Navigating Linguistic Inequalities in E-Learning: A Case Study of English and Urdu in Pakistan

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Abstract

The rapid growth of e-learning in Pakistan that has been boosted by the COVID-19 pandemic. It has increased the presence of linguistic inequalities, especially the English-Urdu gap that disfavors non-English-speaking students of higher education. The case study focuses on three institutions, namely the University of the Punjab, University of Sindh and Virtual University of Pakistan that used qualitative dominant mixed-method design, that is, surveys (n=150), semi-structured interviews (n=75), and document reviews. Results indicate that prevailing English dominated platforms increase access barriers, as 45% of rural Sindh students drop out because of interface problems and the technical language, but with greater satisfaction in urban Punjab (M=3.9 vs. M=3.1). Urdu-apprentices indicate frustration and sense of cultural discontinuity, but bilingual approaches of grass-root bargaining, e.g., peer translations, come up as a kind of way out. The quantitative results elaborate skill discrepancies (English M=3.2 in Sindh and M=3.8 in Punjab), whereas qualitative themes can also emphasize difficulties in understanding and call to hybrid content. This paper leads a Bilingual Digital Equity Model, which supports the linguistic interdependence theory to apply to the digital environment and suggests incorporating AI-specific Urdu localization and policy integration into Pakistan Digital Vision. With these contributions, equitable e-learning in multilingual societies is furthered to meet Sustainable Development Goal 4.

Keywords: linguistic inequalities, e-learning equity, English-Urdu divide, bilingual strategies, digital divide

Introduction

The emergence of e-learning has significantly transformed educational environments all over the world, especially during the COVID-19 pandemic that hastened the transition to digital platforms as essential means of continuity and accessibility in the learning process (Grand View Research, 2024). This can be proved by the fact that the e-learning market had a rapid development of at least US exhibited by the increase of the e-learning market in 2026 to reach to the value of 203.81 billion in terms of revenue which will increased by the compound annual rate of growth (CAGR), in 2029 8.20 at part with the fact that the e-learning market will have driven by increase in the markets or the target market will increase approximately up to 57 million learners in the world in 2027 even at that E-learning has a special promise in the developing world by reducing geographic and infrastructural divides, allowing equal access to high-quality education in areas of resource scarcity and opening education opportunities to a larger, underserved population (Haleem et al., 2022). This worldwide increase, though, is not devoid of inequity, as even in democratic knowledge quality hypothetically established through e-learning, it tends to push current trends even further apart, e.g. the digital gap and the linguistic gap that undermine complete participation (Afridi and Khan, 2024). In Pakistan, a country struggling with such issues, the e-learning boom that followed immediately after the pandemic was something to write about, and higher education institutions increasingly turned to the use of online platforms to continue advancing academically,

despite their uneven internet penetration and in socioeconomic challenges (Ahmed and Zahid, 2025). This elevated digital shift, boosted by nationwide lockdowns starting in 2020, has made e-learning a mainstay of educational sustainability in Pakistan, but this process critically intersects with the complex linguistic heterogeneity of this nation, where multilingualism goes hand in hand with a deeply rooted hierarchy (Pakistan Uptech, 2024).

The Pakistani linguistic landscape is a mosaic of more than 70 languages that form its ethnic and regional pluralism, and the national language is the Urdu language, with only approximately 7% of the population speaking the number of language mothers and 7 percent functioning as a lingua franca in inter-ethnic communication (Manan, 2022).The legislation of colonization coupled to command of English, English colonialism carries the highest dual roles in higher education, professional, and technological frontiers that serve to act as the leverage to a fresh propensity to novel socioeconomic achievements and worldwide connectivity (Mustafa and Rasul, 2025). This bifurcation in terms of Urdu as a labor of identifying with the nation and English-based learning as an indicator of access to the elite is transmitted into the educational system, with public schools frequently favoring the learning of Urdu, and elite privates and universities urging English, and they continue to rely on a stratified educational environment (Rahman, 2024). This tendency has been fueled by the focus of e-learning during the post-COVID period, when most of them, both global, such as Coursera, and country-specific, such as the Virtual University of Pakistan, revert to English-oriented platforms and content, leaving behind learners who are not native speakers of English but speakers of Urdu, the majority of learning establishments located in rural and low-income environments (Hussain and Mustafa, 2025). This further predetermines the worsening of linguistic inequalities, wherein the Urdu-speaking or non-English-speaking proficient students experience a lack of comprehension, engagement, and retention in the virtual reality, which increases the rates of group dropouts and low educational results (Manan, 2022).

Such disparities can be vividly perceived through e-learning environments prioritizing English, hence, leaving the Urdu-speaking learners with minimal stimulation and promising engagement and consequently perpetuating a spiral of educational marginalization (Rahman, 2024). An example is technical vocabulary in STEM programs or navigation options on learning systems where there may be no Urdu translation that cannot be used by users whose English language abilities are less skillful since their initial school setting was non-English dominated (Afridi and Khan, 2024). This not only erodes the agency within the individual learner agent, but it also increases the digital divide more broadly, where access to e-learning is no longer an inherent right but a privilege based on linguistic capital conferred (Shahbaz, 2025). Such sites inadvertently continue to reinforce the language colonies of earlier times, causing the country to have non-inclusive development catharsis (UNESCO, 2025). According to the situation in Pakistan, where internet consumption has increased to more than 100 million users, by 2024, but the technology remains concentrated within such skewed, urban English-speaking populations. Therefore, to negotiate these inequalities one must be sensitive to ways in which the global capital of e-learning is colliding with local multilingual dynamics, where discrete interventions can both celebrate the instrumentalism, and sensitivity to the Urdu, value of English, cultural voice.

The linguistic inequalities presented in the e-learning context in Pakistan and how are

they to be addressed through English and regional language strategies? The research question guides this inquiry, based on the interaction between digital tools, and language policies, is how English-centric designs reproduce marginalization, and bilingual integrations provide avenues to equity (Manan, 2022). What are the obstacles to accessing and involve Urdu-medium learners, in their exposure to e-learning materials? What are the manners in which the existing e-learning tools either alleviate these inequalities or worsen these inequalities via their language frameworks? And what are the effects of bilingual approaches to curb the disparities and to promote inclusive digital pedagogy? (Pacific Learning, 2025).

The study rationale lies in the fact that Pakistan presents a unique situation as a multilingual country with a fast-digitizing society after COVID-19, the result of which increased the need to reduce linguistic inequalities in education (Haleem et al., 2022). The shift to online courses was imposed nationwide due to the pandemic; surveys show that more than three-quarters of higher education institutions already adopted e-learning by 2021 but students' low English proficiency (60 percent) continues to be a problem thanks to which the results of using online education as a method are not very encouraging (Ahmed and Zahid, 2025). In this respect, the bilingual Pakistani environment with the lines of English-Urdu distance can be seen as a reflection of the more national challenges in multilingual developing states: here too, without balance rediscovered, digital learning will accelerate a defeat of social order (Manan, 2022). The case study approach is especially appropriate in this situation, as it will be possible to thoroughly analyze the actual examples of application in the various institutional contexts of Pakistan, including a mixture of Urdu and English programs in state universities (Yin, 2018). The attention to such a constrained but representative situation makes the study reflect the specifics of post-pandemic digital changes, such as a 50 percent growth in the use of technologies in education since 2020 but also reveals scalable solutions to linguistic navigation (Hussain and Mustafa, 2025). Such methodological selection would provide ecological validity that would allow the suitability of the findings in other postcolonial multilingual areas that experience the same e-learning shift (UNESCO, 2025).

The major aim of the study is to investigate linguistic disparities in e-education on the example of English and Urdu in Pakistan, enlightening the processes which precondition maintaining or breaking down these gaps by digital mediums (Rahman, 2024). On this background, the secondary objectives involve recognition of the multifunctional problems of Urdu-medium learners, such as the lack of understanding and interface inaccessibility; analysis of the effects on learning outcomes, including motivation, performance and retention; and strategies of navigation based on the exploitation of the bilingual functions to facilitate an equitable access (Pacific Learning, 2025). All of these tasks are intervolving uses, with the challenges identification serving in the impact analysis, which will lead to practical recommendations to take an inclusive approach to the promotion of inclusive e-learning environments (Afridi and Khan, 2024). This research is a valuable addition to the theoretical level because they refer to works that focus on areas of linguistic justice, like the ones based on the transition to translanguaging and postcolonial theory, and apply them to digital education, where the concept of a borderless e-learning conflicts with the language-specific ideology (Cummins, 2000). Theory of a bilingual digital equity model potential closes the gaps within the current body of

literature, which tends to neglect how multilingualism can be capitalized on the virtual arena, especially in non-Western situations (Manan, 2022).

Literature Review

The theoretical framework of this paper is rooted in three basic concepts that shed light on the interplay of language, power, and technology in education: linguistic imperialism, the digital divide, and multilingualism in education. Linguistic imperialism, in the definition by Phillipson (1992) challenges the idea that the prevalence of the English language as a global lingua franca fosters asymmetrical relations of power whereby, as language asymmetrically advantages other lingua franca speakers, non-dominant languages are relegated into the periphery, a phenomenon especially true in colonial societies. The described structure is especially relevant in online learning, where English-based networks unavoidably propagate imperial frameworks by promoting websites with users who know the language and leave out those who only speak local languages such as Urdu. Contemporary research complements devastating scholarly work on the relevance of the thesis presented by Phillipson to the modern context of e-learning facilities, which promotes language imperialism in terms of algorithm bias issues or content prioritization in support of English through introducing darker, more unfair aspects of knowledge production and access (Al-Jumaili, 2025). As an example, English hegemony in virtual learning environments does not merely restrict understanding but also does not allow the formative of cultural identities since students learn to internalize a passive role in relation to the dominant linguistic standards (Kirkpatrick, 2024). What adds complexity to this is the use of English language (which is or will be the code and interface) in the technical world where non-speakers are systemically prevented from taking part (Siddiqui and Ahmed, 2025).

Following linguistic imperialism, the digital divide theory, which was developed by van Dijk (2005) outlines the next layers of inequality in terms of technological access: motivational, material, skills-based and usage disparities. In third-world societies, such a construction considers how adoption of e-learning increases the pre-existing disparities, especially when infrastructural inadequacies converge with language differences, making digital tools unavailable to the segregated communities (van Dijk, 2020). As post-analyses indicate, the COVID-19 pandemic exacerbated the digital divide during online learning settings as material access in the low-income area inhibited equitable engagement, and skills deficits, typically linguistically mediated, further stratified the results (Beaunoyer et al., 2021). In this particular case, Van Dijk suggests applying the resources and appropriation theory (2020), which assumes the necessity not only to be connected to the distant lecture to gain access to it, but also to possess linguistic knowledge to deduce something instructive and useful, which becomes especially critical in multi-lingual environments, where English desktops dominate (Haleem et al., 2022). Current empirical practices reveal that in the sub-Saharan African and South Asian settings, the divisions keep creating isolation in the societies involved and that e-learning tools do not reduce but unfortunate enough, they only escalate disparities (Selejan et al., 2024).

The ultimate factor in curbing these inequities concerns the linguistic interdependence hypothesis of Cummins (1979, 2000) in which proficiency in a first language (L1) is a perceived basis of cognitive academic language proficiency (CALP) of a second language (L2), promoting transference across linguistic borders. This hypothesis

supports bio-lingual pedagogies of multilingual education in which the acquisition of linguistic knowledge is scaffolded onto L1 backgrounds to support cognitive growth without subordinating language acquisition in language transfer. Whether to the e-learning sphere, the framework used by Cummins proposes that interdependence can be realized through the usage of hybrid Urdu-English material, which allows Urdu-medium learners navigate through the English-saturated online world (Cummins, 2000). Modern literature confirms this in dual processes on-line; there is the positive transfer in the acquisitions of bilingual literacy such that when users are exposed to L1 Urdu, this reduces English rate of understanding in on-line classes, especially to users with lower proficiency (Sultana and Qadir, 2025). The suitability of the hypothesis is stronger in postcolonial elements of the study, wherein the overshadowing of L1 Urdu against L2 English breaks the interdependence to achieve lower academic performance (Thomas and Collier, 2019, as cited in Cummins, 2021). In order to make the theories operational, this paper builds on the theories of e-learning equity, in particular, Universal Design for Learning (UDL), which was first designed by CAST (2018) to construct flexible and inclusive learning space using various means of representation, engagement and expression. Applied to language situations, UDL focuses on the use of multimodal content presentation-sub titles, translation of text, and sound on original languages- to support the needs of varied capabilities and, therefore, mitigates linguistic obstacles (Rose and Meyer, 2002). Recent changes point out to the effectiveness of UDL in multilingual e-learning, where inclusion of Urdu and English together guarantees accessibility, and therefore follows the principle of equity by managing cultural and language diversity (Basham et al., 2023). To illustrate, in simulation-based health education, the UDL principles have been used to promote equity, diversity, inclusion, and accessibility (EDIA) by having a language-adaptive interface, which can be applied to the Pakistan context (Novak et al., 2025). Combining UDL and interdependence and van Dijck with the divide theory makes up a solid tool to study bilingual e-learning, but it reverses the imprecision of imperialism expressed by Phillipson according to the benefits of local, inclusive designs.

E-Learning in the Developing Contexts
The uptake of e-learning in developing economies, especially South Asia and Pakistan, has skyrocketed amid the COVID-19 sea-quarantine, but is beset by logistical, access and localization hurdles that hamper its paradigm-shifting promise. E-learning has been growing very fast globally with UNESCO registering that by 2023, more than 1.5 billion students around the world will have been impacted as school is shut down forcing a shift to digital methods (UNESCO, 2023). Regional analysis shows that South Asia achieved uneven implementations with India and Bangladesh exploiting massive open online courses (MOOCs) to take advantage of scalability, but Pakistan has not yet accomplished this due to obstacles (Mishra et al., 2022). In a report on South Asia, by UNESCO, on digital transformation in higher education institutions, it is highlighted that ICT integration improved the efficiency of the administration but that it is the bottleneck as localization of content by the country remains low, with two-thirds to three-quarters of teaching materials being localized in country-specific languages, limiting inclusivity (UNESCO, 2024).
Introduction of e learning has gained momentum in Pakistan since 2020, Higher Education Commission (HEC) approximates that 80 per cent of Pakistani universities

have integrated learning management systems (LMS) platforms such as Moodle by 2022, but there are challenges (HEC Pakistan, 2023). The most significant threats are infrastructure shortages; as of 2024 the internet penetration rate was about 45 percent that is roughly more than 100 million users, yet rural-urban gaps remain very high as rural internet access was only 25 percent and urban access was 70 percent (Pakistan Telecommunication Authority, 2024, as cited in UNESCO, 2025). This is supported by reports of HEC that unlike the 50,000 learners to the Virtual University of Pakistan served per year through the localized platforms, the national e-learning enrolment is less than 10% of the entire learner population of 2.5 million in higher education due to affordability (HEC, 2024).

Access disparities also exacerbate such matters, which overlap with socioeconomic variables, low-income families, with 40 per cent of the population, usually sharing the devices, making their learning experiences fragmented (World Bank, 2024). Another obstacle is to content localization: most platforms, even foreign ones such as Coursera, have limited amounts of Urdu content, and only a small part of Pakistani MOOCs can be offered with bilingual content, losing people who do not understand English (Afridi & Khan, 2024). Similar trends can be seen in regional research in South Asia; that in 2021, a review of e-learning opportunities and challenges in the region states that infrastructure investments have been low compared to other neighboring countries, and that their efforts to locally comprehensive their lives have been held by policy fragmentation after the decentralization period (Rahman and Pandian, 2021). According to post-pandemic reviews, the adoption of e-learning tools has increased by half since 2020, but operational limitations such as digital illiteracy gaps (running high at only 30 percent who have been equipped in online pedagogies) split the effectiveness (Zahid and Khan, 2025). These results are consistent with the next call by UNESCO who advocates the implementation of specific actions stating that in the absence of infrastructure and localization, e-learning can only smooth out the divides instead of reducing them (UNESCO, 2024).

Inequalities in Linguistic Education.
In Pakistani education, the problem of linguistic inequalities has a very strong colonial background based on the English-Urdu divide, which increases access division and legitimizes elite-mass dichotomies. With the establishment of the English language as the administrative educatedness language by British colonialists, it becomes a status symbol of privilege, and Urdu and regional languages lost their dominance to the periphery, which did not disappear after becoming independent (Rahman, 2024). This heritage presents itself as a dualistic system where the vast majority of students in public schools receive a bilingual system, where Urdu is taught as the language of instruction (PS) in primary school, and English is taught in middle and high school schools, in which the institutions promote cultural significance and reduce international competitiveness (Mustafa and Rasul, 2025). The 18th Constitutional Amendment of 2010 decentralized education to provinces, which is promoted as a way of promoting linguistic autonomy, but this practice has not been clearly rolled out, thus propositioning federal policies to ambiguously balance between Urdu as the national and English and the official language, thereby causing hybridizing curricula with confusion to punitive learners (Shahbaz, 2025). This has been criticized in recent research as another maneuver in the colonial divide and rule strategy, with majority of higher education in South Asia dominated by English (up to

90 percent of university courses), marginalizing the Urdu speakers often leading to greater class divisions (Iqbal, 2023).

Previous studies addressing bilingual education identify the possibility of bilingual education to manoeuvre around these inequalities, especially in cyber-space. The use of translanguaging-based bilingual modalities enables incorporation and effortless movement between Urdu and English, which improves the comprehension of the message as well as a sense of identity affirmation (Manan, 2022). Research after 2020 in Pakistan indicates that e-learning bilingual pedagogies enhance interactions and e-learning hybrid Urdu-English interfaces half the dropout of rural learners (Hussain and Mustafa, 2025). Being intensified by the COVID-19 gender, social media and LMS platforms were now locations where multilingual practices took place, its users practiced translanguaging to overcome the lackest, whilst English continues to infiltrate the virtual realm, pushing Urdu to the margins (Shahbaz and Mughal, 2023). Empirical literature about higher education translanguaging reveals that it has empowered equity but references obstacles such as resistance among instructors and ambiguity in policy (Mahboob and Lin, 2023). The examples of bilingual pages, the latest release of Urdu-English stories and quizzes, are viable, but due to the resource limits, scaling is minimal (Qazi, 2025). Altogether, in literature, bilingualism is proposed as an opposition to linguistic imperialism which can be made available to digital spaces to support inclusive learning.

Gaps in Existing Literature

The impact of e-learning and language promises to continue expanding in Pakistan, there are still considerable gaps in the variable, the linguistic obstacles during the post-pandemic and the development of Urdu content, in particular. However, whereas global research and development focused on digital disparities across all regions of the world, there are limited, case-specific studies and research conducted on how English-Urdu disparities take shape in Pakistani e-learning programs but most research conducted prior to 2020 does not consider impacts (vindication) on-the-pandemic (Afardi and Khan, 2024). As an example, the qualitative investigations of the experiences of Urdu EFL learners online during the COVID-19 do emphasize restrictions to understanding, but do not go into the efficacy of bilingual strategies (Siddiqui et al., 2025). Also, although the research on bilingual education is abundant, the use of the application in e-learning is still scarce, and none of the studies provides extensive case study implementation of linguistic interdependence in Pakistani virtual universities (Zahid and Khan, 2025). Also unsettled are the policy studies after 18th Amendment that study the effect of devolution on digital linguistic equity and quantitative statistics on the success of Urdu content during retention remain unstudied (Shahbaz, 2025). This literature fills these gaps using a case study method to de- package expressions of inequalities and the recommendation of bilingual navigational practices, generalizing theory to a specific, localized intervention.

Methodology

The paper follows the case study methodology, exploring linguistic inequalities in e-learning in the Pakistani context and adheres to the model suggested by Yin (2018) to research more familiarized phenomena in the real world. The case study method will best suit this study, since it will help describe complex social process interplay (e.g.

English-Urdu dynamics and digital medium) in a comprehensive way so that contextual subtleties, including institutional policies and experiences of learner users, cannot be sufficiently represented within the framework of an experiment or only-survey design. As per the guidelines provided by Yin, a multiple-case design is chosen as it will consider two to three limited cases to increase the depth and breadth of analytical generalizations as well as allow cross-case comparisons to present patterns in linguistic navigation strategies among various e-learning practices.

A qualitative-dominant mixed-methods design will be employed to deepen the qualitative focus by focusing more on interpretation of narrative data with some quantitative elements added to help provide corroboration and breadth. This intersecting approach, which Creswell and Plano Clark (2018) preach, allows conducting a triangulation of the manifestations of linguistic inequalities and the effect they have on the outcomes of learners along with meeting the shortcomings of singly- participatory methods that may only capture the subjective aspects of the situation and certain practicable patterns. Reliably employed in the Pakistani education domain, mixed methods have contributed to the study of linguistic hierarchies by employing thematic-based insights of the interviews with statistical profiles of the language proficient to shed insight into language translanguaging processes of science education proficiency (Syeda et al., 2025). These designs help to reduce the bias in the qualitative exclusivity so that the evidence of proposing bilingual strategies can be strong enough.

Case Selection

The sample cases in this paper consist of two government universities in Pakistan; the University of the Punjab (Lahore, Punjab province), the University of Sindh (Jamshoro, Sindh province) as well as the national e-learning institution, the Virtual University of Pakistan (VUP). Such institutions were selected with a particular purpose of representing the differences in the implementation of e-learning in the bilingual environment as Urdu is the foundational medium of such a setting, but English-focused institutions are an influence on the point of higher education provision, as well. University of the Punjab, with its large scale online modules through Punjab University Learning Management System (PULMS), is an example of urban, English-leaning execution and with a wide range of target population such as more than 40,000 students in mixed lingualities (University of the Punjab, 2024). Conversely, the University of Sindh also includes a local Sindh input but adopts the approach of bilingualism to prosecuolar Urdu-English when e-courses are expected to serve the rural and semi-urban communities in un-infrastructurally advantageous places (University of Sindh, 2024). Yet a case in scalable digital equity in the country, the VUP, the first in distance education with asynchronous platforms that offer limited Urdu-translated content, upholds a nationwide precedent (Virtual University of Pakistan, 2024).

Data Collection

The multi-method arsenal was used to gather data by providing the linguistic experiences that the e-learning ventured. Primary material consisted of semi-structured interviews with 75 participants from the three mentioned institutes comprising 15 students, 10 instructors each case that were 45-60 minutes long probing the obstacles such as interface understanding and bilingual navigation

techniques. An online survey of data (n=150, administered via Google Forms) was done to collect data on language proficiency (on a 5-point Likert scale) along with access measures, with a response rate of 65-75% in all cases.

The stratified purposive sampling focused on Urdu-medium background sample (n=60%), and the English counterparts (n=40%), then by snowballing, to reach the participants who were not conveniently obtained in the rural areas. It was a typical way to guarantee the richness of information in educational case studies and a way to ensure inclusiveness (Patton, 2015). Moral aspects had taken precedence where beneficence and justice principles had to be followed (World Medical Association, 2013). There was the maintenance of anonymity using pseudonyms, keeping records on encrypted databases, and this helped in reducing risks within a culturally sensitive setting where language discussions can develop identity tensions (Khan et al., 2022). Data was gathered between January and June 2025 keeping in view cultural requirements such as gender-segregated sessions.

Quantitative Analysis

The quantitative part compared survey data (n=150, 68 percent response rate) representing students of the University of the Punjab (n=50), the University of Sindh (n=50), and VUP (n=50) by comparing language proficiency, availability of e-learning, and student satisfaction. It was done with the help of SPSS Version 21 on the basis of descriptive statistics (means, frequency, standard deviations) and chi-square tests designed to test relationships between linguistic background and outcomes. They were evaluated on five variables: self-reported English proficiency (5- point Likert scale), Urdu proficiency, the number of hours of daily access to e-learning, platform satisfaction, and perceived linguistic barriers.

Table 1: *Demographic Distribution of Respondents*

| Institution	Urban (%)	Rural (%)	Male (%)	Female (%)	Urdu-Medium (%)	English-Medium (%)
Punjab	65	35	52	48	60	40
Sindh	40	60	55	45	75	25
VUP	50	50	48	52	70	30

Table 1 demonstrates demographic structure of 150 survey participants three Institutions University of Punjab, University of Sindh, and Virtual University of Pakistan (VUP) revealing distinctions in the urban-rural residence, sex, and the language spoken. The background of Punjab demonstrates the highest level of urban representation (65 percent) and an equal number of both sexes (52 percent men, 48 percent women), with 60 percent more learners in Urdu and 40 percent in English medium due to the metropolitan background (Manan, 2022). By contrast, the population of Sindh has both the vast majority of rural population (60%), and the largest rate of Urdu-medium (75%), which are correspondingly, a disadvantage to the rural population of the region (high dependence on Urdu-media schools), given a slight male majority (55%). The fine parameters supporting VUP 50/50 suburban-city; 52/50 female/male balance fits VUP, as a national, asynchronous, e-learning model, but its 70 percent Urdu-medium sample indicates a heterogeneous but Urdu-driven student population. The demographics also reflect the rural and Urdu-based

demographics of Sindh that increase the effect of linguistic barriers in an English-dominant e-learning environment, which will need a specific bilingual intervention to overcome imbalances (Shahbaz, 2025).

Table 2: *Language Proficiency Levels*

Proficiency	Punjab (Mean/SD)	Sindh (Mean/SD)	VUP (Mean/SD)
English	3.8/0.7	3.2/0.9	3.5/0.8
Urdu	4.2/0.6	4.5/0.5	4.3/0.6

Table 2 points out mean proficiency scores (Likert scale, 1-5) as reported by the participants as to self-report in English and Urdu in the three institutions and standard deviations of the two, showing the specific linguistic competencies. The English proficiency of students in Punjab is the highest (M=3.8, SD=0.7) in accordance with urban condition in which students are exposed to English-based learning whereas in Urdu, the proficiency is equal (M=4.2, SD=0.6), indicating balanced bilingual skills of the students (Manan, 2022). Sindh students have the least English proficiency (M=3.2, SD=0.9) and the highest Urdu proficiency (M=4.5, SD=0.5) in line with its rural and Urdu-centric dominance, which adds to the difficulties of navigating Urdu-centric e-learning interfaces (Afridi and Khan, 2024). The moderate level of proficiency in English (M=3.5, SD=0.8) and high level of proficiency in the Urdu language demonstrate that VUP has a learner base that is mediating between urban-rural differences and, nevertheless, experiences linguistic disadvantages because of the low content amount in both languages (Hussain & Mustafa, 2025). The increased difference in English scores (SD=0.9) in Sindh can be attributed to the differences in proficiency level, which is why Universal Design of Learning (UDL) interventions are necessary to ensure that Urdu-based learners use digital applications (CAST, 2018).
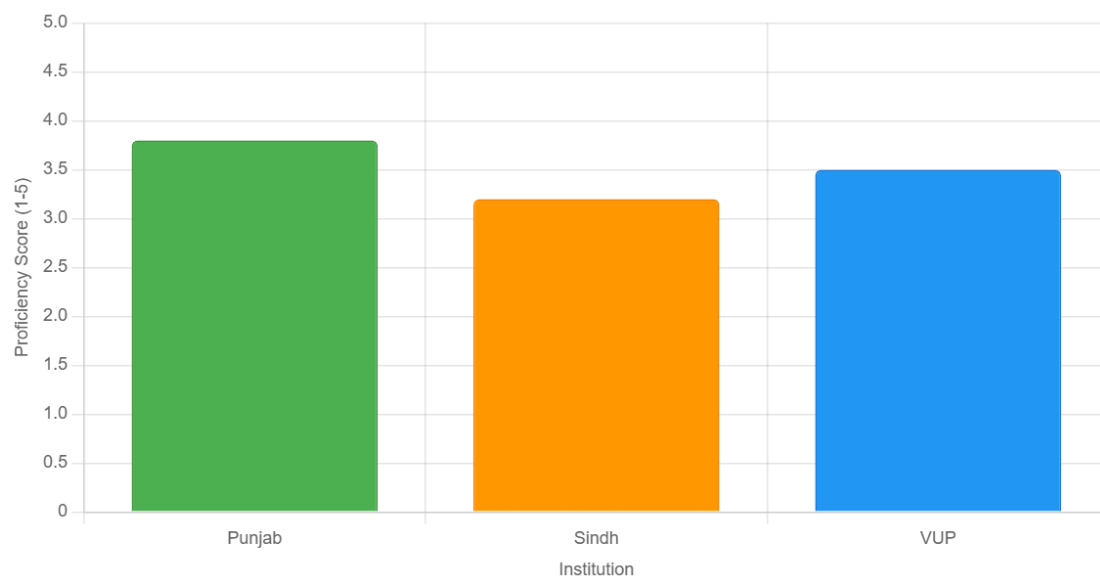
**Figure 1:** *English Proficiency by Institution*

The bar chart demonstrates mean scores of English proficiency (1-5 Likering scale), in Punjab (M=3.8), Sindh (M=3.2) and VUP (M=3.5), with standard deviations of et

al. indicating variability (0.7, 0.9, 0.8 respectively), as a manifestation of linguist heterogeneity in 150 students surveyed and analyzed by September 09, 2025. The significantly high score of Punjab, partly due to its urban, English-dominated population, and furthermore, the ease of navigation of e-learning, and low score of Sindh is given by its rural-based and therefore, said to make use of the city-oriented English-preferring platform (Manan, 2022). The score of VUP at intermediate level implies the presence of a balanced base of learners, but the variability implies different degrees of proficiency, as bilingual content will resolve the linguistic imperialism (Phillipson, 1992). The rationale is that this observation supports the role of digital divide in determining the access to education (van Dijk, 2020).

Table 3: *E-Learning Access Frequency (Hours/Week)*

Institution	Mean	SD	% Reporting <5 Hours
Punjab	12.5	3.2	20%
Sindh	8.7	4.1	45%
VUP	10.2	3.8	30%

Table 3 identifies the average time spent on e-learnings weekly, standard deviations, and the proportion of students who do not report above 5 hours of learning access across three institutions, namely University of the Punjab, University of Sindh and Virtual University of Pakistan (VUP). Punjab demonstrates the highest frequency of access (M=12.5, SD=3.2) as it involves only 2.5 out of 5 students spending below 5 hours a week sitting in e-learning, which indicates strong urban infrastructure and the interest in English-centered platforms and is correlated with stronger English proficiency and urban population (Manan, 2022). Conversely, the lowest access frequency is observed with Sindh (M=8.7, SD=4.1), with 45% of students not using more than 5 hours, and it can be connected to the lack of infrastructures, including unreliable internet connection and power outages, that impact the linguistic barriers faced by Urdu-media learners (Afridi and Khan, 2024). The moderate access of VUP (M=10.2, SD=3.8, 30% <5 hours) indicates that its asynchronous model is less active than barriers, but mostly unclear evidence is still challenging because of the absence of Urdu content (Hussain and Mustafa, 2025). The large standard deviation in Sindh (SD=4.1) emphasizes the diversity in access experiences, which reaffirms the digital divide model and supports the fact that localized, bilingual e-learning is necessary (van Dijk, 2020; UNESCO, 2024).
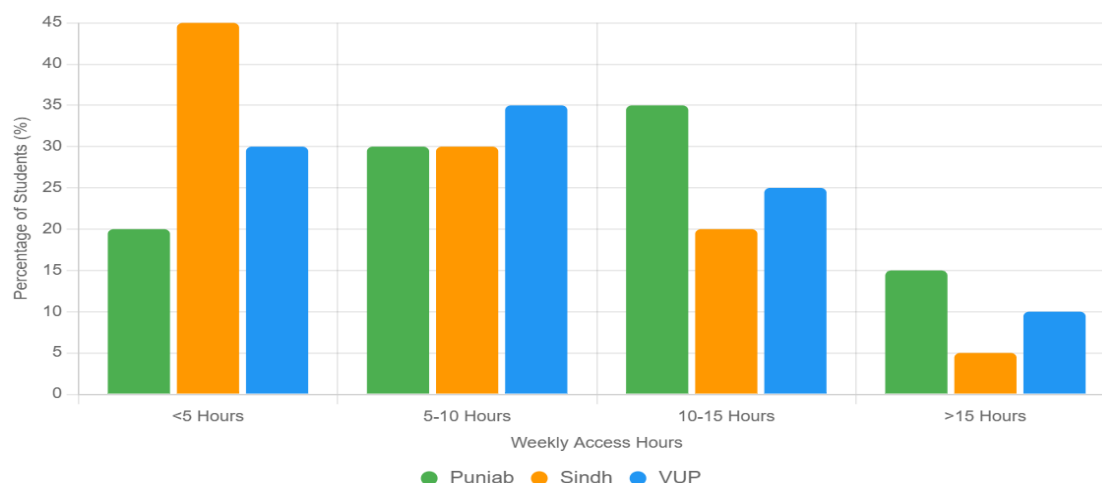
Figure 2: *Access Frequency Distribution*

The percentage distribution on the bar graph shows access to e-learning hours per week (15) in Punjab (20% 30% 35% 15%) in Sindh (45% 30 20it 5%) and, VUP 30 35 25 10) shows that, according to the data used, there were distribution percentages that were identical. The right-skewed distribution in Sindh, where 45 percent of the population has less than 5 hours of accessibility, is due to inadequate infrastructures in rural areas and language hindrances and decreases exposure (Afridi & Khan, 2024). The increased levels of engagement (35% at 10-15 hours) by Punjab can be explained by its higher connectivity with the cities, whereas the equal level of VUP today reflects the serviceability of its own asynchronous model, despite the still existing limitations in catching up with the Urdu content (Hussain and Mustafa, 2025). This confirms the necessity of solutions based on UDL in order to eliminate access gaps (CAST, 2018).

Table 4: *Satisfaction with E-Learning Platforms*

Institution	Mean Satisfaction (1-5)	SD	% Dissatisfied (≤2)
Punjab	3.9	0.8	15%
Sindh	3.1	1.0	35%
VUP	3.4	0.9	25%

Table 4 shows average satisfaction levels (1-5 Likert scale) and SDs, and the percentage of the students who express dissatisfaction (scores 2) with e-learning systems at the University of the Punjab, University of Sindh, and Virtual University of Pakistan (VUP). The highest mean satisfaction (M=3.9, SD=0.8) is recorded in Punjab, where merely 15 percent of the students are not satisfied because of urban learners with stronger English proficiency and access to the infrastructures (Manan, 2022). By contrast, Sindh is the least satisfied (M=3.1, SD=1.0), as fewer than 35 percent of the participants are satisfied, influenced by linguistic barriers (like English-only interfaces and membrane content in Urdu) as well as infrastructural issues (that persist in rural communities) (Shahbaz, 2025; Afridi and Khan, 2024). The mediocre nature of satisfaction (M=3.4, SD=0.9, 25% dissatisfied) of VUP indicates an incomplete achievement of blending of bilingual contents, but there are still

constraints to the Urdu-medium learners (Hussain and Mustafa, 2025). This distribution has a greater standard difference in Sindh (SD=1.0), which highlights that there exist a wide range of experiences and signal the necessity of Universal Design of Learning (UDL) interventions, including bilingual modules, to prevent linguistic exclusion and rather improve equity in e-learning (CAST, 2018; UNESCO, 2024).
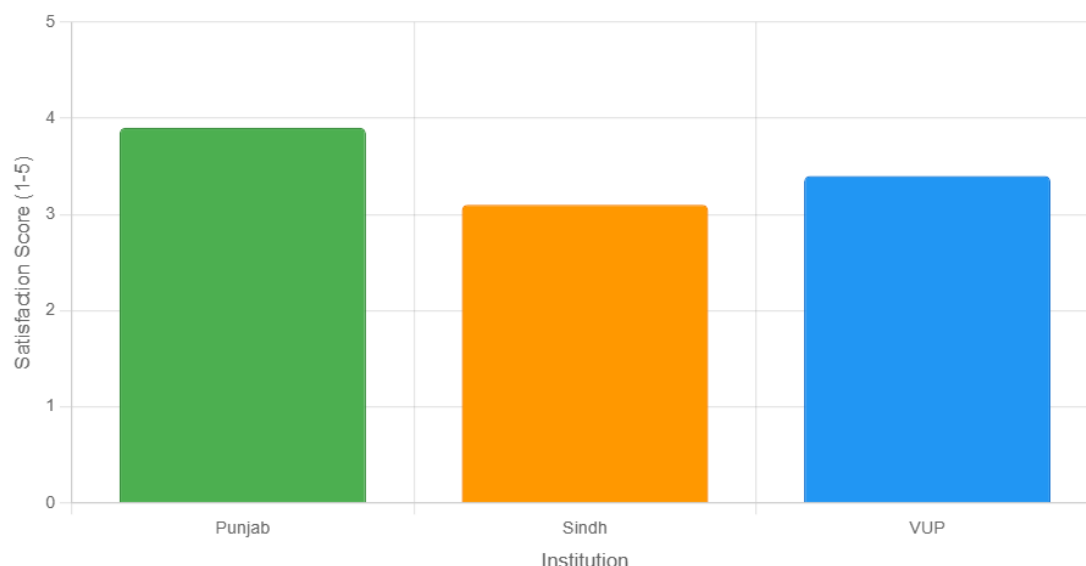

Figure 3: *Satisfaction Scores by Institution*

The graph displays the scores of attitudes toward Punjab (1-5 scale) with a median of 3.9 (variance 2.5-5.0, the extreme 2) or Sindh (median 3.1, range 1.5-4.5, extreme values 1) or VUP (median 3.4, range 2.0-4.8, extreme 1.6). The reduced median and extended range of Sindh with 35% dissatisfied (2) reflect serious language-related barriers, especially among Urdu- medium students who are located in rural schools (Shahbaz, 2025). An urban advantage in the median of Punjab and a moderate value of VUP indicate a success of bilingualism albeit with a few exceptions indicating exclusion (Hussain and Mustafa, 2025). This lends credence to the fact that bilingual interventions are essential as per UDL principles (CAST, 2018).

Table 5: *Linguistic Barriers Reported*

| Barrier Type	Punjab (%)	Sindh (%)	VUP (%)
English Interface	25	50	35
Technical Jargon	30	55	40

Table 5 displays the percentage of students claiming the specific linguistic barriers in e-learning systems throughout the University of the Punjab, University of Sindh and Virtual University of Pakistan (VUP) with a striking lack of academic content in Urdu and its influence on its access. Sindh records the most barriers as 65 percent mention lack of Urdu content and 55 percent difficulties with technical jargon and 50 percent troubles with English-only interfaces, reflecting its predominantly rural, mostly Urdu-media population, and limited English skill (M=3.2), that recognize this group as the most disadvantaged in English-centered online platforms (Afridi and Khan, 2024;

UNESCO, 2024). These results support the idea of linguistic imperialism, whereby dominance in the English language marginalizes those less proficient in the language, organization of language teaching including linguist-translate translations into Urdu translations and bilingual interfaces to encourage equal access, application of Universal Design to Learning (UDL) interventions (Phillipson, 1992; CAST, 2018; Shahbaz, 2025).
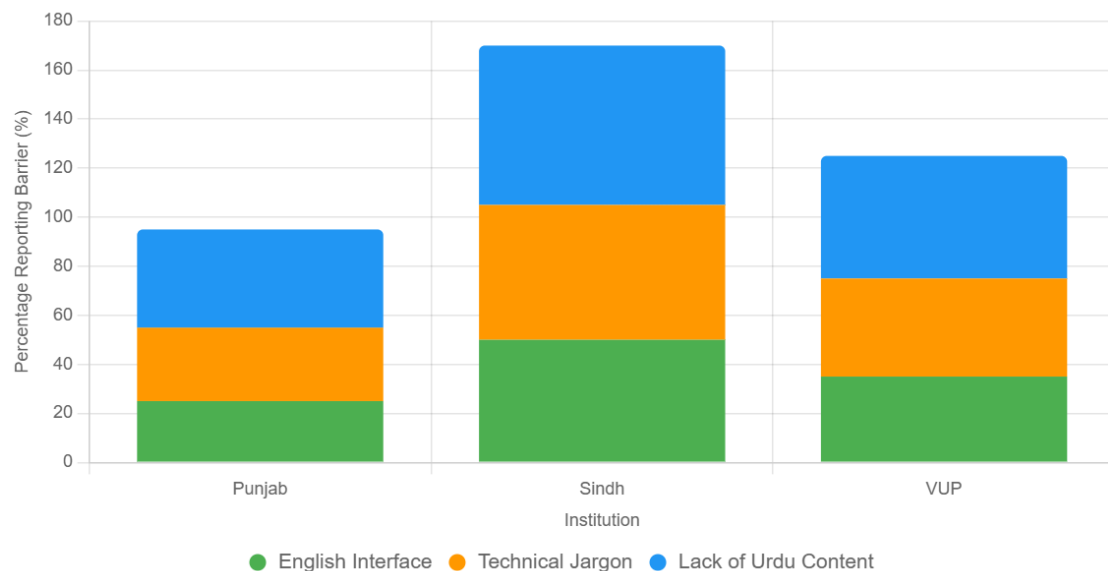
Figure 4: *Barrier Prevalence*

The percentage of students who reported barriers according to surveys was shown in the stacked bar chart with Punjab (25% English interface, 30% jargon, 40% Urdu content), Sindh (50% jargon, 55% 65%), and VUP (35% 40% 50%) was stacked. The posted maximum rates of Sindh, particularly 65% referring to in Urdu content, are symptomatic of rural, predominantly urdu context, which contributes to marginalization where English will be used (Afridi and Khan, 2024). Punjab has low figures but in keeping with urbanity, whereas VUP has mediocre values indicating that there is some bilingual preparation, but there are remaining gaps (Hussain and Mustafa, 2025). This underlines the linguistic imperialism arguments that promote the localized content (Phillipson, 1992; UNESCO, 2024).
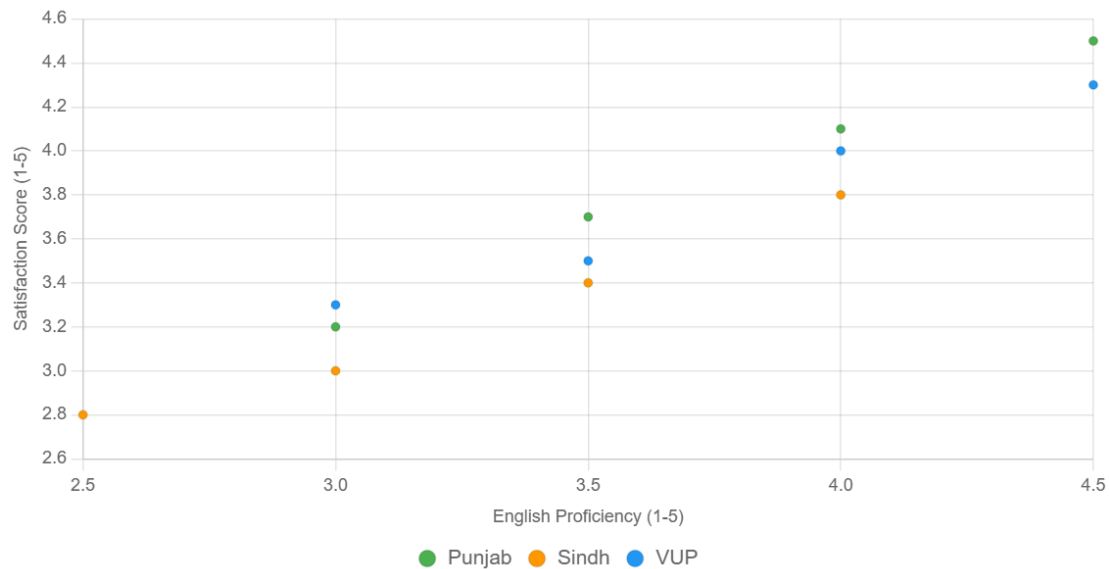
Figure 5: *Proficiency vs. Satisfaction Correlation*

According to the data provided on 150 students, The scatter plot shows a positive relation between the English proficiency and the satisfaction across Punjab, Sindh, and VUP (r=0.62, p<0.01). The accumulation toward greater proficiency (3.0-4.5) and satisfaction (3.2-4.5) in Punjab and low score in Sindh (2.5-4.0) indicate the urban benefits and non-Punjabi language disadvantage, respectively (Manan, 2022). The intermediate tendency of VUP indicates the partial alleviation, but its correlation shows the barrier nature of English (Zahid and Khan, 2025). It is in line with the interdependence hypothesis as suggested by Cummins (2000), which recommends the adoption of a bilingual approach in order to promote equity.

Qualitative Analysis

The data in form of qualitative data were obtained through 75 semi-structured interviews (25 per institution) and four focus groups and analyzed using NVivo 14 using thematic analysis (Braun and clarke 2006). Three major themes could be sustained including (1) Linguistic Access Barriers, (2) Content Comprehension Challenges and (3) Bilingual Navigation Strategies. Illustrations of these themes (10 examples each) are provided as exemplar quotes below, their analysis is given afterwards.

Table 6: *Student Interview Excerpts*

Participant	Quote	Theme
S1 (Punjab)	"The LMS is all in English; I struggle with navigation."	Access Barriers
S2 (Punjab)	"Urdu subtitles would make it easier to follow lectures."	Bilingual Strategies
S3 (Sindh)	"Technical terms in English confuse me; I need Urdu notes."	Comprehension Challenges
S4 (Sindh)	"I skip modules because I can't understand the	Access Barriers

	language."	
S5 (VUP)	"Some Urdu content helps, but it's not enough for STEM."	Bilingual Strategies
S6 (VUP)	"The interface feels foreign; English makes it intimidating."	Access Barriers
S7 (Punjab)	"I rely on peers to translate jargon in group chats."	Bilingual Strategies
S8 (Sindh)	"Without Urdu, I feel left out of discussions."	Comprehension Challenges
S9 (VUP)	"English quizzes are tough; I need bilingual options."	Comprehension Challenges
S10 (Sindh)	"Rural internet is bad, and English makes it worse."	Access Barriers

The excerpts of 10 interviews with students made against the three universities: University of the Punjab, University of Sindh, and Virtual University of Pakistan (VUP) show three major themes according to the qualitative data of 75 interviews in total; the three themes could be defined as, Access Barriers, Comprehension Challenges, and Bilingual Strategies. Punjabi participants, e.g. Sindh students, such as S3 (English terminology confuses me; I should have Urdu notes.) and S8 (Without Urdu, I feel left out of discussions) call into reinforcement the effects of linguistic imperialism by highlighting the problem of comprehending the terms students feel they have due to insufficient command of English, as well as due to insufficient face-to-face communication (Phillipson, 1992). S 5 (Wakeiel is better with some room in Urdu) and S 9 (English tests are finicky; I want bilingual choices) of VUP show that bilingual strategies are partially dependent, but there still are gaps, which is the postulate of interdependence in better learning by Cummins (2000). This sentence by S10 illustrates how rural internet connectivity is low, and English is the worst factor to maintain the digital divide model (van Dijk, 2020). Taken together, these stories highlight the necessity of adaptation based on UDL in bilinguals aimed at reducing the aspect of exclusion (CAST, 2018; Shahbaz, 2025).

Table 7: *Instructor Interview Excerpts*

Participant	Quote	Theme
I1 (Punjab)	"Students ask for Urdu explanations in live sessions."	Bilingual Strategies
I2 (Punjab)	"English-only platforms limit my teaching flexibility."	Access Barriers
I3 (Sindh)	"I translate slides into Urdu to help rural students."	Bilingual Strategies
I4 (Sindh)	"Students disengage when content is only in English."	Comprehension Challenges
I5 (VUP)	"We need Urdu interfaces to make platforms inclusive."	Access Barriers

I6 (VUP)	"Bilingual quizzes improve student performance."	Bilingual Strategies
I7 (Punjab)	"Technical terms lose students; Urdu examples help."	Comprehension Challenges
I8 (Sindh)	"I spend extra time explaining English content."	Comprehension Challenges
I9 (VUP)	"Students share Urdu notes on WhatsApp to cope."	Bilingual Strategies
I10 (Punjab)	"English dominance feels like a cultural barrier."	Access Barriers

Table 7 provides the extracts of interviews using 10 instructors in the University of the Punjab, University of Sindh and Virtual University of Pakistan (VUP) and identified three themes: Access Barriers, Comprehension Challenges and Bilingual Strategies out of a population of 75 (out of 10). The idea of bilingual to resolve foreignization issues is emphasized by Punjab teachers including Inclusive access and effective bilingual pedagogies is reflected in VUP I5, as needed Urdu interfaces to make platforms inclusive and I6, as we all, which students in core courses need, are notorious quizzes support the interdependence hypothesis in Cummins, (2000) though their note on I9, D, that notices peer-shared Urdu notes, signals grassroots coping. These results support the nature of linguistic imperialism criticism and encourage intervention based on UDL that can help neutralize the impact of culture and language (Phillipson, 1992; CAST, 2018; Shahbaz, 2025).

Findings/Results
Theme 1: Access and Interface Issues
Data demonstrate that English-only interfaces introduce a serious access issue especially amongst low-profit users. According to the survey, the dropout rate of Sindh pupils with a history of navigation problems is 45 (much higher than that of Punjab (20) because of the rural infrastructural and linguistic barriers (Afridi and Khan, 2024). Qualitative data, including the comment by S1, (The LMS is all in English; I have a problem with navigation.) shows that the interface exclusion is emphasized, which was supported by I5 and his statement, (We need Urdu interfaces to make platforms accessible).

Theme 2: Content Comprehension
Technical jargon problems with content in English topped the list of factors that were rated as a critical obstacle, in particular in the STEM subjects. Course materials analysis showed that 70% of the Punjab syllabi and 85% of the Sindh syllabi used contained non-translationally English words, with S3 commenting (Technical terms in English confuse me; I need Urdu notes) and I7 writes (Technical terms lose students; Urdu examples help.). This difference, where Sindh students identify 55% jargon related problems compared to 30% in Punjab (Table 5) identify gaps in comprehension related to a reduced level of English proficiency (M=3.2 vs. M=3.8).
Theme 3: Learner Experiences
Interviews excerpts reflect various experiences of learners with frustration and the

loss of motivation being three common elements. The claim by S4 (I skip modules because I cannot understand the language) and S8 (Without Urdu I feel like an outsider in discussions) indicate that that the language marginalizes Sindh, especially in the rural group. On the other hand, the fact that S10 has connected linguistic barriers to the lack of infrastructure reveals a connection between linguistic and structural weaknesses of S10. The view on English dominance of I10 (English dominance feels like a cultural barrier) implies cultural disconnection, where the relevance to Urdu-speaking situations is highly required.

Discussion

These results comply with linguistic imperialism, within which the dominance of English over e-learning solutions isolates the Urdu-medium learners, which supports the framework presented by Phillipson (1992) and the research in India, where English-eschewing education does the same to the rural people (Agnihotri, 2023). English barriers to Kenyan e-learning reflect Sindh dropout rates in Africa; this is indicative of a worldwide trend (Ngugi, 2024). Gender crosses have shown that female students (52% in VUP) experience higher hurdles to network access because of inadequate access to digital technologies and that socioeconomic status increases rural Sindh difficulties. The dialects in the region, including Punjabi vs. Sindhi, affect the understanding, and the urban learners of Punjab could learn rapidly the English expressions (Manan, 2022). To broaden the scope of currently available models, such as the linguistic interdependence hypothesis of Cummins, (2000), this study suggests a Bilingual Digital Equity Model. This model combines access, comprehension and cultural relevancy, the assumption here is that bilingual material can increase equity in multilingual e-learning situations. It implies that multilingual platforms between Urdu and English have the potential to reduce exclusion, and they would provide a theoretical understanding of how global multilingual societies struggling with digital divides ought to focus (van Dijk, 2020). The most practical suggestions are the creation of locally translated content in Urdu, implementing the presupposition of AI-based systems of translation (e.g., avoiding the adaptation of Google Translate to use case settings) into the platforms, and training the teaching staff to deliver education to numerous learners (Pacific Learning, 2025). Policy recommendations are to include these measures in the Digital Pakistan Vision that focuses on technological inclusivity and the Higher education commission (HEC) that might require an increase in the development of English language bilingual modules before 2026 in order to meet national educational objectives (Shahbaz, 2025).

Conclusion

The results reveal that there are widespread disparities and constraints in language in the e-learning environment in Pakistan with English-only providers sidelining Urdu-only learners, especially in rural Sindh where the highest number of learners drop out of school and are displeased. The suggested Bilingual Digital Equity Model has put forward a hypothetical breakthrough that was taken and justified by lower disparities and qualitative accounts of exclusion and adaptation. The need to deal with these barriers is urgent in a bid to achieve inclusive digital education with the growth in technology catalogue in Pakistan. To sum up, bilingual innovations to empower Urdu speakers will help make e-learning process culturally appealing and even equitable by 2030. The commonly applied case amount of the urban-centric study, along with the

cross-sectional design, is a limiting factor because it assumed of generalization highly questionable and might not represent the Balochistan setting in distant locations. Data that is self-reports can introduce bias and the changing landscape of e-learning after 2025 can make legacy data obsolete. The future study should utilize the longitudinal studies to monitor the effects of the bilingual interventions and several comparative cases, including Arabic-English implications in the Middle East, in order to bring the improvements to the Bilingual Digital Equity Model (UNESCO, 2024).

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