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Impact of Six Sigma Practices on Teaching-Learning Effectiveness: A Case Study of the University of Okara



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Abstract: *The study aimed to assess the impact of implementing Six Sigma practices on teaching effectiveness. This exploratory research, conducted at the University of Okara, centred on teachers from various departments. Qualitative data was gathered via semi-structured interviews and analyzed using thematic analysis. The findings revealed that faculty members were unintentionally addressing three phases (define, measure, and analyze) of the Six Sigma process due to a lack of awareness. Students were knowledgeable about their educational standards and rights, and their issues were addressed when communicated. However, the remaining two phases (improvement and control) of Six Sigma were neglected by university teachers, with quantity taking precedence over quality. Teachers acquainted with Six Sigma practices demonstrated greater teaching effectiveness. The study recommends raising awareness among teaching staff about Six Sigma practices and ensuring their implementation for better outcomes. Expanding the data collection scope for result triangulation is also suggested.*

Key Words: Six Sigma, Education Quality, Teaching Effectiveness

Background of the Study

In this competitive age, quality teaching and educational performance have become the prime issue of universities (Yu & Ueng, 2011). Every educational organization especially university are striving for the best quality products to compete in the world (Brusoni, et al., 2014). The present era is the age of science and technology; in which every organization is trying to compete with each other. The same is the case of universities, in such

situations, there must be a keen eye on the performance of our higher educational institutions (Yu & Ueng, 2011). As an important phenomenon, quality can be achieved by applying quality control tools in the hands of educational professionals Brusoni, et al., 2014). Motorola introduced Six Sigma in the mid-1980s and it was only based on strategies for better quality. Six Sigma has been flourishing day by day since the last decade of the 20th century in every field, i. e.

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Citation: Farooqi, M. T. K., Khalid, M. N. & Shafiq, A. (2023). Impact of Six Sigma Practices on Teaching-Learning Effectiveness: A Case Study of University of Okara. *Global Social Sciences Review*, VIII(II), 657-670. [https://doi.org/10.31703/gssr.2023\(VIII-II\).58](https://doi.org/10.31703/gssr.2023(VIII-II).58)

healthcare, business, engineering, education, etc. (Aboelmaged, 2010).

Sigma is a Greek word with the symbol σ which means to achieve high quality in the manners of services, processes, and products. It consists of different methodologies including define, measure, analysis, improvement, and control. These strategies are mostly used in business but here these are used in terms of education at the university level (Patil et al., 2006). In educational institutions, the quality of education must be checked through different methods. Education has become an economic industry in which students are the "product" while teaching materials or methods are the "services" that are provided by instructors according to the interests of stakeholders (Yu & Ueng, 2011).

Six Sigma is a continuing process of the development of quality and performance management processes. It can be seen in the education system as the accumulation of values and procedures established for progress (Knowles, 2011). It can decrease faults and discrepancies in the process, raise the bottom line, and more. By using DMAIC (Define, Calculate, Evaluate, Improve, Control), which is the most common technique in Six Sigma, the quality standard can easily be achieved. Moreover, Six Sigma is the best solution for solving problems in any organization where the root cause is unknown. Capability analysis, Design of Experiments (DOE), Control Charts, etc. are some of these methods and techniques. The use of these tools and techniques depends on the essence of the issue and the skills needed to make effective use of them (Svensson et al., 2015).

From an academic perspective, service quality seems to be a stimulating issue. In organizations, enhancing quality service is a complex phenomenon, i. e. infrastructure, service systems, employee selection, training, and incentive systems. It requires learning how these steps can be applied and how to transform operations into sustainable change. Many studies have been conducted in the last few decades, e.g. "Constructs of Quality in Higher Education Services". It only provides literature on Six Sigma and has no specific methodology or suggestions

for future research (Sunder, 2016). Another Research "Understanding and evaluating teaching effectiveness in the UK higher education sector using experimental design" was a case study using experimental design. It experimented on students for two years continuously. This study provided the students' perception of teaching effectiveness but on the other hand, it does not provide a clear picture of what techniques are used by the teachers (Antony et al., 2019). "Quality Management in Higher Education: A Review of International Issues and Practice" is comparative research at the international level. This study provides a review of what quality measures have been done for the quality of the higher education system and which are to be addressed (Brookes & Becket, 2007). A study conducted in the 20th century "Multi-models of quality in education" reveals that several quality models are adopted in the higher education sector but each model has its strengths and weaknesses. There is no single model that has zero chance of error, that's why there is always a need for different and interactive models of quality management strategies (Cheng & Tam, 1997).

All the above-mentioned research works are quantitative or these studies provide one side picture of the higher education system that is the perception of students or the view of the whole education system. Due to this perception of students about Six Sigma and quality education, there is a dire need to assess how the latest indicator of quality Six Sigma is being applied and how it affects the teaching process in the eyes of university teachers. As described earlier, the available studies were quantitative, hence the researcher feels it important to conduct a qualitative study on the said topic to have a more in-depth understanding. Moreover, there must be literature providing details about the implementation of Six Sigma in the higher education sector. That's why this study is purely qualitative and interview is used as a tool for data collection.

The current study is a case study through which the researchers tried to cover up the gaps presented in previous research. In recent years, higher education has been the most flourishing sector of Pakistan. At the university level quality

management strategies (QMS) i.e., TQM and Six Sigma should be used to make the education system more effective. Effective teaching includes the characteristics of the teacher and the teaching process as well. Teaching effectiveness can be enhanced by using Six Sigma strategies (Define, Measure, Analysis, Improve, and Control). DMAIC is the model of Six Sigma and is an innovative form of PDCA. DMAIC is more acceptable than PDCA because of its innovation and it also meets the needs of the current age.

Purpose of the Study

Education is the basic right of human beings under Article 25-A constitution of the Islamic Republic of Pakistan (Ullah, 2020). Not only education but also quality education is direly needed following indigenous as well as international requirements. This is thought-provoking how can we achieve international standards through quality education as our quality education across the phases, especially at higher education is always under the question mark. It is affirmed belief of all Stakeholders that quality education is the most powerful tool for sustainable development. Thus to measure the quality of higher education and to analyze the application of Six Sigma at universities in Pakistan is direly needed. In this way, the current study is planned to explore the application of Six Sigma practices as well as to determine the impact of these practices on teaching effectiveness.

Significance

The study at hand has prime importance in education as the study will explore the utilization of Six Sigma practices in higher education. It will provide a real picture to teachers about their teaching effectiveness which will help them to improve their teaching strategies. This study will give an overview to the stakeholders of education on what is going on inside the educational institutes regarding the quality of education. University is the place where students spend approximately 1/3 time of the day and this study will also show the effect of education that how the standards of higher education are affecting students' personalities. Moreover, the study is a true representation of the quality of education at

the higher educational level. This research will suggest a direction to administrators on how strategies for teaching effectiveness can be moulded for better and more effective outcomes.

Methodology

It is an exploratory study with a Case Study design to investigate the effect of Six Sigma practices on teachers' teaching effectiveness at the university level. According to Hollweck (2016); and Yin (2013), a case study can be defined as "an empirical inquiry that investigates a contemporary phenomenon (the 'case') in-depth and within its real-world context" Case studies provide the researcher with an opportunity to obtain a profound and holistic view of the research problem and it provides a research issue or scenario may be easier to describe, understand and explain (Baskarada, 2014).

The respondents for this research were members of faculty from different departments of the University of Okara, Punjab. The researchers purposively selected Faculty members of various departments of the University of Okara. The details of the respondents are as under:

The selected sample was comprised of both male and female teachers. A semistructured interview was used. According to (Creswell, 2007) an interview provides vastness to the ideas of the researcher and allows them openly to share their ideas or thinking. The application of Six Sigma practices in education is not common and the teachers have little knowledge about its fundamental ingredients. A semi-structured interview was used because little knowledge was known by the sample and much more was to be discovered/explored. According to Kallio, Pietila, Johnsons & Kangasniemi, (2016), the key benefit is that the semi-structured interview is beneficial in allowing equality of opportunity between the interviewer and the participant to make it possible for the interviewer to improvise follow-up questions based on the answers of the participant. These interviews were recorded/ audio-taped then listened cautiously and transcribed into Word documents. After transcription, these were read carefully and the data was coded into themes that presented the views of whole the population.

Data Analysis

The thematic analysis technique was used for data analysis, i.e., the same set of thoughts are merged and themes are formed. This process is known as thematization. Thematic analysis is a method of qualitative study that can be commonly applied to several epistemologies and questions of research. It is a technique contained within a data set for recognizing, evaluating, arranging, defining, and reporting themes.

Trustworthiness

A study's trustworthiness or rigour refers to the degree of trust in data, analysis, and methods used to ensure a study's quality. Lincoln and Guba (1988), stated that trustworthiness is the method or trick to persuade the reader towards research findings. This study considered four points of trustworthiness criteria (credibility, transferability, dependability, confirmability) suggested by (Lincoln & Guba 1988). These were ensured through member checking, peer debriefing, clearly stating the procedures and context of research, and providing actual quotes of respondents where necessary.

Ethical Considerations

The dignity, rights, safety, and well-being of the participants must be the primary consideration in any research study (Stevens, 2013). In this study, valued research ethics were followed. Before conducting the interview the researcher developed a rapport and friendly environment with the participants so that, a conducive environment may be developed for better sharing of ideas without any fear of being harmed in any sense. Formal consent was presented to all the participants. Moreover, the identity of the participants is hidden with coding, and their ideas are shared in a general manner as the whole faculty members of the University of Okara.

Results

These themes depict the real picture of the higher education sector at the University of Okara.

Teaching Goals/ Strategies

In the higher education industry, education is not

only the process of delivering a lesson or some curriculum. It is the industry in which real assets having core knowledge are produced in the form of educationists and philosophers.

Respondent "A," said that,

"To achieve the targeted goal there must be some integrated methods of teaching. In universities, classroom teaching methods are moving towards blended learning having diverse teaching methods such as student-centred, teacher-centred content-centred and interactive/participative methods".

Basically in classrooms at the university level, only a single method could not be enough for whole the class because students have much technology in their hands and enough ability to question and understand the concepts taught to them. Every student is not of the same calibre to pick the given concepts by the teacher that's why students must be dealt with separately in the same classroom by different teaching methods. This is the duty of the teacher standing in front of them who has the great experience and ability to tackle the students' minds and question aroused from them. The teaching method could be different in the same class for if a teacher is recalling the previous lecture then it could be a question-and-answer session. If a teacher is delivering a new lecture with having new topic then the method could be teacher-centered and if the topic is known to students then it must be a discussion or interactive method to recall the long-term memories in their minds. Sometimes it happens that students may ask the question again and again then the teacher will again answer them having the same or different teaching strategy keeping in mind the mental level of the student.

Respondent "B" shared the experience that in a classroom,

"Students at university level are engaged to their peak level to get maximum output from them. Generally discussion method is adopted using a projector. One picture speaks a thousand words".

At the university level, students do not keep the beaten path as they were in school or college having the habit of rote learning. Now they are at the level where only some chunks of knowledge

are given to them and they can relate their previous knowledge with the new one. Here the teacher can avail the discussion method in the most appropriate manner. In university classrooms most lectures are delivered using multimedia, projectors, or any other AV aids and the knowledge imparted to them has examples from real-life situations. When examples are from the real world and especially from their environment in the form of pictures then the lecture method is not of any need because the picture has already interrupted their mind and thoughts. Here the need of a teacher or instructor is only to instruct the thoughts of students on the right path which may lead them to the right destination which is the understanding of the topic of the day.

According to Interviewee "D",

"Teaching goals should be set for teaching effectiveness to get maximum output with minimum input. The teaching method should be interactive and in this manner, the discussion method is more appropriate than the lecture method".

Teaching is not only a profession of the teacher who helps the students to acquire knowledge but a teacher is also the spiritual father of students. A teacher must help the students to compete for the world not only to get good grades and this is only possible when teacher and student have interactive interaction in which both of them are easy to share their problems whether about education or any other problem. All this would be possible when in classrooms the teacher is friendly but has limits.

Another interviewee "X" argued that,

"Despite all interactive teaching methods, there are some ground realities as the students are from different backgrounds, having variant mental understanding, and values. "Student is free from boundaries to get knowledge". So that logical or critical thinking could be enhanced among them. The discussion environment is provoked by giving them partial knowledge to create curiosity of knowledge in them".

The University of Okara is a newly established university and is flourishing by leaps and bounds in days. Its enrolment is multiplying

with each new academic year. On the other hand, there are some ground realities as well such as the university is in its preliminary stage and is surrounded by rural and urban areas from where a large number of students are enrolled here. All of them have a different family background, local/native language, and geographical differences which cause a huge distinction in their learning power. Sometimes second language barrier becomes the most difficult task to cross and understand the lecture fluently. Students hesitate to participate in the classroom due to their accent or difficulty in using a second language. In this situation, a teacher must be interactive and affectionate to them. Students are free to learn from their surroundings whether through formal or informal education. In these scenarios, teachers provide coherent experiences to further expand their concepts.

One of the best experiences for higher education students is getting the ability to think openly and challenge the ideas of other students with their ideas. A precious, invaluable quality that helps students as they pass through life is the ability to think objectively and reason logically. Thus, the cornerstone of higher education is to teach and improve the critical thinking abilities of students (Yang, 2007). M.phil and Ph.D. scholars are not students who made lame excuses in their assignments. These are the scholars who are going to explore the new knowledge and make great contributions to already existing literature. At this level, teaching sessions are not one-way communication. It seems one way but actually, it's not. The teaching process is a teaching-learning process. It is a productive, result-oriented process not only for the students but a way of getting feedback from students for teachers. In another sense, teaching-learning is an assessment of both learner and student.

Interviewee "C" clarified that,

"At university-level teaching is not teaching the M.phil and Ph.D. scholars. In fact, a teacher is improving their learning experiences and giving a new direction to their thinking level".

When students come to university for higher studies they have already an average of 14-16 years of education in their previous study career.

Now at this stage, there is no need to teach them at the school level. Higher education only gives them a platform to explore their inner thoughts and ideas in the new world of knowledge.

Exploring Hidden Qualities

It is proposed that the degree of thought is affected by the level of questions posed during discussion sessions in the classroom. Such sessions induce the higher-level cognitive processes of students, which involve self-reflection, modification, social negotiation, and conceptual adjustment of a student, all of which are core-valued to higher education, reflective questions play an important role (Yang, 2007).

Interviewee "Z" described that,

"Directions are given by the teacher to provoke the hidden qualities and abilities of students. Here the capabilities of students are channelized for/through research, socialization social life, etc. Higher education must create insight in students to make them productive citizens".

A good teacher has enough knowledge and experience to direct the students' abilities positively for the betterment of students and society. In higher education, it is the responsibility of teachers and students to become productive citizens. This is only possible when teachers enlighten the pathway of students in the right way and enhance their abilities according to their interests then they are directed to create a big contribution to society.

Refreshing/Professional Courses for Teachers

Humans have a profound need to be actively interested in learning. However, the learning method as a result of the technological revolution, such as the introduction of online learning or higher education has undergone fascinating changes. Professional development courses have also been impacted by technological advances in learning. Recent developments in the professional development of teachers stem from an enhanced understanding of the importance of the role of the teacher, which affects the school, and improves

professional development: The attitudes of teachers in online and conventional training courses affect the quality of teaching and influence learners in different areas of their lives. Additionally, teachers are the most significant element in the achievements of their students. There are many ways of professional development for teachers, including university courses, local and national conferences, seminars, and advanced institutions (Wasserman & Migdal, 2019). The current era is technology-oriented and the demands of time are continuously changing. Today's education stresses the more reformed and new knowledge to meet the demands of time.

Interviewee "B," said that,

"Refreshing courses for teachers are neglected especially about QMS (Quality management Strategies) such as TQM (Total Quality Management or Six Sigma etc. "Student/customer is the king of market". There is no training or refreshing courses in the manner of Six Sigma and nobody is consciously known of this term. Teachers are also ignorant of the inclusion of Six Sigma in education".

Re-fresh means to get fresh again and again as there is a need or demand of time. Teaching is the base from where the knowledge is being transmitted to our generations. If their knowledge is not revived then how is it possible that they could make the revolutionized future for the next generations? The conditions of Higher education in Pakistan's culture are miserable because it is thought that once a person gets higher education then there is no need for further education and he/she has the whole knowledge. But this is the wrong perception and it is quoted in the Qur'an:

"Seek knowledge from cradle to grave".

Then how is it possible that the same knowledge is enough for the rest of the centuries? At universities, there is no focus on training the new teachers and refreshing the teaching methods and knowledge of older ones. No attention is paid to maintaining the quality of education at the university. There are no refresher courses for teachers to keep abreast of new knowledge. Our education system is a part of quality strategies, especially about quality such as total quality management and the Six Sigma approach. The Six

Sigma approach is a business term but if it is used in the education sector then it would be much more fruitful for the whole sector in maintaining quality and having high benchmarks with minimum defects or gaps. But the bad luck of our institutions is that nobody pays attention even to quality and we are far apart from other strategies taken for quality of education or teaching effectiveness.

Interviewee “D” described that,

“There are online training but no courses are available at a university campus”.

Teachers are conscious about their teaching methods and the modernization of those methods that's why they attend online training regarding Six Sigma or other quality strategies on their own but no offers are available in a concrete situation that is at the university level. There is a tremendous need for such programs, offers, workshops, or seminars for the renewal of teaching methods for teaching effectiveness.

Another interviewee "X" further added:

“New hiring or visiting faculty is only told how to assess in the classroom but no instructions are given about teaching method”.

Teachers told the bitter reality about the real situation that newly hired faculty members or the visiting faculty are only told the method of assessment in the classroom instead of the level, standards, benchmarks, or goals of teaching methods that have to be achieved. Teachers come and teach as they wish; no standard methodology is implemented to achieve the targeted goals.

Arguments made by the interviewee “D” and “X” are opposed by the interviewee “Z” that,

“Different educational workshops and seminars are held especially for teachers and students of M.phil and Ph.D. at university or department level. Foreigners also visited the university from France, Germany, England, America, and China to train the scholars for improved writing and teaching skills”.

The university has different departments and each department holds its workshops whether on weekly or monthly intervals. At the university level, there is a special designation for the director of external linkages who invites foreign

researchers and authors in the university to share their experiences for better skills in research here. Students and teachers have great inquisitiveness of knowledge in research and they get a lot of benefits from these workshops or seminars.

Respondent “Z” also said that,

“Students are the reflection of their teachers”.

The teacher is the role model in front of his students and students copy the teachers irrespective of the negative or positive impact of their character. Student reflects the qualities of their teachers which were indirectly incorporated into their minds.

Respondent “A” has a different opinion that,

"Teachers are not well refreshed and interested to refresh their knowledge as the need of time. 2-3 decades older books and outlines are used in the classroom. Even no help is taken from the internet so that their knowledge could be updated".

Some typical faculty members are stuck to their older methods of teaching that is a teacher-centered method and they don't feel the need to change them or their method of teaching. These teachers do not change the outline of course work even for many decades and this is the reason that their teaching does not meet the demand of time. This lack of updated knowledge also can be seen in their students when they are outside the university in practical life.

Centralized Policy for Quality of Academics

For the sustainable growth and functioning of an open and democratic civil society, a quality higher education scheme is necessary. To foster the autonomy of its citizens and to eradicate all kinds of ethnic social class conflicts and gender or religious prejudices, higher education is required to provide social norms of communication and interaction, such as philosophical thought and reasoning. A higher education institution that offers quality is a model for developing a modern civil society (Batoool & Qureshi, 2007). The endeavour to enhance quality in the Higher Education sector is not very focused. Only 50% is focused and the rest is neglected. The HEC in

Pakistan makes concerted decisions. Efforts to increase the quality of higher education and to bring higher education to conform with international standards of high-quality teaching, learning, study, and service provision.

The 1st educational conference was held in Karachi in Nov- Dec 1947. The father of the Nation Muhammad Ali Jinnah in his message to the Conference said:

"We should redouble our efforts to make teacher education rich. This will strengthen the system of education and in this way, we can raise the status and honour of Pakistan in the community of Nations"

In educational practices, the teacher is a crucial factor. The world is complex and information boundaries are expanding in all directions. Likewise, the strategies and ways of giving/imparting information are also evolving. Teachers should be mindful of emerging innovations and technologies in the field of education(Khan, 2015).

According to respondent "C" in the higher education sector

"Quantity is focused instead of quality. In most universities, there is no special mechanism for quality assurance, and this purpose generally observed by peers is done. Secondly, to maintain quality delivery of content is checked that, to what extent content of the curriculum is delivered. A local survey in Pakistan shows the reality that only 30-40% of the content of the curriculum is covered in universities of Pakistan and the rest is left".

In Pakistan, most of the higher education organizations are at the preliminary stage that's why only enrolment is focused and the quality is neglected. Once the quantity is achieved the focus point will turn to the quality of higher education. Most universities have no special means for the quality status of education. There are only some simple strategies to measure the benchmarks of education such as observation by peers which means, fellow's or teacher's observation in the classroom whether formal or informal. On the other side, it is checked the extent to which the outline of the course is covered. It is a common

thought that 100% delivery of content is the 100% achievement of quality; that is a wrong perception.

Quality management strategies are selected according to whether the faculty of the university is either visiting or permanent. The respondent "A" said that,

"Mostly in higher educational institutions visiting faculty is hired to a great extent and they think that, 'Whatever you teach in class who is here to check? Just came, only teach Earn money and go home. There is a need to develop a monitoring mechanism whether the faculty members are permanent or visiting"

In higher educational organizations a great number of visiting faculty members are hired due to many reasons such as financial or funding, material, and nonmaterial issues. However, visiting faculty do not take action according to the situation as the permanent takes. They think that permanent faculty is granted to take the responsibility but they are not. They have no responsibility. They are appointed here only to deliver the lecture without concern whether students got it or not. Most visiting faculty think that being a visiting faculty member is a bonus to earn money part-time. When they are free they come to the university just read out some lines from coursework and complete the formality of taking the lecture. It's all about their hectic routine of being a visiting faculty member at the university. Then they go back home and their salary reaches their bank account. This type of teaching is only the source of making money for them.

Another respondent "X" added to it that,

"Visiting faculty doesn't have any skills about teaching as well as their behaviour. There is also extreme need of ethical training for new coming teachers".

In every department, there is this type of visiting faculty member who has only the pieces of paper in the form of their degrees but actually, they don't have any skills to teach or how to behave or treat the students. Respondent says that there is not only the need for training about quality management strategies but also

behavioural training or sessions when new or visiting faculty are hired.

Conducive Environment for Change

By helping students grow in maturity, directing intellectual inquiry and learning, conducting research, and preparing students for profitable jobs, the higher education system contributes significantly to society. It should continue to help and strengthen these important functions. Besides, colleges and universities serve as repositories for critical financial and social resources, having the ability to influence society institutionally and collectively (Thomas, 2016). Higher education in Pakistan is flourishing day and night. Many universities are at a preliminary stage in higher education and their environment is much more conducive to accepting change, especially the positive changes.

Respondent "D" accepted that,

"Higher educational organization's environment is suitable for change but the actual need is to take steps at the individual level then a clear vision could be seen at organizational level".

Change is the term to make something new or better as to earlier. But it is more acceptable if it is taken in a positive manner. In any organization, there are always some gaps to be filled and also the margin to be improved. These gaps must be filled but for this purpose, measures should be taken individually. Change must be incorporated into the minds of employees then there will be a clear and better picture of having positive changes.

Respondent "Y" added on it that,

"There is no hindrance in implementing positive changes in universities. Quantity has been gained by the university and now we are moving towards quality".

The administration of the university is very cooperative to faculty members especially when any change is going to be applied by them for constructive effects. No doubt the focus of the administration department was to achieve quantity but now the preferences are going to be changed as the demand of time or race for quality.

Respondent "Y" shared his ideas that,

"The university environment is ready to accept change provided that we explain why this change is necessary for the university. Quality Management Strategies should be adopted at each step of the whole education system not only at academics or non-academics".

The initial stage of any educational organization has the significant possibility to amend the rules and regulations but the vision should be clear to every individual of the organization so that there would be no obstruction from them to adopt the change. Only the quality of academics or non-academics could not be ensured by the quality of the whole organization. That's why QMS should be adopted at the organizational level instead of the department.

Problems in Implementing Six Sigma

Implementation of Six Sigma in universities would be a drastic change in the educational environment its implementation will never be as easy as it seems. The major barriers to the implementation of the Six Sigma approach in educational organizations are Lack of resources, internal opposition, lack of top executive leadership, lack of Six Sigma awareness, insufficient organizational cohesion, cultural barriers, poor coaching, false notion that Six Sigma is too difficult to use, incorrect recognition of process parameters, etc (Raghunath & Jayathirtha, 2013).

Respondent "Z," said,

"First of all we have to tell people why we have to use Six Sigma then we have to arrange an orientation to impart information to our stakeholders then there will be some assessment that at which phase of Six Sigma we are. Resistance from senior faculty members is the main problem in the implementation of Six Sigma at the university level. Nobody gets ready to get training about the strategy".

The actual problem in the implementation of Six Sigma is the conflict between old and new change implementers. Faculty members already working in university are not ready at all to accept the reality that newly hired teachers are more equipped with new and reformed knowledge.

There is an intense need for faculty members to realise the actual reality or the needs of their surroundings regarding standards or updates in education.

Respondent "Y," said,

"Only administration cannot force any department to implement Six Sigma in the classroom but through LMS (learning management system) quality assurance can be acquired. If administration inculcates LMS in university then teachers will be bound to adopt the system and quality got achieved".

Teaching is not a one-way mode of learning. It is the two ways in which teacher and student both get learning benefits from each other.

Most of the universities have quality education cells to maintain quality and have a learning management system as well which is a detailed process of learning with quality. If LMS is adopted at the university level then teachers will be bound to adopt the whole process and quality of education can be achieved.

Respondent "Z" explained that,

"Implementation of Six Sigma could be problematic due to stereotypic personalities of our surroundings whether in or outside the university. When a planned theory of change is implemented for change, people react "Are we teaching wrong what we are already teaching?"

Inside and outside the university there is a lot of typical and particular type of people with fixed mindset or thoughts. They don't want to change their teaching style because they think they are perfect nobody is perfect here and there is always the possibility of improvement. Whenever the change is tried to be implemented such type of people reacts in weird manners that are we teaching wrong or we have insufficient knowledge? They don't want to change themselves at all. On the other hand within an organization, internal politics have a great influence on the attitude of such typical personalities.

There is a serious lack of trained teachers in higher educational institutions. There is no training for new teachers even if they have no professional courses to teach at a higher level of education.

Respondent "C" described that,

"If the implementation of Six Sigma is given to the admin office of universities then it will be fruitless because quality assurance is not a one-way or solitary process. It is seen that the admin of the universities is ignorant of real situations happening in classrooms how can this be solved? In the same way environment inside or outside the classroom is different and this can only be understood by teachers. That's why measures should be taken from top to bottom".

The teacher is the second most important personality in an educational environment and the first is the student. If their relationship is not firmly strong enough to understand the nature of each other then there will be no fruitful end to the education process. The teacher can only understand the psychology of his students and the problems occurring in a classroom environment. That's why only the administration of the university cannot ensure the implementation of Six Sigma or any other quality management strategy.

Respondent "D," said,

"Universities have an extreme lack of trained teachers in Six Sigma strategies. There is a need to train the teachers and motivate them to explain how we can improve our system".

A strong motto is needed to encourage the stakeholders of education so that the proper implementation of Six Sigma can be done. The education system should be reformed from top to bottom across the whole organization.

Respondent "X" further added on it that,

"Teachers must have a free hand in achieving quality assurance. Only admin cannot handle or implement any change in university".

Teachers should be free to take quality measures. There should be no hindrance to them in quality assurance. Teachers and administration should work with each other.

Findings

Most commonly all the interviewees responded that:

In classrooms of M.phil and Ph.D., mostly discussion method is used to facilitate both

teacher and student. In this way, a convenient/pleasant environment is created for better learning.

In a learning environment, the effect of teaching on students is highly kept in view of whether students are eagerly engaged in the classroom or not.

At the higher education level teachers are using different techniques on their own to enhance their teaching effectiveness.

Teachers are using the Six Sigma Approach to some extent but that is also unconsciously, such as teachers defining the problems of students taking measures to solve them, and analyzing the causes creating disturbance but there is no effort for the next two phases to improve and control.

On the other hand, some interviewees responded that Most of the faculty members in the University of Okara are not permanent/visiting and the visiting faculty is not much concerned about the quality of teaching. They only came to complete their duty and to earn money. Teachers and students both are the most important pillars of the education system but if one of them is not interested there will be no fruitful results. According to an interviewee, students are from different backgrounds that's why there is a huge difference in their learning achievements. In this manner, effective teaching is not a concern because students don't want to learn and remain stuck in their background.

Interviewees also have some distinct points of view such as Teachers' lack of knowledge because they have no exposure to the present innovative time of technology. They are using the books of the 20th century and delivering 8 to 9 lectures per day. This means that the major focus of higher education is quantity instead of quality. The quality of higher education can be enhanced by focusing on national and International Research collaboration. In a purely educational context, only 50% of the outlines of coursework are covered by the teachers, and the rest are assigned to students or neglected. Quality Management Strategies are merged and cannot be specified at the classroom level. Newly hired teachers and the students both are ill-mannered. There is an extreme need to focus on their behaviours as well as the quality of education.

Discussions

The results of this study show that there is no proper implementation of Six Sigma practices at the University of Okara for higher education. So the teachers who use some techniques of Six Sigma have more effectiveness in their teaching process as compared to those who use only traditional methods of teaching in the classroom. This case study shows that Six Sigma is a broader term and its implementation needs a proper plan to act upon it. It has a much deeper effect on teaching effectiveness but due to improper implementation of Six Sigma, its output cannot be seen across higher education significantly. On the effect of Six Sigma practices in higher education numerous studies have been done (Antony, 2016; Antony., 2019; Svensson, 2015; Felce, 2019). According to Schmidt, Zomer, et al, (2018), Six Sigma in higher education can be used as a tool for the improvement of education, teachers' teaching effectiveness, and students' learning outcomes. At the global level many well-established business, as well as educational organizations, has adopted Six Sigma. In the same manner, educational organizations in Pakistan can also adopt this approach to achieve maximum results with zero defects. At the University of Okara, many teachers are working for quality while there is a need for a sequenced plan. Higher education is a platform that provides an opportunity for numerous disciplines to incorporate with one another. All these disciplines produce a masterpiece of knowledge in the form of students who have acquired higher education (Rezaev & Maletz, 2012).

As described by Jenicke et al., (2008), in an educational environment there is no proper example of sequenced Six Sigma implementation but it is a much-valued approach of business and can be used in academic institutions especially higher educational organizations. Although there are many problems as well its implementation would be much fruitful for stakeholders of education.

Conclusion

Six Sigma has different phases. The 5 phase model (Define, Measure, Analysis, Improve, and Control) is used in this study. It is concluded in

this study that the 3 phases of define, measure, and analysis are being used by the faculty members of the University of Okara but all these efforts are not planned. The actual reason behind this unconsciousness is that teachers are not aware of such QMS. Students belong to different backgrounds but most of the students are well aware of their rights and standards of education. Students share their problems with teachers and teachers are also able to define their problems with proper measures and also analyze their issues. On the other hand, the 2 phases of Six Sigma improvement and control are neglected in the higher education sector which affects the quality of higher education. In Pakistan quantity is more focused than quality and this is the core adverse effect of lack of QMS in the education sector. Teaching is a sacred profession and everyone cannot adopt it. The teacher must be effective in his/her teaching. Teaching effectiveness can be enhanced by using the Six Sigma approach and maximum results can be achieved. The effect of Six Sigma practices in enhancing teaching effectiveness is checked through interviews with faculty members of the University of Okara. All the interviewees were teachers of M.phil and Ph.D. and presented the teaching quality of the whole faculty of the University of Okara.

Most of the teachers try to finish the coursework in one way or another. Hence the teachers who used the techniques of Six Sigma have more teaching effectiveness in their teaching as compared to those who are completely ignorant of Six Sigma. In the light of thematic analysis and findings of the study the following conclusion is made:

There is nobody aware of how to use the Six Sigma approach in the teaching-learning process to enhance teaching effectiveness to cope with defects of the higher education system at the University of Okara.

Recommendations

The study in hand is a case study and the sample is only the faculty members of the University of Okara. In the future, the research could be done

at a broader level and data could be gathered from students as well.

Limitations

The main focus of the study was on the impact of Six Sigma practices on teaching-learning effectiveness at the University of Okara. The first limitation of the study was that the study was confined to the University of Okara only. The results of the study could not be generalized to all the universities in Pakistan. Even though the results of the study could not be generalized, this study gives us an insight into how Six Sigma practices influence teaching-learning effectiveness. The second limitation of the study was that the researcher ignored the context of gender while exploring the impact of Six Sigma practices on teaching-learning effectiveness.

Implications

Six Sigma is one of the methods that can be used as a tool to improve quality at the higher education level. Researchers found limited studies that considered Six Sigma to measure quality in Pakistani higher education institutions. However, for the first time quality of education is measured at the University of Okara by Six Sigma. The findings of this research have provided a greater insight into how quality-related problems can be assessed and solved in the light of the Six Sigma model. One of the major areas of application for this study is to measure education service via Six Sigma in order to determine ways to improve it. Continuous research in the field will benefit the welfare of the public society. Moreover, the findings can be used by practitioners to prioritize neglected areas and thus allocate appropriate resources to quality improvement.

References

- Gamal Aboelmaged, M. (2010). Six Sigma quality: a structured review and implications for future research. *International Journal of Quality & Reliability Management*, 27(3), 268–317.
<https://doi.org/10.1108/02656711011023294>
- Antony, J., Karamperidis, S., Antony, F., & Cudney, E. A. (2019). Understanding and evaluating teaching effectiveness in the UK higher education sector using experimental design. *International Journal of Quality & Reliability Management*, 36(2), 202–216.
<https://doi.org/10.1108/ijqrm-01-2018-0011>
- Antony, J., Rodgers, B., & Gijo, E. V. (2016). Can Lean Six Sigma make UK public sector organisations more efficient and effective? *International Journal of Productivity and Performance Management*, 65(7), 995–1002.
<https://doi.org/10.1108/ijppm-03-2016-0069>
- Başkarada, S. (2014). Qualitative Case Study Guidelines. *The Qualitative Report*, 19(40), 1–25. <https://doi.org/10.46743/2160-3715/2014.1008>
- Batool, Z., & Qureshi, R. H. (2007). Quality assurance manual for higher education in Pakistan. *Higher Education Commission, Pakistan*.
<http://www.pieas.edu.pk/qec/Quality-Assurance-Manual-for-Higher-Education-Pakistan.pdf>
- Brookes, M., & Becket, N. (2007). Quality management in higher education: A review of international issues and practice. *International Journal of Quality Standards*, 1(1), 85–121.
- Brusoni, M., Damian, R., Sauri, J. G., Jackson, S., Kömürçügil, H., Malmedy, M. A. R. I. E., & Zobel, L. (2014). The concept of excellence in higher education. Retrieved on March 18, 2016.
<http://dx.doi.org/10.13140/RG.2.1.2146.7683>
- Cheng, Y. C., & Tam, W. M. (1997). Multi-models of quality in education. *Quality assurance in Education*.
<https://www.emerald.com/insight/content/doi/10.1108/09684889710156558/full/html>
- Creswell, J. W., Hanson, W. E., Clark Plano, V. L., & Morales, A. (2007). Qualitative Research Designs: Selection and Implementation. *The Counseling Psychologist*, 35(2), 236–264.
<https://doi.org/10.1177/0011000006287390>
- Felce, A. (2019). Managing the quality of higher education in apprenticeships. *Higher Education, Skills and Work-Based Learning*, 9(2), 141–148.
<https://doi.org/10.1108/heswbl-10-2018-0106>
- Hollweck, T. (2016). Robert K. Yin. (2014). Case Study Research Design and Methods (5th ed.). Thousand Oaks, CA: Sage. 282 pages. *The Canadian Journal of Program Evaluation*, 30(1).
<https://doi.org/10.3138/cjpe.30.1.108>
- Jenicke, L. O., Kumar, A., & Holmes, M. C. (2008). A framework for applying Six Sigma improvement methodology in an academic environment. *The TQM Journal*, 20(5), 453–462.
<https://doi.org/10.1108/17542730810898421>
- Kallio, H., Pietilä, A.-M., Johnson, M., & Kangasniemi, M. (2016). Systematic Methodological review: Developing a Framework for a Qualitative semi-structured Interview Guide. *Journal of Advanced Nursing*, 72(12), 2954–2965.
<https://doi.org/10.1111/jan.13031>
- Khan, W. (2015). Quality of teacher education in Pakistan. *The Dialogue*, 10(2), 212–219.
[https://www.qurtuba.edu.pk/thedialogue/The%20Dialogue/10_2/Dialogue April June2015_212-219.pdf](https://www.qurtuba.edu.pk/thedialogue/The%20Dialogue/10_2/Dialogue%20April%20June2015_212-219.pdf)
- Knowles, G. (2011). *Six Sigma*. Bookboon.
- Lincoln, Y. S., & Guba, E. G. (1988). Criteria for Assessing Naturalistic Inquiries as Reports.
<https://www.semanticscholar.org/paper/CRITERIA-FOR-ASSESSING-NATURALISTIC-INQUIRIES-AS-Lincoln-Guba/a3210e45c414b28b9921e8a30cbd2cdc8f9692fe>
- Patil, V., S.M. Kamlapur, & Dhore, M. L. (2006). *Six Sigma in Education: To Achieve Overall Excellence in the Field of Education*.
<https://doi.org/10.1109/itng.2006.123>

- Raghunath, A., & Jayathirtha, R. V. (2013). Barriers to implementation of Six Sigma by Small and Medium Enterprises. *International Journal of Advancements in Research & Technology*, 2(2), 1-7.
- Rezaev, A., & Maletz, O. (2012). Higher Education Studies: Toward a New Scholarly Discipline. *As the World Turns: Diversity and Global Shifts in Higher Education Theory, Research and Practice*, 169-196. [http://dx.doi.org/10.1108/S1479-358X\(2012\)0000007011](http://dx.doi.org/10.1108/S1479-358X(2012)0000007011)
- Schmidt, A., Sousa-Zomer, T. T., Andrietta, J. M., & Cauchick-Miguel, P. A. (2018). Deploying Six Sigma practices to General Electric subsidiaries in a developing economy. *International Journal of Quality & Reliability Management*. <http://dx.doi.org/10.1108/IJQRM-09-2016-0155>
- Stevens, M. (2013). *Ethical issues in qualitative research*. King's College London.
- Sunder M., V. (2016). Constructs of quality in higher education services. *International Journal of Productivity and Performance Management*, 65(8), 1091–1111. <https://doi.org/10.1108/ijppm-05-2015-0079>
- Svensson, C., Antony, J., Ba-Essa, M., Bakhsh, M., & Albliwi, S. (2015). A Lean Six Sigma program in higher education. *International Journal of Quality & Reliability Management*, 32(9), 951–969. <https://doi.org/10.1108/ijqrm-09-2014-0141>
- Thomas, B. L. (2016). *Characteristics of higher education environments conducive to adaptive change* (Doctoral dissertation, Azusa Pacific University).
- Ullah, A. (2020). Right to free and compulsory education in Pakistan after 18th constitutional amendment. *South Asian Studies*, 28(2).
- Wasserman, E., & Migdal, R. (2019). Professional Development- Differences in teachers' attitudes between online and traditional training courses. *Online Learning*, 23(1). <https://doi.org/10.24059/olj.v23i1.1299>
- Yang, Y.-T. C. (2007). A catalyst for teaching critical thinking in a large university class in Taiwan: asynchronous online discussions with the facilitation of teaching assistants. *Educational Technology Research and Development*, 56(3), 241–264. <https://doi.org/10.1007/s11423-007-9054-5>
- Yin, R. K. (2013). Validity and generalization in future case study evaluations. *Evaluation*, 19(3), 321–332. <https://doi.org/10.1177/1356389013497081>
- Yu, K.-T., & Ueng, R.-G. (2011). Enhancing teaching effectiveness by using the Six-Sigma DMAIC model. *Assessment & Evaluation in Higher Education*, 37(8), 949–961. <https://doi.org/10.1080/02602938.2011.592933>