

Qualities of Effective Mathematics and Science Teachers

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Abstract

The effectiveness of mathematics and science teachers stems mainly from their confidence of the subject matter, how to teach it (pedagogy), and their attitude. Truly inspirational mathematics and science teaching occurs when a teacher is not only enthusiastic about the mathematics or science topic being taught, but also understands that topic fully in order to present it in a comprehensible and meaningful way to each learner. The behaviours used to indicate effective mathematics and science teachers have been grouped under three categories namely: professional knowledge, professional practice, and professional attributes. The behaviours under each category are considered standards of performance of teachers, something they can work for standards are broadly stated expectations of what teachers should know and be able to do. These standards provide the criteria for making judgments about the quality of professional development opportunities that university teachers need. We will present the standards for effective mathematics and science teachers. The list of standards and behaviours are by no means complete. But they are useful for professional development programs to focus on so that teachers can be helped to achieve most, if not all, of them.

Keywords

Attribute, Education, Effective, Knowledge, Practice, Teaching
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I. Introduction

Our every day is different from the earlier days and this is largely due to the contribution of science in our life. Mathematics is a science whose subject matter has special forms and quantitative relationships of the real world. Mathematics is a branch of science, which deals with numbers and their operations. It involves calculation, computation, solving of problems etc. Its dictionary meaning states that, 'Mathematics is the science of numbers and space' or 'Mathematics is the science of measurement, quantity and magnitude'. It is exact, precise, systematic and a logical subject. Mathematics reveals hidden patterns that help us to understand the world around us. Now, much more than arithmetic and geometry, mathematics today is a diverse discipline that deals with data, measurements and observations from science, with inference, deduction, and proof; and with mathematical models of natural phenomena, of human behavior, and of social systems. It may also be defined as, 'Mathematics is the study of quantity, structure, space and change; it has historically developed, through the use of abstraction and logical reasoning, from counting, calculation, measurement, and the study of the shapes and motions of physical objects. We can't live happy life without science. The science has become integral part of our life. Science has also influenced educational enterprise and hence it is also the integral part of our educational system. Learning of science has become unavoidable part of general education. The modern civilization is a scientific civilization. In this age the modern society is completely drawn into the scientific environment. Today science has become an integral part of our life and living. Now we cannot think of a world without science. I think teaching is an art and there are born teachers. But there are majority of teachers, who can improve upon by experience of practice and utilization of various methods of teaching science. The basic aim of teaching any subject is to bring about desired change in behaviour. The change in behaviour of student will be indicated through students' capacity to learn effectively. This is only possible by adopting various methods of teaching. The teacher cannot utilize any method to any type of students in any type of environment. One has to choose and adopt

the right method of teaching while keeping in mind the capability of the students and the curriculum. Thus, method is a way of presentation of the content in the classroom. But, it is however very important to keep in mind that a method is not an end in itself but is used to achieve the set aims of teaching. You should also keep in mind that, same method should not be used at all times but there should be flexibility in using it as for as situations, circumstances, and condition in a particular case. You should use various methods depending upon demand of the situation. The method which in a particular class under a particular circumstance, may be a total failure for other teacher. The best methods of teaching science are Teacher-Centered and Pupil-Centered. The first type of teaching methods focuses on telling, memorizing and recalling information. The students' participation is very limited wherein they only ask questions or answer questions. Most of the time, the students are passive listeners and receive the knowledge. The teacher is center of process that goes on in the classroom. The second type of teaching process emphasizes on need, requirement, interest and capability of students. The students are active participants where in their skills and abilities are developed. Teacher and students jointly explore the different aspects of problem. The role of the teacher is to create a problematic situation, have materials and resources available to the students, and help them identify issues, state hypotheses, clarify and test hypotheses and draw conclusions. If you are keen in making lesson plans which may help you in achieving your identified objectives, then they should be stated clearly. If objectives are not clearly defined, it is impossible to evaluate a student, a lesson, a unit, a course or a program effectively. This leads to teaching disaster. Unless you have clear picture of instructional intention, you will be unable to select test items in which the objectives are clearly defined and the students know which activities are relevant for success of the teaching and learning process. A meaningfully stated objective is that clearly communicate the readers the writer's intention. It states the behavioral outcome of students after completing a certain topic. The most important characteristics of useful objectives are that it identifies the kind of performance that will be accepted as evidence

that the learner has achieved the objective. The developments include an understanding of lecture-cum-discussion method, laboratory method and its utilization in teaching of science, importance of observation method in science teaching, project method and problem solving method. The teacher should elaborate principles, merit and limitations of lecture – cum – discussion method. An effective teacher plays an important role of a teacher and provides suggestions for effective mathematics and science teaching methods.

II. Knowledge of Mathematics And Science Teachers

A. Professional Knowledge

Professional knowledge includes knowledge of mathematics and science content, knowledge of pedagogical content, knowledge of general pedagogy, and knowledge of the mathematics and science.

B. Knowledge of Mathematics and Science Content

Content knowledge refers to the disciplinary conceptual knowledge of the teacher. Good subject knowledge involves understanding the substance, content, structure and organization of the mathematics and science subject itself. It is essential for the teacher to explain not only the facts of mathematics and science but more importantly the arguments for the scientific model. When it is weak, many teachers find it difficult to deal with learners' questions and resort to teaching from a textbook to avoid having their lack of knowledge exposed. The mathematics and science teachers may have a particular area of expertise, but it is essential that he has breadth of knowledge across several other mathematics and science disciplines to become scientifically, technologically, and environmentally literate. An effective mathematics and science teacher has an extensive knowledge of basic mathematics and science concepts and their applications to daily life and with other disciplines. He has mastery of concepts considered important for all students and those that serve as enrichment topics for particular course or year levels. He can identify and address mathematics and science misconceptions of students. He has a good grasp of the complex relationship between mathematics as well as science and technology, that technology is not just applied mathematics or applied science but that it is a cultural response of people to problems and opportunities that then shapes the way they live, think, and work. He updates himself on recent developments in scientific research and uses this knowledge to motivate learners and make mathematics and science teaching interesting. He knows how to connect his learning to what should be taught and how to incorporate new mathematics and science knowledge into practice. He helps learners cope with the demands of a rapidly changing society strongly influenced by scientific technology but realizes that mathematics and science cannot answer all questions the learners might ask.

C. Knowledge of General Pedagogy

Knowledge of general pedagogy refers to teachers' knowledge about characteristics and cognitive levels of varied learners, variety of learner-centered teaching and learning approaches including assessment and classroom management. More specifically, it includes knowledge about how learners learn, alternative conceptions that many learners hold, issues of safety, availability of appropriate resources, and the values held by various stakeholders in the education process. An effective mathematics and science

teacher understands the unique characteristics of learners, their strengths and potential, talents, abilities and perspectives based on the developmental characteristics of the age groups with which he is working. He knows how to plan and design strategies to support the intellectual, social, and personal development of each learner. He understands the variety of information and communications technology and other resources and how to incorporate them into new learning experiences. He understands the nature of varied forms of assessment for both formative and summative purposes, the role of feedback to both learners and parents, and when and how to use them most effectively. He knows how to deal fairly with issues that arise in classroom management and communicate techniques that generate educationally effective and safe environments.

D. Pedagogical Content Knowledge

Pedagogical content knowledge refers to knowledge that the teacher must have to be able to teach the subject matter. This type of knowledge is complex with many interacting aspects included under general pedagogy. An effective mathematics and science teacher does not only have a strong background of his subject matter but also knows how to develop learners' deeper understanding of subject matter. He is aware of suitable mathematics and science goals and learning programs for his students, knowing that these will necessitate change over time depending on the circumstances of learners and other relevant factors. He knows a wide range of ways in which learners are likely to learn mathematics and science best, building on prior knowledge and experiences and mental constructs to introduce new experiences and ideas. He knows how to engage learners in discussions so that he clarifies and develops their understanding of scientific concepts under investigation.

E. Knowledge of the Curriculum Structure and Materials

Curricular knowledge refers to knowledge of the place of mathematics and science in the basic education level, the interrelatedness of the content of mathematics and science across the mathematics and science discipline and with other curricular areas, and the quality materials needed to support the curriculum. An effective mathematics and science teacher understands the philosophy and the place of mathematics and science in the structure of the overall curriculum at the basic and advanced education levels. He knows the content and connections of mathematics and science across the different mathematics and science disciplines at the basic and advanced education levels and with other curricular areas. He understands that the mathematics and science education needs of all students are different from the mathematics and science education needs of students who have an interest in scientific careers. He knows laboratory equipment, tools, and other instructional materials to be able to work with students with varying learning needs. He knows the characteristics of good mathematics and science textbooks and other instructional materials that would bring about meaningful learning of students.

III. Professional Practice

This category outlines what teachers are expected to do to achieve quality learning outcomes - the objective of mathematics and science education. It also expects teachers to work with the learners, colleagues, parents and other community members to

achieve this objective. The teaching practices listed include those that are unique to mathematics and science teachers as well as those desired for all teachers.

1. Designs Sound Mathematics and Science Teaching and Learning Experiences Suitable for the Needs and Interests of Varied Learners

An effective mathematics and science teacher clearly sets attainable goals to give mathematics and science learning its purpose, focus, and direction. He organizes the areas of mathematics and science he is teaching into conceptually logical teaching and learning experiences or lessons appropriate to learners. He demonstrates links across mathematics and science disciplines and with other subject areas. He develops series of stimulating activities related to the learning goals to engage learners to mathematics and science. He uses real-life context to make mathematics and science learning more meaningful and to enable learners to make connections with their personal experiences. He uses a wide variety of human and physical resources to enrich students' learning of mathematics and science. He integrates Information Technology into teaching and learning mathematics and science lessons and makes students become confident and effective users of technology. He uses the materials and events in the immediate and natural environment to provide rich and relevant experiences for mathematics and science students during field trips and excursions. He knows where to find relevant mathematics and science information and teaches students to access them. He is able to evaluate the strengths and weaknesses of a range of available teaching learning mathematics and science materials and use them appropriately. He makes use of students' experiences and backgrounds in developing mathematics and science concepts and ideas and recognizes that students can be teachers as well as learners. He practices with effective teachers of other subject areas. He does initiates and implements desired change to achieve student outcomes. He challenges learners at the appropriate level and is alert at differences in this regard. He responds to the needs of learners, recognizing that these needs are affected by the learning styles and backgrounds of the learners. He draws on the expertise of colleagues, and relevant parents and other community members in improving the learning process. He is able to identify which business sectors in the community will be useful in enriching the teaching and learning of mathematics and science and how to engage such sectors.

2. Creates and Maintains a Learner-Centered, Emotionally Supportive, and Physically Safe Learning Environment

An effective mathematics and science teacher clearly states what is to be learned in mathematics and science in a particular course. He pays careful attention to the knowledge, skills, attitudes, and beliefs that learners bring to the mathematics and science classroom. He allows students to ask questions, discuss possible answers to the questions, and make decisions based on independent judgment, and to reflect on the consequences of the decision. He engages students in the learning process and guides them to progress from simple acquisition of factual mathematics and science knowledge and skills to conceptual understanding, to analysis and reasoning skills. He creates and sustains a challenging, relevant, exciting and varied learning experience that reflects the nature of mathematics and science. He models the passion and interest implicit in making mathematical and scientific discoveries, however simple the

investigation is. He allows students to pursue a diverse range of learning mathematics and science activities even if they are doing the same tasks, including those that they design on their own. He ensures that intellectual risk taking and persistence are actively fostered when students work in new situations and undertake new experiences. He practices safe and proper laboratory techniques for the preparation, storage, dispensing, supervision, and disposal of all science materials used in teaching and learning. He is able to assess risks constantly and ensures that routines are established to ensure safe practice while performing mathematics and science activities or when events like earthquakes, volcanic eruption or fires occur while students are in university. He has a classroom safety plan in place and rehearses students to ensure familiarity with its various aspects. He practices what effective teachers of other subject areas do. He designs and maintains a learning environment where all students, regardless of diversity of their backgrounds and capacities, feel valued and comfortable. He observes fairness and respect for the viewpoints of others and uses the diversity of learners as a learning resource to develop differing perspectives and understandings. He establishes a warm and supportive relationship with students, building on mutual respect, cooperative behavior, and a sense of community. He deals with arguments and conflicts fairly and respectfully, enabling students to get involved in maintaining good behaviour and establishing limits to what they are allowed to do.

3. Engages Students in Scientific Investigations to be Able to Generate, Construct, and Test Knowledge and Evaluate Evidence

An effective mathematics and science teacher involves students in conducting varied types of scientific investigations to expose them to diverse ideas, resources and technologies. He teaches and models practices that allow students to analyze knowledge and experiences critically, recognize problems, ask questions, and pose solutions. He is a risk taker who is willing to live with unpredictable consequences of open-ended activities. He guides students to become independent learners by progressively stepping back to allow more student-directed scientific inquiry. He develops students' curiosity and openness to new ideas, the demand for reason, honesty and objectivity, and acceptance of the tentative nature of scientific knowledge. He guides students in active inquiry- observing and measuring phenomena, formulating hypotheses, recording tasks, and reaching tentative conclusions consistent with data collected. He guides students to reflect on the results and consider ways to refine the investigation, helps them analyse and evaluate the evidence they have collected and checks the validity of their findings. He makes it clear to students that, before knowledge can be accepted as mathematical, scientific, reliable, and a basis for action, these data must have supporting evidence that has been or can be reproduced by others. He practices what effective teachers of other subject areas do. He uses varied strategies to increase students' ability to process information from a wide variety of sources including print, internet, discussions and media reports to be able to participate in discussions, and ask effective and appropriate questions; and provides students with opportunities to develop competencies in the use of technology in authentic contexts, and enables students to be in control of the technological tools, whenever possible.

4. Finds and Implements Ways to Extend Students' Understanding of the Ideas and Concepts being

Learned

An effective mathematics and science teacher shows the connection and coherence between information acquired and their daily life applications. These connections draw on students' everyday events, current topics, and other curricular areas to establish the relevance of science to students' lives. He is able to trace and use examples to show how mathematics and science ideas evolved and change over time to ensure that students understand that mathematics as well as science is dynamic. He builds on students' prior knowledge and understanding and incorporates these aspects into mathematics and science teaching. He creates environments that promote sustained high quality opportunities for all learners through purposeful discussion about mathematical and scientific ideas. He knows that language is the gateway to learning and the teacher ensures learners that there are many opportunities to use that language to construct their own meanings and to grapple with new ideas. He enables students to understand that scientists use language in particular ways where certain words have precise meanings in mathematics and science and that these meanings may differ from everyday usage. He helps students to express and clarify their growing understanding of mathematics and science concepts and communicate these using a range of forms and technologies. He provides strong links to literacy, numeracy and interpersonal and communication skills and regularly pose tasks and questions to students to heighten their awareness of the different discourses in mathematics and science, in mathematics education, in science education, and in the communication of mathematics and science to different audiences. He utilizes successfully the unplanned learning opportunities that arise in the course of the lesson development. He communicates enthusiasm and interest while being able to draw out and explain relationships of mathematics and science to other learning areas and make the whole coherent. He practices what effective teachers of other subject areas do. He maintains a high level of student engagement using flexible approaches, changing strategies to solve particular learning problems that arise as a group or as individuals; and is prepared to tackle societal issues that emerge and seeks relevant parts of student experiences to elucidate what is being learned.

5. Builds Students' Confidence and Capacity to Use Scientific Knowledge and Processes to Make Informed Decisions

An effective mathematics and science teacher exposes students to varied learning situations to make them at ease with mathematics and science as part of daily life, giving them opportunities to continue to learn mathematics and science, engage with mathematical and scientific processes and communicate about them. He ensures that their teaching enables students to develop and enhance their habits of mind including being critical and creative thinkers and become lifelong learners. He provides learners with opportunities to identify relevant mathematics and science topics and including personal and social issues and reach evidence-based decisions and make them realize that some problems often do not have one correct answer. He uses strategies that develop divergent thinking and models creative and ingenious ideas in searching for evidence. He explains clearly interdependent relationship between mathematics and science and technology and society and the links that mathematics as well as science has with other areas of knowledge and ways of knowing. He considers mathematics and science and technology as interdependent human experiences with costs and benefits and

emphasizes the development of their students' understanding of both the power and limitations of mathematics and science. He encourages students to read newspaper and magazine articles about mathematics and science, to follow TV programs on new advances in science with interest, to critique articles and reports about mathematics and science, and to engage in discussions about the validity of any conclusion made. Students gather information using varied means: electronic via email and the internet and are able to critically evaluate this information for bias and accuracy. He explores with students ways in which societal and cultural beliefs and values have shaped mathematics as well as science and decisions about its applications. He focuses on new and emerging ideas and technologies and the ethical issues arising from them, enabling students to exercise their skills responsibly and participate effectively in public debates. He increases students' understanding of the impact that current decisions have on future directions of Mathematics, Science, Technology and Society.

6. Uses a Wide Variety of Strategies Consistent with Learning Goals to Monitor and Assess Students' Learning and to Provide Effective Feedback

An effective mathematics and science teacher uses assessment as an integral part of teaching and learning process. The assessment procedures chosen are coherent with the goals of mathematics and science learning experiences. He practices what effective teachers of other subject areas do. He recognizes the different purposes of assessment, making them explicit to students along with the process and criteria for judgment. He draws on formal and informal assessment strategies to guide in planning and developing units of work, gauge the progress of students individually and as a group, and review the nature of the teaching and learning process. He utilizes assessment to help students reflect on their own progress and to provide summative accounts of progress made in relation to the goals that have been set. He assists students to use self and peer assessment strategies to make them reflect on their progress and be responsible for their own learning. He makes use of an extensive repertoire of formal and informal assessment strategies and justify why that strategy is used, recognizing that good assessment tasks are good learning experiences. The multiple methods ensure reliability and validity of assessment data and enable the teacher to explore and identify the full range of students' understanding and capabilities. He keeps careful and thorough records of students' progress, uses these records of progress together with samples of work to aid two-way communication with their students and students' families. He recognizes the different reporting requirement of parents, education agencies and certification authorities. He develops portfolios of student achievement which illustrate and exemplify what students know and can do and the progress students have made. He uses assessment as part of the general process of evaluating the quality of their own work and identifying where improvements can be made.

IV. Professional Attributes

Professional attributes are those characteristics that enable teachers to embrace change to develop and improve teaching practice as well as sustain professional growth. Professional attributes include modelling mathematical and scientific inquiry skills and scientific attitudes. These attributes include being reflective, committed to improvement, and becoming active members of their professional community.

A. Analyses, Evaluates, and Refines Teaching Practices to Improve Student Learning of Mathematics and Science

An effective mathematics and science teacher regularly and critically analyses the strengths and weaknesses of his teaching practices, changing them if needed to improve student learning. He reflects on the extent to which the goals for student learning have been met, recognizing patterns in student interactions, and gathering evidence about problems that students may have in learning mathematics and science. Information have to be regularly collected from students and their work or from colleagues who can help evaluate the effectiveness of the teaching methods, analysing them for their implications to future practice and acting on the implications. He sets long term goals for his own professional growth, identifies areas where improvement is needed and seeks the appropriate professional development activities to meet them. He analyses and reflects on his teaching practices using examples of students' works and teaching methods used. He uses these opportunities to compare their students with relevant goals and standards for learning. He uses a variety of means to meet his own goals for professional growth to include: learning from colleagues through collaboration on professional tasks and seeking advice from other teachers on matters related to teaching and learning; reading professional literature to remain up to date on issues and developments in mathematics and science education, using Information Computer Technology to access information and collegial interaction. He seeks resources and ideas from outside the university and assesses their value through reflection and professional judgment prior to and after their use and subsequent evaluation. He models the development and improvement implicit in lifelong learning along with risk taking and flexibility entailed in the testing of new ideas and changes in practice.

B. Works with other Teachers within the University and Joins Professional Teachers and/or International Organizations to Improve the Quality and Effectiveness of Mathematics and Science Education

An effective mathematics and science teacher is an active member of professional mathematics and science teacher organizations. He is a team player, recognizing that the quality of mathematics and science education is dependent on the strength of the professional community and on how this community facilitates frequent conversation about practices and student progress. He helps in the professional growth of colleagues, keeping abreast of current mathematics and science knowledge and developments in mathematics and science education, actively participates in workshops and other learning activities, and passing on useful knowledge to colleagues. He contributes to the development and evaluation of the mathematics and science curriculum and teaching programs in university. He provides accurate information about the university teachers and the mathematics and science program and offers suggestions to international community members on how the latter can support the students' learning in mathematics and science. He conducts his own research on mathematics and science teaching and learning and shares the results with others. He practices what effective teachers of other subject areas do. He acknowledges that seeking and giving collegial advice are not signs of incompetence but rather professional action viewed as desirable to acquire new skills. He is active in professional development in and outside of the university, helps in designing and implementing programs, gives talks and serves as resource

person or trainer, writes articles in journals, develops new teaching materials, and participates in research projects. He is able to establish effective relationships with teachers in their university and other universities, with significant international community members who share the same interest in improving the teaching and learning of mathematics and science.

V. Conclusions

While the standards under these domains in the university are generic for all teachers, this document presents specific competencies and behaviour of mathematics and science teachers in three categories: professional knowledge, professional practice and professional attributes. The standards for mathematics and science teachers demand bold, flexible professionals equipped with quality teaching practices. The standards will guide them to work towards an in-depth knowledge and pedagogical understanding of mathematics and science subjects they will teach. In addition, the standards will help teachers elevate their level of commitment to the education and wellbeing of students, background, level of ability, or style of learning, increase their understanding of how students learn and develop, and assist in adapting teaching and assessment to student needs. Likewise, they will enhance teachers' skills in classroom management, instructional methods and strategies, including technology, and use of various types of assessments to analyse students' progress and plan instruction. They will build up a collaborative approach to relationships with colleagues, universities, cultural institutions and the broader community of interest in education, and step up dedication to lifelong learning and professional development. These expectations require reflection and even redefinition of the nature of work of educators and in service training providers to strengthen the knowledge and skills of teachers. Opportunities need to be provided to support development of these competencies before the standards enter into the evaluation of mathematics and science teachers.

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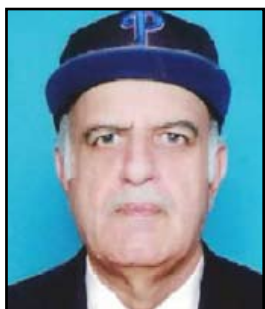
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Author Profile



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I completed B.Sc. degree in Mathematics and Physics from the University of Punjab, Lahore, Pakistan in 1972. I completed M.Sc. in Mathematics and M.Phil in Mathematics in 1975 and 1976 respectively from the Quaid-i-Azam University, Islamabad, Pakistan. Soon after my graduation in the same year, I started teaching as a lecturer in Mathematics at the same

University. In 1980 I obtained DAAD scholarship and worked as a research fellow at the University of Osnabruck, Germany, for a period of two years. I had been teaching different graduate courses including Topology, Real Analysis, Complex variables, Functional Analysis, Group Theory, Linear Algebra, Rings and Modules, Ordinary Differential equations at the Quaid-i-Azam University. In 1985 I obtained Canadian International/University of Alberta Scholarship and started my Ph.D. in Mathematics at the University of Alberta, Edmonton, Canada. I completed my Ph.D. in Mathematics in 1989. Then in the same year I joined Northern Illinois University, DeKalb, U.S.A. as a teaching assistant. In 1990 I joined the University of Southern Maine, Portland, U.S.A. with the same teaching assistant position. In 1991 I joined King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia, as an Assistant Professor of Mathematics. I had been teaching General Topology at the Graduate level and different courses of Mathematics including Advanced Calculus, General Topology, Calculus, Ordinary Differential Equations, Finite Mathematics, Algebra, Trigonometry, Linear Algebra, Business Calculus and Probability and Statistics at the Undergraduate level. During my career of twenty years at KFUPM, I published

about forty research papers in Topology, Algebra and Statistics in International Journals. I published about thirty Technical Reports in the Department of Mathematical Sciences at KFUPM. I also completed a few research projects in Topology and Probability & Statistics. I have participated in more than two hundreds national and international workshops. I have given several seminars at KFUPM. I also participated and made presentations in about twenty national and international conferences. I have examined six M.S. Dissertations in Topology at different Universities in Saudi Arabia as an external examiner. I had made contributions in several committees and technical groups consecutively at KFUPM. I joined Prince Mohammad Bin Fahd University, Al Khobar, Saudi Arabia August 17, 2016 as an Assistant Professor of Mathematics in 2011. I have published more than ten research papers in International Journals during the last five years. I have taught different courses in Mathematics and Statistics including Linear Algebra, Statistical Methods, Introductory Algebra, Business Calculus for Business Students, Calculus – I, II, III, and Ordinary Differential Equations.

Education

Ph.D. Mathematics (1985 – 1989) University of Alberta, Edmonton, Canada.
M.Phil. Mathematics (1975 – 1976) Quaid-i-Azam University, Islamabad, Pakistan.
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Teaching Experience

27 August 2011 – Present: Assistant Professor, Department of Mathematics and Natural Sciences, Prince Mohammad Bin Fahd University, P.O. Box 1664 Al-Khobar 31952, Saudi Arabia.
15 April 1991 – 31 August 2011: Assistant Professor, Department of Mathematics and Statistics, King Fahd University of Petroleum and Minerals, Dhahran 31261, Saudi Arabia.
01 September 1990 – 14 April 1991: Teaching Assistant, Department of Mathematics and Statistics, University of Southern Maine, P.O. Box 9300, Portland, U.S.A.
01 September 1989 – 31 August 1990: Teaching Assistant, Department of Mathematical Sciences, Northern Illinois University, DeKalb, U.S.A.
01 September 1982 – 31 August 1985: Lecturer, Department of Mathematics, Quaid-i-Azam University, Islamabad, Pakistan.
01 September 1980 – 31 August 1982: Research Fellow, Department of Mathematics, University of Osnabruck, Osnabruck, Germany.
01 October 1976 – 31 August 1980: Lecturer, Department of Mathematics, Quaid-i-Azam University, Islamabad, Pakistan.
01 January 1976 – 30 September 1976: Lecturer, Department of Mathematics, Gordon College, Rawalpindi, Pakistan.
01 September 1975 – 31 December 1975: Senior Teacher, Department of Mathematics, Islamabad College (For Boys), Islamabad, Pakistan.
01 January 1973 – 31 August 1975: Teacher in Mathematics (Part Time), Department of Mathematics Asia College, Islamabad, Pakistan
Membership in Professional Associations
American Mathematical Society. (1985-89; 1995 to date).
Punjab Mathematical Society. (Life Member, since 1976)
Islamic Society of Statistical Sciences (ISOSS). (Life Member,

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All Pakistan Mathematical Society (Life Member, since 1976)

Dhahran Geo-Science Society (DGS) (Member, since 2005).

KSAALT – Kingdom of Saudi Arabia Association of Language
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