness, and autonomy level. Future studies could examine which teaching strategies and personality traits of teachers facilitate and develop trust among students. Future studies could also include more dimensions of trust to experience an in-depth understanding of the effects (i.e.

trustors' propensity, integrity, benevolence, ability to trust). These dimensions of trust can be used to study knowledge sharing tools with different perceptions.

The current study has made many contributions to the literature and provided practical implications based on the findings, however, it has some inherent limitations. The implications, based on the findings, are significant for the educational sector of developing countries, like Pakistan, to comprehend to what extent knowledge sharing tools affect students' knowledge outcomes. The current study was conducted within the specific settings of HEIs, and this setting limits the generalizability of the empirical results to other organizations or sectors.

To overcome the generalizability issue, the model could be tested in different cultures and with other demographical differences such as age. As in hereof, the analysis based on biographical or demographical modifications can be included in future studies to address the issue of generalizability by testing the same model in empirical settings.

The findings of the current study are based on results analyzed by collecting data on independent variables from students only; a previous study suggested that teachers and parents also play a mentor role in order to boost students' motivation and their knowledge level (M. M. Khan et al., 2012). So, it is suggested that future studies include parent's role to test the conceptual model of the current study.

Although the findings of the current study are limited to the explicit use of selected mediating variables (i.e. perceived competence, relatedness, and autonomy), the questions/items selected to measure these variables are based on their relevance to the underlying concepts and based on the literature; future research could possibly include other relevant items to measure the mediating variables. Moreover, the current study selected limited mediating variables, future studies could include other variables (KM practices) as mediating to understand the impact of knowledge sharing tools on students' knowledge.

There is much theoretical and empirical evidence available in the literature on the issues of students' learning and willingness to share their knowledge and knowledge sharing patterns; however, so far, few studies have incorporated SDT as mediating variables to check the effects on students' motivation and learning outcomes. In order to get more in-depth knowledge and understanding of the functions of knowledge sharing tools and students' attitudes towards knowledge sharing tools and their learning outcomes, the research focus should move to a complex examination of teacher performance appraisal and teachers' trust in educational system.

The current study incorporated mediating variables of competence, relatedness, and autonomy. Based on the findings of the current study, perceived competence level of students failed to show mediating role between motivation and students' tacit knowledge, relatedness remains insignificant as mediator between trust, teacher role, teacher enthusiasm and students' explicit knowledge, and autonomy failed to show mediating impact in case of motivation, teacher enthusiasm and students' explicit knowledge. Future research could explore in detail the possible reasons for such results by doing a qualitative analysis to explore the underlying phenomena for better understanding.

Moreover, the current study has only taken a few knowledge sharing tools into account, future studies are recommended to conduct research on other knowledge sharing patterns and tools or other independent variables (KM practices) to investigate the impact on students' tacit and explicit knowledge in higher education sector of Pakistan.

The evaluation of students' knowledge for the present study was conducted using self-report of the students. Although this way of assessing the change in students' attitude is not perfect, many previous studies have supported the view that students' self-report is valid and reliable (Gershuny & Robinson, 1988; B. Martin, Irvine, & Turner, 1984; Pohlmann & Beggs, 1974). However, a few experts in the field

(Huba & Freed, 2000; Palomba & Banta, 1999) have suggested that multiple assessment measures be adopted in order to have a better understanding of what students learn in classrooms and to recompense the weaknesses of the singular assessment of the instrument. Self-report was selected for the present study because it was more practical to survey and ask students to report on how much they think they know and how much they learn. The limitation of this selection is the lack of ability to gather accurate inferences regarding measures and methods utilized in current study to assess the particular knowledge (i.e. tacit and explicit). Other methods and instrument can be used to reveal unreliable results and misleading conclusions.

6.5 Concluding Remarks

The present study aimed to empirically validate the conceptual model and interdependent relationships of knowledge sharing tools and students' tacit and explicit knowledge in the developing country context of Pakistan, from a higher education perspective. Through the use of quantitative techniques, the current research on the relationship between knowledge sharing tools and tacit and explicit knowledge has made important theoretical, empirical, and practical contributions to the literature of KM and SDT by investigating these effects in HEIs, and the results confirm such relationships exist. The empirical findings of the present study have provided evidence and support for relationships between knowledge sharing tools and tacit and explicit knowledge that may be based on mediating role of SDT's dimensions: perceived competence, relatedness, and autonomy. The study has provided empirical evidence that knowledge sharing tools have an impact on students' tacit and explicit knowledge, whereby, students' perception of perceived competence, relatedness, and autonomy influence the relationship has mediator. The assertion of SDT as theoretical lens provided sound backing to explore the underlying phenomena and relationships between variables. The present study highlights the importance and significance of the

implementation of knowledge sharing tools in HEIs, and proposes that the implementation of knowledge sharing tools in HEIs should be undertaken to increase the performance of higher education in Pakistan.

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Annexure A

Questionnaire

DEMOGRAPHIC DETAILS

Gender:

☐ Male ☐ Female

Level of Education:

☐ Undergraduate ☐ Postgraduate

Field of Education:

☐ Social Sciences ☐ Applied Science

Sector:

☐ Public ☐ Private

City:

☐ Lahore ☐ Outside Lahore

University Name:

_____

For each of the following, point out your satisfaction level with the statement.		**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
Trust						
1	Our classmates are very capable of solving their own exercises.					
2	I trust that our faculty also shares their personal experiences with their trustworthy students.					
3	My needs and desires in regard to understanding the problem are very important to my friends.					
4	I trust that faculty share ordinary things with them.					
5	The faculty of my department can be trusted to approach their duties with professionalism and dedication.					

Motivatoin	
6	Motivational behavior of teachers can also motivate me to share my knowledge with others.
7	My inner drive and feeling helps me to share my knowledge with others.
8	I have no intention to share my knowledge with others.
9	I want to share my knowledge with others when I am motivated.
Technology	
10	Use of modern technology can help me to share my knowledge with others.
11	Ease of access to technology can be helpful for knowledge sharing.
12	There must be proper concealing for the use of modern technology.
13	Use of modern technologies in education enhances my capabilities and quality of knowledge.
14	I can easily access multiple resources (database, study material etc.) to learn at a single point in time.
Teacher's Role	
15	Teachers give feedback on how to establish classroom discipline.
16	Teachers guide us to establish close relationships with students to share knowledge.
17	Our teachers' role in delivering good knowledge help us to focus on class participation.

Teacher's Enthusiasm	
18	I always enjoy when teachers teach new things.
19	I enjoy when teachers interact with students.
20	I find our teachers excited when they teach.
21	My teachers always teach with enthusiasm.
Competence	
22	I struggle with tasks that I should be good at in class.
23	I think I am good in preparing class assignments.
24	I feel good about my class assignments.
25	I do well preparing my tasks as compared to other fellows.
26	I am satisfied with my abilities and skills to prepare good assessments.
Relatedness	
27	I really enjoy interacting with my classmates.
28	I can really trust my classmates.
Autonomy	
29	I feel free to express myself, my opinions, and my concerns in class.
30	I feel comfortable participating in class.
Tacit Knowledge	

31 I share my knowledge based on my experience with my fellows.

32 I share my expertise at the request of my fellows.

33 I share my ideas about my research with my classmates.

34 I talk about my tips on subjects with my fellows.

35 I convey my thoughts on subject matter to my teacher.

Explicit Knowledge

36 I frequently collect reports, papers, and notes from all teachers.

37 I share my reports, papers, and notes with other students.

38 I frequently share reports, papers, and notes prepared by others with other fellows.

39 I frequently share research techniques based on my experience.

40 I frequently share knowledge based on my experience with other students.

Annexure B

Correlation Matrices

Correlation Matrix for Trust

	1	2	3	4	5
Our classmates are very capable of solving their own exercises.	1	.402**	.422**	.479**	.404**
I trust that our faculty also shares their personal experiences with their trustworthy students.		1	.512**	.617**	.583**
My needs and desires in regard to understanding the problem are very important to my friends.			1	.492**	.510**
I trust that faculty share ordinary things with them.				1	.608**
The faculty of my department can be trusted to approach their duties with professionalism and dedication.					1

Correlation Matrix for Motivation

	1	2	3	4
Motivational behavior of teachers can also motivate me to share my knowledge with others.	1	.540**	.370**	.551**
My inner drive and feeling helps me to share my knowledge with others.		1	.417**	.559**
I have no intention to share my knowledge with others.			1	.388**
I want to share my knowledge with others when I am motivated.				1

Correlation Matrix for Technology

	1	2	3	4	5
Use of modern technology can help me to share my knowledge with others.	1	.364**	.407**	.346**	.354**
Ease of access to technology can be helpful for knowledge sharing.		1	.271**	.278**	.362**
There must be proper concealing for the use of modern technology.			1	.391**	.409**
Use of modern technologies in education enhances my capabilities and quality of knowledge.				1	.270**
I can easily access multiple resources (database, study material etc.) to learn at a single point in time.					1

Correlation Matrix for Teacher's Role

	1	2	3
Teachers give feedback on how to establish classroom discipline.	1	.499**	.484**
Teachers guide us to establish close relationships with students to share knowledge.		1	.715**
Our teachers' role in delivering good knowledge help us to focus on class participation.			1

Correlation Matrix for Teacher Enthusiasm

	1	2	3	4
I always enjoy when teachers teach new things.	1	.670**	.667**	.748**
I enjoy when teachers interact with students.		1	.689**	.766**
I find our teachers excited when they teach.			1	.674**
My teachers always teach with enthusiasm.				1

Correlation Matrix for Competence

	1	2	3	4	5
I struggle with tasks that I should be good at in class.	1	.750**	.602**	.733**	.748**
I think I am good in preparing class assignments.		1	.648**	.764**	.735**
I feel good about my class assignments.			1	.757**	.591**
I do well preparing my tasks as compared to other fellows.				1	.758**
I am satisfied with my abilities and skills to prepare good assessments.					1

Correlation Matrix for Relatedness

	1	2
I really enjoy interacting with my classmates.	1	.297**
I can really trust my classmates.		1

Correlation Matrix for Autonomy

	1	2
I feel free to express myself, my opinions, and my concerns in class.	1	.358**
I feel comfortable participating in class.		1

Correlation Matrix for Explicit Knowledge

	1	2	3	4	5
I frequently collect reports, papers, and notes from all teachers.	1	.377**	.470**	.104**	.450**
I share my reports, papers, and notes with other students		1	.318**	.042**	.402**
I frequently share reports, papers, and notes prepared by others with other fellows.			1	.142**	.446**

I frequently share research techniques based on my experience.	1	.065**
I frequently share knowledge based on my experience with other students.		1

Correlation Matrix for Tacit Knowledge

	1	2	3	4	5
I share my knowledge based on my experience with my fellows.	1	.692**	.786**	.753**	.755**
I share my expertise at the request of my fellows.		1	.659**	.686**	.692**
I share my ideas about my research with my classmates.			1	.738**	.755**
I talk about my tips on subjects with my fellows.				1	.699**
I convey my thoughts on subject matter to my teacher.					1