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Investigation into Rural-Urban Gap in Readiness of Universities for Online Teaching: A Case of Pakistan

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ABSTRACT

Higher education institutions worldwide faced significant disruption and chaos as COVID-19 swept away the normal in 2020, catapulting them into online mode of instruction with hardly any transitional time. It can be argued that the challenge was particularly daunting for universities in developing country contexts of South Asia, like Pakistan, with limited resources and a large student body coming from socioeconomically disadvantaged backgrounds. While research evidence piled up around the world about different challenges that specific universities faced within or across countries, there has been little systematic work done to explore the comparative challenges faced by universities in urban (large metropolitan) and rural (smaller/semi-urban /cities) in a single country context. This paper presents the findings of a large-scale survey sent to all the universities in Pakistan during COVID to understand the intra-country variation that one needs to keep in mind as we prepare for online instruction to meet similar challenges in the future. A quantitative survey was sent to 196 universities in Pakistan. The survey had questions under the following categories, namely: university readiness, faculty readiness, student readiness, technology readiness and laboratory readiness. The results presented here are from 170 universities. The results reveal that urban universities were much more successful in their transition to online instruction than rural universities. The disparities were across: a) the extent of online policy adoption; b) infrastructure and support; c) operationalization of online teaching processes; and d) student and faculty readiness for online instruction. The study in the developing country context of the global South contributes to the relevant literature by providing insights into the unique challenges faced by universities because of their location.

INTRODUCTION

In developing country contexts, a comparative analysis between rural and urban contexts reveals a staggering contrast that is biased against those living in rural areas. The issues in rural areas include a myriad of issues, including infrastructure challenges, electricity outages, poor health facilities, and lack of education (Ngwa *et al.*, 2023). Access to education is central to addressing economic poverty in rural by fostering local job creation for communities and keeping in check large-scale urban (large metropolitans) to rural (small cities/villages) migrations (Davies *et al.*, 2023). As a strategy to strengthen educational access, governments encourage the establishment of higher education institutions in rural areas and emphasize the use of technology to make education accessible to remote populations (Lagura *et al.*, 2022).

However, COVID-19, declared a pandemic on March 11, 2020, by the World Health Organization (UNESCO, 2020), brought multiple challenges at personal, social, and institutional levels; Higher Education Institutions (HEIs) were no exception. HEIs worldwide were forced to lock down and shift to online instruction (World Bank, 2020). This transition represented a significant departure from traditional face-to-face teaching and learning in classrooms and was also abrupt (Sahu, 2020; Tamim, 2021). HEIs faced formidable challenges in upgrading technological infrastructure, providing faculty training, and facilitating students (Bao, 2020). Research focused on single or cross-country contexts documented and analyzed the struggles of HEIs as they adapted to online instruction, a complex undertaking even under normal circumstances (World Bank, 2020; UNESCO, 2020). The COVID-19 experience, traumatic as it was, has opened up new possibilities for hybridity in higher education program offerings, addressing issues of inequitable educational access. This means that the lessons learned from COVID-19 remain relevant for preparing for similar future shocks (Navarrete-Cazales & Rojas-Moreno, 2023) or for retaining the positive aspects of online work on the environment, families, and businesses (Yaseen & Joshi, 2021). While a robust body of literature around the world focused on the readiness of universities made broad comparisons between inter- and intra-country contexts of HEIs, they sampled only some HEIs (Devananda, 2020) or a program or two within a single HEI (Al Harthi, 2020; Latif & Latif, 2021). However, there has been hardly any intra-country study comparing universities located in rural (semi-urban/smaller cities) and urban (large metropolitan) areas using a large data set, despite the glaring differences between rural and urban contexts.

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Statement of the Problem

This paper contributes to the current literature by exploring the readiness challenges faced by rural and urban universities in the developing country context of Pakistan. Unfortunately, HEIs in rural areas are often viewed in the same light as those in metropolitan areas, leading to the generation of data and policies that may overlook crucial contextual differences between them. The aim is to provide a comparative understanding of HEIs operating in rural and urban areas and to highlight context-specific issues that can inform decision-making and foster innovative solutions to address these challenges. Although the data is generalizable only to HEIs in Pakistan, it nonetheless provides valuable insights for other similar contexts.

The paper presents key findings from a large-scale survey conducted by the Higher Education Commission, which was distributed to 196 universities in Pakistan. The analysis is based on responses from 170 universities that completed the survey. The paper is structured into five sections: the introduction is provided in the first section, followed by a literature review in the second section. The third section details the methodology used, and the fourth section presents and discusses the results. The paper concludes with the final section, summarizing the findings and arguments.

LITERATURE REVIEW

Higher education institutions (HEIs) tend to be clustered in large metropolitan areas; however, their role in rural development and social transformation is significant. Establishing HEIs, such as agricultural universities in rural areas, is a strategic move by governments due to their crucial role in human resource development (Sharma, 2014; Luvalo, 2014) and their ability to implement targeted strategic interventions to address local knowledge gaps and bring prosperity to the community (Hanssen & Mathisen, 2018). Despite this, rural HEIs face several challenges, including low enrollment, poor infrastructure, and high drop-out rates (Sharma, 2014; Konwar & Chakraborty, 2013). Technology can play a significant role in improving access to higher education in rural areas by offering flexibility in time and personalized instruction if designed carefully (Kiong, 2023). However, given the challenges related to human resources, infrastructure, and the digital divide in rural contexts (Kumari & Srivastava, 2023; Jena & Das, 2024), technology may also exacerbate existing inequalities (Harmelen & Pistorius, 1998).

COVID-19 necessitated the integration of e-learning in HEIs globally (Turnbull *et al.*, 2020), prompting the transition through policy creation and resource distribution (Alqahtani & Rajkhan, 2020; Adedoyin & Soykan, 2023). These policies aimed to support the shift to online education and mitigate the associated challenges (Adedoyin & Soykan, 2023). Institutions needed to implement strategic planning to revamp curricula, provide access to infrastructure, and offer training facilities and support for teachers and students (Bordeos *et al.*, 2022). The three major steps taken by HEIs in this regard were: a) e-learning policy making; b) provision of technological resources and infrastructure; and c) ensuring the readiness of faculty and students. However, there is a need to understand the extent of implementation and availability of these measures, particularly in developing countries like Pakistan.

E-Learning Policies

Higher education authorities worldwide formulated policies to navigate the complexities of e-learning (Turnbull *et al.*, 2020; Shrestha *et al.*, 2022; Hasan *et al.*, 2022). These policies aimed to standardize instructional frameworks, ensure the restructuring of course content for online delivery, and provide resources and crucial support for equitable access to online instruction (Zgheib *et al.*, 2023). HEIs in developing country contexts, such as Nigeria, faced significant challenges in devising these policies due to the absence of existing e-curricula (Eli-Chukwu *et al.*, 2023). Similarly, there is a gap in understanding the extent of the development and implementation of standardized e-learning policies in Pakistan.

Resources, Technology, and Infrastructure for E-Learning

The rapid transition to e-learning required robust technological infrastructure, including computers, smartphones, and reliable internet connectivity, to support remote teaching and learning activities for HEIs (Rafiq *et al.*, 2020). HEIs globally endeavored to provide the necessary infrastructure, online learning platforms, tools for teaching and learning processes such as assessments and assignments, as well as training and certification for these tools and platforms essential for e-learning (Gautam & Gautam, 2021; Salunoy *et al.*, 2023). However, the equitable provision of resources for e-learning and infrastructure remained a significant challenge worldwide (Zgheib *et al.*, 2023).

The importance of resource dissemination is highlighted by Kalkan (2020), who examined the e-learning readiness of university students in Türkiye using the e-learning readiness scale of Yurdugül and Demir (2017). This study found that computer, internet, and online communication self-efficacy were the top-ranked factors significantly affecting students' e-learning readiness, followed by self-learning, learning control, and motivation. This includes not only the availability of devices such as internet, laptops, and power supply but also the infrastructure and technological support to address arising issues (Boakye & Akwensi, 2023; Crawford *et al.*, 2020). Providing a strong internet connection, presenting live and offline sessions appropriately, and sharing class materials timely and correctly are influential factors on students' and lecturers' perceptions (Mohammed *et al.*, 2020).

It becomes increasingly important to assess the extent of provision and utilization of these resources, especially in developing countries like Pakistan. The readiness of HEIs

for online learning depended greatly on the availability of resources such as laptops and internet facilities, along with the technical skills to use these online platforms (Bana *et al.*, 2022). Several studies were undertaken to assess the adequacy of these tools by examining the challenges that emerged while using them (Binoy, 2024). For instance, HEIs in developing countries like India used tools and platforms to supplement online teaching and learning processes, yet faced challenges related to technological readiness, provision of tangible and intangible resources, and technological support (Singh *et al.*, 2023; Zgheib *et al.*, 2023; Bana *et al.*, 2022). Binoy (2024) gauged the importance of using digital tools, such as LMS and collaborative tools, based on their success in countries like the United States, Canada, United Kingdom, Singapore, and Australia. Access and adequate training for tools that can replace fieldwork or lab work become crucial, especially when physical lab access is not possible (Garcia *et al.*, 2022).

Rural areas globally face issues related to connectivity and access to resources, which compromise the effective implementation of e-learning (Basilaia & Kvavadze, 2020; Gautam & Gautam, 2021). While HEIs and government bodies have strived to provide tools, platforms, and training to support e-learning (HEC, 2024), significant gaps remain in understanding the challenges related to resource provision and utilization, especially in Pakistan. The Higher Education Commission (HEC) has endeavoured to ensure the provision of necessary resources (HEC, 2020). However, there is a need for studies to gauge the adequacy of infrastructure, tangible, and intangible resources, which are key factors affecting e-learning.

Factors Affecting Readiness of Faculty and Students for E-learning

The rapid shift to online education during the COVID-19 pandemic presented the HEIs, faculty and students with a host of challenges (Gautam and Gautam, 2021). The importance of being acquainted and well versed in using the latest Information and Communication Technology (ICT) tools becomes one of the key factors for successful online teaching (Lagura *et al.*, 2022) as teaching and learning became completely dependent on these tools (Sariakin *et al.*, 2023). In such circumstances, faculty readiness emerged as one of the crucial factors which impacted the overall readiness of HEIs for an online transition (Rafiq *et al.*, 2020). Faculty throughout the world, faced issues such as lack of IT skills required to use tools for online teaching along with limited access due to inadequacy of devices which proved to be a barrier for effective online education (Rafiq *et al.*, 2020; Turnbull *et al.*, 2020). In order to address the aforementioned challenges, faculty training and certification programs were deemed essential to equip the faculty with the necessary digital skill set (Martin *et al.*, 2019; Turnbull *et al.*, 2020). Although training and certification programs were deemed essential in developing countries such as India (Singh *et al.*, 2023; Turnbull *et al.*, 2020, Naik *et al.*, 2021), faculty members continued to face challenges due to inadequate resources and training opportunities. Mere familiarity with ICT tools was not sufficient; teachers accustomed to traditional brick-and-mortar teaching required rigorous ICT training and workshops to implement these tools successfully (Lagura *et al.*, 2022; Nemalynne *et al.*, 2023).

Similarly, student readiness also emerged as a critical factor impacting the success of online learning (Reyes-Millán *et al.*, 2023). Student readiness was heavily influenced by provision of resources, digital skills, and technological support (Reyes-Millán *et al.*, 2023; Siddiqua, 2022). Disparities in resource availability and technical knowledge posed significant barriers, particularly for students in underserved communities (Candy *et al.*, 1994). The availability of intangible resources, such as training and support structures for both faculty and students, played a pivotal role in facilitating the transition to e-learning (Kebritchi *et al.*, 2017, Rafique *et al.*, 2021). In Pakistan, HEC took steps to gather information related to student readiness, including access to tangible and intangible resources (HEC, 2020).

Despite these efforts, there remains a gap in understanding the specific challenges faced by faculty and students, particularly in rural areas. Furthermore, there is a need to understand the readiness of both faculty and students for e-learning to ensure equitable access to online education in rural and urban Higher Education Institutions (HEIs) across Pakistan. It must be highlighted that the differences and disparities surrounding IT skills, access to resources and availability of technological support between HEIs located in rural and urban areas exacerbated these challenges (Shrestha *et al.*, 2022) making it increasingly important to understand the degree of readiness in these areas especially in the case of rural and urban contexts of Pakistan. Moreover, understanding the preparedness of Pakistani HEIs, especially the differences in readiness between urban and rural universities, is crucial for addressing these issues. There exists a gap in understanding the need for understanding the degree of both faculty and student readiness for e-learning, thereby promoting equitable access to online education across Pakistan especially in the context of rural and urban HEIs in the context of Pakistan. Lastly, there exists a gap in understanding the policy implementation, resource availability, technology and resources, infrastructure support, and the readiness of faculty and students between rural and urban HEIs in the context of Pakistan

MATERIALS AND METHODS

Pakistan is a developing country, with 264 private and public universities (HEC, 2024). Participation in higher education is limited to 7% which is still much low (Economic survey Pakistan, 2023). This paper focused on the data collected by HEC (Higher Education Commission) from universities across Pakistan during

Covid. The key determinants essential for e-learning in the face of a forced transition is the adoption of a uniform policy for distribution of resources; tangible or intangible; here the need for a central regulatory body becomes more and more important which in the case of Pakistan is HEC HEC Pakistan a regulatory body constitutionally established and mandated in September 2002 to supervise funding, overseeing governance, support research and development, ensure implementation of policies, and undertake accreditation of the higher education sector in the Country (HEC, 2024). Over the years, it has played a pivotal role in ameliorating the quality of higher education by offering support and guidance in adopting international best practices through standardized quality ranking and offering support for faculty research, innovation and commercialization, and giving developmental grants for infrastructure. In response to the challenge of online instruction it provided a multidimensional support package to all the universities. This included technological and infrastructure support, requisitioning tools for seamless delivery and imparting effective training (HEC, 2024). To ensure that these aforementioned aspects do not pose any hindrance in e-learning HEC provided resources to universities across the country to ensure readiness for an online shift (Higher Education Department, 2020). Furthermore, keeping the importance of training programs in hindsight, HEC provided several capacity-building programs and strategies to transform pedagogical activities into a virtual model (Academia, 2020). It must be noted that the overall readiness for an online shift can be measured through the readiness of faculty and students, availability of resources, and their proper dissemination by the university, therefore, the role of a central regulating body becomes more and more important (Kummitha *et al.*, 2021), which in the case of Pakistan was HEC.

These tangible and intangible resources were provided by HEC to ensure readiness across several categories ranging from university readiness to student readiness, technological readiness and faculty readiness. Based on the facilities provided by HEC during the pandemic for online teaching to the universities across Pakistan, HEC conducted a survey to gauge the degree of readiness of universities for e-learning during the pandemic. This paper is based on the data collected through the survey circulated to the universities located across Pakistan by HEC during April 2020 at the time of the forced transition to online education. The methodology of filling evidence-based data-driven surveys was clearly communicated to the leadership of HEIs through online meetings via MS Teams and emails. This was undertaken through a customized survey tool designed for data collection (HEC, 2020). The transition to online and distance education mode was conducted in a decentralized manner ensuring that every unit of an HEI could be made operational for students and faculty. It was operationalized through the institutional statutory hierarchies and forming an Online Academic Council (OAC) in each HEI (HEC, 2020). This paper holistically tries to comprehend the readiness of universities across Pakistan and conducts a comparative analysis based on the rural urban locations of universities. The data set used for the purpose of this paper is divided in seven major categories, as the survey was divided in the following seven categories, namely, university readiness, course readiness, student readiness, evaluation readiness, laboratory readiness respectively and each of these categories have questions dividing them into subcategories. For the purpose of this study these subcategories were re-grouped and analyzed under the following four major categories namely, online policy adoption, the provision of infrastructure and support, the extent of operationalization of online teaching processes, the extent of student and faculty readiness. These became the primary factors which affected the readiness for online transition in universities across Pakistan.

The data collected through the survey was stored in an excel sheet, thus forming a comprehensive data set. Moreover, the data set was an amalgamation of qualitative and quantitative data which were helpful in understanding the data set. Coding was used to code the data collected in binary form when it was transferred to the excel sheet format. The coding process made it easier to read the data set. The data set was further enriched by listing some values in textual format where necessary. We went on to analyze the data through Excel software for a comprehensive and holistic analysis. Graphical representation of the tabulated data was used to enhance the analysis. Data engineering was used to engineer the data set for apt analysis.

The use of Excel enabled us to generate graphs, plots and distributions to analyze the data in-depth. Our findings have grouped the aforementioned categories in four major themes to understand the data comprehensively and to derive a conclusion based on the readiness of universities based on their rural and urban locations. Analysis of the trend of readiness in each of these categories based on the rural urban location of the universities is thus a measure for the comparison of readiness for an online shift of universities in rural and urban areas in cities across Pakistan.

RESULTS AND DISCUSSION

The findings of the study have been divided into the following four themes that describe the distribution of universities and online policy adoption, the provision of infrastructure and support, the extent of operationalization of online teaching processes, the extent of student and faculty readiness and the factors at play. These findings are further divided into sub-themes as depicted in figure 1 below. Each finding first presents an aggregated estimation and then a disaggregated one by locality. This is to allow an understanding of how an aggregated estimation can mask important inequalities.

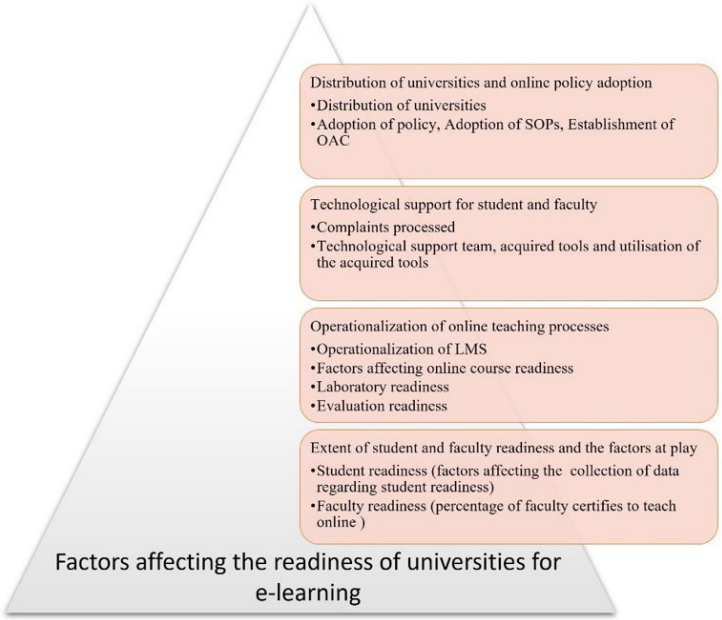

Figure 1: Factors affecting the readiness of universities for e-learning

Distribution of Universities and the Extent of Online Policy Adoption

Distribution of universities and the trend of the extent of online policy adoption are important factors in gauging the degree of readiness for e-learning across Pakistan based on locality (rural-urban status). There are two factors which affect this category namely, the distribution of universities across Pakistan (based on locality) and the extent of adoption of policy, SOPs and the establishment of OAC based on this distribution.

Distribution of Universities

The distribution of 196 universities in this sample shows a bias towards urban metropolitans across the country. The highest number of universities are in the metropolitan cities, depicted as the first 9 in figure 2 that displays the distribution of universities across Pakistan.

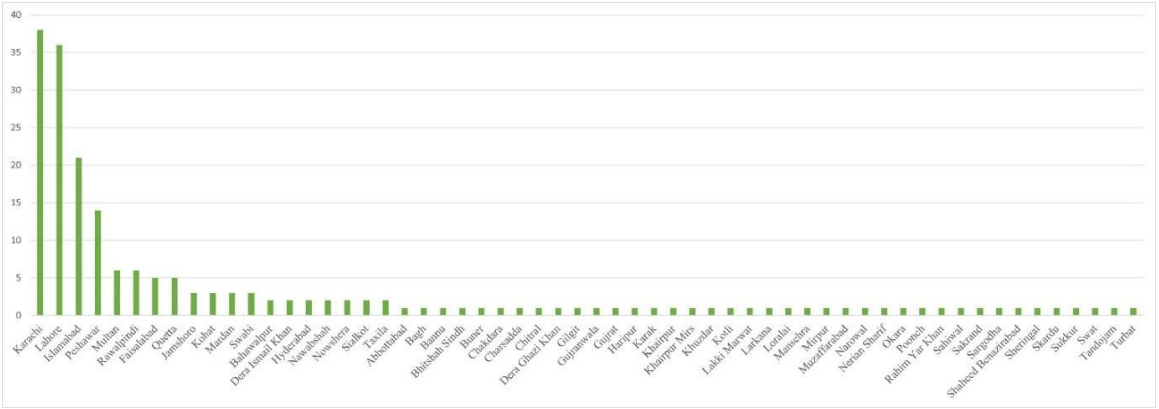

Figure 2: Distribution of universities across Pakistan

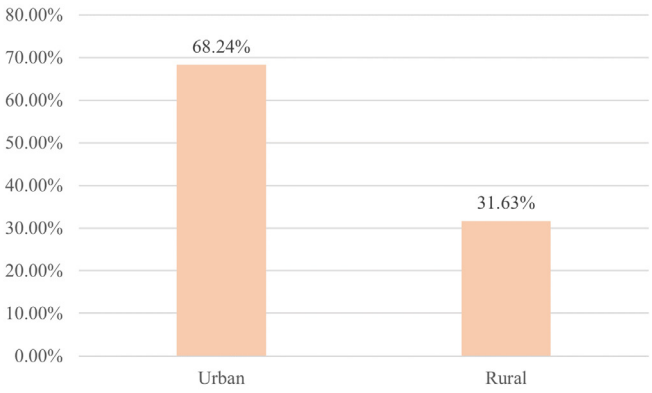

Figure 3: Percentage of universities across rural and urban areas

Furthermore, figure 3 shows the distribution of universities based on the rural-urban status. Figure 3 shows that the greater number of universities are located in the urban areas of Pakistan as compared to the rural areas. Moreover, figure 2 depicts that 68.24% of the universities in Pakistan are in 9 urban areas while 31.63% are located across rural areas.

Adoption of Policy, SOPs and the Establishment of OAC

The adoption of policy given by HEC involved among other things following Standard Operating Procedures i.e., SOPs for the approval of courses for online delivery; and establishment of Online Academic Council i.e., OAC which was responsible for approving courses for online delivery. Figure 4 reveals that 99% adopted the online policy given by HEC universities, 100% followed SOPs, while 99% also established OACs. This shows a good number of universities following HEC directions and online instruction protocols. Furthermore, the disaggregation of data by locality displayed in figure 4 below shows a higher level of compliance in urban universities than in rural universities. The main issue seems to be in setting up or establishing OAC for online instruction.

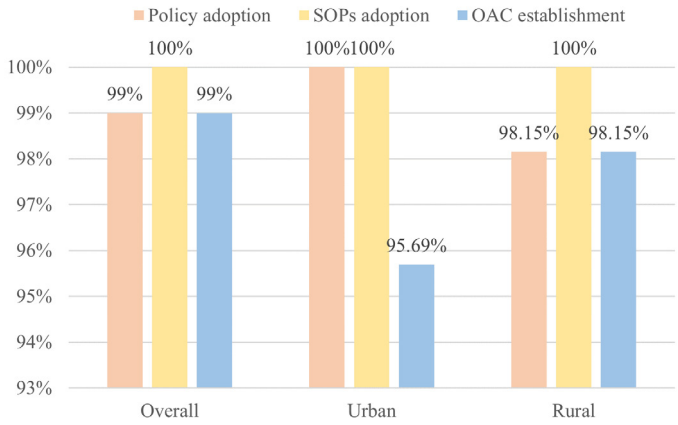

Figure 4: A comparison of the adoption of policy, SOPs and establishment of OAC across Pakistan and according to rural-urban status

Our findings suggest that although there is a high percentage of policy adoption for online education across all three aspects as mentioned above, it is interesting to note that when we conduct a comparison of universities based on their locations it is clear that urban universities have a higher preparedness as compared to rural universities in the aspect of policy adoption, whereas for urban universities the issue seems to be up an OAC.

Technological Support for Students and Faculty

An important aspect of a university's readiness for online instruction is the availability of technological support for students and faculty. This includes the provision of facilities for firstly, complaint processing and secondly the provision of technological support, acquiring the required tools and software and utilization of the acquired tools by the students and faculty.

Complaints Processed

As complaint processing is a pivotal part of technology readiness, figure 5 shows the comparison of the complaints registered, resolved, addressed in universities across Pakistan. As depicted in figure 5 below among the complaints registered i.e., of the total number of complaints received, 0.69% of the complaints were updated to the status of resolved whereas 24.72%

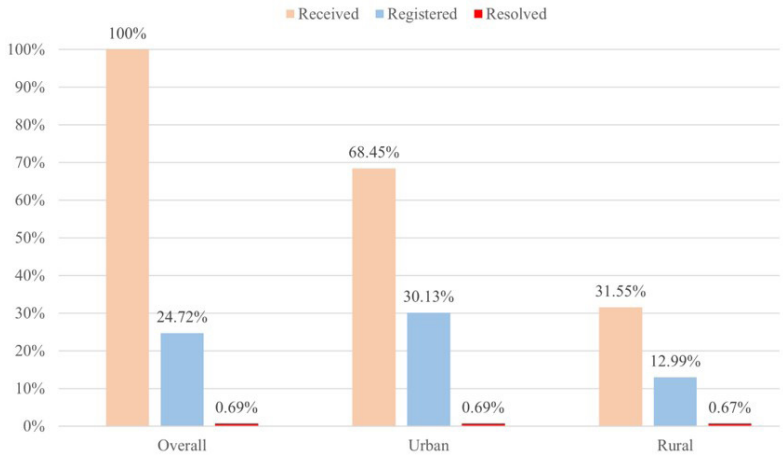

Figure 5: Comparison of the complaints registered, resolved, addressed in universities in Pakistan and based on rural-urban locations

were registered. When we view the complaints received according to locality, we can see that 68.45% were received by universities in urban areas, whereas 31.55% were received by the universities located in rural settings. When we analyze the number of complaints registered with the number of complaints resolved we might be able to see a stark difference between the two numbers. Moreover, a rural urban analysis in figure 5 shows that among the complaints received in urban areas, 30.13% of the complaints were registered whereas only 0.69% resolved. Furthermore, figure 5 also shows that in rural universities among the complaints received, 12.99% of the complaints were registered whereas only 0.67% were addressed. This shows that a higher number of complaints were registered and updated to the status of resolved in urban universities. It can be inferred from these numbers that urban universities have addressed a greater number of complaints that they have received highlighting a better preparedness in the area of student support in technological aspect.

Technological Support Team, Acquired Tools and Utilisation of the Acquired Tools

Secondly, provision of technological support, acquiring tools, and utilization of the acquired tools is also important for e-learning. Figure 6 below shows that 100% of the universities had acquired the required technology and software and for using them online teaching, while 77.22% of the acquired tools were being used, whereas 95.29% had technological support available. HEIs seemed to be doing better at acquiring technology and software and slightly less in putting in place a technological support team. However, the difference seems to be marginal. The most worrisome is the lack of use of the 22.88% acquired technology by the universities sampled for the study.

This shows that a vast majority of tools acquired by the universities are being used and a large proportion of the universities have technological support (team) available. Furthermore, a rural urban comparison in the figure 6 below suggests that 70.25% of the tools were acquired by the urban universities, all of the acquired are being used by the urban universities and 97.41% have technological support (technology support team) available whereas 29.75% of the tools were acquired by rural universities and 90.74% have technological support (technology support team) available.

This suggests that urban universities have better provision of support and a higher percentage for acquiring and using the acquired tools as well. Moreover, urban universities seem to be performing similarly across all three subcategories, whereas rural universities seem to be following the pattern of the general analysis above as they are performing better in acquiring and utilizing tools but lag slightly behind in the technology support area.

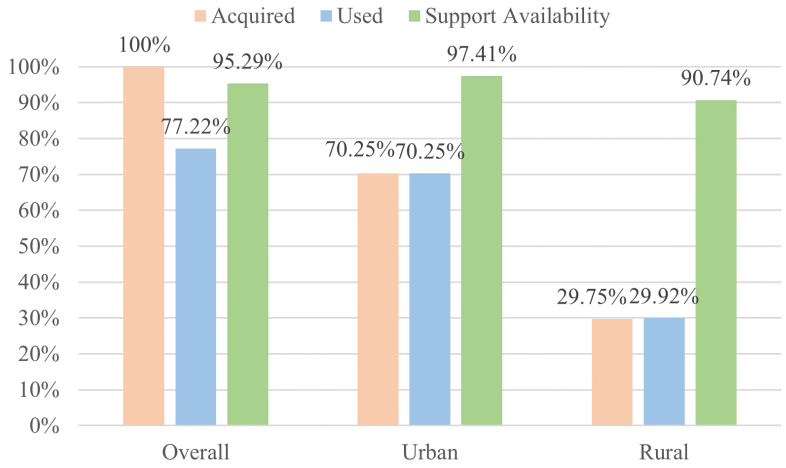

Figure 6: A comparison of the technological support, acquired tools and utilisation of the acquired tools by the universities across Pakistan and based on rural-urban locations

From the discussion above we can infer that urban universities perform better in complaint resolution, and in the domain of technological support as compared to their rural counterparts.

Operationalization of Online Teaching Processes

Operationalization of online teaching includes four factors, namely, operationalization of LMS, factors affecting online course readiness, laboratory readiness and evaluation readiness.

Operationalization of LMS

Operationalization of LMS is one of the most important factors for e-learning. Figure 7 on the left shows that operationalization of LMS has been adopted by 91.76% of the universities across Pakistan. Furthermore, a rural urban analysis in figure 7 below shows that among the urban universities 93.97% have an operationalized LMS whereas 87.04% of the rural universities have an operationalized LMS. We can infer that urban universities have better preparedness based on the factor of operationalization of LMS.

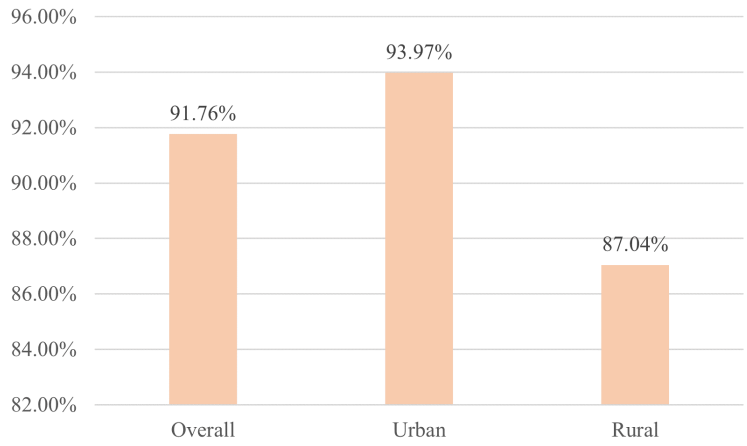

Figure 7: A comparison of the Operationalization of LMS in universities across Pakistan and based on rural-urban locations

Factors Affecting Online Course Readiness

Secondly, course readiness i.e., readiness of a university for teaching online courses depends upon the following factors, namely: the number courses approved for online delivery, the number of approved courses being taught online, availability of online course materials, lesson plans, course objectives, textbooks, online availability of course details, textbooks, operationalization of LMS and availability of course details.

Figure 8 below shows the overall course readiness for universities across Pakistan. Figure 8 below shows that almost 96.17% of the courses authorized for online teaching are ongoing in universities across Pakistan. Moreover, a vast majority of the universities have provided online facilities such as provision of learning objectives, lesson plans, course particulars etc. The category which seems to be performing the best is the ongoing courses among the ones have been authorized for online delivery and the weakest one seems to be in getting online library subscription from HEC.

Furthermore, a rural urban analysis in figure 8 below shows that among these factors, the urban universities have an overall greater preparedness as compared to the rural universities. Moreover, figure 8 below shows that for each category urban universities have a higher preparedness as compared to their rural counterparts. The category with the highest percentage: 96.55% of the courses authorized have learning objectives available for online teaching in urban universities are being offered whereas, 90.74% of the courses authorized for online delivery that are being offered in rural universities have learning objectives available. It is also clear from the figure 8 below that for the category with the lowest percentage: 93.10% of the urban universities have succeeded in obtaining HEC library subscription as compared to 77.78% of the rural universities.

Here, similar to the overall analysis, availability of learning objectives for the operationalization of online courses seems to be the strongest category, whereas, obtaining library subscription from HEC seems to be the weakest category.

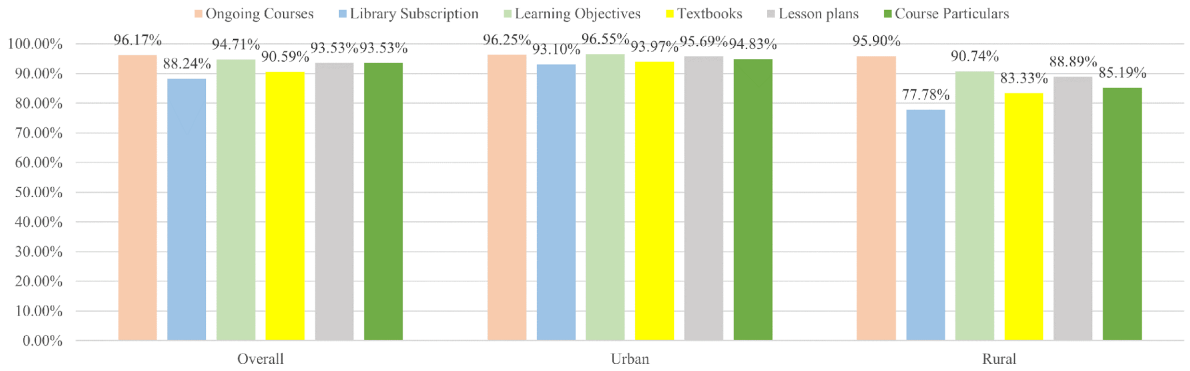

Figure 8: Factors affecting the overall course readiness across Pakistan, and based on rural-urban location

Laboratory Readiness

The third factor essential for operationalization of online teaching processes is laboratory readiness. Laboratory readiness is important for successful online education as several courses require lab work. The factor which affects the laboratory readiness depends upon the coordination of the university with professional councils on possible and permissible alternative modes of delivering psychomotor information (HEC, 2020).

Figure 9 shows the overall laboratory readiness and the comparison of laboratory readiness based on a rural-urban factor. Figure 9 shows that 66.47% of the

universities have a high laboratory readiness. Analysis based on rural urban locations shown in figure 9 below suggests that 68.97% of the universities in urban areas have high laboratory readiness whereas 61.11% of the universities located in the rural areas of the country. Although this finding is only dependent upon one variable as discussed above, the figure 9 below clearly shows that a higher percentage of urban universities are equipped for online education in the aspect of laboratory readiness as compared to rural universities.

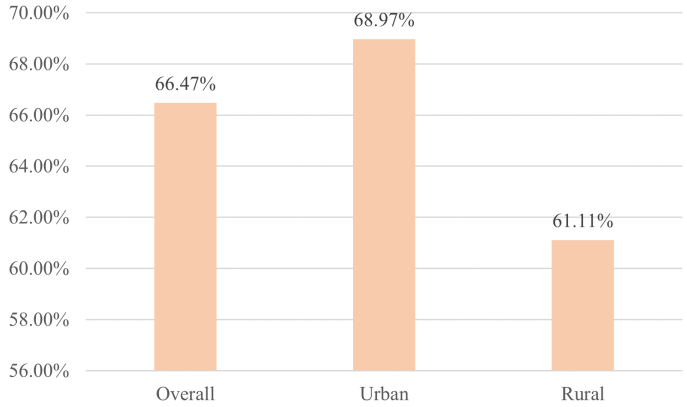

Figure 9: A representation of the percentage of laboratory readiness of universities across Pakistan and based on rural-urban locations

Evaluation Readiness

Lastly, the fourth factor essential for operationalization of online teaching processes is readiness for online assessment (evaluation readiness). Evaluation readiness is one of the primary factors which affects the overall readiness of a university for online education. Evaluation readiness depends upon the adoption of a uniform policy for online evaluation for online courses and the dissemination of that policy among the students and the faculty (HEC, 2020).

Figure 10 below shows that 79.41% of the universities have adopted a uniform policy for online evaluation and 71.18% have disseminated it as well. The difference in these percentages shows that there is a need for greater adoption of policy for evaluation and to disseminate these policies as well.

Additionally, a rural urban analysis in figure 10 below suggests that 79.31% of the urban universities have adopted a uniform policy for online evaluation whereas a slightly lower percentage i.e., 75% of the universities have disseminated it. Whereas 79.63% of the rural universities have adopted a uniform policy for online evaluation whereas a lower percentage i.e., 62.96% of the universities have disseminated it. The results also highlight that although the majority of universities have adopted a policy for evaluation, they have not succeeded in disseminating it.

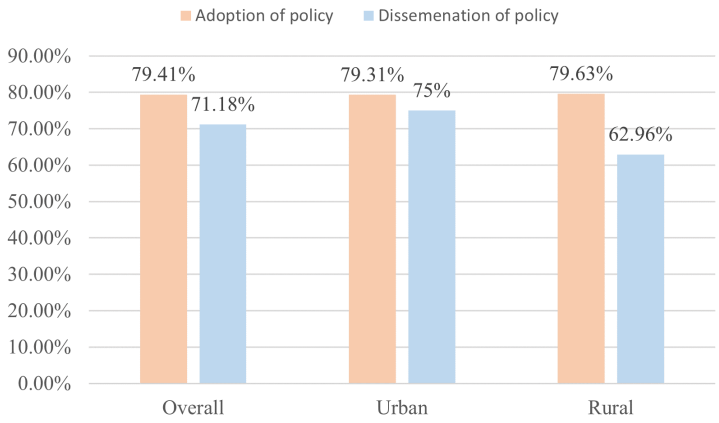

Figure 10: A representation of the percentage of evaluation readiness of universities across Pakistan and based on rural-urban locations

Here, it is again interesting to note that urban universities have a high preparedness across most factors as compared to those in rural areas. Furthermore, as we delve into the findings regarding the factors essential for course readiness, we can see that the universities located in urban areas have higher preparedness in operationalization of LMS and factors affecting the overall course readiness for e-learning. Thirdly, rural universities have a lower preparedness as compared to urban universities when it comes to laboratory readiness. Lastly, we can see that urban universities have

a slightly lower preparedness when it comes to adoption of policy for online evaluation as compared to those situated in the rural settings, whereas, rural universities have a much lower preparedness in dissemination of the policy. We can say that urban universities have better preparedness in evaluation as compared to the universities located in rural settings. Based on these factors, we might be able to say that, when it comes to operationalization of online teaching processes, urban universities perform better but there seems to be an overall lower preparedness in the aspects of laboratory and evaluation readiness for universities located in rural and urban settings.

Student and Faculty Readiness

Student readiness is measured through collection of data regarding the factors that gauge readiness of students for online learning. Students are one of the primary stakeholders in online education. The factors which affect the collection of data regarding student readiness (student readiness) of a university are based on university collecting the basic information regarding the students such as demographics (area of residence), student particulars (contact numbers), internet details, the nature of available devices to students such as laptop, desktop etc., the distribution of certified tools for e-learning, and the establishment of a complaint center by the director of student affairs of the university. The figure 11 below shows the distribution of the percentages of the factors affecting the student readiness of the universities across Pakistan.

Figure 11 below shows that 98.24% of the universities have collected information regarding student particulars whereas, a much lesser 70% have succeeded in establishment of a complaint center. It is interesting to note that across all sub-categories for collection of data regarding student readiness; collection of data regarding student particulars is the strongest category whereas, setting up a complaint center headed by the director of student affairs is the weakest.

Interestingly, a rural urban comparison in figure 11 below shows that 99.14% of the urban universities have collected information regarding the area of student particulars, whereas rural universities have collected slightly lesser i.e., 96.30% of student residence information. Moreover, rural and urban universities have the lowest percentage for establishment of a complaint center with urban universities at 71.55% and rural universities at 66.67%. A deeper analysis suggests that universities in urban areas seem to be performing overall slightly better as compared to those in rural areas as depicted in figure 11 below. This shows that collection of data regarding student readiness is better in urban universities because the higher percentages of universities have succeeded in the factors that affect the overall student readiness of a university as compared to those in the rural areas.

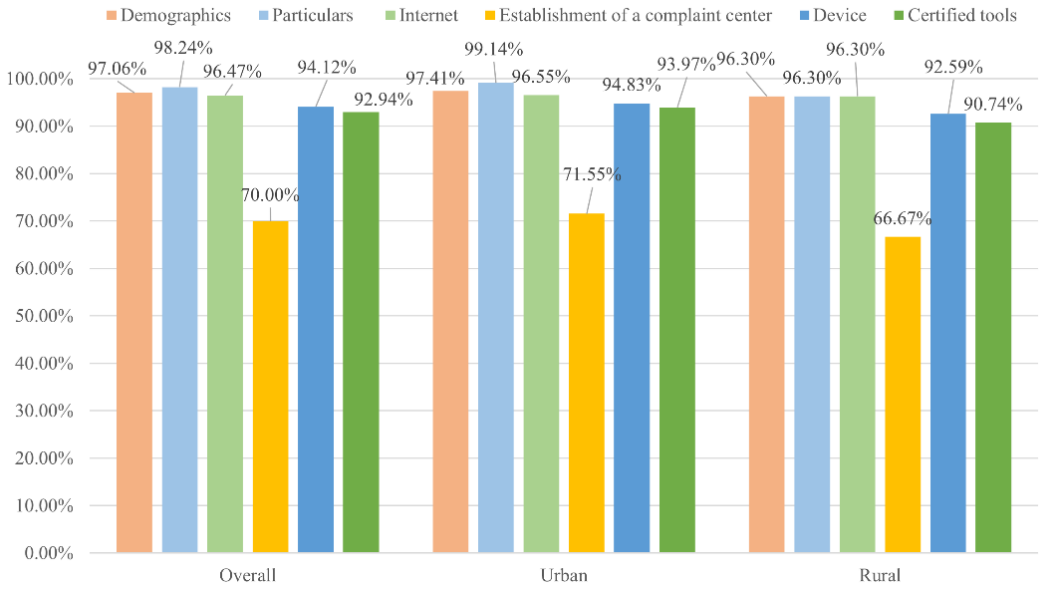

Figure 11: A distribution of the factors affecting the collection of data regarding student readiness (student readiness) of universities across Pakistan and based on rural-urban location

Faculty Readiness

Faculty readiness depends upon the total number of faculty and the percentage of faculty certified to teach online courses. Figure 12 shows that 85.32% of the total faculty available in Pakistan is certified to teach online. Although 85.32% of the faculty has been certified, it is interesting to note the rural urban comparison in this regard. Figure 12 shows that 84.85% of the faculty in urban universities is certified whereas 86.83% of the faculty in rural universities is certified to teach online courses.

This suggests that universities in rural areas have a slightly better faculty readiness as compared to those in urban areas as suggested by the figure 12.

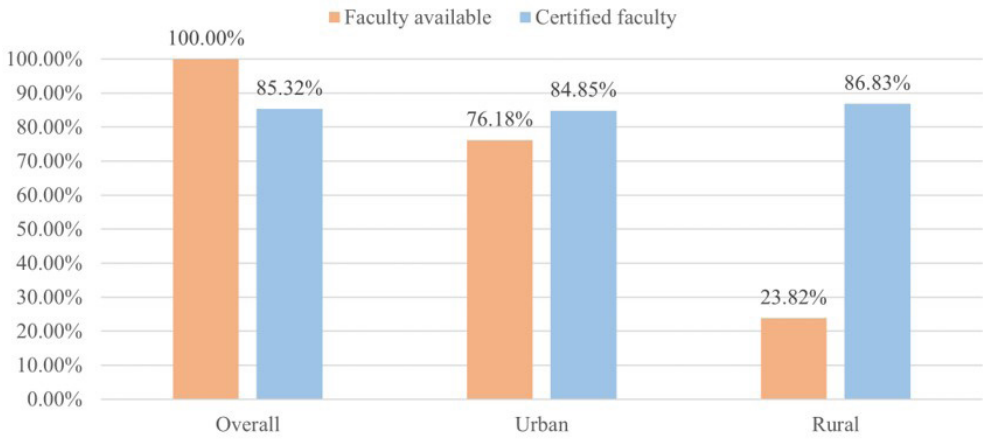

Figure 12: A comparison of the total faculty and the percentage of faculty certified to teach online courses in universities across Pakistan and based on rural-urban locations

As one of the key factors which are essential for the transition to e-learning are faculty and student readiness. We might be able to suggest that rural universities need to improve their student readiness, whereas urban universities need to improve their faculty readiness.

The study revealed that universities in Pakistan are well-prepared for online policy adoption, with urban universities outperforming in several aspects, including policy implementation for online teaching, adherence to SOPs, and establishing an Online Academic Council (OAC). Despite overall high readiness for infrastructure and support, urban universities excel in complaint resolution, and greater readiness for technological support. Additionally, urban universities are more prepared for LMS operations, better equipped for online courses, laboratory readiness, whereas there is a minor lag when it comes to adoption of policy in evaluation readiness. The findings indicate that while both urban and rural universities demonstrate high readiness for e-learning, urban universities have higher student readiness, whereas rural universities show slightly higher faculty readiness. The study concludes that Pakistani universities were generally well-prepared for the transition to online teaching, with notable differences between rural and urban institutions.

CONCLUSION

During the Covid-19 pandemic, switching from on-campus learning to e-learning showed gaps in policy and resources. This especially affected students and teachers in Pakistan's rural and urban areas. Efforts by the HEC and other bodies are noted, but gaps in tech support remain. The study looked at how ready Pakistani universities were for online teaching, comparing rural and urban areas. We found readiness in four areas: policy adoption, infrastructure, teaching processes, and student and faculty readiness. Rural universities need to boost student readiness; urban ones need better faculty readiness. Urban universities did better in policy adoption, SOPs, and tech support but lagged a bit in evaluation readiness. Both rural and urban universities showed high e-learning readiness overall. The study suggests Pakistani universities were quite ready for online teaching during the pandemic. However, there are differences between rural and urban schools. Similar global trends show urban universities usually have higher e-learning readiness. In Pakistan, this isn't always about location. The study used a survey from the HEC during the quick shift to online learning, with 170 out of 202 universities responding. This is a limitation of the study. Based on HEC's research, there's potential to find what drives e-learning tool use. Future research could look at why certain tools were used more—ease of use, limited training, or strict rules. Also, comparing tool use before and after COVID-19 could give insights. Lastly, studying gender differences in urban vs. rural areas could be interesting for further research.

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