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The Impact of Covid-19 on the Work Environment of University Professors

A Qualitative Comparative Study

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Technology, Work and Health

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Foreword

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Abstract

The spread of the Covid-19 has led to a worldwide pandemic which altered many aspects of human life including higher education. As a result of a worldwide pandemic the education system shifted from university campuses to virtual setups. This shift had a major impact on the faculty members and professors teaching across the globe. While there the phenomenon was being studied from students' perspective, this study highlights the impact of digital teaching on the university professors at two universities in Sweden and Pakistan.

The aim of this thesis project was to conduct a comparative study which explores how university professors adapted their work environment in light of COVID-19 and e-learning. The universities primarily being studied are KTH Royal Institute of Technology situated in Stockholm, Sweden and National University of Science and Technology situated in Islamabad, Pakistan. The ambition was also to discern measures to cater positive health and work environment, and a diverse knowledge pool of best practices through a qualitative interview based study. These findings were generated through inductive reasoning by analyzing eleven interviews conducted in both countries. The discussion was steered by the Human, Technology, and Organization (HTO) - Model and concepts of Resilience Engineering.

Sammanfattning

Spridningen av Covid-19 har lett till en världsomspännande pandemi som förändrade många aspekter av mänskligt liv inklusive högre utbildning. Som ett resultat av en världsomspännande pandemi skiftade utbildningssystemet från universitetscampus till virtuella installationer. Denna förändring hade en stor inverkan på fakultetsmedlemmar och professorer som undervisade över hela världen. Medan fenomenet studerades där ur studenters perspektiv, belyser denna studie effekten av digital undervisning på universitetsprofessorerna vid två universitet i Sverige och Pakistan.

Syftet med detta examensarbete var att genomföra en jämförande studie som utforskar hur universitetsprofessorer anpassade sin arbetsmiljö i ljuset av covid-19 och e-lärande. De universitet som främst studeras är KTH Kungliga Tekniska Högskolan i Stockholm och National University of Science and Technology i Islamabad, Pakistan. Ambitionen var också att urskilja åtgärder för att tillgodose positiv hälsa och arbetsmiljö, och en mångsidig kunskapspool av bästa praxis genom en kvalitativ intervjubaserad studie. Dessa fynd genererades genom induktiva resonemang genom att analysera elva intervjuer gjorda i båda länderna. Diskussionen styrdes av människo-, teknik- och organisations (MTO) - modell och koncept för resiliens teknik.

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Introduction

This introductory section of the report outlines the background, presents the aim and problem identification which establishes the scope of the degree project.

1.1 Background

The spread of the virus: Covid-19 has led to a worldwide pandemic which caused major disruptions across the world. The effects of the global crisis have been extensive as a complete shift in lifestyle was witnessed which lead to rise in general feelings of stress and anxiety. While everyday practices have certainly been altered, there has also been a major shift in organization of work activities as the work environment for knowledge workers completely transforms into virtual one (Carroll & Conboy, 2020). To ensure optimal productivity at work there has been a rather sudden shift to digital technologies to adapt to the “New Normal”.

Due to the highly contagious nature of the virus the learning activities needed to be shifted to digital platforms in order to continue them. Online work environment for most people consists of a portable computer, stable internet connection, digital tools to communicate and collaborate and digital security to ensure data protection and online safety. Design and implementation of such technological interventions have been the focus of leading business frontrunners, yet at the advent of the pandemic even the top industries were taken aback while digitally transforming their work organization and management structures (Savić, 2020).

The on-campus learning encompasses an overall learning environment, which includes physical setup, one on one interaction with professors and peers, direct communication, group activities etc. The physical setup constitutes of a classroom environment which is designed according to standards catering to enhance audio visual learning and ergonomic seating and enable direct communication. The learning includes the knowledge transfer from the professor through presentations, but also healthy discussions about varying experiences and views of instructors, peers and participants. The interaction is more tangible and discussions more vibrant; facilitated by a physical classroom environment.

On the contrary, digital learning came as a paradigm shift challenging the mental models and the norms of campus teaching were tested. It would not be incorrect to say that it was challenging for both professors and students to adapt to the change. The one on one

interaction and direct communication with professors and peers was completely eliminated from the learning experience and more reliance was formed on assisting technology to connect with each other. The technology also assisted in creating digital spaces to carry out learning activity and interactions but changed how information was presented and hence increased the cognitive load on the people participating in digital learning activities (Bohgard et al., 2008).

1.3 Problem

While there are a limited number of research studies on the Covid-19 pandemic's effect on learning activities, there is not much information that can be found on its health effects on faculty and teachers. Moreover, most of the studies conducted are seen to be in isolation in terms of geography, strategy and policies etc. This comparative study will help develop deep insights on effects of varying geographic, strategic and organizational factors, and its influence over individuals' overall wellbeing and work environment.

1.3 Aim

The aim of this degree project was to identify challenges faced by faculty in universities in Sweden and Pakistan during the digital transformation of education as a result of pandemic. It focused on the effects on health and wellbeing of professors, to recognize and compare associated risks.

Consequently it aimed to provide scientific answers to the identified problems, counter measures to cater positive health and work environment, and a diverse knowledge pool of best practices.

1.3.1 Research Questions

The research questions were:

- How have the major aspects of teaching changed as a result of pandemic in terms of physical ergonomics, cognitive ergonomics and organizational ergonomics?
- What are the physical stressors, psychosocial stressors and potential risks to health that poses a risk to the wellbeing of university faculty?
- How did faculty in two different countries cope up with the changes and displayed resilience?

1.4 Scope

The thesis is a comparative study of investigating and understanding the digital teaching at universities in two different countries. The universities being studied are KTH Royal Institute of Technology situated in Stockholm, Sweden and National University of Science and Technology situated in Islamabad, Pakistan.


The scope of project is limited to the active professors teaching online (at two above mentioned universities), their everyday work activities, and their digital home work environment. This includes the tools they use, their average working hours and their physical working space. The main objective of the project was to devise answers to the identified problems, counter measures to cater positive health and work environment, strategies employed to adapt to the new situation to curate best practices.


2 Theoretical Background

To understand the basics of the study, a few theoretical concepts have been explored in this section. To formulate the study it was important to explore the historical background and development of e-learning and teaching and the impact of Covid-19 on the digital transformation of learning activities. After which the HTO Model was used to identify and categorize key risks and stressors under human, technology and organization, and establish a comparison mechanism. Once this baseline was established the concepts of Resilience Management and specifically Safety II provided a reference point to understand adapting strategies at both universities and curate best practices established by professors.

2.1 Overview of E-Learning

At the advent of the pandemic, in order to continue the learning activities, the universities across the globe had to shift from traditional on-campus teaching methods to digital ones almost instantaneously. This was necessary due to the highly contagious nature of the virus. The key determinants of an effective online teaching system include the learning inclinations of students, their engagement levels and whether the professors are satisfied with the process or outcome all the while maintaining a balance between communication and interaction (TallentRunnels et al., 2006).

E-Learning can be defined as a formalized teaching system which takes aid of electronic resources. The recent past has witnessed a vast spread of online courses and Massive Open Online Courses (MOOCs) as a new innovative and sustainable approach to learning in the higher education sector. The massive spread has helped the students to get in touch with the new way of digital learning at a distance. 

The digital learning tool provides student's ability to manoeuvre their study pace (TallentRunnels et al., 2006) and the fact that lectures and study material can be recorded and archived for future references. The research shows that optimum use of digital tools in terms of their audio visual features improves the overall learning experience (Caton et al., 2021) and help students have a positive engagement and discourse by not keeping the environment so virtual (Martin et al., 2021). However, it is also recognized that the digital learning hinders in creating a connection with professors and fellow students as well as it hinders social learning of students at campus which is effortless in face-to-face learning. 

2.2 Covid-19 and Digitalization of Higher Education

Most of the online courses and MOOCs previous to Covid-19 were prerecorded and sufficient time and resources was spent to prepare and design not only the content but also, assignments and examination techniques (Leire et al., 2016). This is stark opposite of what the professors had to go through at the advent of the pandemic.

The situation that appears is that of an “emergency digital learning”, which also created a sense of impromptu change and the students feeling at a disadvantageous position in terms of holistic university learning experience (Martin et al., 2021). Since the students were already familiar with advanced interactive courses available, their expectation for interactive teaching session in pandemic caused a stressful situation for professors who were already adapting to a lot (Syed et al., 2020). Digital tools for learning operates on the principle of video-conferencing and when used optimally it makes the learning more interactive and engaging in terms of the student response to the lectures and questions being asked (Caton et al., 2021).


Establishing a holistic and practical Virtual Learning Environment requires integration of multiple e-learning tools and platforms such as learning management system (LMS), audio-visual communication tools, and platforms to discuss and post grades etc. (Syed et al., 2020). Effective implementation and use of these systems can provide an interactive and engaging virtual learning environment (ibid). However, this also requires specialized knowledge of online systems as well as practice in managing multiple platforms for various courses and students.

The new learning environment increased human-computer interaction, and tested the limits of human cognition, physical abilities, and social needs (Bohgard et al., 2008). In this new system the cognitive abilities which are considered to be one of the fundamentals for interaction with technology were said to be under stress the people participating were not only required to observe and process new information presented due to the change in environment, but also correlate it with previous knowledge and maintain protocols of learning (ibid). One cannot simply remain indifferent and unaffected by the change and perform actions as they would in a regular learning environment.


Moreover, since everything moved to virtual platforms, there are additional operational risks which worried both organizational management and the faculty. These include losing content

and possibility malicious attacks which might infringe private institutional content or even personal identity (Syed et al., 2020).

2.3 Risks and Stressors

Treating learning activities in terms of work origination and management; creating a digital workspace was inevitable. Leading and managing work delegation in the absence of physical work space, one-to-one interaction is also very difficult. It is not only challenging to delegate tasks but also motivate and engage the teams. Furthermore, schedule conflicts, unclear communication, disruptions in the connection can strain relationship between employee and management which could eventually lead to burnout. 

According to research employees feel a sense of exhaustion and fatigue; classified as burnout, when they do not feel emotionally connected to their work (Baker et al., 2014). This gives rise of negative feelings towards work which can be considered relevant in the current pandemic circumstances. As there is a need to socially distance one's self to reduce risk to physical health, its possibility to affect emotional health has increased, as there is a common feeling of not being able to communicate effectively and understand work-tasks.

Challenging work requirements leads to physical and emotional exhaustion  which eventually is a primary risk to optimal employee health (Dellve & Eriksson, 2016). Covid-19 has given a rise to the factors causing psychosocial stress especially in relation to occupational health. Mostly people are working in isolation at home, having difficulty to manage technical tools, consistent work hours and having control over work at the same time.

Existing organizational resources provides a foundation to build up new improvements. Employee participation and sharing experiences increases the overall resource base of the organization which results in individual as well as organizational growth (Dellve & Eriksson, 2016). These resources can be further categorized under, individual, group and structural provisions to support resource comprehension at a particular company (Dellve & Eriksson, 2017). According to literature effective resource allocation can contribute to organizational productivity, inspired and invested staff and overall increased job fulfillment.

2.4 Leadership for Digital Work Environment

In uncertain times it is more important for leaders on top to be empathetic and create an environment of mutual trust and agreement. It is documented that leaders employ various techniques in their job. A leadership style based on democracy would mean that the leader would include and engage his team in the decision-making process as contrast to authoritarian or delegating style where the leader demands or instructs respectively (Dellve & Eriksson, 2016).

Research conducted by Skakon and colleagues to identify the effects of leadership styles and patterns on employee's health from existing researches demonstrates that if a leader is under stress, his employees will most likely show similar symptoms (Skakon et al., 2010). Hence, in light of the pandemic it is important to manage symptoms of stress in organizational leaders as well as the employees as they are co-dependent. A sustainable digital work environment would require both; top down and bottom up stress management approach to encourage productivity and well-being.

Effective leadership techniques can reduce anxiety in current stressful times. Managing and leading remote teams is slightly different and require more active effort both on part of the leader as well as team members. Factors like documenting expectations, timely feedback, regular communication between teams and constructive reinforcements can aid in creating a healthy online work culture and relationships (Phillips, 2020).


2.5 The HTO Perspective

The **HTO Model** is based on a systems view of organizations. It was developed in the Swedish nuclear industry but currently it is being applied in various complex systems (Karlton et al., 2017). The model places human activity at the centre, and studies how it is being influenced by the human, technology and organization. The below illustration represents the core HTO Model:



Figure 1 HTO model adapted from Karlton et al. (2017)

The model illustrates that interactions between human activity, technology and organizational structures form work activities. It defines a work activity as an intersection of human, technology and organization. Furthermore the extended framework further includes the concept of environment and divides the human activity into processes. The extended HTO - Model (Karlton et al., 2017) hence places human work activity at the very core, and suggests that it is achieved through interactions between technology, organization and environment.

The model is chosen due to the fact it provides a systems perspective to change transformation and highlights human work activity as the central aspect. An average work activity consists of multiple processes and sub process which is accomplished through human activity. Hence, the HTO Model as a theoretical framework enables analysis of human activity in relation to the technology they interact with in the organization where it is being carried out. Moreover, the systems perspective rationale caters social  technical factors as it regards work activity carried out by humans as the driver of organizational processes (Karlton et al., 2017).

2.6 Adapting in context of Resilience

In current times the organizations are more conscious of the need to prepare for the unexpected. In the words of Holling (1973), resilience of an ecosystem refers to the measure of its ability to absorb changes and still exist. The concept of resilience can be further contrasted with stability, and the ability of a system to return to its equilibrium state after going through a transitory disturbance.

Harms-Ringdahl places work activities and arising accidents in a systems perspective. It provides enablement to visualize adverse events not only as accidents resulting from human error but also investigate how latent conditions and system parts work together to run smoothly and at times result in unfortunate event. It further provides deep learning about identifying risk sources; tools and activities to manage risks give systematic view of work management (Ringdahl, 2013).

In contrast to the traditional view which involves more of damage control, resilience engineering maintains that ‘things go wrong’ and ‘things go right’ for the same basic reasons. This approach aligns its self with a view of safety, which is more commonly known as Safety-II. It advocates that safety of a system is in fact its ability to succeed under varying conditions.

Safety II takes a proactive view of safety and look at operations and events that are resulting to safe operations (Hollnagel et al., 2015). Notions like Reliability, resilience and that an ability to withstand and bounce back from and adverse event is also considered a trademark of a safe and reliable system (Pecillo 2016). Managing risks and safety also includes managing trade-offs (ibid) and at times introducing uncertainty in a system could help in identifying boundaries, managing and even reducing risks in a work system (Grote, 2015).

2.7 Investigating Success in a Work System

If everyday activities and events are presented as a normal distribution curve (Hollnagel et al, 2015 pg. 33), traditional safety approaches are said to be focusing on approximately two percent of the occurrences. While there are many occurrences where the system is performing flawlessly and also instances where there is a misstep but the system recovers without any adverse event. Hence the idea of an alternative approach is to continue to examine the adverse happenings but also explore the potential of what keeps the system performing flawlessly and discoverer opportunities to develop safety management in these occurrences (ibid).

Traditionally successful systems are defined by absence of accidents (Hollnagel 2014), and hence the traditional way of navigating a success in systematic work is to reduce the occurrences of accidents, incidents or adverse events, and achieving a state in a system where all flaws are accounted for and handled (find and fix style) (Hollnagel et al., 2015). System in this case is the associated university where multiples parts work in alignment to provide

optimum and quality education to students. Hollnagel defines these measures of system performance as a Safety I approach. While the alternate Safety II approach advocated that there is more to high system performance than mere bimodality in terms of functioning system and malfunctioning system. It also stresses that investigating success in light of systems perspective highlights the role interplay of system parts in its safe or unsafe operation for example human operation, role of technology, management structure, guidelines and policies etc. (Hollnagel et al., 2015)

Hence to cumulate both approaches could be achieved by a shift in perspective. Rasmussen's hierarchical model depicts a feedback structure and presents how reactions and opinion travel between different hierarchical levels of a system (Akselsson, 2019; Levenson, 2011). This feedback structure which enables decision and policy making for system safety could incorporate feedback of frequently occurring events instead of only focusing on severe consequences of accidents and incidents (Hollnagel et al., 2015) to promote and include do's in the policies and guidelines. This would also enable the organizational leaders and managers to look at consequences leading up to quality operations, and to motivate employees to be more mindful and observant on best practices.

Maintaining databases of events serve as learning opportunities for organizations. These systems could also support organizational learning by incorporating a database of best practices. Mostly work related learning occurs by experiencing how to avoid mishaps. On the flip side if the workers and managers focus and document operations which avoided mishaps, it could contribute to a looped learning (Akselsson 2019) not only at individual level but also at organizational level. These could further be explored by not only analysing how an incident or a near miss could harm a system but also intentionally focusing to identify and analyse the aspect of resilience and what system operation aided in system recovery. A curation of both of these could assist the organization in double loop learning of not only prevention methodologies but also promote to resilience.



2.8 Sustainable Development Goals

This project relates to the UN Agenda 2030 Sustainable Development Goals (SDGs) 3, Good Health and Well-being; and 8, Decent Work and Economic Growth.



Figure 2 Target goals of UN Sustainable Development Goals 3 and 10 (United Nations, 2020)

The UN Development Program describes some of the target goals of SDG 3 as: ending epidemics of communicable diseases and promoting mental health (UNDP, 2020). This target is touched upon in this study as it concerns how known physical and psychosocial stressors related to work environment of university professors have been affected by the Covid-19 pandemic.

Some of the target goals of SDG 8 are described as: promoting supportive policies at work; achieving full and productive employment and decent work for all; and promoting safe and secure 15 working environments for all workers (UNDP, 2020). This target is touched upon in this study due to the uncertain nature of work that was created as a result of global pandemic.


Another factor to include in this regard is that the understanding of these goals can vary in different geographic regions. Sweden, being a developed economy, might have a different interpretation and implementation strategy of these goals compared to Pakistan, which is a developing economy. There is a remarkable difference in terms of demographics, per capita income, infrastructure in place, technological development of communication channels such as internet broadband.

Methods

This section sketches the epistemological and methodological approach selected for this study. It describes the strategy used to collect information from two countries, focuses on the sampling process for data collection and the design of interview guide. It also touches upon the ethical approach incorporated in the study.

3.1 Study design

The methodological basis for this qualitative study and its focus in terms phenomenology roots from the interpretivism epistemology. The interpretivism epistemological perspective lays emphasis on the connotations and denotations human beings generate as they interpret the world around them. Hence, qualitative approaches such as phenomenology are linked with interpretivism as they seek to understand a particular phenomenon from the perspective of the humans experiencing them (Williamson, 2002).

The interpretivistic approach in phenomenology is largely associated with inductive reasoning; where the concepts are developed on the basis of understanding the human interpretations and insights on a particular phenomenon (Williamson, 2002). This study is an observational cohort cross-sectional study as it identifies and explores problems and possibilities at a given point in time and is not repetitive. 

The basis of the inductive reasoning in this study is achieved by organizing rich in-depth interviews gauging the perceptions of the participants, deeply observing the context of phenomenon and the ethnographic aspects, which might influence the participants' feelings and, experiences around the phenomenon (Groenewald, 2004).

3.1.1 Information Collection Process

Information and data collection was conducted in the three following stages:

Firstly a literature review was conducted to deeply understand the topic and to build upon the aim of the study in context of the available research and publications.

Secondly, to deeply understand the difference in context of work and digital learning practices at universities in both countries, university visits were scheduled. It was necessary because of the contrasting contexts of both countries. While the university campuses in Sweden were accessible but the teaching was being conducted online, in Pakistan there was a

strict lockdown initially but soon they resorted to a hybrid learning system. These differences had an impact on the respective teaching activity, style of teaching, environment of online classes and contributing challenges.

Thirdly, interviews were conducted as part of the study of professors based across Sweden and Pakistan. The interviewees helped to identify key problems and stressor at the individual and organizational levels, contributing from their experience in teaching, research and management roles.

3.2 Approach to Literature Review

Websites of both universities, available documents online and previous knowledge of studying in these universities provided a deep insight into the organizational culture, overall mode of work and dissemination of information. Moreover, KTH Library Database and Google Scholar were used as researching tools to find relevant literature on Covid'19 impact on the work environment.

3.3 Semi – Structured Interviews

The study falls under the Interpretivism epistemological paradigm. As the views and ideas of people at specified workplaces are being explored through this research, a qualitative study design was chosen, which provided evidence for the categorization of the study. Individual interviews have provided deep valuable insights which helped in providing inductive reasoning to identify barriers and facilitators while digital teaching and carrying out work activities online.

The interview process was formulated in a semi-structured way, according to a modified Adams (2015) approach, in order to have a free-flowing discussion. This way individual interview generated a discussion; they were conversational in nature but still were carefully planned to collect relevant information through thoughtfully designed categories.

The guide for the interviews conducted in both countries was designed using the process described by (Edwards & Holland, 2013). A set of questions were prepared in advance which were then supplemented by probing questions based on the response from the interviewee to further discuss and understand the views and thought process of the participants.

Each interview (Appendix 1) started off with introductory questions which aimed to discern the overview of the interview and his/her previous experiences. The questions under the main section were already categorized according to the HTO Model and focused on overall general health, interactions with technology and experiences with organizational support. The interview ended with futuristic note inquiring about how the experiences with online teaching can be used in future.

3.4 Sampling process and strategy

In total, eleven interviews were conducted for this study; five in Sweden and six in Pakistan. The participants for the study were selected carefully both in Sweden and in Pakistan as all of them were seasoned professors, who had teaching experience of over ten years; lowest teaching experience was ten years and maximum was forty years.

The aim of the selection was to achieve a blend between teaching activities as well as to include managerial and research work experience to gain holistic insights.


3.5 Ethical approach

The ethical approach was incorporated in the study at two stages. Firstly when the formal invitation emails were sent and secondly before the interviews would begin. When the interviewees were invited for their participation in the study they were provided with an overview of the ethical approach this study would follow.

At the beginning of the interviews approximately three to five minutes were utilized to introduce the aim and the objective of the study to the interviews and gain their informed consent to voluntarily participate in the study. At this stage the interviewees were also informed about the possibility of questions to be sensitive in nature and hence were presented with opportunity to pause recording at any stage of the interview and also were made aware of their right to opt of the study at any point in future. After this the interviews were formally asked if they agreed to start the recording and the interview would begin formally.

While most interviews were comfortable sharing their anecdotes and opinions, some were a bit reluctant to share views on the strategies of their respective states and their organizational policies. They were ensured complete anonymity in that regard and in order to fulfil that only combined descriptive data will be presented in the study.

3.6 Analysis process

Phenomenographic analysis  process is used to analyse interviews and interpret them. In this process recorded interviews are transcribed and created into a text file. After which the text is to be read in a more thoughtful way to find deep insights under relevant categories and co relations to generate results.

The seven interviews which were conducted over zoom were recorded with the inbuilt zoom meeting recorder, while the four in-person interviews were recorded on phone using the Samsung voice recorder app. These were then transcribed using oTranscribe (<https://otranscribe.com/>) which is a free online transcription tool.

The coding process began by going through each transcribed interview multiple times in order to identify units of meaning. As the interviews were read several times, similarities in the answers of multiple interviewees were found. As a result the units gradually began to take the form of codes such as : “pressure on the job”, “physical work environment”, or “cognitive overload”. In total, forty codes were identified between all the interviews. As new codes were discovered, similarities arose between them which prompted the formation of categories. The categories were labelled based on the core similarity between the codes which formed them. The categories further formed the basis of the fundamental themes.

After the interviews had been analysed through the coding process, the results were interpreted and contextualized within the framework of the human, technology, and organization model. The results were then framed in a systems perspective so that they could be understood in detail and a comparison between two countries could be generated.

4 Results

The coding of the interviews resulted in the creation of eight categories under the following three broader themes.

The theme Situation under Covid-19; deals with how the working conditions of university faculty have been affected by the pandemic. It focuses mainly on the changes in demographics and the overall physical health.

The theme Resourcing Structures includes the key resources and facilitating structures in terms of means for digital connectivity and technical as well as organizational support.

The theme Psychosocial Stressors concerns how the professors perceived the changes in their work activities as a result of changes in the teaching system.

Demographics/ National regulations	Situation under Covid-19
Impact on Physical Health	
Connectivity	Resourcing Structures
Technical Resources	
Organizational Support	
Cognitive Overload	Psychosocial Stressors
Insufficient Work Organization	
Managing Work Expectations	

Table 1 Categories and Themes generated from coding process

4.1 Situation in Covid-19

4.1.1 Demographics

Demographics and national regulations played an immense role in the online teaching activities during the pandemic. It had an effect on the quality of teaching and also on the stress levels of the professors teaching online.

Family Structure

In Pakistan the family structures and units are much larger than Sweden. There are generally more people living in a household, however in Sweden the household sizes are much more compacted. It was evident in the responses that there were more chances of friction between family members in terms of working space and schedule if the house was compact or there were many members living together.

In Sweden the general trend was to have a dedicated office room and if the space did not allow it then shift to bigger property a bit outside the city.

“Living away from the city now we have a bit more space, my partner and I both have separate offices while previously we were switching spots on the kitchen table and when one of us had a meeting it became really difficult. Now I also have an office chair, proper desk and screen while previously it was kitchen furniture, so getting a separate office has definitely helped.”

Similarly in Pakistan dedicated office spaces or rooms were preferred. However since the children could not go to schools due to Covid-19 restrictions, there were common complaints about difficulty to maintain work discipline.

“I do have a separate office room but I also have to be present during my children’s online classes. Sometimes I have them sit beside me but it is very difficult to focus on my work then... my husband and I take turns... it is very challenging also during hybrid setup.”

“ It was hard to tell kids that you’re home but you’re at work; you see they would come in and start talking or discussing their issues without knowing that you’re in a meeting or something... So maintaining a work discipline at home was very difficult for me.”

Covid-19 Regulations and Restrictions

In Pakistan the restrictions were much stricter than those in Sweden. There was a strict lockdown enforced and most spaces were closed and not accessible, which included indoor gyms or sports facilities, restaurants, shopping centers etc. Whereas in Sweden most of the spaces had restrictions on number of people who could be present in a space, but generally most places were still accessible

“I was not going to the university but I could still go out for a jog or sport; even set my schedule at the gym...”

In Pakistan even the outdoor spaces had restrictions which were a cause of distress for all of the participants.

“The outdoor parks were not so accessible the gyms were closed restaurants were closed so there was no activity, especially the kids, they were so frustrated since the playgrounds were also closed; no swimming or any sport ect. It reflected on us as well.”

4.1.2 Impact on Physical Health

Most people working from home initially did not have access to proper office furniture which is a risk to their physical health and ailments due to poor work posture. According to the discussions, initially most professors were not prepared to completely shift their work stations at home. It seemed perplexing to create an office like work environment at home especially when proper furniture is not available. However, later they realized that converting the extra room into home office was the inevitable choice. Even then due to limited activity and living in isolation impacted the health of almost all the professors who participated in the study.

“I did try to have a setup eventually and have it ergonomically sound as well, but even then i had quite a severe backache because of working from home and sitting continuously.”

“I found that sitting in the same posture or place very inconvenient, for me it was it was better to move around. Like at moment you might be sitting and working at times you can stand or recline or even change places in the house.”

Consciously including physical activity and maintaining an exercise schedule improved the overall health situation of most participants.

“I tried to maintain some aspect of physical activity like schedule routine walks otherwise you would become unhealthy, gain weight etc. but i think it was quite challenging because a strict lockdown was in place... overtime i think it has become better, you know what times are better, which areas to avoid and how to appropriately comply by regulations at the same time.”

“I have definitely finding same ways to maintain a healthy lifestyle; i bike, I run, started teaching yoga, just trying out and doing things at home and consistently sticking to them. But it definitely has its struggles.”

One participant also thought that the pandemic lead them to reevaluate their health choices and focus more on themselves.

“I think for me, at start not commuting every day, staying mostly at home and being less involved in the hustle of everything, got me more time to look after myself; it made me more health conscious... but it effected mental health a lot, eventually everything became really taxing and then you'd also start feeling it taking a physical toll.”

4.2 Resourcing Structures

Resourcing structures mainly comprise the facilitating units which enabled the professors at both countries to continue learning activities digitally. This includes internet connectivity to ensure the shift, technical support and gadgetry, and the role of organizational management and leadership.

4.2.1 Connectivity

It is emotionally stressful to ensure that there are no technical glitches while delivering a lecture or in a meeting. This often causes struggle in communication and understanding of tasks. While the professors in Sweden didn't criticize much about the internet connectivity, in Pakistan it was definitely the top problem. It became an issue when multiple people in the household were working together and the children were taking their online school at the same time. The internet connectivity and bandwidth not only caused major technical disruptions but was also a stressor for many faculty members in Pakistan.

“Internet speed and access has been and still is one of the major issues. Bandwidth is not sufficient for teaching and staying connected with soo many students together... and also for students to ensure they have sufficient access at time of the class especially in rural or far flung areas.”

“I have an internet connection which is the best in the country, but even the when all the family is working; my wife's work and kids taking their home school, it very tough, incredibly tough... So much so that since the restrictions have eased I have started coming to my office at university to do major tasks. The students are not at university but I can imagine this is the story of every house”

In contract, the instances of internet disruptions were much lower in Sweden. Although faculty members faced glitches, it can be said that internet connectivity was not one of the top concerns for Swedish participants of the study.

4.2.2 Technical Resources

In Sweden the technical resources were in place and were being used even before the shift to digital learning. The communication and teaching was mainly conducted through Canvas, Email and Zoom Meetings. Both faculty members and students were not only familiar with these systems but were also comfortable using them. Although there was learning involved but it can be derived from the responses that these systems were sufficient as well as reliable.

However in Pakistan there were a bit of experimentations at beginning to implement the most convenient systems. Both Zoom and Microsoft teams were tested in terms of ease of use, reliability and availability. Although a standard learning management system was in place, it was not much in use before the pandemic and the shift. Hence both faculty members and students had to struggle to learn and figure out the most convenient modes. While official communication was conducted through email like, makeshift solutions to stay connected were more popular. For example Chatting tools and applications such Facebook and WhatsApp groups were perceived to be more convenient.

In terms of technical hardware there was mixed responses both in Sweden and in Pakistan. While some participants said they were provided by necessary equipment by the institutions others were weary. However in Sweden even if the necessary devices could not be provided by the institution, they were much more accessible to procure from the market as compared to Pakistan.

In Pakistan it was noticed that advanced technology is less reachable and much more expensive.

“So, I teach Physics and Mathematics and previously I used to solve problems and write on the board... but now unless you have the right kind of gadgetry it’s really not possible. Voice recording presentations doesn’t really help that much, it’s a different thing all together and very challenging. If it continues universities will have to provide the gadgetry or the students will suffer”

One major point of comparison is the resources at national and also personal level. According to the findings, technology and technological structures were much more manageable and well placed in Sweden. In case of Pakistan the general view were that the resources were scares and the demands were much higher than before.

“In covid time we were economically hit as well; I mean at government or national level the priorities for resource distribution was reevaluated. In previous times there was more governmental support in terms of technical gadgets and tools but I guess at this time such efforts would have been much more beneficial. In such (current) a situation the government’s top priority is to restore normalcy and make health systems strong“

“Resources is a big issue I guess, not only state or university level but also personal. When a person is at the university he/she doesn’t need to think about arranging for quality internet, or broadcasting devices, air conditioning or worry about the disruptions due to power cuts; that’s taken care of, but at home you have to ensure everything and that too from your own pocket... these are the real issues”

4.2.3 Organizational Support

In terms of leadership and organizational support participants from both countries had a very positive response. All participants were very satisfied and felt that they could reach out to the management with their problems and sufficient assistance was also extended in return.

In Pakistan initially surveys were conducted to understand the view of both faculty members and students. After which the action plan was laid out accordingly.

“It was quite a transition, we had to do many surveys to ensure smooth transition and that everyone could be present online. Opinions of both faculty members and students were included while making the general policy ”

“ The institution didn’t ask you to take all courses from day one you know, we gradually paced up and they(Leadership) gave us time to get used to the new situation so overall very cooperative in my opinion. If you needed any help they were available”

4.3 Psychosocial Stressors

4.3.1 Cognitive Overload

At the beginning of the online teaching, most participants felt overwhelmed with the sheer variety of digital platforms and new software and applications in use. There were challenges in adapting to online learning management systems as there was limited faculty experience. Hence there was extra pressure on faculty maintain quality and to learn and adopt the new systems instantaneously. Moreover, the new teaching mode had also contributed to a sharp increase in screen exposure and time spent in front of digital devices.

“It’s been quite a steep learning curve I believe; initially people were bombarded with too many unfamiliar things to cope-up with but gradually I guess we are managing... even though specialized departments have been established to facilitate us, there is still a lot of self-learning involved in the process”

Learning new technology and tools combined with the lack of social connection and response was quite challenging and stressful for the participants. It created uncertainty in terms of whether students were being able to grasp and understand what was being taught.

“I think it was the human aspect that was the trickiest, I mean you’re doing it through the technology but how to make people, relate, collaborate and especially understand each other and the tasks. How to have effective communication in both directions so to say... there are more tools that I use now than I would before and in a way I am glad to know them but I am also starting to get tired of it all.”

“Seeing people in class, seeing their body language versus black screen with names on zoom having very little feeling on how information is landing on students, we are always trying to find alternative ways by asking are you understanding this, is this making sense, is there any confusion/questions...”

To cater to this different avenues and techniques were explored by the professors.

“(I) tried to interact with web based groups around the switch, (since I have) no formal trainings on pedagogics;, blogs and posting on best ways to cope and deal in such situations really helped... (Moreover, following) education hash tags on twitter (and) real time debate about what is the best approach and making use of expertise that is already there really made a difference.”

Managing data in multiple places was also a challenge, since one could have different computers for home and office.

“Data management on different platforms and systems both was challenging, we have systems at work and we have laptops or PCs at home. For example yesterday I downloaded all exam papers in office and checked a few and now in the morning when I wanted to get back to the rest I realized all of them are in the office computer and I forgot to transfer them.
”

“I learned the hard way to save everything on Google drive, I mean you have prepared for everything and the last minute changes and varieties of files just add to the stress and confusion. I have also started to do my writings on Google Documents instead of Microsoft Word so that I can access them from anywhere; at least I have less worries now.”



4.3.2 Insufficient Work Organization

It was mentioned time and again during the interviews that working and teaching from home have given rise to narrow boundaries at work and irregular working hours. It also takes longer time to arrange for collaborative tasks schedule work meetings to complete tasks which could be previously done in an informal chat over coffee.



“ Working from home the boundaries are blurred, there is no physical disconnect from work... we were online 24 7, it was very exhausting because we were sitting from morning till

maybe night time, there was no real following of any office timings. Since we were (showing) online it was sort of understood that we are present and there the whole time.”

“After a while the Sundays and Mondays all start to mean the same... and then you get a wakeup call from your kids or something and you feel that you weren’t managing work life balance that well.”

However it was also noticed that many people became more thoughtful and accepting of managing work from home and the hiccups that come with it. Most people found the virtual environment to be supportive in terms of the fact that sometimes there might be disturbances due to other people or activities at home.

“It is generally harder to minimize conflicts and disturbances in a way... but generally people were more considerate and understanding as well not saying things like that's unprofessional, or that I could hear some doing dishes in the background or your dog is barking, kids walking through behind. It is definitely becoming a fuzzy line for sure.”

4.3.3 Managing Work Expectations

Aligning tangible and workable goals and corresponding during the endemic and online setup was also a task for the professors. For most participants it was a constant struggle as everyone was at a constant health risks.

“What has been more disturbing is that the virus has been widespread, more people have been affected by it, specially students, and families and it had eventually an effect on the overall learning and quality of outcomes”

“Pandemic has been stressful on everyone and it has been particularly challenging striking the right balance between (being) empathetic and trying to meet the educational goals”

Another factor of concern which could be categorized as a stressor for teaching faculty members was not being able to communicate and respond to students individually and also timely. While in traditional campus teaching the faculty is physically available to answer student questions in a virtual set-up most of these queries are routed through emails. It was noticed by the participants that most students wouldn't engage much in online classes and then they would later find many questions of similar nature in their emails.

“The kind of response you get in on campus class you don't get it online, you do miss the human interaction and the black silent screens become extremely frustrating and demotivating sometimes. But at the same time I don't think it a fair expectation or a reasonable request given everybody is home”

“As an instructor, at least I wanted my camera to be switched on at all times even though the students couldn't so that they feel I am present and available. I want my students to know I am approachable and they could raise their questions and concerns”

To increase engagement and have the correct perspective many participants added more of collaborating activities in their lectures. It was felt that in breakout rooms on zoom and polls the students were much more comfortable and more responsive.

“Using breakout rooms or even polling function in zoom increased student engagement in the online classes. The students were having discussions and I could also gauge their understanding of the subjects and what they were struggling with.”

“Mural and Mentimeter are life changing tools, small activities take collaboration and engagement to another level... the lectures seems to me more substantial.”

Examining procedure was also quite a task for mainly the participants teaching science and engineering subjects.

“It’s a big challenge to identify; especially with science subjects, that who’s at the other side and if students are doing exams with mutual consultation. You really have to design exam papers in a way to limit communication by regulating time. Another thing that has worked it to give one question at a time, otherwise what started happening was that we would give five questions at a time and students would distribute among themselves... its quite daunting to come up with smart ways to restrict such kinds of malpractice ”

Most participants mentioned that although they tried their best, still they were not fully satisfied with their work and felt that they were not able to teach the way they would under normal circumstances.

“Overall it has been quite stressful because we know we know we aren't able to teach to our full potential during this mode that we are following and i think that has been quite a challenge.”

5 Discussion

In this section, along with the results from the conducted interviews, the employed theories, and methodological approach will be discussed. Furthermore, recommendations for future studies will also be proposed.

5.1 Summary of Results

This study set out with the aim to understand how the core aspects of teaching changed as a result of pandemic at university in Sweden and Pakistan. It had a particular focus on the faculty members' physical work environment, effects on cognitive functioning, and the overall organizational ergonomics. As a result it targeted to identify physical and psychosocial stressors in the everyday work environment of faculty members. Moreover, the coping strategies and mechanisms were of particular interest as well.

The core aspects of teaching changed as the teaching activities at both institutions in Sweden and Pakistan shifted to online platforms. It had particular effects on the professors' health as they struggled to arrange for a proper ergonomic office environment at home. Even when they could arrange for office space and furniture most of them complained about the lack of social interaction leading to emotional anxiety and pressure. Increased screen time and the struggle to learn many new tools in short time added to that stress. Most of the faculty members at both countries praised the support of leadership and their organization's management.

Major stressors for faculty members in a virtual learning environment were mainly of meeting the academic criteria and meeting expectations of students, in terms of quality of online learning. Limited faculty experience in this area as well as extra pressure to learn and adapt to new systems instantaneously added to the stress. Another stressors was the demand to communicate effectively through available channels, arrange for unhindered collaborative work and to respond to students individually and timely

Since the infrastructure was well in place, the stress about accomplishing basic connectivity and carry out teaching activities was not a major stress in Sweden as opposed to Pakistan. Creating work discipline was also especially difficult in Pakistan because there are generally larger family units and more people being involved and having stakes.

The third and last research question, was regarding the efforts by the faculty in two different countries to cope up with the changes. It can be said that there were immense displays of resilience at both places. Covid-19 crisis engendered a sense of empathy and consideration and took it to another level. Everyone was considerate about the fact that the every individual is not only equally worried but is also trying their best to make the situation better.

5.2 Analyzing Findings with HTO Model



Human

From the human perspective, the findings show that demographics play a huge role. In Sweden the interviewees generally followed a generally healthier lifestyle during and prior to the pandemic. This is in terms of incorporating physical activity in daily life during pandemic. Most interviews would go out for a walk, jog, cycling or followed a home exercise routine like yoga. Since a stricter lockdown was in place in Pakistan, the interviewees also had limited access to outdoor spaces as well. It was noticed that during the pandemic, it was a struggle for Pakistani participants of the study to maintain an active and healthy lifestyle.

Family structures also played an important role. From the interviews it can be assessed that most Swedish participants had smaller family units and enough space and resources could be allocated to meet the needs of all family members during the work from home system. Most participants could arrange for proper office spaces with appropriate furniture to alleviate the risks to physical health. On the contrary, the Pakistani participant struggled to not only allocate an ergonomic working space for themselves, but also share resources with spouse and children working and studying from home. It not only contributed to risk in terms of physical health but also caused a lot of mental stress.

In Sweden it can be said the most participants to the study tried to structure a balanced work routine since the beginning of the pandemic to cater to health risks. Absence of formal lockdown type situation and familiarity with work from home setup gave them more flexibility to maintain a schedule. In contrast the professors in Pakistan complained of long working hours and less distinction of on work and off work times since there was no disconnect in terms of working space. Most professors had never worked from home in Pakistan so it can be said that the shift was overwhelming, and it took them considerably

more time to get used to the transition and establish required setup. However, they also cherished the flexibility in work control that the work from home allowed.

In terms of social work climate participants from both countries showed dissatisfaction and a sense of being lonely at work. The fact that professors could not interact with their peers and colleagues had a negative effect on their emotional health. Moreover, not being able to teach and meet their students in person added an extra stress on the professors as they could not gauge how the information was being perceived by students and whether they were retaining anything as well. At times the professors would feel that the students were worried or frustrated and that the online system created barriers in understanding and connecting with the students.

Technology

Technology plays a vital role in establishing platforms to continue educational activities from home during pandemic. The communication between professors and students, and as well as basic everyday work activities are largely dependent on the technological structure in place in both countries. This included hardware technology such as computers, microphones, cameras, projectors etc. As well as software technology such as email applications, learning management systems, communication software such as Zoom etc. All of this is also fundamentally dependent on the connectivity and the internet broadband which ensures the basic communication to take place.

In terms of internet connectivity, it can be construed that Sweden has far more advanced and effective systems in place as compared to Pakistan. Although there were occasional turbulences where the internet quality of either students or teachers would make communication harder, it was not the top most worry for most people. Whereas in Pakistan, it was very difficult to ensure that everyone in the class would have a stable internet connection at the time of the lecture. Moreover, it also incurred an additional cost on professors to maintain uninterrupted power supply and internet connection which otherwise was taken care by the organization.

The hardware and software technologies have played an equally important role as well. While the Swedish system seems to be better equipped for the transition, Pakistani system had to experiment a bit at the start. In Sweden the software platforms were already in place along with the necessary licenses, in Pakistan the first few months were reserved to assess

which software would suit best and then make them available for faculty members and students.

It can also be derived that due to the constant interaction with digital media and technologies, faculty members at both organizations remonstrated about the increase in screen time leading to cognitive overload. Since the digital tools were ever present and there was no physical disconnect from work, it was difficult for most professors to organize work in a sustainable way. Moreover, transitioning instantaneously and learning new tools in a short span of time was found to be quite stressful.

On a positive note the pandemic and the exposure of digital technology lead to rapid growth of tech infrastructure especially in Pakistan. Most of the faculty members appreciated the fact that they learned lots of new things which would not have been possible otherwise. Having said that, what cannot be ignored is the fact that the whole process of becoming tech-friendly have been quite challenging.

In Pakistan the increase in uncertainty in the form of global pandemic and closure of everyday activities provided a base line to develop the basic infrastructure. A lot of advancement in the technological space has occurred over a short span of time. It has also resulted in penetration of technology in even the remote areas and also created awareness and technology friendly attitude.

Organization

At organizational levels, it can be deduced that mostly professors in both countries were satisfied by the support and assistance that were provided. The efforts to organize dedicated teams to guide and troubleshoot problems for the faculty members were greatly appreciated. It can be said that more support was provided at the technological front and the focus on individual health and social support was not as much.


At organization level it is also important for the leadership and higher management to perform effective risk assessment and communicate it as effectively as well. Professors who are not aware of the ergonomics must be educated and also facilitated. This aspect could be found in Sweden but was somewhat lacking in Pakistan. Although surveys were conducted before the shift the focus on health and healthy work organization was not as comprehensive in Pakistan as it was in Sweden.

Moreover, in Sweden professors were comfortable planning and organizing work digitally. While in Pakistan a lot usually depend on physical meetings and discussions. A lot of approvals and clearances are required, hence the professors appreciated that every aspect of their work was not being micromanaged. It would not be wrong to infer that the faculty member in Pakistan enjoyed the flexibly the digital setup allowed in terms of individual work organization and management.

Conversely, it is integral for the organizations to cater for health of employees during such a transition and to identify and assess risks to come up with holistic policies. This is of particular importance in situations where the work environment of employees is not consistent, are designed in a makeshift manner and not according to acceptable standards. This way the actual risks as well as perceived risks (WHO, 2002) would be accommodated and translated in terms of concrete strategy and transparent presentation of events and risks would be achieved. Clear identification of judgments and guesses would also help the decision-makers in drafting appropriate and careful policies or decisions.

5.3 Resilience Engineering Findings – that may be used in future

In context of resilience engineering, from an organizational perspective an integrative risk management system (Aven 2016) would have greatly benefited both the organizations with regard to the health of employees, overall social climate as well as perceived job satisfaction. Hence it could be concluded that such studies provides a comparison between judgments and evaluations (Harms-Ringdahl, 2013) which at one hand could increase uncertainty for the organization (Grote, 2015) but also provide clarity if managed appropriately.

Furthermore, it is important to bridge the gap between experts' and non-experts' understanding and awareness of risks which would result in holistic and sustainable decision making. The decisions by the higher-ups need to be more risk informed (Aven 2016), and risk must be integrated (Levenson 2011) in business management as a systems thinking approach. Attempts at risk management by organization must also aim to communicate and attempt to bridge that gap between expert and non-expert understanding of risks to physical as well as psychosocial health of their employees. 

This could also be achieved by advocating learning and promoting a just safety culture (Grote 2015) in letter and spirit in the organization. Specialized trainings of standards being



implemented for **example ISO 45001 would** contribute to knowledge building (ISO 2018) of non-expert decision makers and also generate awareness and understanding among the organization's workforce.

Another aspect of Safety II structure includes accumulation of what has been going right as a learning opportunity. In the case of this study the coping mechanisms or key learnings from both countries are listed below:

- In Sweden, university professors seem to enjoy the time they could spare for their personal research projects and development, and found it to be a motivating factor.
- In Pakistan, university professors resorted to informal tools and applications to stay connected. A WhatsApp group chat created a sense of assemblage and association, and helped open up students to have constructive discussions. Moreover a joke here and there often helped to generate a lively and relaxed environment.
- In Pakistan many professor found that they felt encouraged by the motivation and attitude of the students. It was noticed that they were more hands on and were consistently finding out ways to make the situation easier. The informal communication channels would keep the discussion flowing and it proved to be a learning experience for both students and professors.
- In Pakistan a formal discussion portal at organization level also inspired professors to share their experiences. It made them feel connected, understood and not alone in the situation.
- In Pakistan, the faculty members were are found to be appreciative of the fact that the micro management was less and they had more flexibility organize and perform work task as per their liking.
- Professors in both countries seem to appreciate the skills and knowledge they could learn as a result of the transition and were seem to be in favor of a more hybrid form of teaching in future as well.
- Faculty members in both countries also appreciated the global exposure, participation in international conferences and the increased opportunities of collaborative research ventures.



5.4 Methods Discussion

The discussion in this section includes ideas and prospects about the research design as well as the structure of the method employed in the study i.e. qualitative interview.

The study being reported is solely a qualitative one where literature search is conducted followed by a semi-structured interview. More importantly, interviews were chosen as an approach since they were relatively easy to conduct in the timespan of the project and provide rich descriptions of phenomena related to people's experiences. Since the project started at the beginning of the covid-19 pandemic, the published work especially related to the work life of university professors, gave room to explore a relatively novel topic.

The chosen methodology; qualitative research (as opposed to quantitative) is used to answer questions regarding experience, perception and meaning. However qualitative research methodology is not inherently designed to be representative of a broader population. Sometimes the findings are also not seen to be purely objective from a quantitative research perspective since they rely more on individual experiences and the results have possibilities to be influenced by the researcher's own opinions or experiences (Hammarberg et al., 2016). However it can be argued that the research which employs qualitative methods cannot be entirely objective as it largely gives value to the environmental and sociocultural context in which it takes place (Dodgson, 2017). In a comparative format of research this aspect is particularly very valuable.


Having said that; the study would have greatly benefited by a mixed methods approach. While the interviews and literature analysis provided depth in insights; a questionnaire survey could be conducted alongside to cover the breadth. Triangulation would be achieved as surveys would provide generalizable results and interviews would provide experiential views and opinions. Mixed methods would contribute to the credibility of the study and results.


5.5 Recommendations for future studies

In the future this study could be adapted to assess the post Covid-19 situation. A more detailed narrative could be explored by conducting surveys beforehand to find out core categories and inclinations of faculty members during the shift to digital teaching and moving into a hybrid mode of education. After the survey the categories to focus could further be developed through carrying out observations when the classes are going on. This would have provided depth in the study and the supplementary interviews would enrich the study with



practical and perceptive insights. Hence, the analyses and results could be based on statistical data as well as perceptions and observations with a larger data pool.

 Another direction could be going towards an action research strategy which would aim for researching and developing knowledge in a more collaborative manner. This is especially useful in the field of ergonomics and work environment as both physical and experiential factors could be taken into account in the research. The action researcher would want to understand the ground realities and be more empathetic while designing interventions and reporting results which is not exactly possible in experimental research design. On the contrary excessive empathy could lead to a possibility of bias in the study as there is a possibility that the research develops an opinion and reports results from that particular lens.

Lastly, as the Covid-19 vaccination process has begun in Sweden as well as Pakistan, the re-opening of societies would mean transitioning back to older routines. Therefore, it could be interesting to study how the situation develops in a post-Covid world. Furthermore, more regions could be explored and wider perspectives and best practices could be accumulated to form a guiding document for what seems to be a hybrid model. A triangulated study will  give more detailed statistical results in terms of comparison of different geographic regions.

6 Conclusions

This thesis explored the impact that the Covid-19 pandemic had on the physical and psychosocial work environment of university professors at two universities in Sweden and Pakistan. The findings show that:

- While demographics played an important role, faculty members at both countries made conscious efforts to incorporate healthy practices to alleviate the physical and psychosocial stressors in the new work environment. This was in terms of creating and ergonomic work space and finding motivating factors to continue teaching in online and hybrid setups.
- Interaction with technology was an integral aspect of continuing teaching activities during the pandemic. While it seemed to be overwhelming for most faculty members to adopt new tools and systems, they were also found to be gratified by the learning opportunity it presented. The organizational support in this regard was also greatly appreciated.
- The faculty members had different coping mechanisms to the transition of the teaching activities from in-person classroom to digital classrooms. The main concerns were to establish reliable communication and collaboration channel and reduce social isolation.

The results were discussed through the lens of the HTO-model, where it could be said that the human aspect of the model is found to be the most vulnerable part of the system. The human subsystem is affected by environmental, organizational, as well as technological factors which contribute to the physical and psychosocial stressors and risk factors in the work environment.

The results were also discussed through the lens of resilience engineering, where it could be said that while the technological support for professors during the transition was adequate. However more stress could be given to the health promotion and social support for the university professors to overcome risks and stressors.

It is hoped that this work can contribute to further understanding the physical and psychosocial work environment of the faculty members in Sweden and Pakistan. The study has prospects to be contextualized within the Covid-19 pandemic, but also during the hybrid setup and transition thereafter. Furthermore, such a research pattern could be employed to collect larger pool of information by not only including more universities but also comparing different geographic regions. It can be seen as exceptionally important for future research as well as policymakers to assess comparative implementation of UN Sustainable Development Goals in terms of creating a sustainable working in the education sector.

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8 Appendix

Informed consent statement

The study aims to identify challenges faced by faculty in universities in Sweden and Pakistan during the digital transformation of education as a result of pandemic. It focuses on its effect on the health and wellbeing of professors, recognize and compare associated risks. Furthermore, the study explores strategies employed to adapt to the new situation to curate best practices. I want to learn about your experiences and perspective on this subject. It is important that you understand that your participation is completely voluntary and that you can opt-out of this study whenever you want and would also remain anonymous in the report. Some questions can be sensitive, but you do not have to answer any of them if you do not want to, you can also ask me to pause or stop the recording at any time during the interview. All raw data that is collected will be destroyed no later than June 8th, 2021.

Knowing this, do you consent to being interviewed and participating in this study?

Interview Guide

Introduction:

1. Presentation of myself
2. Presentation of aim for the study
3. Seek permission to record the interview
4. Address questions about confidentiality; How the information being provided would be used, role if interviewee data in the report and possibility to withdraw consent anytime. (Read Consent Statement)

Introductory Questions:

1. How long have you been teaching?
2. How long have you been associated with the current institution?
3. How has the core aspects of teaching changed as a result of pandemic?
4. What were the key challenges you faced initially when the mode of teaching was completely shifted from on campus to online?

Core Questions:

1. Have you had any previous experiences with digital teaching?
2. How has your interaction been with digital technologies so far?
 - a. What strategies did you employ to overcome them?

Technology

3. What hindrances do you face while interacting with digital tools and technology?
 - a. How well do you think you adapted to the digital tools and platforms?
4. What is the hardest/most challenging part of that for you?
5. What progress do you think you have made so far?
6. What has contributed to your success so far?
7. Have you felt overwhelmed by the technological tools and how did you overcome it?
8. Do you feel spending time in front of the computer impacting your health?

Human

9. In what ways do you feel your physical health is affected by teaching from home?
10. What changes did you make to your work environment to feel relieved?
11. What strategies have you employed to maintain physical and recreational activity?
12. How has the work organization and work responsibility changed as a result of pandemic?
 - a. Is it a source of worry or stress?
13. How have you been able to maintain a balance between your work life and personal life?
14. Do you feel it is challenging to communicate and foster teamwork in a virtual learning environment?
 - a. What tools have you employed to make the sessions more engaging?
15. Do you feel the expectation of student changed in an online setup?
 - a. If yes; Is it a source of worry or stress?

16. How have you been able to maintain expectations of our students and your institution?

Organization

17. How has the vision of you institution changed as a result of a global crisis?
18. How do you think the institution adapted during the trying times?
19. How has the institution facilitated its faculty for a smooth transition?
20. What are the major challenges you still come across?
21. How do you think you manage with/ overcome these challenges?
22. What would be the key take-a-ways from the situation?

Ending:

1. What do you think is working well for you in these situations?
2. What do you think has contributed to your success so far?
3. Is there anything else you think you can do which would ease the situation?
4. What key learning/ experiences would you like to take forward with you?
5. Acknowledgment for time and salutations
6. Information about future updates and progress

