CHAPTER-2

REVIEW OF LITERATURE

This chapter discusses the existing literature on the professionalism of teachers and the achievement of students. The section on teacher professionalism elaborates on the varied perspectives that define the concept and the factors that explain the construct. The section on Student Achievement delves into the connection of Mathematics and Science Achievement to the cognitive abilities of students with an in-depth explanation of the PISA Framework for achievement assessment in Mathematics and Science and how countries around the world have shaped their policies based on the findings of the PISA test.

In the past decades, countries around the world have continuously struggled with many new challenges in the education systems ranging from the inclusion of students from diverse backgrounds to prepare them for their future as global citizens. Literature suggests a large number of approaches to reform educational systems as per the changing needs of students, with many researchers rooting for investment in teacher quality as the most promising approach (Darling-Hammond, 2013). Improving teaching makes the most sense as it is the only important factor that determines student learning (Rhoton & Stiles, 2002). The status of the teaching profession is considered a critical component in attracting better and more teachers (Barber & Mourshed, 2007), and for the retention of teachers, factors such as job satisfaction and professional growth have been identified as essential (Brunetti, 2001). Teachers' beliefs about their professional status, self-efficacy, and job satisfaction are all parameters that need policy level consideration to affect the overall quality of teachers.

2.1 Teaching Profession

The subjective aspect of status deals with society's perception of their prestige whereas the objective aspect deals with the socio-legal entitlements of the individuals. The prestige of the occupation as perceived by the general public in comparison with other professions; status of the occupation as perceived by other knowledgeable groups like the civil servants, policymakers, etc.; the esteem garnered by the members from the general public owing to the core abilities that they bring to the task; are all important aspects to measure the status of a profession (Hoyle, 2014). Hargreaves & Flutter, 2013 mentioned that the word 'status' is a derivation of a Latin word meaning 'standing' and refers to one's position in society. Concerning the teaching profession UNESCO and ILO (1966)) define status as - 'The expression status as used in relation to teachers means both the standing or regard accorded to them, as evidenced by the level of appreciation of the importance of their function and of their competence in performing it, and the working conditions, remuneration and other material benefits accorded to them relative to other professional groups.'

A profession fulfills certain criteria out of which the most commonly backed characteristics are having a specialized knowledge base, rigorous training and certification, collaborative functioning, induction of new entrants, continuous professional development, high sense of accountability, maintenance of high standards, and autonomous decision making guided by ethics. These characteristics sometimes vary from profession to profession depending upon the nature of work and the clients (Saphier, 1995). The traditional view of professions relies on the remuneration received by the practitioner, social status of the profession, autonomy, and service (Pratte & Rury, 1991). These attributes have been derived from traditional professions like law and medicine. A number of factors account for the status of the

teaching profession. The alignment of occupational characteristics with these factors brings the occupation closer to becoming a profession accelerating the professionalization process. The recommendations of ILO and UNESCO (1996) set international standards for a wide range of issues and concerns of the teaching profession and their status. The issues highlighted were: (a) pre-service and in-service training, (b) recruitment, (c) advancement and promotion, (d) disciplinary procedures, (e) job security, (f) part-time service, (g) professional autonomy, (h) supervision and assessment, (i) rights and responsibilities, (j) decision making roles, (k) negotiation, (l) conditions for effective teaching-learning, and (m) social security. UNESCO's reports titled '*Strategy on Teachers (2012-2015)*' focused on the status of teachers in the developing countries and identified teacher shortage, quality, and research knowledge production and communication as priority operations for elevating teacher status.

These precedents point out the importance of quality teachers for quality learning and increasing the status of the profession with an evidence-based approach to tap the changing demands and expectations from teachers in the 21st century. Due to the increased emphasis on ensuring accountability, often teachers' autonomy is compromised and teachers feel under pressure more than at any time in the past. Very frequent school inspections, league tables of school performance, and constant assessment for raising standards have also been doubted to affect teachers' self-esteem and status negatively. Factors like feminization of the teaching profession and teacher migration (Caravatti, et al., 2014) are also responsible for bringing down the status of the teaching profession.

According to Weber, the concept of status has been derived from the Latin word for 'standing', which implies a means of understanding the process of stratification

(Gerth & Mills, 1991). Weber identified status as groups or communities of people who share lifestyle interests and experience dynamic degrees of social esteem and honor. Recent sociological thought, poststructuralists, and cultural theorists focus on the ways in which social distinctions emerge and depict how judgments are affected by the type and quality of knowledge the practitioners possess (Lawler, 2005). This is interlinked to the choice of occupation, consumption preferences, etc., and is an important part of the formation of perceptions about themselves (Giddens, 1991; Hockey & James, 2003). According to Turner (1988) -"By status I mean firstly a bundle of socio-political claims against society which gives an individual (or more sociologically a group) certain benefits and privileges, marking him or her off from other individuals or groups…This cultural aspect of status gives rise to a second dimension, namely the notion of status as a cultural lifestyle which distinguishes a status group with a special identity in society."

Based on these explanations, teachers can be regarded as a distinct 'status group' in society. Weber understands social ranking through the lens of status which was earlier dealt with only on the basis of economic class. This makes it easier for him to explain how some professions receive less monetary rewards or compensations but still command high esteem, for example, teachers.

Developing on this understanding Hoyle (2001) further purported that occupational status is based on three relatively independent phenomena namely, prestige, status (more specific connotation), and esteem. Further, the researcher suggests that prestige refers to the perception of the public about the social position of an occupation relative to others in a hierarchy. Status refers to *'the category to which knowledgeable groups allocate a particular occupation'*. The issue being in the current context as to whether politicians, social scientists, and civil servants, etc. view teaching as a

profession. Hoyle also suggests that the recognition of teaching as a profession by other groups remains ambiguous. The third component, esteem refers to the perception of the general public towards the profession based on the personal qualities brought to work by the practitioners. According to Hoyle, only the third component can have a potential direct influence on teachers themselves. In other words, the sociological considerations argue that a number of perspectives need to be sought to determine the status of the teaching profession through a range of research procedures.

Recent years have witnessed an increase in the studies over professionalization and 'deprofessionalization' of certain professions with the loss of autonomy due to changes in work nature and application of new managerial techniques. The teaching profession also has been undergoing a lot of changes which undermines the profession's claims to classical professionalization as experienced by doctors and lawyers. This has led to a debate on the kind of professionalization needed for the teaching profession. Hoyle (1974) identified two different types of teacher professionalization: restricted and extended professionalization. Restricted professionalization is the experience-based intuitive classroom teaching expertise whereas extended professionalization refers to teaching profession beyond the boundaries of the classroom which is more interactive or democratic (Whitty, 2000).

Hoyle (2001) suggests that the low professional status of teachers is the low status of their clientele: the students. It is obvious that the primary motivation for becoming a teacher is to work with students but recent developments in the teaching-learning sector have widened the scope of teachers' roles which reaches far away from working purely with students, for example, collaborating with teachers from other

schools, working with doctors, psychologists and social workers, engage in pre-service training and Continuous Professional Development (Hargreaves et al., 2006).

Varkey Foundation, (2018) conducted *Global Teacher Status Index* to identify the status of teaching occupation across 35 countries including India. It recorded the opinions of general people and teachers to determine the ranking of the teaching profession in these nations. The study found that on average, teachers ranked at the 7th position out of 14 professions across the 35 nations that indicates that teachers are mid-way in the respective ranking of professions. The Index suggests that the teaching profession falls somewhere in the middle of the index (Figure 1)
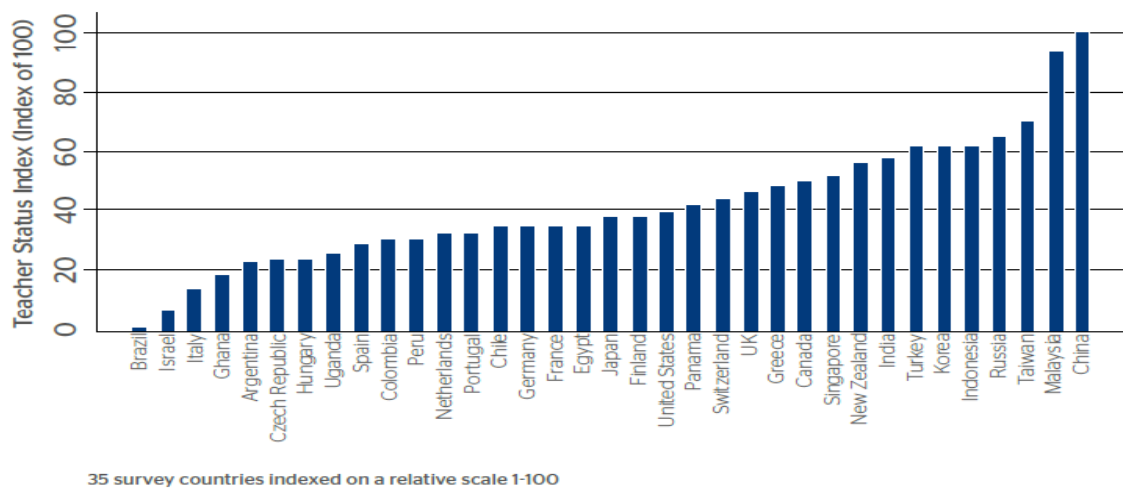

Figure 1: Teacher Status Index across countries. Source: Varkey Foundation (2018). Global Teacher Index

Most of the countries opined that the status of the teaching profession was equal to that of social workers. In Ghana, France, Brazil, Spain, South Korea, Uganda, the US, Turkey, Hungary, India, and Peru the profession of teaching was found to garner similar status as librarians. There was found to be a positive correlation between the perception of compensation and the status of a particular profession. Teaching does not emerge at a higher ranking in both respects or pay perception rankings. Even within the teaching profession, better status is garnered by headmasters followed by

secondary teachers as compared to primary teachers. Almost 50% of parents in India, Ghana, Malaysia, and China encourage their students to take up the teaching profession, in Russia and Israel only 8% of parents encourage their students for the same. The support of parents was found to be positively correlated to the opinion that teachers are respected by students.

Another important aspect revealed by the study conducted by the Varkey Foundation was that teacher wages affected the perception of teachers' status. 95% of the participant countries opined that teachers should be paid more than what they perceived they are paid. 50% of the countries favored performance-based pay. The general public was also found to underestimate the number of working hours of teachers except for Italy, Indonesia, China, and Finland.

The study found that teacher status and wages had significant positive effects on the performance of students on PISA test scores. With respect to India, it was found that the perceived status of the teaching profession (secondary level) by the teachers was slightly higher than that of the general public. At the primary school level, the perceived ranking of both populations was almost similar but lower than secondary school teachers. Malaysia and China were the only countries where the teaching profession was considered to be on the same pedestal as the medical profession. Parents' encouragement to take up the profession depended on the respect the profession garnered rather than the pay the profession entails. Indian teachers were also found to be highly favourable to the notion of pay based on students' performance. The same has been supported by a plethora of literature where various kinds of pay systems in accordance with the performance of students have been suggested by researchers (Dobbie & Fryer Jr, 2013; Fryer et al., 2012; Goldhaber, 2002; Rivkin, Hanushek & Kain, 2005).

There was a large positive gap in the perception of teachers and the general public regarding the status of the profession in India, Uganda, Indonesia, and Switzerland were teachers and public. The study conducted by the Varkey Foundation (2018) also found that spontaneous perception of teachers regarding their profession is less positive as compared to perception extracted from structured questionnaires. Perceptions of teacher status and teacher quality were found to be correlated but in some countries like Uganda and Netherlands, teachers were implicitly viewed as high on quality but low on status.

2.2 Teacher Professionalism

Profession imbibes certain characteristics based on which it differs from occupation, job, and vocation. Professionalism can be regarded as the extent to which occupations possess structural attributes and criteria in accordance with the need of the workplace. It is also considered as the process through which a teacher goes on to become more productive and deliver as expected. This attainment cannot be possible without the realization of duties and responsibilities a teacher is invested with. Professional educators are actively engaged in lifelong learning, self-regulation and intuitive thinking, ethical functioning, and exhibit ideals of literacy, scholarship, and social justice in the rapidly changing world (Albee & Piveral, 2003).

To professionalize teaching, the value and the status of the occupation needs to be enhanced by the means of enhancing their compensation level, which can make recruitment easier, by formulation of various policies on teacher education, education qualifications, certification, and teacher evaluation (Howsam, 1980). It can be seen that professionalizing teaching is important for improving both teacher and student status, but there exists a lack of consensus and confusion among the researchers as to the concept and the attributes of teacher professionalism.

Developing an understanding is a challenge in itself due to the lack of synergy amongst the researchers regarding the concept of teacher professionalism. Ingersoll & Merill (2011), arrive at three perceptions prevalent among the researchers pertaining to teacher professionalism. According to them, while some researchers think that advanced professional knowledge and training is the route to teacher professionalism, some argue that the essence of professionalism lies in the attitude individuals have towards their work, which includes a sense of "public good" and "high standards" among teachers. Few researchers opine that the best way to professionalize teaching is by improving working conditions in organizations. Further, they propose the professional model which identifies seven dimensions of a profession, namely, credentials, induction, professional development, specialization, authority, compensation, and prestige.

Another study conducted by Snoek (2012) outlined four perspectives to understand teacher professionalism. The first perspective compares the professionalism of teachers to archetypical professions like doctors and lawyers, to seek similarities and dissimilarities to identify teaching with attributes like autonomy, further development opportunities, ethical code, knowledge, and freedom. The second perspective is about the professionalization project, in which a professional body is developed that places filters at the entrance to the profession to maintain a monopoly and status. The focus is on restricting entry of the under-qualified, and improving codes and ethics. The third perspective demands teachers to change in alignment with the expectations of society and the schools and work in an outcome-driven mode. The fourth perspective focuses more on the logic behind classifying a profession and a non-profession rather than focusing on the attributes that make an occupation a profession. In the fifth perspective, the unavoidable altruistic and ethical character of the profession is taken

into account. Snoek (2012) identifies knowledge, skills, and attitude to be the elements that contribute to the professionalism of teachers.

Not only the concept itself, but the pathway through which this reform has to be embedded in the education system is a concern. To analyze the discourse through which professionalism can be introduced in schools, Sachs (2001) argues that in Australian schools, the modus operandi of professionalizing teaching can be seen as either being managerial or being democratic, where professionalization is either implemented by the means of efficient management, where managers act as the heroes; or following the traditional democratic professionalism which decodes professional work and emphasizes on the collaboration of teachers and other stakeholders towards collective professional development, where the teachers are the heroes. Whitty (2000), also favors that the teaching profession should take the democratic discourse as would be most suited to the contemporary educational needs.

Another important review study conducted by Ifanti & Fotopoulou (2011) on opinions of researchers and the policymakers about the need to professionalize teaching, observed that teachers are well aware of the concept and importance of professional development. Their choice of becoming a teacher acted as an intrinsic motivator, helping them to overcome everyday workplace challenges and become a professional.

As obvious as it appears, not everybody decided to become a teacher, around 25.6% of teachers in the study joined the profession by chance. Another important aspect that motivated teachers to go through the professionalization process was that it facilitated pupils' learning, leading to teachers' satisfaction and also due to their willingness to become better teachers. The teachers outlined teacher collaboration and continuous training and learning as the most important indicator of professional development.

Factors like inadequate working conditions, large classes, and emotional distress have a negative impact on the teachers' perceptions of their professionalism. Professional development of the teachers starts a chain of developments. Professional development enhances teacher knowledge and skills, knowledge and skills improve classroom teaching, and improved teaching raises student achievement.

In the earlier years, professionalism and categorization as a profession needed to fulfill the sole criteria of level of autonomy and internal regulation invested with the practitioners while rendering their services to the society (Evans, 2008). Since the 19th and the 20th-century, professions started to be mainly categorized by the level of institutionalization of the practitioners, the level of expert knowledge, formal code of conduct, and the level of compliance with the regulations of the state (Siegrist, 2015). With the passage of time, the boundaries of professions expanded and the university professors and higher secondary teachers started to be recognized as professionals and education experts. With the advent of the 20th century, professionalization of teaching faced a downward trend due to standardization of curricula, lesson planning, and imposed accountability.

More women joined the profession which also led to a decrease in autonomy and an increase in external regulations (Popkewitz, 1994). The coming of the 21st century again saw a turn in the meaning of professionalism of teachers. It now started to be seen as a tool to reform education and improve teacher quality and student achievement. The World Declaration of Education for All held in Dakar, Senegal committed to the promotion of teacher professionalization through adequate pay, professional development, and proper autonomy to make decisions in matters that concern the profession (Harris-Van Keuren, Silova & McAllister, 2015).

Table 3: Teacher professionalism policy reforms across countries. Source: OECD (2015), Education Policy Outlook 2015: Making Reforms Happen

Country	Policy	Description
Denmark	Reform of teacher education in Denmark	The university colleges will be granted more autonomy in setting program structures and determining the content of modules for the development of teacher profiles.
Estonia	Increasing teacher salaries	Increase teacher salaries, changing the calculation base from contractual hours to full-time employment pay.
Iceland	Council for Teachers' Education and Professional Development	Increased representatives from the teachers' union, teacher training institutions, and Ministry of Education.
Ireland	Procedures for induction and procedures and criteria for probation	Local control to formally discipline and eventually dismiss primary and secondary school teachers.
Korea	National Teacher Professional Development and Evaluation System (NTPDES)	New evaluation system to improve teacher effectiveness.
Netherlands	Registration for teachers	Registration for teachers to monitor their formal qualifications and their professional development, which was voluntary, will become compulsory.
Portugal	Entrance exam for all new teachers	Pre-service entrance exam for all new teachers in compulsory education.
United Kingdom	New arrangements for managing teacher performance	Aim to give schools and local authorities more freedom to design appraisal policies that suit their circumstances.

The meaning and implementation of professionalism vary from culture to culture and across countries. Countries around the world have used varied approaches to induce professionalism into the teaching occupation which highlights the differences at the historical, cultural, and local, and national policy level priorities. Most of the OECD member nations introduced policy reforms between the years 2008 and 2014 (OECD, 2015). This depicts that the concern of improving learning outcomes across countries

remains the same but the basis of policy reforms varies substantially. In other words, there is no one way to induce teacher professionalism into the education systems across the world. There are a variety of approaches that work in different countries in different contexts (Table 3).

Majorly, the common thread within the range of reforms introduced by these countries is that the policies focus on the formation of the expert knowledge base through training and professional development, evaluation, accountability along with practices related to pay, recruitment, and retention ultimately affecting the professionalism of teachers. The high-performing education systems on the PISA scale can turn into potential lessons for the world. For example, China and Hong Kong have invested high levels of autonomy in the hands of teachers as compared to their eastern neighbors, where the teachers can customize curriculum, teaching methods, and materials. The intensity of autonomy has led to high esteem, internal motivation for Continuous Professional Development (CPD). The same happens in low-performing schools too, the state does not interfere in school management and relies on the school administration and teachers for decision making (OECD, 2014).

Singapore relies heavily on an elaborate system of teacher selection, training, compensation, and development creating extraordinarily capable education delivery systems (OECD, 2014). South Korea on the other hand again relies heavily on a reformed system of teacher selection, recruitment, and pre-service training of teachers with permission to only high performing students to enter into the teaching profession. With respect to the European and North American countries, the high-performing nations like Canada, Finland, and the Netherlands are well known for their professionalization policies that equip teachers to customize learning in their classrooms (OECD, 2013).

2.2.1 Teacher Professionalism and Teacher Quality

Teacher quality refers to the characteristics of a teacher that help in producing desirable student outcomes. The attributes that increase the teaching quality can be developed and enhanced through professionalization. These attributes can be *endogenous* i.e., academic qualifications while entering the teaching profession, and *exogenous,* i.e. experience and professional development (Toh et al., 1996). Rivkin, Hanushek & Kain (2005), in their longitudinal study on students' achievement scores in grades 3 until grade 6, found that teacher quality has large effects on student achievement, but teachers' educational qualifications and experience had a minimal effect. This study also observed that most of the variations in teacher quality were within schools indicating that high-performing teachers were scattered and not concentrated in the same school.

Similarly, another study undertaken by Jacob & Lefgren (2008), found that large differences exist in value-added measures of teacher effectiveness but teacher qualifications and experience had a little stake. Instead, they found that school principal rankings of teachers can predict teacher performance better than teacher qualifications. Drawing upon the sociological studies on professions and their characteristics, many researchers have attempted to narrow down the characteristics of professional teachers. This has led to a copious list of attributes possessed by effective professional educators. The Purdue studies (the 1920s-1960s); the Michigan Studies (1950s), studies by McKeachie (1990-1995) and Murray & Renaud (1995) were all concerned with the specific characteristics of effective teachers (McCombs & Whisler, 1997; Pintrich, Roser & De Groot, 1994). The data used by these studies was collected from teachers on self-reporting questionnaires, students' opinions, and observation.

Although these studies spanned across seven decades, all of them reported similar characteristics of effective teachers, which are: a passion for the subject and dealing with students with interest and enthusiasm; respect for students; concern for students' learning; fair teaching and sympathy towards students and learner-centered teaching (Albee & Piveral, 2003). A large number of studies have attempted to explore the professional characteristics of teachers but comprehensive research encompassing vital attributes and their effect on student learning was not found. Students achieve better when taught by teachers possessing a wide range of skills and use them in varied teaching-learning contexts (Brophy, 1986).

Classes performing high on achievement and attitude were organized, spent quite a good amount of time on instructional activities, and were task-oriented. Classes performing low were characterized as chaotic and unstructured with low task orientation. Pozo-Munoz et al., (2000) investigated the attributes of an ideal teacher and narrowed down on four factors and sub-factors namely Teacher Competence (consisting of subfactors clarity, fluency in speech, expert, competent, etc.); Teacher Qualities (engagement with students, practicality, self-regulated, objective, organized, etc.); Appearance (physical appearance, elegance, attractiveness, and kindness); and finally, Directive-ness (authoritarian, overbearing and demanding).

The managerial perspectives have emerged from the Managerial Grid (Blake & Mouton, 1985) in order to give advancement to the notion of considering teaching as a managerial profession. Analoui (1995) has defined teaching styles based on the concept of 'concern for production' and 'concern for people' which when applied to teaching becomes 'concern on task' and 'concern on students' giving rise to five teaching styles namely, the hard teacher, soft teacher, rundown teacher, effective teacher, and so-so teacher. According to this approach, effective learning cannot take

place unless equal emphasis is laid on the subject matter (the task) and the learner (students). According to Phelps (2006), the professional status of teachers can be elevated when teachers embrace responsibility, demonstrate respect, and exhibit risk-taking behavior.

According to the Ontario College of Teachers (1999) teaching profession revolves around five concepts: commitment towards students and their learning; professional expertise; leadership and community; continuous professional development, and teaching practice. Based on the functions performed by teachers, professionalization has also been explained as a process in itself like scientific inquiry and artistic creation. The process brings about a change beyond itself, thereby affecting not only the profession but also the clientele i.e., the students. Based on this approach, the functions of the teachers can be enumerated as cognitive (the process of learning), affective (preference of learning), and executive (strategies for learning) (Squirefr, 2004). The key characteristics that make teachers high-quality professionals are master communicators; smart researchers and scholars, where, communication indicates the ability to understand and interact with students; smart researchers imply to enhance their research abilities to assess the students' readiness to learn through simple observational procedures, and finally a scholar whose range of knowledge is wide in both skills and curriculum which resonate with the principles of effective learning (Packard, 1993).

Literature depicts that a range of perspectives has been deployed to study the characteristics that play a role in shaping teaching as a profession and also promote learning among the students. The characteristics dealt with in the literature are mostly educator characteristics rather than being professional characteristics. A

comprehensive study based purely on the professional characteristics of teachers is a research gap that is yet to be explored.

2.3 Theoretical Understandings

The most general understanding of profession classifies an individual as a professional if they receive remuneration for their respective services. Professionalism is the aspect of professions that makes them distinct from occupation, vocation, or job based on some peculiar characteristics. Professionals are a high-status service occupations group that serve as repositories of authoritative knowledge. Entry into such professions is limited by high-level qualifications and strict competency testing along with various formal organizations. However, the work delivered by independent and high-status professionals is not the only path of supply of services which raises a question on the need and emergence of the concept of profession and professionalism. According to Suddaby & Muzio (2015), the theories of professions can be categorized into three groups where one group of theories focus on the traits that need to be possessed by occupations to become professions. The second group of theories that relate professions to power and privileges invested in professionals and examines autonomy, professional knowledge, and prestige held by professions. The third approach states that it is not fruitful to define a profession because the nature of professions is dynamic which differs from profession to profession. Rather it focuses on the practices and process of professionalism. Each of these approaches has a crucial role to play in understanding the status of the teaching profession and educational supervision.

This section discusses the historically important and distinct theories of studying professions which provides insights into their origins and characteristics. It also

discusses the continuous evolution of the understanding of professions across the studies taken up with a special focus on the teaching profession.

2.3.1 The Structural-Functional Theories

Functionalism suggests that the existence of groups and institutes can be attributed to the functions they perform for society. The key source of ideas behind the functionalist approach was Emile Durkheim, who propagated that professional and civic organizations form an important part of economically advanced societies. Durkheim opined that modernization would lead to political instability in society and professions would act as the counterbalancing forces possessing power and authority to the state (Durkheim, 1992). Such organizations would possess a 'collective conscience' suited for economically developed societies realizing social accountability and altruism. Professions actively contribute to decreasing authoritarianism by state or political powers and anarchy.

Building on Durkheim's views Talcott Parsons (1953) proposed that professions have self-adjusting tendencies within societies. Durkheim's idea that equilibrium has to be fostered faded away and, on its place, Parsons suggested that society automatically tends to push towards attending equilibrium which is achieved through adaptation, new goal attainment, reintegration, and pattern maintenance. However, recent research suggests that Parsons' work majorly discussed elite professions like business executives and administrators which are functionally similar and are considered as the bearers of the development of progressive and rational values (Brante, 2011).

The functionalist view considers public good and altruism to be the true base of professions (Goode, 1957). However, these claims remain untested by researchers. Following which, many studies critically discussed the aspects of profession where provisions were based on professional judgment and the tendency of professions to

closure markets of services. The tendency of professionals to limit the entry of new practitioners so as to increase the rewards and exclusivity of existing practitioners started to be observed in the literature related to the profession by the 1970s and 1980s, marking the beginning of problems with the acceptance of the functionalist group.

Another recent Structural-Functional Approach almost similar but still distinct from the trait approach was proposed by Maxwell (2015). They summarized four interrelated characteristics which focused on the relationships of professionals to society and individual clients. According to them, professions are *Need-Centered* and assist their clients in achieving well-being; they are *Help and Trust* based where the professional functions for the benefit of clients rather than for-profits; they are *Asymmetric* which implies that there is a gap in the knowledge of the professional and the client and lastly, professions are *Consensual* where the services are provided with the consent of the client.

2.3.2 Power and Privilege Theory

Unlike the principles of Durkheim used by Structural-Functional Theories, the Power and Privilege Theory is rooted in the Weberian and Marxist ideologies and articulates those professions are a product of capitalism which do not just function for the benefit of their clients or the society. Suddaby and Muzio (2015) critique the way professions can control labor markets and professional knowledge to accomplish goals that enhance the power and compensation of an exclusive group of professionals. The theory supports the notion that professions intend and contend to preserve their power, control, and prestige (Fry, 2018). Further, according to Larsen-Freeman (2013), society grants power and prestige as rewards as professions have exclusively possessed competence in complex knowledge that is linked to major needs and values

of the system. Professions exist because they are backed by professional associations, schools, and self-applied codes of ethics which are regularly protected by the state. The critique reflects the lack of backing garnered by teaching as a profession and the rise of educational supervisors to the position from where they can direct and control teachers' behaviours and functions.

2.3.3 The Process and Practice Theory

The Power and Practice theories do not completely reject the Structural-Functional Theories and the Power and Prestige Approach. Rather it argues that professions are just not about power and traits but more than that. They argue that defining professions is unnecessary and rather dangerous because a single definition of professions cannot cater to the dynamic process of professionalization each occupation goes through. The roots of the theory can be found in Abbott's seminal work on professions, namely, *The System of Professions* (1988). The book states that professionals are not just agents of change in social organizations. They play an active role in changing the organization as a whole because "professions both create their work and are created by it" (Abbott, 1988). Therefore, it can be inferred that professions evolve with practice. More than becoming a profession, the process an occupation goes through to become a profession is important. The trait approach views professionalization as a hierarchical process but this approach states that professions emerge when professionals interact with each other and the impact of these interactions on individual practitioners as well as on the institution as a whole. Abbott considered the jurisdiction of decision-making as a definitive part of professionalization which covers two aspects – *what to teach* and *how to teach.* Teachers' autonomy within these areas is dependent on their abilities to make informed and responsible decisions; gather information through observations and

interactions; being critically analytical and confident while making reliable decisions. This helps individual professionals to be identified and valued as an individual as well as a group member (Burk & Fry, 1997).

The theoretical opinions of professionalism have not been put to test empirically intensively. Most of the studies on professions and professionalization have been done in the form of theory generation or case studies which staunchly work against the trait perspective which forms a crucial part of survey studies. The most prominent works on professions have regarded it to be a multidimensional and multidirectional construct that is difficult to be defined. This notion goes against the positivist paradigm which demands a clear and sharp definition. The only concrete and empirical study on professionalism have been the one conducted by Wilensky (1964). The study attempted to assess the order of various events that lead to the professionalization of certain occupations. Wilensky found that the process of professionalization starts from a training school at a university, and continues through participation in a local and a national association, passing credential examinations, and establishment of a code of conduct. The order was found to be the same for a number of professions.

The study was later summarised and compiled by Abbott (1988) which maintains to be the clearest study of the sequence of events leading to the professionalization of occupations. Abbott also criticizes the study of Wilensky and argues that the approach used by him to interpret data had serious flaws where the order of considering an event first or later could have various interpretations (Abbott, 1991). Further, the researcher indicates using data from doctors that irrespective of the order the events that play a major role in the professionalization of occupations are: association; control of work; interest in professional education, and profession-dominated work

sites.   the order after analysis at the local level remains autonomy; practical knowledge, dominated work sites, and scientific transformation of knowledge. At the state level, the order was found to be autonomy, association, practical knowledge, dominated work sites, and tangential knowledge.

The study conducted by Abbott in 1991 was done on the medical profession and according to his theory of practice and process, professionalization is a dynamic process that can happen through many small events which are not necessary to be in a sequence. Also, the theory suggests that the path of professionalization can be different for different professions.

2.3.4 The Trait Approach

The roots of this approach's origin lie in Durkheim's work which values social order (Hewitt, Thomas & Wilson, 2007). The earliest approach to professions was the trait theory which attempted to distinguish professions from occupations based on certain characteristics. The initial application of the theory was to analyze and raise the status of the medical profession and education (Flexner, 1910). The report by Flexner became one of the premiering efforts to establish medicine as a profession. Stinnet (1962) later summarized the traits pointed out by Flexner that define a true profession. They were:

1. Involvement of intellectual operation.

2. Derivation of raw materials from science and learning.

3. Professions use this material to a practical and definite end.

4. Possession of educationally communicable techniques.

5. Self-Organization.

6. Altruistic nature.

Professions and their distinction from occupations came to light majorly from the work of Carr-Saunders & Wilson (1933). This prominent work on professions elaborated on the development of the profession in Britain. It states that professions possess "complex characteristics" and "grouped vocations" that distinguish them. Although, the work was inconclusive and could not distinctly suggest a list of traits. In the 1950s foundation of trait theory was laid by Cogan (1953) and Greenwood (1957) for members of a specific profession: educationists and social works respectively. However, these works are still not considered serious contributions. The number of traits suggested by the researchers increased over time with expertise, consistent knowledge, and certification emerging as the most common traits. Following this, Lieberman (1956) elaborated on the "complex characteristics" posed by Carr-Saunders and added specific traits professions possess, namely, a unique, definite, and essential social service; an emphasis upon intellectual techniques in performing its service; a long period of specialized training; a broad range of autonomy for both the individual practitioners and for the occupational group as a whole; an acceptance by the practitioners of broad personal responsibility for judgments made and acts performed within the scope of professional autonomy; an emphasis upon the service to be rendered, rather than the economic gain to the practitioners, as the basis for the organization and performance of the social service delegated to the occupation group; a comprehensive self-governing organization of practitioners; and a code of ethics.

The trait approach continues to be an important pillar of studies concerning the status of teaching as a profession by attaching certain traits or functions that are associated with professions and professionals and how the field of teaching should mature to meet the standards. For instance, Dejonka (1978) based his work on Flexners' ideas

and wrote "prescriptions" for teacher education which includes closure of substandard teacher training programs and raising the admission eligibility standards. Houston (2008) argued that teaching had the opportunity to develop as a profession like medicine and law by establishing clear protocols of a profession and nesting itself in universities. The teaching profession reached the university but failed to establish strict quality protocols (Flexner, 1910).

The biggest limitation of this approach remains the lack of consensus over the traits that are important for the classification. A list of traits is considered insufficient to be termed as a theory that should ideally explain the causality. Despite this, trait theories are used till date to study professions as it is efficient and easy to understand and apply. Researchers have also found the structural and functional approach cannot adequately describe and differentiate traits between and among professions, i.e., the traits that are fluid across professions and the ones that are exclusive to a particular profession (Suddaby & Muzio, 2015).

The current study uses this approach and attempts to unearth the traits and characteristics of teachers and their teaching practices that that help them in ensuring professionalism. The traits that have been examined in the current study included demographic traits and practices of teachers that based on literature are major contributors to professionalism.

2.4 Autonomy

Teacher autonomy is the level of freedom practiced by the teachers to develop and implement teaching practices to meet the needs of the students (Parker, 2015). It refers to the freedom to make decisions over one's work and forms one of the most important components of the classic profession. With respect to the teaching profession, autonomy refers to the power of decision-making on matters such as

curriculum choice, instructional planning, and classroom management. Autonomy also empowers teachers by recognizing their capabilities and professional judgment. Professionalism, autonomy, and empowerment are separate constructs but are found to be interconnected, and also higher perceived empowerment is connected to higher perceived professionalism among teachers (Pearson & Moomaw, 2005). Not only decision making inside the classroom but allowing teachers to participate in decision making at the school level is necessary for their professional growth (Dondero, 1997). The magnitude of freedom practiced by English teachers in secondary schools of Hong Kong was studied by Benson (2010). The study found that teachers faced several constraints in their professional practices and that the most restraining measure were documents and surveillance positions that even specified the teaching content and the teaching pace with which the teacher should proceed while teaching the textbooks units along with some additional tasks. Such structures 'standardize teaching' and were overlooked by the senior teachers since they did not want students and parents to feel losing on learning opportunities. At the same time, the findings also indicated that teachers actively sought ways to go around the constraints by either redesigning the tasks in accordance to students' capabilities by interpreting the regulations accordingly or by 'carving out a space' where they meet the students' needs without challenging the regulations. Standardizing teaching practice might not affect teachers' professional practice. As an example, standardized homework practices were found to be frustrating for some teachers, inhibiting them from becoming the kind of professional they want to be, and for some teachers such practice was normal and a part of their responsibilities as prescribed (Moorhouse, 2018).

Autonomy in professions acts at both collective and individual levels where the practitioner is allowed to make decisions independently and also as a member of an association by interpreting the case and deciding based on the client by exercising a discretionary space (Bucher & Strauss, 1961). Noordegraaf (2020) opines that autonomy along with expertise and authority acts as a 'protective shield' for the profession and professionals which detaches professionals from the world and at the same time allows them to work for the world. But the shield is weak and is not free from the pressures of the external world. It was also mentioned that autonomy influences two types of professionalism namely, protective and connective. Autonomy in protective professionalism incorporates independent decision making, discretion without any interference whereas autonomy in connective professionalism is interdependent, where the decision-making process involves sharing, needs a supportive environment, and involves social experiences involving interaction.

A study conducted in England found that an average teacher in the country reports having low autonomy with 38% of teachers stating that they have little or no say in their own professional development goals, and 16% reporting low autonomy over task completion and pace of work as compared to similar professions (Worth & Van den Brande, 2020). Autonomy is lower among newly recruited teachers and higher among senior teachers and is strongly correlated with job satisfaction and teacher retention. An increase in autonomy over professional development decisions was found to be associated with a nine-pointer increase in the intention to stay in the teaching profession. Both classic and contemporary studies have supported autonomy to be an important component of teacher professionalism which goes beyond the boundaries of just making teaching a profession but also affects students' learning, prevents teacher attrition, and boosts satisfaction.

2.5 Peer Network

Towards the end of the 20th century, research concerning school reforms has reported teacher collaboration to be an important strand in educational trends like teacher professionalism, integrating community and school, and decentralization. This has led to a number of changes in the interactions and associations of various stakeholders of the education system (Murphy & Hallinger, 1993; Prestine, 1995). The most basic principle to promote teacher professionalism is the notion that teachers themselves have the responsibility of improving their practice. Hargreaves in his book "*Changing Teachers, Changing Times – Teachers' Work and Culture in the Postmodern Age*" refers to the collaborative functioning of teachers as the "new professionalism" which does not reject the foundations of classic professionalism but extends and enriches the teachers' role (Caldwell, 1997).

Collaboration of teachers with stakeholders takes into account both formal and non-formal collaborative efforts of teachers. Collaboration of stakeholders gives rise to the idea of school as a community in itself. Hargreaves (1997) finds that schools can prove to be the best places to generate a sense of community. Schools that thrive as a community have common values and expectations that shape members' interactions. This results in interpersonal care and support among the stakeholders and meaningful education. Such organizational structures provide ample opportunities for collegiality with an emphasis on shared goals and interdependence (Friend & Cook, 1992; Welch & Sheridan, 1995).

Another important aspect of collaborative functioning is the formation of partnerships between, schools and parts of the community. Welsch & Sheridan (1995) state that no agency alone can fulfill the need of a large number of students who are at a risk with social, medical, and educational problems and are therefore vulnerable to fail at

school. Educators must nurture collaborations with parents, community leaders, higher education institutions, and industry (Hoover & Achilles, 1996). As a result, the educational needs of students are approached from a variety of perspectives through teams and partnerships that promote flexibility, freedom, and autonomy to work collaboratively. Slowly the boundaries of the school become transparent, making the school more visible and connected. Rather than remaining just a social structure, school becomes characterized by important components of collaboration like interdependence, common vision, and parity (Cook & Friend, 1991; Stewart, 1996; Winitzky et al., 1995). Interdependence is an important component of collaboration (Gray, 1989; Little, 1990) which helps the school to emerge as a whole that is organic and meaningful rather than a collection of isolated parts (Maehr & Midgley, 1996).

Collaboration of teachers with other stakeholders requires restructuring at the systemic level rather than at the compartment or segment level. Change should be such that collaboration becomes an unavoidable part of the educational institute (Prestine, 1995). Not perceiving school as a collaborative whole can lead to reinforcement of the sense of isolation experienced by people who engage in teaching and learning regularly in separate classrooms (Goodlad, 1984).

A plethora of definitions, components, and terminologies have been prescribed by researchers in literature to describe the nature of collaboration (Wood & Gray, 1991). Based on works done earlier, Slater (2004) identifies common goals (Cook & Friend, 1991; Welch & Sheridan, 1995), joint work or interdependence (Gray, 1989; Little, 1990; Welch & Sheridan, 1995), parity or equality (Cook & Friend, 1991; Winitzky et al., 1995) and voluntary participation as important components of collaboration (Cook & Friend, 1991; Hargreaves, 1994).

Recent research has found that collaboration of teachers is important not only for better school functioning but also for the professionalism of teachers (Bondorf, 2013; Schussler, et al., 2014). Collaboration develops teaching abilities and increases instances of intuitive or reflective learning among teachers (Terhart, 2002). The inculcation of values and practices of collaboration should be attempted right from the teacher training phase to favor their professionalism (Schussler et al., 2014). The quantity and quality of collaboration among teachers is an important pillar of professionalism (Hargreaves, 2019). As compared to other professions teaching profession has been claimed to lack proper autonomy and collaborative effort (Fullan & Hargreaves, 2016; Schleicher, 2018). TALIS studies found that collaborative culture is very closely associated with teacher self-efficacy and job satisfaction (Peña-López, 2016). Collaborative practices in the current scenario of the teaching profession are limited to discussing particular students and sharing resources.

Teachers seldom collaborate for teaching in a team or professional development and the least collaboration was observed for joint activities and classroom observations (Hargreaves, 2019). Teachers who work in collaboration add value to human capital individually by having a huge impact on the students' achievement especially mathematics and reading (Bryk & Schneider, 2002; Day, Sammons & Stobart, 2007). Hargreaves & Fullan, (2015) also stated that the most important function of collaboration among teachers is of *social capital*. Social capital refers to the capital generated by people by the means of their network, mutual support, collaborative professional development, and mutual trust.

According to the recent development regarding policy interventions in the western world, professional collaboration of teachers through participation in professional learning communities has been acknowledged as a more sophisticated form of teacher

collaboration that is more focused and action-oriented (Donohoo, 2013). Professional collaboration is not limited to keeping a check on the achievement data and improving it but also permeating the way of learning in the whole organization where the administration enacts and values collaboration by engaging in open and challenging dialogues where vulnerability and gaps in expertise are admitted (Hargreaves & O'Connor, 2017; 2018). Collaboration is no longer just about meetings, discussions, and talks. The concept has extended its boundaries to collective inquiry, action, and responsibility to define their professional life. Collaboration in the teaching profession is the intermingling of formal protocols with informal processes. The protocols are not meant to contrive or constraint teachers' professional interactions, rather the purpose of protocols is to enrich teachers' interactions (Datnow & Park, 2018).

2.6 Professional Conduct

For the efficient and desirable execution of duty at the workplace, the conduct of the teacher is an unavoidable aspect to examine. In this regard, professional ethics and values have been characterized by various policy documents and academic scholars. Professional ethics form an important component of a profession because professions are attributed with a commitment to serve the client's interest and work for the welfare of the society in general which indeed is a dual ethical responsibility (Tatto, 2021).

Regarding teaching, this dual responsibility is faced by the teachers in fulfilling the learning needs of the students on one hand and at the same align their professional practice in accordance with the interests of the larger society. A mismatch in these expectations creates conflict and tension for the professional where the last resort is to engage in the compromised practice (Gardner & Shulman, 2005). Similarly, confusions like whether to follow the humanistic perspective and nurture students to

grow into critical thinkers and independent learners or be driven by market perspective and produce workers needed to run the economy and compete at the global level using test results that would be a reflection of teacher effectiveness and education (Goldhaber, 2019) where they are torn between giving authentic learning experiences to the students and also prepare them to perform in achievement tests. Professional ethics can prove to be a solution to these impending confusions of the kind of role a teaching professional should play.

Professional ethics play a crucial role especially in the teaching profession as they are the nearest support to students and also the first role models. It is the lack of professional ethics that has become a huge cause of concern besides possession of high credentials and expert knowledge. A professional code of ethics serves as a guiding principle for professionals and assists them in fulfilling their duties with utmost commitment and integrity. Professionalism comprises skills and values defined by the essence of humanism in professional practice. This 'humanism' is acquired, maintained, and improved by continuous perseverance by the practitioners by practicing the principles and values that constitute the profession. Professionalism is directly associated with concepts like excellence, duty, altruism, compassion, honor, integrity, and accountability (Daniel & Sapo, 2020).

Due to the nature of the profession, it is difficult to separate teaching from the moral code of ethics that should govern the profession. The most important concern is to view ethics in the profession from the lenses of both professional and business points of view to establish thorough and high standards (Nuland, 2009). When an individual joins a profession, they become a part of a community with historical practice with a purpose that needs commitment. The community has its own practical and theoretical knowledge and is governed by collective norms which facilitates them to go beyond

subjective intuitions to judge and act professionally. Literature depicts an abrupt treatment of the importance of ethics in the teaching profession as compared to other more established professions (Maxwell & Schwimmer, 2016). Although this neglect of ethics in teacher education does not manifest all over the world, for example, researchers and policy interventions in the U.S. started giving attention to the inclusion of ethics of teaching as a formal part of teacher education with the work of Strike & Soltis (2015). As a profession, teaching has not been able to build a body of knowledge or expertise that can facilitate the profession in new and trying circumstances (Zeichner, 2014).

Professional ethics is a significant component of professionalism as when unethical behaviors are demonstrated by teachers, it negatively affects the collegiality among peers. Equipping teachers with a code of do's and don'ts facilitates teachers' growth and development in attitudinal domains of professionalism, beyond skills and knowledge (Amzat & Valdez, 2017). According to Van Manen (1977), it is extremely important for mathematics teachers to engage in self-reflection and introspect about the morals and ethics that affect their classroom practice both directly or indirectly. But huge barriers in the path to impart ethics education includes, that rules laid around the code of ethics are often vague and conflicting. Learning ethics by mere study of models are incomplete and futile and most of the education about ethics focuses on the wrongs rather than studying both the right and the wrong (Handelsman, Gottlieb & Knapp, 2005).

Students are more likely to open up to teachers who amalgamate the notion of trust and honesty along with the ethics of care and compassion in contrast to teachers who are authoritarian and focus only on teaching towards syllabus completion and examination. A mixed-method study conducted by Ghanbarpour et al. (2019) in Iran

found that professional ethics of teachers consists of 8 major components, namely, spirituality; personality; self-knowledge; ethical responsibility towards students; moral responsibility towards parents; profession and colleagues, with moral responsibility towards parents was found to be the most important component and ethical responsibility towards organization and administration was the least important which needs immediate attention.

Professional ethics in the teaching profession has witnessed a shift to attending to the moral essence of teaching and ethical professionalism for the last 15-20 years. The literature consists of multiple viewpoints put forth by various philosophers to understand the need of studying ethics in relation to the teaching profession. For example, Carr (2005); Fenstermacher & Richardson (2001), and Sockett (1990) follow the Aristotelian perspective in part to invoke ethical virtue. Strike (1990, 1995, 1999) discusses ethics with an orientation to principles, rights, and duties. Some scholars also use Dewey's perspectives (Hansen, 2001) while some also use the feminist approach that studies ethics as an area of care and caring distinctively from the ethic of justice (Noddings, 2002). Psychological perspectives deal with Kohlberg's theory of moral development (Oser, 1994; Rest, 1994) and the practical approach to ethics has been dealt with deeply by Campbell (2003).

Professional ethics has been also discussed with a range of virtues in literature like fairness, justice, integrity, honesty, compassion, patience, responsibility, practical wisdom, and variations on the principles of non-maleficence and beneficence associated with the expectations for professionals (Coombs, 1998; Haynes, 2002; Lovat, 1998; Macmillan, 1993). According to Campbell (2015), just as there exists a difference in the approaches and theoretical frameworks used to study ethics, the existing literature also seems to be divided into three groups based on the form of

scholarship and methodology with one group of studies purely discussing ethics in the form of philosophical essays; another group of studies driven by the rigorous conceptual framework using a qualitative approach to study the notion of ethics and the third group of studies that use case study method that demonstrates the analysis of thought-provoking ethical dilemmas.

Ethics as a field of study in teaching has an unbounded robust scope as can be seen from the multiple theoretical, conceptual, and methodological approaches that have been used to gauge the concept. The concept of ethics is deeply connected to the fundamentals of human relationships, addresses the vulnerability of students and the professional commitment of teachers. The ethical and moral realities of teaching need proper exploration through the empirical lens.

2.7 Professional Development

Professional development refers to the skills and knowledge acquired for both personal development and career advancement. It comprises all types of facilitated learning opportunities formal and informal in nature and practice. Professional development is intensive and collaborative and involves evaluation ideally. A wide range of approaches is considered to be a part of professional development which includes consultation, coaching, communities of practice, lesson study, mentoring, reflective supervision, technical assistance, etc. (Amadi, 2013). Teachers tend to improve their education by attending seminars, workshops, or classes. Pre-service and in-service teacher training is also a part of teacher professional development. Pre-service teacher training is the training and knowledge acquisition by teachers before entering the teaching profession, which is also a mandatory qualification to enter the profession. Whereas, in-service teacher education is categorized by the flexibility of time, space, content, and technique it entails. The purpose of in-service training is to

provide qualitative improvement of education by making up for the loopholes left by the pre-service teacher training and reorganization of knowledge accumulated while carrying out the profession (Sakkoulis, Asimaki & Vergidis, 2018).

The practices and approaches of in-service teacher training mirror the teachers' views on education, their learning preferences, and their views about their professional roles and work (Katsarou & Dedouli, 2008). In-service professional development has been claimed to be instrumental in facilitating the formation of pedagogical identities of teachers by recontextualizing the official pedagogical discourse and transforming knowledge into classroom talk and defining teaching practices (Barrett, 2009). Professional development is considered to be cognitive and personal that needs engagement with new ideas, approaches to enhance pedagogy, and emotional involvement with students and the profession itself (Girvan, Conneely & Tangney, 2016).

Teacher professional development often incorporates sharing of ideas, experiences, and engagement in problem-solving activities. Engagement in professional development activities has a positive impact on teachers' professional practice and also affects the learning outcomes of students. Improvement in teacher knowledge and skills through professional development activities has been found to have a positive impact on self-satisfaction and efficacy in teachers (Avalos, 2011; Coldwell, 2017). Active participation in Targeted Professional Development that focuses on key classroom management skills has been found to enhance classroom management skills in teachers. Teachers found Targeted Professional Development to be feasible, usable, and acceptable (Simonsen et al., 2019).

Professional development of teachers is the result of continuous 'learning, development, socialization, growth, improvement, innovation, cognitive and affective

change and self-study' (Richardson & Placier, 2001). Professional development is an ongoing process of training and support to help teachers understand and reform their professional practice. Studies highlighting the positive effect of professional development on quality instruction and student achievement have grown in number since the last two decades (Cohen & Ball 1999; Borko 2004; Cohen & Hill 1998; Corcoran, Shields & Zucker 1998; Darling-Hammond & McLaughlin 1995; Desimone, Smith & Ueno 2006; Knight & Wiseman 2005; Teemant, Wink & Tyra, 2011).

A decent number of studies also assert that quality professional development enhances teachers' content knowledge which in turn improves their instructional practices leaving a positive impact on the learning outcomes of students especially the higher-order thinking skills of students (Polly, et al., 2015; Pehmer, Groschner & Seidel, 2015). Teachers improve gradually through experience particularly if they teach the same content year and year again (Kini & Podolsky, 2016). This increase speeds up in a supportive school with well-behaved students, collaborative peers, effective leadership, and strong professional development (Kraft & Papay, 2014).

Despite the well-known effectiveness of professional development, quantitative evidence of its impact on teachers and students is very limited until recently. A review of early studies found that only 9 studies out of 1300 provided sufficient evidence of effects according to the standards set by the US Institute of Educational Sciences. All of them were set up in elementary schools with difficult to discern patterns of effect on students' learning (Yoon et al., 2007). While professional development has been always considered beneficial by teachers and policymakers, its relationship with students' learning and academic performance are still vague. However, a recent

dramatic increase in the number of robust studies addressing this gap since the year 2006 can be seen as a major shift (Connolly, Keenan & Urbanska, 2018).

2.8 Cognitive Correlates of Academic Achievement

PISA framework 2015 (OECD, 2017) illustrates that mathematical abilities rely on processes, fundamental competencies, content knowledge, and context knowledge. These competencies refer to the core dimensions of assessing mathematical abilities. She, Lind & Huang (2019) defined scientific abilities as science literacy which requires inference based on empirical data for which three kinds of knowledge are required viz. content, procedural and epistemic knowledge. The cognitive demand is required to comprehend and resolve scientific problems in the correct order. The process involves identification, analysis, judgment, inference which varies on various levels. Individualistic differences are very important in accordance with the cognitive demand (OECD, 2017). Knowledge, context competencies, and cognitive demand are referred to as the core components of scientific abilities.

Achievement is described in various ways. In the realm of education and psychology, the desire for achievement becomes a reason to push in accordance with individual cases (McClelland & McClelland, 1961; Atkinson, 1974). Atkinson conceptualizes achievement motivation and referred based on two factors, firstly, hope for success and secondly, fear of failure. The two opposing forces act together for determining the probability of motivational behavior. The achievement theory describes the variation of motivation in individuals; it relies on two psychological principles as referred formally. This theory bases itself on the approach-avoidance model as an individual could be motivated based on approach or to avoid a situation. This broadly is a combination of trait-centered approach, as well as personality traits, might not just be

the factor affecting motivation. At the same time, the situation predominantly affects the probability of success.

NASSCOM & McKinsey (2005) report emphasizes employability skills. Employability skills are the transferable skills involved in knowledge, specialization, content-driven applicability of work requirements. It could be considered as the outcome of learning outcome. Baartman et al. (2007) indicate that alteration in learning patterns leads to enhanced academic achievement. Thus, it is very essential to build a holistic educational system so that the construction of knowledge becomes a dynamic process. Barth et al. (2007) interprets learning outcomes as a gamete of student attributes with expertise, skills and refer to it as competence. ASER (Pratham, 2010) mentions that there has been no significant improvement in students' learning outcomes despite so much effort being made in the last decade. NAS (2015) results of grade ten reveal that very few students were able to score more than 75% in any of the subjects (Figure 2).
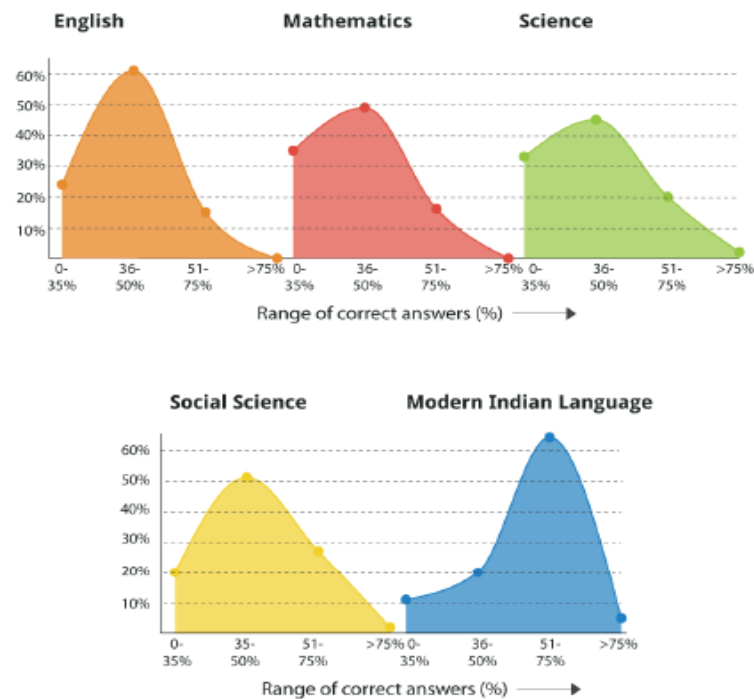

Figure 2: Performance of Grade 10 students in NAS, 2015

Cognitive and non-cognitive skills play an important role in the dynamic learning of an individual. Cognitive skills are also called thinking, remembering and reasoning skills as it requires intellectual effort towards learning. Kiely et al. (2014) mention that cognitive ability involves decision making, language skills, focus memory, and learning. Cognitive functioning is also synonymous with cognitive abilities including information usage, analytical ability towards problem-solving. Wilhelm & Engle (2004) interpret cognitive skills as a part of the construction process and the elementary capacity for abstract reasoning and adaptability. Osmon & Jackson (2002) mentions the ideas of behavioral sophistication and neural therapy whereas psychologists like Gardner (2004) and Sternberg (2000) emphasize a broader conceptual framework of applied skills. Critical thinking is a crucial aspect of cognitive skills in terms of subject, content, and problem (Elder & Paul, 2001). According to their framework, reasoning intellectual standards, and traits emanates from the persistent application of academic standards to thought element.

Cognitive faculties as scientific abilities that refer to the empirical study of the mind (Miller 2003). Cognitive science is a vast domain and quite interdisciplinary. It focuses on distinct mental faculties involving thinking and emotion. Neuronal circuitry modular brain structure has a significant role in learning and holistic cognitive abilities (Varela, Thompson & Rosch, 2016). OECD (2017) explains scientific abilities like the ability to engage with science-related ideas for a precise conclusion. Likewise, non-cognitive abilities are very important skills comprising factors like compiling memory, planning, preparation, and linguistic skills. Cunha & Heckman (2008) refer to non-cognitive abilities involving social intelligence, compassion, leadership skills, verbal and non-verbal communication. Skill to survive the practical world needs non-cognitive skills more than cognitive skills as referred to

in various studies. It is also called soft skills and comprises confidence competence and a behavioristic approach for pertinent employability skills (Beckmann & Minnaert, 2018).

Merchant et al., (2018) studied non-cognitive skills and found vast differences among the region, teamwork along with other factors across provinces. Mills et al. (2016) found a minor variation in non-cognitive and physics skills and non-cognitive structure and academic achievement were not found to be significantly correlated with each other.

Bazzi et al. (2019) studied the impact of rewards on teachers' performance in language and mathematics. Daily pay had a positive impact on learning outcomes. The functional definition of mathematical abilities within the cognitive abilities framework is "the ability to formulate, employ and interpret mathematics through mathematical reasoning, usage of concept and formulation of the procedure." (OECD, 2017). Bloom's principle was used to define mathematical abilities as referred to in Anderson & Krathwohl (2001). TIMSS (2003) comprises cognitive components as context, factual knowledge, conceptualization, resolution of routine problems, and reasoning and compared three parts of mathematics skills in the TIMSS 2007 framework which are, knowledge, application, and solution of novel problems (Mullis et al., 2005).

Niss et al., (2017) defined the ability to analyze mathematics through analogy, reasoning, employing factual knowledge. Mathematical skills referring as cognitive abilities are important for students likely to complete secondary education. The mathematics framework of PISA (2015) includes three important processes for better mathematical activities – formulation of the situation; employability of path, concepts, and related processes; application, evaluation, and interpretation of results. These

three are mathematical processes as defined in the framework. Apart from this, the framework enlists seven fundamental competencies. These are – communication, mathematizing, representation, reasoning and argument, designing strategies, usage of symbolic and technical language, and utilization of mathematical tools. The mathematical content knowledge domain is also highlighted in the framework as it refers to the capability of forming deduction along with practical context. It refers more to practical utilization of the knowledge. The subdomains of the content are change and relationships; space and shape; quantity; uncertainty and data. Context knowledge is referred to as supplementary information (Niss et al., 2017). The mathematics framework strives for four kinds of context, namely, personal, occupational, societal, and scientific context. There exist other determinants which play a vital role in this context.

Jungwirth, (1991) mentioned that gender does not play important role in classroom settings for subjects like mathematics. Attitudes and perceptions of both genders towards mathematics were found to be the same, as evinced by (Uwineza et al., 2018). PISA and TIMSS based studies reflected boys outperforming girls highlighting cultural factors affecting cognitive abilities (Mullis et al, 2016). The theory in socio-cultural ways focuses on gender discriminatory culture referring to mathematics and science as masculine subjects. Languages, social science, arts are referred to as feminine subjects and are viewed as soft disciplines. Many studies did not find a difference in cognitive and non-cognitive abilities in male and female students. Brown & Alexa Anderson (2020) obtained no gender gap in mathematics performance. Many research studies held perception to be an important factor towards subjects like mathematics and science which has no difference in the output of both genders. The

functionalist theory of liberal feminism focuses on the stratification of students' merit (Arum, Beattie & Ford, 2010).

The effort towards reducing differences in both genders has augmented merit-based evaluation treating both genders equally in mathematics and science plays an important role towards effective learning outcomes. Using this theory, the cause of the gradual shift in accepting mathematics as a progressive measure for female secondary education has also increased the academic achievement of females. Adaptability in this context is regarded as the highest pedestal by Tomafevski (2001).

2.9 Teaching Practices and Student Performance

The effectiveness of pedagogical practices is presumably important for quality student-teacher interaction. Teachers' effectiveness depends on the professional knowledge and training for the enhancement of learning outcomes in a significant manner. There is a dearth of researches examining the concepts and processes behind teaching-related professional practices associated with learning outcomes. Teachers' professional knowledge for student achievement has been explored on qualitative dimensions in various ways. Studies delving into the exploration of teacher characteristics like the professional courses completed, grades achieved, etc. have been continuously found to be less correlated to students' achievement (Wayne & Youngs, 2003).

Literature concerning these stresses on the concepts such as active learning, collaborative participation, increasing content knowledge and pedagogical knowledge, practical and relevance, and stretching over sufficient duration and continuance (Adsit 2004; Brandt 2003; Bransford & Schwartz 1999; Desimone, Smith & Ueno 2006; Garet et al., 2001; Ingvarson, Meiers & Beavis 2005; Karagiorgi & Symeou 2006; Mundry 2005; Yoon et al., 2007). Recent research has backed the

differential instruction method as an important approach to preparing the teachers for tackling diverse classrooms (Valiandes & Neophytou, 2018). Differential instruction acknowledges the diverse skill sets and abilities students bring to the classroom and helps teachers adjust curriculum, teaching material, and support students in having equal opportunities towards access to high-quality teaching-learning. It is important to understand that equality of opportunity becomes practical only when students receive instructions that suit their varying needs, preferences, interests, and readiness to learn (McLaughlin & Talbert, 2010).

Differentiation is considered as a response to the technocratic and positivist tradition and proposes a change in the teaching practices of teachers such that the practices correlate to learning in diverse classrooms with students with mixed abilities. Differentiation is seen as a potential practice to increase learning outcomes of students but the implementation of such an intervention is a huge task. In earlier researches, teachers have reported problems related to resource unavailability, infrastructural deficits, time constraints, etc. The implementation of such an extent needs reform in the traditional classroom teaching practices which have established themselves as irreversible modus operandi of education dissemination over a long time (Tomlinson, 2004). However, teachers that have successfully implemented differentiation in their pedagogical approach have reported an increase in their effectiveness and professional practice (Blank, de las Alas & Smith, 2007).

To develop personal practical knowledge a teacher should use judgment in place of obedience. The approach also identifies the need for synergy between autonomous teachers and educational supervisors. Educational supervisors need to trust the professional judgments of autonomous teachers. This trust is the key ingredient for fruitful decision-making, accountable teachers, and improved schools (Fink, 2015).

Successful schools were identified to possess higher degrees of trust among their members (Daly & Chrispeels, 2008; Bryck & Schneider, 2002; Robinson, 2011).

The pursuit of professionalism is important for teachers and even a slight success can take teaching miles ahead in its venture (Sykes, 1990; Labaree, 1992). The concern is not whether teaching wins a position among high professions, but the concern is that whether professionalism will have any positive effect at all on the development of the profession and the learning outcomes of the students.

2.10 Knowledge Gap

Student achievement and learning, assessed at the end of primary education in India, show a lack of quality as evident in numerous literature. Studies in the Indian context have majorly focused on improving the access to elementary education by focusing on the facilities available to students inside schools, socio-economic and household factors. Causal attributions behind the low transition rates from elementary to secondary grades and high dropout rates in secondary grades have been addressed in the existing research scantily.

There is a constant universal emphasis on improving the learning outcomes of students. Nationally conducted large-scale assessments as National Achievement Survey and PISA Plus have revealed the lack of quality education in the elementary grades due to which students face difficulty in coping with the intricacies of the curriculum. It leads to an increase in the dropout rates at the secondary school level. The students who are retained ultimately perform poorly at the end of the secondary grades which leads to a lower transition to the higher secondary school level. There is a dearth of robust studies in the Indian context, that venture into exploring the factors that can help in improving retention and quality of education at the secondary school level.

Teachers are considered to be the drivers of education, but at the same time, there are very few studies that have explored the role played by the teachers in the educational journeys of students at the school level. Teachers have been regarded as professionals in the policy documents concerning the education system but researches probing the professional aspect of teachers in the Indian context is quite rare. Literature suggests that the importance of raising the professional status of the teachers in India continues to be emphasized for decades but there exists a lack of research studies that reveal the attributes of professionalism important for the enhanced professional practice of teachers in the country.

This study would prove to be an attempt to explore the possible reasons behind this condition and also devise ways in which student competency can be improved. Exploring the relationship between the existing pattern of teacher professionalism and student abilities and competencies can help the Indian researchers to move a step ahead in their quest to find a reason behind the differences in the achievement of different schools and school types. Having explored the external forces that play a role in student achievement this study would help in looking into factors that are internal to the school and classroom settings that directly affect their achievement and competencies.