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Country-Level Research Review: EdTech in Pakistan

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Reviewers	Imdad Baloch
	Zulfiqar Qazilbash
	Arnaldo Pellini
	Joel Mitchell

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Abbreviations and acronyms

AEPAM	Academy of Educational Planning and Management
AKU — IED	Aga Khan University — Institute of Education
AIOU	Allama Iqbal Open University
AQUAL	Advancing Quality Alternative Learning
ASER	Annual Status of Education Report
BAEC	Balochistan Assessment and Examination Commission
CAI	Computer Assisted Instruction
CDPR	Centre for Development and Research
CERP	Centre for Economic Research in Pakistan
CTE	Centre for Technology in Education
DCAR	Directorate of Curriculum, Assessment and Research
DFID	Department for International Development (now FCDO)
DHS	Demographic Household Survey
EMIS	Education Management Information System
ERIC	Educational Resources Information Center
ESRC	Economic and Social Research Council
FCDO	Foreign, Commonwealth & Development Office
FDE	Federal Directorate of Education
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Corporation for International Cooperation)
HEC	Higher Education Commission
HPEG	High-potential evidence gap
IDEAS	Institute of Development and Economic Alternatives
IDRC	International Development Research Center
IRC	International Rescue Committee
ITA	Idara-e-Taleem-o-Agahi

ITU	Information Technology University
JICA	Japan International Cooperation Agency
KESP	Khyber Pakhtunkhwa Education Support Programme
KPEMA	Khyber Pakhtunkhwa Education Monitoring Authority
LEAPS	Learning and Educational Achievements in Pakistan Schools
LUMS — SOE	Lahore University Management School — School of Education
MoFEPT	Ministry of Federal Education and Professional Training
NEAS	National Education Assessment System
NEMIS	National Educational Management Information System
NFEMIS	Non-Formal Education Management Information System
NRPU	National Research Programme for Universities
OPM	Oxford Policy Management
PBS	Pakistan Bureau of Statistics
PDR	Pakistan Development Review
PEAS	Punjab Education Assessment System
PEC	Punjab Examination Commission
PEF	Punjab Education Foundation
PESP	Punjab Education Sector Support Programme
PIDE	Pakistan Institute of Development Economics
PITB	Punjab Information Technology Board
PMIU	Punjab Monitoring and Information Unit
PPIU	Policy and Planning Implementation Unit
RCT	Randomised Control Trial
REAL	Research for Equitable Access and Learning
RLI	Research Landscape Index

RISE	Research on Improving Systems of Education
SAHE	Society for the Advancement of Education
SDPI	Sustainable Development Policy Institute
SEMIS	Sindh Management Information System
SEND	Special educational needs and disability
SOE	School of Education
STBB	Sindh Textbook Board
STEM	Science, Technology, Engineering and Mathematics
TEACh	Teaching Effectively All Children
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USAID	United States Agency for International Development
VU	Virtual University

Executive summary

Section 1 of this report introduces its purpose, which is to glean an understanding of what potential opportunities exist for future EdTech research in Pakistan. Specifically, the report is about providing the necessary context required to understand how EdTech Hub can most meaningfully collaborate with researchers, practitioners, and policymakers going forward.

Section 2 contextualises the education system in Pakistan, focusing on EdTech indicators, where these are available. It sets out the various constraints the education system has faced historically, while also outlining the structures, policies and programmes in place to overcome these challenges. A core feature of the education system is the challenges relating to access, as well as those relating to learning, and how these permeate the system. Based on the latest available data, 22.8 million school-aged children aged 5–16 years are out of school in Pakistan (↑UNICEF, 2020). Two out of every five children in Grade 5 cannot read a simple sentence in their first language (whether Urdu, Sindhi, or Pashto) (↑ASER, 2019). Literacy rates for girls, rural populations, and the economically disadvantaged are even lower. There are further challenges with regard to the teaching profession, including: poor content knowledge and skills of teachers, undue influence of teachers over where they are posted and finally, high rates of teacher absenteeism (↑Naviwala, 2016).

Section 3 provides an overview of the EdTech research landscape in Pakistan and illustrates the paucity of existing research. A literature search using search terms applied to the EdTech field returned only 71 papers (including grey literature, and non-academic research) that met the inclusion criteria for this study. Of these research studies, none had a statistically significant control group nor were they performed at scale. Only 2 out of 71 studies had a sample size of over 3,000 learners. As such, further work is necessary to bring these findings to scale in order to create findings that can be more confidently generalised. The problem of a near absence of good-quality research on EdTech in Pakistan is further compounded by the fact that research that is commissioned to international consultancies by donor agencies is not easily accessible. A further problem identified with these studies is their somewhat optimistic approach when viewing the potential for technology to act as a panacea to an underlying problem. Moreover, few of the studies explore the equity implications around the uptake of technology and the corresponding infrastructural and financing challenges related to scaling up EdTech.

Section 4 presents an overview of the research production landscape, with a focus on local and international academic institutions, research centres, and independent organisations involved in education more generally, and EdTech research more specifically. The landscape reveals a higher education

infrastructure that appears to prioritise teaching over research. Moreover, while there are 61 Departments of Education across the country's higher education institutes, education research seems to emanate only from a handful of institutions. Public government research entities primarily collect nationwide education data rather than produce research. Research is dominated by a handful of think tanks dominating the education space. However, these appear concentrated in the large metropolitan areas of Pakistan, namely Lahore and Islamabad. The funding landscape for research in Pakistan reveals a severely underfunded higher education landscape, and one which does not prioritise research in the social sciences more generally and education more specifically. The lion's share of funding for research appears to come from donor funding, meaning that it is not surprising that they also play a key role in setting the research agenda.

Section 5 is organised thematically against the five EdTech focus areas and synthesises the literature identified in the scoping review according to these five themes. Using existing research literature, this section discusses evidence gaps that have high potential for future research. The section reviews those evidence gaps most useful in the context of the challenges that Pakistan's education system faces. By focus area, the studies are presented as follows:

Technology to support personalised learning and teaching at the level of the student

An emerging area of research in LMIC settings, in the context of learning outcomes, relates to personalised learning. This considers how learning instruction better aligns with the needs of the individual student (⇧Major & Francis, 2020). As is the case in most LMIC settings, teaching in Pakistan has typically consisted of a teacher using a 'chalk and talk' method to teach students (⇧Beg, et al., 2019). Insofar, as research on technology and personalised learning go, there is very little literature that exists in the context of Pakistan. Of the studies that do exist, the majority have a sample size that is not statistically significant and tend to focus on students in higher income settings.

(In-service) teacher professional development, structured pedagogy, and technology

Teacher appointments in Pakistan are characterised by huge political interference. This has led to a number of negative consequences, including high rates of teacher absenteeism and teachers choosing where they wish to be deployed to work even if this is not necessarily based on need. Of the studies which have been undertaken in relation to TPD, structured pedagogy,

and EdTech, the majority have been focused on the extent to which technology can help with issues relating to teacher accountability. Elsewhere, a handful of studies have researched what effect EdTech for teachers has had on learning. Overall, however, there appears to be a general lack of substantive evidence on teacher-related EdTech research. Moreover, few studies have interrogated this area of research by incorporating teacher voices into their studies.

Technology to advance data use and decision-making in education

Pakistan's education system is defined both by its weak, formal political system and by the influence of informal institutions which are characterised by bonds of kinship and patronage (⬆Lieven, 2012). In relation to using technology to advance data use and decision-making, research has focused on the extent to which technology has helped data collection and whether technology has helped to improve accountability in the system. However, these studies are skewed by an undue focus on the provinces of Punjab and Sindh, meaning potential research gaps relating to other parts of the country. Given the particular political economy aspects relating to Pakistan, there is potential for future research to explore the extent to which technology can act as a panacea to systemic challenges in other parts of the country.

Technology to promote participation in school

Currently, Pakistan has the second-highest number of out-of-school children globally, with ⬆UNICEF (2020) reporting the total at 22.8 million. Of the total number of out-of-school children in Pakistan, a disproportionate number are children with SEND. In terms of the literature reviewed for this study, which relates to SEND and the use of educational technology, the majority of studies tend to be more focused on access-related issues. Considerably less research is available on what impact EdTech has had on the learning outcomes of these groups. Of the few studies that have focused on the latter, the sample size has been very small.

Girls' education and technology

Girls' education is a challenge in Pakistan, with the low number of girls in school reflecting a wider pattern of gender inequality across the country. Girls make up a disproportionately higher share of children who are out of school compared to the overall population. Of the porous literature that exists on girls and EdTech in Pakistan, the content has largely considered this from the perspective of girls' access to digital technology. The data from these studies

largely appear to conclude that there is a gender divide when it comes to accessing digital technology.

Section 6 goes on to explore the structural issues relating to the generation and use of research in Pakistan's education sector. These were synthesised based on the interviews carried out by key producers and users of education research in Pakistan. The findings from these interviews reflect issues of importance for EdTech Hub in relation to current and future research and engagement in Pakistan. Broadly speaking, the issues emerging from these interviews included poor funding and the capacity of higher education institutions to produce good quality research; the production of research being dependent on donor funds; the regional concentration of where research is produced; the capacity constraints of government officials in utilising and absorbing research in their policy decisions; and the interference of non-formal stakeholders as to how policy is formulated and prioritised.

The review concludes by emphasising the gap in good-quality research that is needed to empower national and global stakeholders to engage with EdTech. Within the research areas that EdTech is prioritising, there is either a complete absence of evidence or else the quality of the studies that have been identified is of poor quality and they lack rigour. This presents ample opportunity for conducting EdTech research going forward, especially when considering this in the context of the specific challenges that beset the education system in Pakistan. The concluding section of the report considers some of the thematic areas of research on EdTech that could have the greatest impact in the short-to-medium term when set out against the systemic challenges faced by Pakistan's education system. These include a focus on the role of EdTech in helping girls and children with SEND to access good-quality education, with these areas also aligning well to current, national, and donor priorities. Another area of emphasis could be on research relating to the role of technology in furthering teacher development. This is especially important given the Government of Pakistan's move in the direction of blended learning approaches. Lastly, the problems relating to both data gaps and accountability within Pakistan's education system present an opportunity to consider more robustly the extent to which EdTech can act as a panacea for addressing the long-standing problems in these areas.

1. Introduction

1.1. Purpose of the review

This review provides an overview of EdTech research in Pakistan in order to understand the opportunities for carrying out further research in the country, and how EdTech Hub can collaborate with researchers, practitioners, and policymakers most effectively. The report will be important for researchers focusing on EdTech in Pakistan and the surrounding region, as well as for EdTech implementers seeking to understand what evidence exists and what else is needed. Through analysis of existing literature, key stakeholders, and the broader political economy, the evidence gaps with the highest potential for impact on education are identified for future research priorities of EdTech Hub in particular. These priorities can also serve more broadly to foster and sustain conversation in a community of practice and learning among education stakeholders and the use of EdTech in Pakistan.

1.2. Methodology of the review

The evidence for this report was built from a three-stage process of literature discovery and analysis, interviews with key stakeholders, and a synthesis of findings.

To discover and analyse relevant literature, a set of key terms for EdTech, alongside the terms 'Pakistan' and 'Education' were developed for searches on Google scholar and ERIC academic databases. The 1,971 results returned were then further reduced by placing the search terms 'Pakistan' and 'Education' in the 'title' search resulting in 272 results. These were then screened for relevance based on title and abstract, resulting in 78 papers. Those 78 papers were then read in full and the 52 that met the inclusion criteria were analysed according to a Research Landscape Index (RLI) framework. In addition, 19 papers from grey literature were added. In total 71 papers were included for analysis in the RLI. This facilitated both the analysis of the overall research landscape (Section 3), as well as the thematic analysis of particular evidence gaps.

Understanding the state of research pertaining to the EdTech sector in relation to Pakistan required considering factors beyond what research was available. Initially, this was done by looking at the existing literature which considers the challenges in producing good-quality education research in Pakistan. This has been well-documented by a number of studies, which also look at why evidence is not factored into the policymaking process. This review, however, aimed to consider the education research ecosystem specifically in relation to the EdTech sector. For this, telephone interviews were

held with stakeholders active in the EdTech space in Pakistan. The information collected from these consultations not only provided an opportunity for the challenges concerning the research infrastructure but also provided points of contact through which the Hub's future research priorities could be shaped.

2. Summary of the EdTech operating context

This section provides an overview of Pakistan's EdTech operating context. The section starts by presenting factors related to the broader national context that influence the delivery of education in Pakistan. It then reviews service delivery of primary and secondary education, before finishing with a brief overview of the current state of service delivery during the Covid-19 pandemic. This context provides a foundation for understanding the EdTech research base presented in subsequent sections.

It is important to note that a full set of national education statistics does not exist due to the devolution of responsibility for education service delivery to provinces, and to the different ways the provinces govern their systems. As such, the information presented in this section uses multiple sources to provide insights.

2.1. Country context

Located in South Asia, Pakistan comprises four provinces (Balochistan, Punjab, Sindh, and Khyber Pakhtunkhwa), the federally administered Islamabad Capital Territory, and two autonomous regions (Gilgit-Baltistan and Azad Jammu). Each province operates in very different environmental conditions, which impact the delivery of education. Two-thirds of the country is arid or semi-arid. The remainder is home to healthy vegetation and farmlands. The less arid areas are generally more prosperous and are able to invest more in public services including education.

With a population of over 200 million people, Pakistan is the fifth-largest country in the world. More than two-thirds of the population live in rural areas. Significant inequalities exist between urban and rural populations. For example, literacy is significantly higher in urban areas (53% rural to 76% urban). Access to key services is nearly four times as likely in urban areas (18% rural to 74% urban, ⇑Pasha (2018). Inequalities also exist within urban areas. Those in more developed urban areas have better access to services such as immunisation, family planning, and clean water than those in slums.

Table 1. *Country overview. Source: Adapted from⇑Baloch, et al. (2020), ⇑World Bank (2019)*

Population	Total population	In 2019, the population was 216.6 million. The growth rate is 2.0% per year
		61.4% of the population is aged 15–64.

		34.2% of the population is aged 0–14.
	Population location	Urban: 79.9 million (36.9%) Rural: 136.7 million (63.1%)
Language		Urdu is the official national language. English is essentially treated as an official language, with most government ministries using English officially. Pakistan is also home to dozens of other languages spoken as first languages. Four of these have more than 10 million speakers (Punjabi, Pashto, Sindhi, and Saraiki).
Literacy		Urban population: 76% Rural population: 53%

2.2. Education in Pakistan

Pakistan's constitution states that: "The State shall provide free and compulsory education to all children of the age of five to sixteen years in such manner as may be determined by law" (⇡National Assembly of Pakistan, 2012).

2.2.1. Education system governance

One of the main factors impacting education in Pakistan is the devolution of education service delivery to the provinces. In 1973, Pakistan federalised public services in an attempt to meet the needs of its population. In the education sector, this was reinforced in 2010, when the 18th amendment to the constitution enhanced the role of provinces in delivering education (⇡Tabassum, et al., 2020). The amendment provides provinces with greater autonomy, decentralising aspects including curriculum development, pedagogical approaches, quality assurance, and monitoring and evaluation.

This decentralisation means that any analysis of the education system must explore the distribution of roles between national and provincial levels. Pakistan's federal education organisations set policies and provide general guidance across the country. As an example, key agencies at the national level include:

■ The Ministry of Federal Education and Professional Training (MoFEPT) sets national policies, plans, and programmes.

■ The Federal Directorate of Education (FDE) delivers education services in Islamabad. This includes employing teachers, providing in-service training, and conducting quality assurance.

■ The National Education Assessment System (NEAS) analyses learning outcomes and identifies drivers of learning. Partner organisations in the provinces conduct assessments.

While federal agencies set general guidance, they only plan and deliver education within Islamabad. Provinces are responsible for most decision-making, planning and delivery in order to ensure more context-specific policy directives. Key provincial agencies include:

- Punjab School Education Department, which delivers education services in Punjab. It develops legislation, policies and plans, formulates the curricula, and delivers teacher training.

- Balochistan Assessment and Examination Commission (BAEC), which conducts annual summative assessments of Grades 5 and 8 in Balochistan.

- Sindh Textbook Board (STBB), which, like its compatriots in other provinces, designs and prints textbooks for science and humanities subjects for Grades 1–12.

2.2.2. Education system characteristics

While the nuances of education service delivery differ between provinces, Pakistan's general education system comprises five levels of education. These are:

- Preschool: Ages 3– 5

- Primary school: Ages 5–10

- Middle school: Ages 11–13

- High school: Ages 14–15

- Higher secondary / Intermediate college: ages 16–17 (⬆Baloch & Taddese, 2020)

Education services are delivered in two main types of school. Public schools are funded by the state. Private schools receive external funding. Private schools include Madrassahs (traditional Islamic schools), as well as basic education community schools and vocational schools. The number of private schools that exist in Pakistan is not clear. For example, approximately 4,000 Madrassahs are registered but the real number is expected to be higher than 40,000 (⬆StateUniversity.Com, N/A). Table 2 contains key education service delivery indicators.

Table 2. *Key education service delivery indicators (2016–17). Source: Adapted from [↑Government of Pakistan, (2018), ↑World Bank, 2020, ↑Baloch & Taddese (2020), ↑Baloch, et al. (2020))*

Pre-primary	Learners	Total: 9.78 million Public: 4.98 million Private: 4.80 million Female gross enrolment: 74.6% Male gross enrolment: 86.5%
	Institutions	Not reported. However, at the time this data was collected all pre-primary education was delivered through primary schools.
	Teachers	Total: Unknown. The number of public pre-primary teachers is not reported, making it impossible to obtain a total number. Public: Unknown Private: Unknown
Primary	Learners	Total: 19.35 million Public: 11.90 million Private: 7.46 million Female gross enrolment: 87.9% Male gross enrolment: 102.3%
	Institutions	Total: 150, 129 Public: 131,376 Private: 18,753
	Teachers	Total: 453,614 Public: 339,235 Private: 114,379
Middle	Learners	Total: 6.53 million Public: 4.06 million Private: 2.47 million Female gross enrolment: Not listed Male gross enrolment: Not listed
	Institutions	Total: 49,090 Public: 16,928 Private: 32,162
	Teachers	Total: 455,445 Public: 136,085 Private: 317,360
High	learners	Total: 3.33 million Public: 2.25 million Private: 1.07 million Female gross enrolment: 37.4% Male gross enrolment: 40.4%
	Institutions	Total: 150, 129

		Public: 131,376 Private: 18,753
	Teachers	Total: 560,642 Public: 241,278 Private: 319,364
Higher secondary / intermediate colleges	Learners	Total: 1.58 million Public: 1.40 million Private: 0.19 million
	Institutions	Total: 5,130 Public: 1,998 Private: 3,133
	Teachers	Total: 120,336 Public: 60,361 Private: 59,975
Education Infrastructure	Electricity	■ 62% of primary schools have electricity ■ 79% of middle schools have electricity ■ 91% of high schools have electricity ■ 97% of higher secondary schools have electricity
	Mobile technology	■ 76% of the total population have access to a mobile phone ■ 56% of the total population have access to a smartphone ■ 85% of the urban population have access to a mobile phone ■ 73% of the urban population have access to a smartphone ■ 66% of the rural population have access to a mobile phone ■ 38% of the rural population have access to a smartphone
	Broadcast media	■ 74% of the total population have access to a television ■ 6% of the total population have access to a radio ■ 88% of the urban population have access to a television ■ 5% of the urban population have access to a radio ■ 60% of the rural population have access to a television ■ 7% of the rural population have access to a radio
	Internet	■ 25% of the total population have access to the internet ■ 36% of the urban population have access to the internet

		■ 15% of the rural population have access to the internet
Education financing	Expenditure on education	In 2017 government expenditure as a percentage of Gross Domestic Product (GDP) was 2.7%.

In addition to the 40 million children enrolled in school, ↑UNICEF (2020) reports that a further 22.8 million Pakistani children are currently out of school. This is the second-highest number of out-of-school children (OOSC) anywhere in the world, after Nigeria. Of these 22.8 million children, 5.3 million are dropouts and 17.5 million have never been to school (↑Government of Pakistan, 2018).

One important element to note is the discrepancy between female and male enrolment. As highlighted in the Table 2 above, male gross enrolment rates are up to 15 per cent higher than females gross enrolment rates. This reflects the challenge that females face in obtaining a basic education in Pakistan. These statistics worsen when factoring in a child's gender, socio-economic status and household wealth. For instance, the latest Demographic Household Survey (DHS) from 2017 / 2018 estimated that 27% of girls and 19% of boys are out of school at the primary level. When factoring in wealth and location, the gap widens considerably, with 5% of boys from rich, urban households out of school versus 59% of girls from poor, rural households (↑National Institute of Population Studies, 2019). Data from household surveys also show the regional disparities in accessing education. In 2012, for instance, DHS data illustrated that 56% of girls in Balochistan were out of school. This compared to 18% in Islamabad (↑National Institute of Population Studies, 2013).

Another key factor not highlighted in the above statistics relates to teacher absenteeism. In 2011, over 20% of teachers did not turn up on an average day. While this improved by 2019, the figure was still 11% (↑Barber, 2013; ↑ASER, 2019). Given the high proportion of provincial budgets spent on teacher salaries, high teacher absenteeism is concerning. In Sindh, despite high rates of teacher absenteeism, a reported 80% of the education budget is spent on teachers' salaries and pensions, rising to 93% at primary level, and in Punjab, in 2016–17, 96% of the primary education budget was allocated to teacher salaries (↑Naviwala, 2016; ↑Asian Development Bank, 2019).

2.2.3. Reform priorities

While the high number of out-of-school children means that increasing enrolment is an urgent priority, the quality of education received by those children who attend school requires improvement (↑Baloch & Taddese, 2020). Education outcomes are low, with only approximately half of learners reaching basic levels of literacy by Grade 5 (↑Government of Pakistan, 2018). Similarly,

only just over half of learners in Grade 5 have obtained basic proficiency in mathematics (↑Government of Pakistan, 2018). This is due in part to the limited hours of education received by children who do attend school and a lack of quality teachers (↑Ahmad, et al., 2014). One challenge has been that the low levels of learners passing have, in turn, resulted in a lower investment in learning at the family level. This has led Pakistan to take a dual-pronged approach in an attempt to simultaneously increase both access and quality. Programmes aimed at enhancing access include policies designed to provide free and compulsory education for children aged 5–16. Initiatives aimed at quality include restructuring pre-service teacher education, reforming the examination system and enhancing basic school facilities (↑Baloch, et al., 2020).

Refining the current approach to decentralisation in an attempt to increase system efficiency is also a regular topic of discussion. The current design results in the duplication of roles and responsibilities across government entities at the state and federal levels (↑Béteille, et al., 2020). These inefficiencies are not uncommon in federalised systems, however, it is important for states to continue to refine their decentralised approaches to best suit the local context in a way that minimises wasted resources.

2.3. Impact of Covid-19

Pakistan's education leaders rapidly reacted to the threat posed by Covid-19. Schools began closing on 27 February 2020, when the Sindh Government shut schools. This decision was among the first of its kind around the world. The national and provincial governments quickly moved to put in place a variety of initiatives to provide educational continuity. The multimodal approach included leveraging TV, radio, and SMS to deliver educational content (↑Tabassum, et al., 2020)). Nationwide programmes such as TeleSchool (an educational TV initiative reaching up to 6 million learners per day), educations.pk (an online portal containing educational materials), and education radio (broadcasting four hours of education programming on the radio, nationally, per day) have been complemented by provincial efforts such as Punjab's Taleem Ghar and Sindh's Digital Learning Platform (↑Tabassum, et al., 2020).

Despite these initiatives, it is expected that school closures will have a significant impact on the health and well-being of Pakistani learners and their families. A recent World Bank report indicated that Pakistan will experience the highest level of dropout globally, with nearly a million children expected to not return to school following the closures (↑Geven & Hasan, 2020). The report anticipates significant learning losses for even those learners who do return to school, with expectations that up to 0.8 years of loss will be inflicted on each student. Simulations suggest that the average number of years Pakistani

learners are in school and learning will fall from the current 5.1 years to as low as 4.3 years. These challenges have been acknowledged by the Federal government, which has begun to support school reopenings (↑Government of Pakistan, 2020).

3. The texture of the research landscape on EdTech

Research on EdTech is relatively easy to find and reflects the output of a range of educational institutions. For the literature search for this study (see Appendix 2 for a complete list of search terms used), 52 academic studies met the inclusion criteria together with an additional 19 studies from grey literature and non-academic sources. Of the 52 academic studies, there was a reasonably even distribution between studies using mixed methods, case studies, surveys and experimental design.

However, although EdTech research in Pakistan is available in certain areas, much is of low quality. A range of design challenges reduces the reliability of the majority of these studies. Of the 52 studies, only two involved a statistically significant sample size of over 3,000 learners, and only four had a sample size of above 500. Similarly, very few involved a statistically significant control group.

The geographic focus of the studies reflects the imbalance of research production across Pakistan's provinces. Of the 52 studies, 18 studies were national-level studies, 16 were specific to Punjab, 12 to Khyber Pakhtunkhwa and 3 to Sindh. We found no academic studies focused on EdTech in Balochistan. The research specific to Khyber Pakhtunkhwa was the product of a small number of academics, whereas the research in Punjab and nationally focused studies were produced by a wider range of actors and were often larger in scale.

The focus of EdTech research is grouped around certain priority themes that reflect underlying assumptions about the value of technology in education. In particular, researchers focus on how to encourage the uptake of technology, how to increase access to technology, and how technology can help in specialised areas such as for SEND learners. These priorities often reflect an optimistic attitude towards new technologies, advocating that technology *should* be taken up, without necessarily exploring the educational and equitable implications of its uptake and the infrastructural and financing challenges that have so far limited EdTech at scale.

Education in Pakistan has been the focus of donor engagement for many years and this is reflected in the focus of grey literature, particularly around large-scale projects such as Punjab's education sector reform and educational data management in Sindh. As a result, several large-scale donor-led projects have involved EdTech at scale, leading to grey literature evaluating project effectiveness. There are few of these, however, and the Pakistan interventions

form part of multi-country projects leading to less focus on Pakistan in the evaluations.

While there is an overall lack of rigorous research on EdTech in Pakistan, it is worth noting that there is considerable evidence, both from academic and grey literature, on aspects of *education* in Pakistan that can contextualise and inform EdTech, for instance on girls education (⬆Martínez & Human Rights Watch (Organization), 2018) (⬆Naveed, 2018) and SEND learners (⬆Rose, et al., 2018; ⬆Malik, et al., 2020). The literature on these challenges can be used as a foundation to better inform the design and deployment of future EdTech interventions in Pakistan.

4. Key stakeholders in the research landscape on EdTech

This section explores the main people and organisations in Pakistan involved in research on education more generally, and EdTech more specifically. A more comprehensive list of key players is presented in Appendix 3. The section is divided into four subsections providing a breakdown of the different key stakeholders within the research landscape.

4.1. Academic institutions, government research institutes and independent organisations

4.1.1. Academic institutions

After the partition of the Indian subcontinent in 1947, the geographic areas constituting current-day Pakistan lagged behind neighbouring India in research production. In 1947, Pakistan had just one teaching university — Punjab University in Lahore (↑Hoodbhoy, 2009). Following the creation of the Higher Education Commission (HEC) in 2002, the number of accredited public sector institutions nearly quadrupled from 52 in 2001 to 193 in 2018 (↑British Council, 2018). The HEC mandates that all universities it oversees are to produce research. In spite of this, numerous studies suggest that the research produced in academic institutions in Pakistan is both low in volume and quality. In a landscaping study of Pakistan's higher education sector,↑Hoodbhoy (2009) found that "none of Pakistan's 50+ public universities comes even close to being a university in the real sense of the word" (p. 581). Higher education institutes in Pakistan are much more teaching-oriented than research-focused (↑Faize, et al., 2018; ↑Wood, 2014). A further divide concerns public versus private universities. Those with the means to do so will send their children to English-language private universities, where foreign-trained faculty members are more likely to be available. In contrast, public sector institutions have fewer lecturers trained abroad and are predominantly Urdu-speaking (↑Khattak, 2009).

Specifically, in relation to education, ↑Naveed (2013) found that the Faculties of Education in higher education institutes functioned mainly as training facilities. Even where research was being conducted its relationship to the policy environment was weak. A key factor that restricts the scale of education-focused policy research within the overall ecosystem is a lack of research expertise at the academic institutions (↑Naveed, 2013). Within the education domain, EdTech research within academic institutions is an emerging field. The emphasis of most academic research is on the number of publications rather than quality. Of the 25 education journals that Pakistani

academic institutions publish, 3 are dedicated to distance education, Edtech, and innovation in learning. Within Edtech themes, the research has focused on assistive learning, blended learning, and distance-learning approaches and their applications. However, in terms of the six parameters that the HEC uses to assess the quality of journals, articles published in most of these journals are below par. Journals are ranked for quality of research according to three different categories. Of the 25 education journals, however, only 9 fall under one of these three categories, meaning that 16 journals do not even meet the basic criteria set as a benchmark by the HEC regarding the quality of research. Of the nine journals which do meet some of the quality criteria, none fell into the highest category (⇡Higher Education Council, no date).[1]

Among the universities, notable academic institutions related to the EdTech domain include the Allama Iqbal Open University (AIOU) and the Virtual University of Pakistan (VU). These are public-sector, federal universities mandated to offer open and distance learning programmes across Pakistan, but which produce little or no significant research outputs. In Punjab, the Information Technology University (ITU) has a dedicated policy research lab on EdTech research, the Centre for Technology in Education (CTE). Its research lab has worked closely with various government departments and implemented the eLearn Initiative project[2] through funding received from the Pakistan Education Innovation Fund known as 'Ilm Ideas-2', funded by Department for International Development (DFID), and the GTZ-funded Hello Rozgar Project focusing on information literacy through telephony. The ITU also offers courses on educational technologies in its undergraduate degree programmes.

As a private entity, the School of Education (SOE) at Lahore University Management School (LUMS) has established itself as one of the top academic institutes within the domain of education research in Pakistan. A number of prominent faculty members employed at LUMS-SOE have also received part of their academic training in prestigious universities in high-income countries, and are also closely affiliated to influential research think tanks in Pakistan working in the field of education. Both Dr Faisal Bari and Dr Rabia Malik, for instance, are affiliated with the Institute of Development and Economic Alternatives (IDEAS) and have been involved in major reports and assessment projects like Punjab Education Sector Support Programme-II (PESP-II) evaluation report.

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[1] As per the new HEC Journal Ranking System, HEC categorises academic research journals according to three categories (W, X, and Y), of which W is the highest category.

[2] The eLearn Project used various educational technologies and collected data from schools on the use of tablets, attendance, and other key indicators crucial for implementation of EdTech.

One of the most prominent academic institutions in Pakistan working on EdTech research is the Aga Khan University's Institute for Educational Development (AKU-IED), which is a private, non-profit institute based in Karachi. The areas of research that the AKU-IED focuses on include those related to (⬆Naveed, 2013):

- Teacher education

- Curricula studies

- Teaching and learning

- Educational leadership

- Mathematics and science education

- English language teaching

- Early childhood education and development

- Pedagogy and assessment

- Educational leadership and policy studies

- Open and distance education.

Specifically, on EdTech, AKU-IED offers academic courses on educational technology, distance learning, and blended learning. In terms of research, it has a dedicated group focusing on ICT in education, which focuses on blended learning and other approaches to integrating technology at higher levels of education.

4.1.2. Government research institutes

Aside from universities, public government institutions are meant to act as another source of research production. However, the background research for this section appears to suggest that government institutions are not research producers, but rather generators of large-scale data. Therefore, these government institutions play a potentially important role in generating the data needed by research organisations to undertake at-scale research.

The Academy of Educational Planning and Management (AEPAM) sits under MoFEPT and was established in 1982. Outputs produced by AEPAM have focused on the National Educational Management Information System (NEMIS) and the Pakistan Atlas. Excluding these outputs, AEPAM's 'Research Wing' has produced seven reports since 2015, of which the overwhelming majority appear to be statistical overviews of public spending on the education sector (⬆Ministry of Federal Education & Professional Training, no date). Elsewhere, the Pakistan Bureau of Statistics (PBS) publishes the

Pakistan Social and Living Standards Measurement (↑Government of Pakistan, 2020) every alternate year, which provides information on key indicators on the usage of ICT along with other development indicators. Similarly, the Punjab Information Technology Board (PITB) leads various initiatives in the education sector. Most notable among them has been the eLearn.Punjab initiative, which borrowed the content, assessment tools, and training devices from the eLearn Initiative at the ITU after the project was completed. eLearn.Punjab collects various statistics on the usage of the video content and assessments taken on the platforms and other gamified content available. The Punjab Education Assessment System (PEAS), which works under the School Education Department, collects assessment data and information on the determinants of student learning within the Punjab province. Similarly, the Punjab Examination Commission (PEC) works on the assessment of learners' learning achievements by developing tests for Grade 5 and Grade 8 and publishes annual assessment reports with a district-level disaggregation documenting the quality of education. The Sindh Education Foundation has an Assessment Unit which is affiliated with the Directorate of Curriculum, Assessment and Research (DCAR) in Sindh, and does similar work. However, the depth of data collection is not as advanced as that of the PEAS and PEC. Another notable institution is the Punjab Education Foundation (PEF), which collects information on private schools (↑Naveed, 2013).

One of the few government institutions that is a generator of research and evidence (rather than data) is the Pakistan Institute of Development Economics (PIDE). This is an economics-centred research and teaching organisation that produces extensive policy-orientated research. The institute has published various studies focusing on the economics of education and usually approaches this from a macroeconomic perspective. It has facilitated a number of round-table discussions on education, including one on the use of technology during the Covid-19 pandemic.[3] It publishes an internationally peer-reviewed journal referred to as the *Pakistan Development Review* (PDR) every quarter. PIDE works closely with the Federal government in providing policy input and exhibits some of the strongest capacities and influence compared to other policy institutions in the country (↑Naveed, 2013).

Although government departments collect extensive data on education, most of this is used for monitoring and performance management only. Typically, the government monitoring units collect periodic data on key performance indicators as part of their operations, which are becoming increasingly digitised, and share them in the form of reports, real-time dashboards, and portals. Barring a few exceptions, the majority of departments do not have the

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[3] "Is Technology the Panacea and are we using it?" ↑Pakistan Institute of Development Economics (no date).

expertise to make sense of the datasets and analyse them. The Khyber Pakhtunkhwa Education Monitoring Authority (KPEMA), the Punjab Monitoring and Information Unit (PMIU) in Punjab, the Directorate General of Monitoring and Evaluation at the School Education and Literacy Department, Sindh and the Sindh Management Information System (SEMIS) under the Reform Support Unit, Government of Sindh, and the Education Management Information System (EMIS) in Balochistan, working under the Policy and Planning Implementation Unit, Balochistan (PPIU) are all maintaining databases and collecting different datasets disaggregated by district. Likewise, in the non-formal education sector, the Non-Formal Education Management Information System (NFEMIS) funded by the Japan International Cooperation Agency (JICA) is an online database of non-formal education in Pakistan under the Advancing Quality Alternative Learning (AQAL) project in Balochistan, Sindh and former Federally Administered Tribal Areas.

4.1.3. Non-governmental organisations, consultancies and think tanks

While there are a number of think tanks and research institutes working in Pakistan, education is not a significant thematic focus of these organisations (↑Naveed, 2013). Additionally, most of the think tanks and research centres are concentrated in large metropolitan areas in Pakistan such as Lahore, Karachi and Islamabad (↑Naveed, 2013; ↑Wood, 2013). The main organisations with an education focus have a policy-driven agenda and are as follows:

The Centre for Economic Research in Pakistan (CERP) is a Lahore-based think tank, largely involved in quantitative research. It led the Learning and Educational Achievements in Pakistan Schools (LEAPS) report, which was initiated in 2003 and was one of the first reports to monitor the learning taking place in schools. Alongside LEAPS, CERP has also been one of the lead organisations working on the Research on Improving Systems of Education (RISE) country profile for Pakistan. Further details are provided in Section 4.3 when discussing the role of international organisations.

The Institute of Development and Economic Alternatives (IDEAS) works on pushing the agenda for development and uses evidence-based research to inform policymaking. There is a great deal of overlap between the works and researchers of IDEAS with those of LUMS-SOE. The IDEAS team created a consortium with the Centre for Development and Research (CDPR) and Oxford Policy Management (OPM) for the evaluation of the PESP-II. IDEAS has also led a consortium of in-service teacher training through technology in collaboration with the Directorate of Staff Development, Punjab. The consortium also partnered with the Society for the Advancement of Education (SAHE), OPM and CDPR.

Idara-e-Taleem-o-Agahi (ITA) is based in Lahore and is best known for its publication of the Annual Status of Education Report (ASER). The report covers 85 rural districts in Pakistan and collects data on learning outcomes. Additionally, ITA works closely with the government to provide research-driven publications to help inform policy (⇡Naveed, 2013). Specifically, in relation to EdTech, ASER reports on a number of indicators focusing on household and school access to technological devices.

The Sustainable Development Policy Institute (SDPI) is an Islamabad-based think tank that primarily employs qualitative methods to inform its work, although it has also — from time to time — focused on the analysis of quantitative data that it has collected. Previous work done by the SDPI has mainly focused on an analysis of taught content as it appears in the curriculum and textbooks. Besides content, SDPI has also focused on out-of school-children, child labour, education and social transitions in rural Pakistan, and the review of education policies.

4.2. Leading academics and independent researchers

Within Pakistan, there are few researchers working on EdTech. Amongst those working in this area are Dr Yasira Waqar — an assistant professor at LUMS-SOE. Her focus of research is on the use of technology to augment student learning and the application of cognitive psychology to hone learners' thinking skills. In Karachi Dr Azra Naseem, the Associate Director of the Blended and Digital Learning Network at AKU-IED, is another researcher focusing on e-Learning design, ICT literacy and collaborative e-Learning. Dr Irfan Muzaffar, currently associated with Adam Smith International, has worked as Technical Lead for the Khyber Pakhtunkhwa Education Support Programme (KESP). KESP was funded by the Foreign, Commonwealth & Development Office (FCDO) to improve access and quality of education in Khyber Pakhtunkhwa. As part of the project, some interventions using technology were used. Dr Dilshad Ashraf and Dr Razia Fakir Mohamad, who are based at AKU-IED, also conduct research on school improvement and assessment in the context of EdTech.

Besides academic researchers, programme managers of EdTech interventions are a valuable resource. These include Nadya Karim Shaw from the Pakistan Reading Project; Dr Umar Saif, former Chairman of PITB; Imdad Baloch, who is a member of EdTech Hub's global Specialist Network and a consultant with RTI International; Helen Kamal, who led the Ilm Ideas -2 Programme; Javed Malik, former UK aid education advisor; Zulfiqar Qazilbash co-founder of the Ilm Ideas Association who also serves as technical advisor to the Federal government on a blended learning pilot in Islamabad; and Waqas Halim, who led the eLearn Initiative. The impact evaluation reports and other lessons

learnt from the projects they have contributed to act as a useful source of knowledge to the EdTech research landscape in Pakistan.

4.3. Leading international academics and independent researchers

Most of the notable foreign organisations and scholars researching Pakistan's education system have collaborated with a select number of the Pakistan institutions listed above. Researchers affiliated with CERP and IDEAS appear to make up a high percentage of global and national partnerships. For instance, CERP was itself created in 2010 with the objective of making international development grants more readily available for a Pakistan-based research entity.

The LEAPS project, initiated in 2003, gathered data on education learning from schools in 112 villages across the province of Punjab. This was a cross-organisational initiative led by Asim Ijaz Khwaja (CERP co-founder and Director, International Development at the Harvard Kennedy School), Tahir Andrabi (Pomona College) and Jishnu Das (World Bank). It has since expanded to better understand and address system-level issues affecting learning outcomes across Pakistan. Likewise, the RISE programme in Pakistan is a multi-disciplinary group of researchers from Pomona College, IDEAS, University of California, John Hopkins University, Georgetown University, and Harvard Kennedy School.[4] The purpose of the RISE programme in Pakistan is to take a systems-level approach to examine what it is that prohibits actors across the education system from fulfilling objectives. Elsewhere, researchers from IDEAS have worked closely with academics at the Research for Equitable Access and Learning (REAL) centre at the University of Cambridge on the Teaching Effectively All Children (TEACh) project, which centred on improving learning outcomes for children with disabilities. In terms of EdTech-specific research, the evaluation of the eLearn project entailed multi-institutional collaboration between ITU, the PITB, and the University of Delaware. The purpose of this study was to conduct a Randomised Control Trial (RCT) focusing on the effectiveness of tablets for student learning (↑Beg, et al., 2019).

As well as international academics, a number of international consultancy firms working in education are also heavily involved in research — mainly through their role in implementing, monitoring, or evaluating government or donor-led projects and they are usually recruited by international donors (see

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[4] For a full list of the team members, see:
https://riseprogramme.org/about-rise/people?combine=&field_person_main_category_target_id=109

Section 6). An example is the five-year FCDO-funded Pakistan Education Innovation Fund project — otherwise known as Ilm Ideas 2 (↑Coffey International, 2016). Funding was made available to 34 education start-ups including those implementing the use of digital devices. As part of total project funding, £25 million was committed, with funds being disbursed to Cambridge Education — out of which, £1.5 million was allocated for research (↑Development Tracker, no date). Elsewhere, the evaluation of various government reforms in education, such as KESP and PESP-II, were contracted out to international consulting firms McKinsey International and Adam Smith International.

4.4. Leading funders of research in Pakistan

Public sector funding for policy research in education in Pakistan is both scarce and limited to either public higher education institutes through the HEC, or else the Federal government's support to AEPAM. Spending on research and development in Pakistan amounts to 0.25% of the GDP — less than half the South Asian regional average (↑British Council, 2018). This translates to 'minuscule budgets for research funding being made available to academic institutions when compared to other emerging markets and remains considerably smaller than its budget for funding overseas scholarships for Pakistanis (↑British Council, 2018).[5] Not only are the levels of HEC's research funding for universities low, but the proportion of the National Research Programme for Universities (NRPU) — a competitive research grants programme — is also skewed in favour of research towards disciplines related to Science, Technology, Engineering and Mathematics (STEM). Research in social sciences and public policy, on the other hand, remain neglected, and virtually non-existent in the education sector (↑Naveed & Suleri, 2015). Together with this, the majority of projects submitted to the NRPU appear to favour certain provinces. In 2017 / 2018, 72% of the projects accepted by the NRPU were from the Federal territory and the province of Punjab. Balochistan and Sindh, on the other hand, made up 2% and 16% respectively of total projects accepted (↑Higher Education Council, n.d.). Aside from the HEC funding, public funding is also disbursed from MoFEPT to AEPAM (↑Naveed, 2013).

Besides domestic funding for educational research, the largest share of research for education appears to come from international donors. The way in which this funding is disbursed is through investment in the development of the infrastructure needed for education research in-country. The United States Agency for International Development (USAID), for instance, supports programmes that strengthen the HEC and also fund Pakistani learners to

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[5] Funding to universities has been particularly badly affected since 2010 onwards when foreign resources to HEC experienced a large decrease (↑Muborakshoevaa, 2015).

study in American universities. Similarly, the World Bank supports research in Pakistan vis-a-vis funding to the HEC. The other way in which support for research by donors is administered is through direct funding of educational research. Both in terms of volume, and as a share of total education aid, disbursements to education research have increased since 2002. However, in spite of this, the share is still low, with aid intended for research making up just 2% of total aid in 2018 (see Appendix 4). The UK's FCDO has also been a major donor supporting research on education in Pakistan, and in 2017 and 2018 appeared to make up almost all of the resources disbursed for education research in the country. Large FCDO funds for educational research include those intended for the KESP (↑Development Tracker, no date) and the PESP-II(↑Development Tracker, no date), and more recently for Ilm Ideas 1 and 2.

Multilateral organisations like the World Bank, Asian Development Bank, United Nations Educational, Scientific and Cultural Organisation (UNESCO) and the United Nations Development Programme (UNDP) fund education reports and other research projects. Likewise, bilateral organisations like USAID, FCDO, GIZ, AusAID, Open Society Institute, the Royal Norwegian Embassy and the Aga Khan Foundation, also provide funds for educational research to the think tanks and research centres mentioned above. However, when looking at where these research funds are being disbursed, it would appear these are mainly being directed toward private research consultancy firms, which are international as opposed to national entities producing educational research. Funding to national entities appears concentrated on particular research centres, such as CERP and IDEAS in the education sector. As mentioned above, these institutions are largely made up of Pakistani researchers who have been formally educated at academic institutions in high-income countries abroad. One of the problems identified in the literature concerning this dependence on donors is the short-termism apparent in the way they operate, especially in the context of a 'difficult' country like Pakistan (↑Wood, 2013). The consequence is that research that does get funded largely fails to prioritise a locally led evidence eco-system or attempts to institutionalise a culture of evidence generation and use (↑Ahmed, et al., 2020). Short-termism in terms of what is funded also means that the work that donors sponsor can often be marginalised by central planners (↑Wood, 2013).

Specifically, in relation to EdTech research, the Ilm Ideas 1 and Ilm Ideas 2 programmes were funded by the FCDO to support digital education and EdTech solutions. Elsewhere, EdTech research funding has also come from smaller research funding organisations based abroad. The International Development Research Center (IDRC) in Canada, for instance, provided CAD $1,200,000)(↑IDRC, 2009) to the VU for greater access to rural learners. Similarly, the Abdul Latif Jameel Action Poverty Lab provided $49,677) to conduct the

RCT study on the eLearn Initiative previously mentioned in this report (↑Beg, et al., 2019).

5. Summary of the academic evidence on EdTech

This section presents the available literature on EdTech in Pakistan. It is thematically organised and analysed around five key focus areas:

1. Technology to support personalised learning and teaching at the level of the student

2. (In-service) teacher professional development, structured pedagogy, and technology

3. Technology to advance data use and decision-making in education

4. Technology to promote access and participation in school

5. Girls' education and technology

Within these themes, the literature reviewed is organised according to where some existing literature was found to be available but also where a high potential for future research exists.

5.1. Technology to support personalised learning and teaching at the level of the student

An emerging research area appears to support how personalised learning has the potential to increase access to education, better align instruction with students' learning levels and help mitigate the negative effects relating to high teacher–learner ratios (⬆Major & Francis, 2020). As is the case in most LMIC settings, teaching in Pakistan has typically consisted of a teacher using a 'chalk and talk' method to teach students (⬆Beg, et al., 2019). There are only a few studies that have looked at how technology can be used in Pakistan to personalise learning in a way that is most effective and cost-effective. Of these, the majority have a sample size that is not statistically significant and tend to focus on students in higher income settings.

Of the ones that were available and included for this study, ⬆Beg, et al. (2019) found that Grade 8 students in Punjab — where teacher instruction had been substituted by videos and where students were able to practise using online material — improved their performance in mathematics and science tests by 0.19 and 0.24 SDs respectively. Elsewhere, ⬆Zualkernan, et al. (2016) found that an interactive adaptive tutor software programme which was used to support mathematics learners in Grades 5 to 12 was more likely to be used by teachers if it was well-aligned with their teaching practices, the student's learning habits, and if the language used in the tutorial was understood by the

students. While the study does not indicate the effectiveness of the programme, it does pinpoint some of the conditions identified for teacher buy-in.

Two studies that have limited wider applicability focused on a very small sample of high-income students. ⬆Ahmed (2016) considered the use of social media groups and forums to facilitate teacher-to-teacher and teacher-to-student interaction in Pakistani secondary schools. Only six teachers were interviewed, however, and they were from the capital city, Karachi. Despite these limitations, the article advocated the wholesale adoption of social media as 'essential' and 'a necessity'. Clearly, such conclusions are unjustifiable given that they are based on such an unrepresentative sample. Similarly, in their introduction, ⬆Hussain, et al. (2017) discuss the use of 'Computer Assisted Instruction (CAI), a form of personalised learning, but it is unclear whether this is the form of EdTech in use in their study. Instead, the study involves one teacher encouraged to use "computers, internet, skype, chemistry CDs and other software, emails for teaching" (p. 83) being compared with a 'control' teacher who uses traditional, non-EdTech, teaching methods. Despite the limitations of this study, the authors conclude that "information and communication technology should be used in teaching chemistry" (p. 74). While ⬆Hussain, et al. (2017) study the impact on students from more rural areas of the Khyber Pakhtunkhwa region, the sample size (74 students) remains too small to derive generalisable conclusions about the efficacy of EdTech across Pakistan.

5.2. (In-service) teacher professional development, structured pedagogy, and technology

A number of challenges have so far hindered Pakistan from developing a strong teaching profession, including teacher absenteeism, lack of training, weak content knowledge and skills, and teachers' having political influence over their appointments — all of which lead to low learning outcomes (⬆Béteille, et al., 2020). In response to these challenges, Pakistan's provinces have undertaken significant reforms in the last decade, in which technology has played a role, particularly insofar as data collection is used for greater accountability and monitoring. There is, however, a debate concerning the extent to which technology alone has been responsible for the changes which have occurred (⬆Das, 2013).

5.2.1. Technology modalities and blended approaches to teacher development

This paper found three studies exploring technology for teacher professional development and two studies that explored the role of EdTech in helping to train teacher trainers.

In a study exploring EdTech for teacher training, ↑Saleem, et al. (2019) show that among the 726 male and female teachers in the province of Punjab sampled for the study, digital technologies — such as Google classroom or email — were hardly used. The study noted a lack of training for teachers in the use of social media applications (86% reported no training) and computer-related technologies in the classroom (68% reported no training). The low use of technology in the classroom is attributed to the lack of effective teacher professional development (↑Saleem, et al., 2019).

To confront the lack of available female teachers in rural areas, UNESCO and Nokia developed a mobile learning programme for pre-primary teachers in rural areas of Pakistan between 2012 and 2014 (↑UNESCO, 2017). The project delivered a three-day workshop in Early Childhood Education followed by providing mobile phones with six months of internet credit to download a series of follow-up video classes. These were targeted at 150 pre-primary school teachers in rural areas of Pakistan. In their final report, UNESCO noted that teachers were adopting more innovative teaching methods as a result of the programme, and had developed improved skills in the use of mobile phones. They noted, however, the significant challenges of connectivity that hampered the downloading of videos for many teachers in rural areas, underscoring the absence of the basic infrastructure that is preventing EdTech from being an option for many rural children (↑UNESCO, 2017).

Several small-scale studies have explored the role of EdTech in blended approaches to training 'teacher-educators'. ↑Impedovo and Malik (2019) evaluate the 'Blended Learning Training for the Teacher-Educators' programme run by Aix-Marseille University. This involved a three-year (2017–2019) online and in-person training programme for teacher-educators in Pakistan. After co-creating 20 modules in the first year, there were two face-to-face training sessions (one in Bangladesh, one in Pakistan), and the second year of training involved sharing teaching best practice. The final year involved the generation of a new curriculum of best practice for 'teacher-educators'. Though the sample size was small (47 Pakistani teacher-educators were surveyed and 10 were interviewed), the researchers reported increased teacher-educator engagement with new technological tools and increased intercultural awareness. The study also noted the potential limitations of using a global model of teacher education that did not account for context (↑Impedovo & Malik, 2019, ↑Impedovo, et al., 2019).

5.2.2. Supporting teachers' technology adoption in the classroom

The evidence landscape on technology adoption by teachers in classroom practices in Pakistan is nascent. While there is a range of studies arguing that technology should be supplied to learners, there is little focus on how EdTech will be used by teachers. However, as found by ↑Beg, et al. (2019), providing technology to teachers — rather than learners — was not only more cost-effective but also improved learning outcomes. Comparing the results of two RCTs in the Punjab region ↑Beg, et al. (2019) compared two approaches to raising student attainment. The first approach largely bypassed teachers by providing EdTech directly to children in the form of eLearn tablets. The second approach used eLearn classrooms to help support and train teachers. The eLearn tablets were observed to decrease student attainment by nearly 0.4 standard deviations, a finding the authors attributed to eLearn tablets diverting children from other more valuable educational tasks. By contrast, the eLearn classroom technology raised student attainment by nearly 0.3 standard deviations or 60% above the control group in around four months. This was partly due to the integration of EdTech alongside existing pedagogies. Finally, ↑Beg, et al. (2019) note the relative cost-effectiveness and scalability of EdTech interventions at the teacher level and argue that, for such programmes to be effective at scale, they need to work through the government school system that educates over 65% of Pakistani children.

5.3. Technology to advance data use and decision-making in education

EdTech in Pakistan is influenced by unique factors of political economy at the national and provincial level. In particular, Pakistan is a country with a weak state (less than 1% of people pay income tax) but where the bonds of society are strong, especially bonds of kinship and patronage (↑Lieven, 2012). From the perspective of using technology to advance data use and decision-making in education, this means that EdTech interventions need to negotiate Pakistan's unique 'enabling environment' of political support, infrastructure and finance (↑Haßler, et al., 2020).

5.3.1. Data use for education

At a broad systems level, the most prominent use of EdTech in Pakistan to advance data use and decision-making in education has been the use of data systems for accountability (↑Baloch & Taddese, 2020).

Sindh

In Sindh, in 2016, some reports estimate as many as 40% of teachers were regularly absent from their posts, despite salaries being a purported 97% of

total education spending in the province (↑Naviwala, 2016). Part of the reason for this has been attributed to extensive political interference in the education system, which stymies any serious attempts to improve it. In 2013, DFID reported that Sindh's education sector suffered 'extremely high levels of political interference and corruption' observing 'the use of teacher posts for personal and political ends, with teachers, principals, and district authorities frequently opposed to reform' (↑DFID, 2012).

As ↑Baloch and Taddese (2020) observe, since 2013, the government of Sindh's Education and Literacy Department has established the Sindh School Monitoring System that collects, analyses and disseminates real-time data on key school-level indicators, monitoring learners, staff, and school infrastructure across the province. Government-appointed 'Field Monitoring Assistants' visit schools every two months monitoring teacher presence and school infrastructure and collecting biometric fingerprint data and GPS tracking data from teachers. This data is fed back to Sindh's Education and Literacy department for analysis. From 2013 to 2017 a reported 26,200 schools and 210,000 education staff were monitored and disciplinary action was taken against 40,000 absent teachers (↑World Bank, 2017). Notably, the World Bank reports that teachers regard the system as 'just and fair'(↑World Bank, 2017).

Other research is more critical. ↑Naviwala (2016), observes that, far from addressing deep-rooted governance issues, the technologies provide a more powerful tool for systematic political interference. Patronage politics and corruption are reported to be conducted via the contracts awarded to technology companies. Although the data system is commended for providing more accurate data on teacher absenteeism, ↑Naviwala (2016) notes that errant teachers are rarely dismissed. Similarly, some reports suggest a less enthusiastic reception to digital monitoring from some teachers, noting that, in Larkana, teachers asked to provide fingerprints destroyed the computers and servers in the centre (↑Naviwala, 2016). This finding is consistent with other examples of the unintended consequences of aggressive top-down monitoring (↑Banerjee, et al., 2008). More broadly, this confirms the view of ↑Alston (2019) that technology is not distinct but intimately linked to the political and economic forces that use it. Likewise, if it is to be effective, EdTech must be part of a 'whole society approach' to the improvement of education (↑Unwin, et al., 2020).

Punjab

Since 2010, Punjab has seen energetic attempts at education sector reform, described by some as "the most frenetic … in the world" (↑Economist, 2018). At the centre of these reforms has been the partnership between the Government of Punjab and DFID (now FCDO), particularly through Sir Michael

Barber's 'deliverology'[6] approach. This approach has achieved rapid results by holding education sector officials to account for a range of targets — such as those relating to student attendance, teacher attendance, and quality facilities — and EdTech has increasingly been used to facilitate timely data collection and interpretation across a range of indicators and levels in the education system (↑Barber, 2013).

As ↑Barber (2013) notes, technologies have been used in a range of ways within Punjab's reformed education system. Central to reform efforts have been the real-time school monitoring, literacy, and mathematics data collected by the Punjab Information and Technology Board (PITB) and the Programme Monitoring and Implementation Unit (PMIU) for the School Education Department (↑PMIU, 2020). Monthly spot visits take place and collect data on attendance and children's performance in Urdu, mathematics, and English across all schools in the Punjab and officials are held accountable for performance in their districts. EdTech for data collection is used at several levels of the education system. In early childhood education, for instance, district-level Assistant Education Officers responsible for a cluster of schools use a monitoring app to collect data that is fed both 'upwards' to district officials and then 'downwards' to headteachers in individual schools (↑Naviwala, 2016). Between 2010 and 2012 the results of the reforms appeared to be dramatic. Both student and teacher attendance increased from 80% to above 90%, and the percentage of schools with functioning electricity, drinking water, toilet and boundary walls rose from below 70% to above 90% (↑Barber, 2013).

As was discussed in the case of Sindh, however, the use of EdTech for data collection and monitoring in Punjab is controversial. The improvements attributed to the 'deliverology' method are disputed by ↑Das (2013) who suggests that improvements were underway before the reforms and that the "trend under deliverology looks much like the trend before it". More fundamentally, the pressure of high-stakes accountability, of which EdTech data collection is a part, is criticised as causing perverse incentives. In particular, officials are reported to be put under so much pressure that some resort to doctoring their reports to appear to hit their targets (↑Naviwala, 2016). These pressures are consistent with critiques of 'high stakes accountability' in education systems around the world (↑Ball, 2010).

5.3.2. Policy and planning

Policy and planning is a key component of improving decision-making in education. While there are few studies that specifically address EdTech policy

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[6] 'Deliverology' — the 'science of getting results' — is a form of performance management involving a government delivery unit forcefully 'managing and monitoring' the system using targets and data collection (↑Barber, et al., 2011).

and planning, several include EdTech in wider discussion around Pakistan's education infrastructure and educational planning.

Several studies highlight that EdTech implementation is hampered by poor infrastructure. ↑Suleman (2014) argues that EdTech should be integrated within wider efforts to improve the classroom environment, including improving toilet facilities, heating, lighting, and electricity infrastructure, arguing for a wider systemic overhaul of the classroom, in particular noting that the lack of continuous power supply hinders the effective use of EdTech. Similarly, ↑Tabassum, et al. (2020) observe that these infrastructural deficiencies were exposed in the Covid-19 pandemic. They directly attribute limited use of technology in schools to the poor technology infrastructure in the country and argue that the lack of digital infrastructure has widened existing inequalities during the pandemic. However, the underlying causes of infrastructural constraints are partly attributed to policy. ↑Tabassum, et al. (2020) suggest that although Pakistan's National Emergency Plan led to some deployment of technology to continue learning, it failed to recognise that poor basic infrastructure would make deployment difficult.

In a report focused on the area formerly known as the Federally Administered Tribal Areas (now part of Khyber Pakhtunkhwa) ↑Naveed (2018) argues that education planning needs to be contextual and take account of the specific challenges of the geography, demography, and economy of the region. ↑Naveed (2018) argues that the use of real-time data for education planning could help achieve this, by informing decision-makers of the unique characteristics of each district, 'in terms of terrain, demographic characteristics, and the perception of residents about girls' education'. Similarly, a fundamental challenge preventing girls from being educated is the societal perception that they have no use for education, as it is thought that only boys will go on to access jobs and earn for their families. To combat this, ↑Naveed (2018) suggests that reorienting the curriculum to include 21st-century skills, including technological skills, may increase girls' employment prospects and build societal support for the value of girls' education.

5.4. Technology to promote participation in school

Existing literature relevant to using technology to promote participation in school in Pakistan centres on using technology to help children with SEND gain greater access to education and learning. Over 11% of Pakistani children experience some form of disability that has "a significant impact on an aspect of their daily functioning" (↑Rose, et al., 2018). For children with disabilities who attend mainstream schools, their immediate need is for technologies to improve access. A study on children with disabilities in the Punjab region,

conducted by the ESRC-DFID funded TEACh project, argued that children with disabilities required "an inclusive infrastructure in schools … such as ramps, provision of aids and appliances and the availability of appropriate teaching and learning materials" (↑Rose, et al., 2018). These findings suggest a need for technologies at the systems level, as well as assistive devices to ensure inclusivity for SEND learners.

While overall there are few detailed studies of SEND children in Pakistan, there are a range of small studies exploring the use of assistive devices for deaf learners. Unconfirmed government statistics estimate that approximately 1.2 out of every 1,000 Pakistani children are affected by moderate to profound, congenital, bilateral hearing loss, i.e., hearing loss in both ears (↑Mactaggart, 2013). Illustrating the distance learning challenges for these learners, the Basic Utility Survey of families of deaf children enrolled with the Deaf Reach programme found that 75% of learners have no computers or devices, while only 15% have access to the internet. In addition, just 42% of children enrolled have more than 15 hours of electricity a day (↑Family Educational Services Foundation, 2020). While a range of specialised online materials for deaf children is available in Pakistan, they are out of reach of the majority of learners due to these basic infrastructural barriers. Similarly, ↑Farooq, et al. (2015) explore the use of both high- and low-tech assistive devices in a sample of 200 deaf learners in the Bluebell Inclusive School in Lahore. Despite the small sample size, the findings align with other studies, which is that the prohibitive cost of specialised, high-tech assistive devices puts them beyond the reach of many parents, and there is also a lack of appropriate training to enable teachers to support children with technology. ↑Farooq, et al. (2015) urge the use of low-tech to enable more deaf children to access these technologies.

One small, but detailed, study explored the use of mobile technologies for autistic children (↑Ahmad, et al. (2015)). The study observed over eight weeks, how eight autistic children responded to computer applications with story-based, visual content designed to encourage socio-emotional learning, finding positive results. As with many studies in Pakistan, however, the small sample size reduces the reliability of the findings.

5.5. Girls' education and technology

Girls' education is a challenge in Pakistan. Low enrolment of girls in school is part of a wider pattern of gender inequality across the country. According to ↑Martínez (2018), the barriers girls face within the education system include low investment, lack of quality education, high costs of education (especially since the advent of low-cost private schools), and poor enforcement of compulsory education. Beyond the classroom, girls face barriers including poverty, cultural norms hostile to girls' education, and insecurity and attacks

on schools. Of the 50+ attacks on schools between 2017–2019, half of them were targeted at girls-only schools (⬆Global Coalition to Prevent Education from Attack, 2020). While there is extensive literature on the barriers that girls face in accessing education in Pakistan, there is little rigorous research on girls and EdTech. Two donor reports were dedicated to girls and EdTech (⬆Ferreira, 2017, ⬆Hanemann & Scarpino, 2016), while technologies were a significant feature of one survey (⬆Malala Fund, 2020) and one policy paper (⬆Naveed, 2018).

A survey by the Malala Fund showed that in the Covid-19 pandemic, access to technologies mirrored existing gender inequalities. Surveying 1,600 adults and over 1,500 children from across Pakistan's four provinces, the Malala Fund found that gender norms hindered girls' access to technology during the Covid-19 pandemic (⬆Malala Fund, 2020). Mobile phone ownership was three times higher (64%) among men and boys compared to girls and women (26%). Access to technology is further compounded by geography. The report found, for instance, that only 6% of women and girls in rural areas used the internet compared to 33% of men in urban areas. Printed resources were the most requested technologies by children, although less than 5% reported receiving any education assistance from the school during the pandemic. Though boys were more likely to use EdTech, the survey found that, overall, less than 1% of learners were using distance learning tools at all.

Several donor programmes have focused on using EdTech to improve women and girls' education. The Commonwealth of Learning's Reaching the Unreached programme (GIRLS Inspire) aimed to provide education and employability training to over 5,673 girls who are out of school in Pakistan (⬆Commonwealth of Learning, 2017). By training local NGOs in the use of technologies for open and distance learning, the project established mobile vocational training centres equipped with DVD and YouTube tutorials and Aptus, an offline mobile learning device. These mobile centres were able to travel across the country to increase access to hard-to-reach girls. At the end of the programme, 74 girls had applied to be considered for full-time work, with 24 being successful. A further 10 girls obtained micro-loans and 84 girls took up internships (⬆Ferreira, 2017).

In 2010, only 44% of Pakistani women were literate compared to 68% of men (⬆Lieven, 2012). In response to this challenge UNESCO's mobile literacy programme, aimed at young women aged 15–30, established a two-stage programme to reach 1,500 learners. Stage one — a two-month basic literacy course — taught literacy with the aid of instructional DVDs. Stage two provided learners with mobile phones that sent 600 messages over the course of four months, testing participants literacy skills. Of the 250 girls who

completed the five-month pilot phase, more than 150 had achieved two grades higher in literacy (↑Hanemann & Scarpino, 2016).

6. Summary of the political economy analysis

The purpose of this section is to present an overview of what underpins the production of research in Pakistan, and its use in policy and programming decisions. This was done by first summarising some of the recurring themes which appeared in existing literature, exploring the political economy of research production and use in Pakistan. Second, interviews were held with nine individuals across six institutions, working in the education sector in Pakistan, to try and focus on these issues more specifically in relation to the EdTech sector (see Appendix 6). While the interviews frame the discussion in the context of the EdTech sector, they are also contextualised within a broader understanding of the education research ecosystem.

6.1. Education research produced is of low quality

The scoping review of EdTech literature (see Sections 3 and 5) found that the research produced to inform education policy and public debate has low academic impact and poor uptake. Stakeholders interviewed for this paper corroborated that it is seen as low-quality research. Specifically, in terms of the higher education landscape, one donor interviewed for this study signalled that "the overall sector is severely underfunded and lacks capacity. You might hear of a few institutions like LUMS or AKU but you also don't hear of strong research institutions." A further weakness identified by both government and donor officials was that the scholarship around education research produced in academic institutions was not "very methodologically robust" and not "internationally recognised and produced in international journals". One study of higher education in Pakistan reported how journal publications are seen as a numbers game where quantity is pursued over quality in order to enable career progression. The consequence means missing "the spirit of enquiry and debate [and] the passion to solve globally or locally meaningful problems" (↑British Council, 2018). The scoping review also found that under the Federal government, it is AEPAM that is a key policy research institute. This includes the NEMIS. However, as our interviews with stakeholders revealed, there was a "semblance of something in place" but "it did not really function" (donor official). Beyond the NEMIS, however, the research wing of AEPAM has not produced much, and in the opinion of stakeholders interviewed, what has been produced is of low quality.

Aside from the low quality of the research produced, stakeholders commented on how the quantity of semi-rigorous research from academic and non-academic researchers is also low — especially compared to Pakistan's neighbours. Donors whom we interviewed noted that there is "definitely a

dearth of research evidence and that is a huge opportunity given the demand and also given the nascence of domestic supply [of research]." As far as EdTech is concerned, stakeholders interviewed from both the EdTech sector and academia discussed how research, in the context of testing out certain interventions, was not seen as important. In relation to the Sindh Education Project, for example, one stakeholder working in the EdTech space and speaking about donors, commented: "they must have spent hundreds of millions of rupees but they couldn't spare 10% to engage a public university to compare pre and post-intervention?"

6.2. The predominance of donor funding can be problematic

As identified in Section 4 given the low level of funding for education research emanating from the HEC or the Government of Pakistan, the majority of funding for research in Pakistan comes from donor agencies. More often than not this research funding relates to the donors' own projects. The majority of stakeholders interviewed problematised how neither research organisations nor higher education institutes receive funding from donors that could potentially help fund long-term projects.[7] Rather, as put by one academic, it "is done by for-profit companies to evaluate donor programmes" which are often external to Pakistan. This appears to be supported by the project-level data available from the Organisation for Economic Cooperation and Development, which indicates that most research funding for education appears to have been disbursed to for-profit research consultancy organisations (see Appendix 4). While universities are seen by donors as lacking the methodological rigour that is required for meeting the research criteria funded by them, at the same time this failure to meet minimum research standards is due to having limited access to funding.

Stakeholders identified how favouring consultants to undertake research has led to a number of problems — not least that it continues to perpetuate a research ecosystem that is not methodologically robust. The problem most easily identified related to one of accountability, with research produced by consultants not being sufficiently scrutinised.

First, this is because donor-funded research ends up not being publicly disseminated to national stakeholders, given that consultants are beholden to their clients (donors), and not to national stakeholders. One example raised by a stakeholder working in the EdTech space was that of research produced for the Ilm Ideas 2 project. In addition to producing research on EdTech, this

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[7] Instead donors fund external organisations who then sub-contract research out to national organisations in Pakistan.

project contained a stream providing innovation grants for EdTech start-ups. It was noted that while the research conducted was "available on the UK government website somewhere … they are so deep and hidden … so it's not really out there in the public sphere". This often leads to findings being insufficiently scrutinised and therefore lacking rigour. Another industry official was emphatic that the EdTech sector needed to include academia to "be invited and involved in the research and then publish these results in public platforms." This was given the absence of peer-review mechanisms in place for non-academic research compared to academic research when assessing the quality of the research. Such a solution would require finding solutions that encourage the state to invest more resources into academic research, and the infrastructure to support this.

A second problem identified was how private-sector consultants often felt more accountable to their funder (the donor), than the Government of Pakistan or Pakistan's population. Given that donor funding to educational research will often be for projects donors themselves fund, one interviewee expressed concern about objectivity. Consultants undertaking evaluations of such projects will all too often lean towards presenting a positive picture, without incorporating information about the deep-seated systemic complexities of Pakistan's education system. This can often lead to unrealistic recommendations, especially given the near absence of discussion concerning the impact of political economy factors on change. As an example, one of the academics interviewed, criticised these studies assessing the effectiveness of EdTech interventions as they rarely included teacher and student voices. This is a fundamental omission given that in interviews elsewhere, stakeholders have indicated the resistance teachers may express against EdTech reforms (see Section 6.5). This reflects a wider point, discussed in Section 3, which is that research currently appears to be overwhelmingly about advocating for EdTech without critically evaluating the systemic challenges in doing so.

6.3. Research is centred in and on Punjab

The decentralisation of services in 2010 saw policy discourse shift from the Federal Planning Commission to the provincial governments (↑Tabassum, et al., 2020). However, a challenge identified in several studies about making policy more region appropriate, was that research organisations working in education were overwhelmingly concentrated in the province of Punjab, with the majority of these being clustered in Lahore and Islamabad (↑Naveed, 2013.) A few organisations are also situated in Karachi (Sindh province). No research organisations working in the education sector in Pakistan are currently based in either the Khyber Pakhtunkhwa or Balochistan provinces (↑Naveed, 2013;

↑Wood, 2013).[8] This problem is further compounded by the locations of the Federal government and donors, as they are the main funders of education research. ↑Wood (2013) identifies how institutions outside of Islamabad often feel excluded from the Islamabad-specific networks and forums through which research is both commissioned and adopted. This consequently has repercussions with non-Islamabad research institutions reporting losing talent to research institutes in Islamabad.

Several respondents interviewed for this paper also discussed the clear preference donors had for working in Punjab, compared to other regions, although this varied from donor to donor.[9] Security-related concerns were identified as one reason. Compared to other provinces, Punjab was considered a safer place in which to conduct research. Khyber Pakhtunkhwa and Balochistan, on the other hand, were perceived to hold a number of security challenges meaning that "any research which involves visiting schools or visiting households — apart from a few districts which are considered safe — a lot of researchers don't feel comfortable visiting these areas" (donor official). Similarly, another donor official indicated that while researchers may be willing to do research in the Karachi area of Sindh, the same was not true of other parts of the province. The accessibility of Punjab was further due to the preponderance of think tanks that are concentrated in this province. While academic institutions are more evenly distributed, LUMS was regarded by several interviewees to be more "forward-looking" with "more of an open attitude towards trying stuff and measuring it."

The difficulty in obtaining permission to conduct research in certain provinces in Pakistan was another reason identified by respondents for researchers focusing on Punjab.[10] Several interviewees from the EdTech sector, research or donor community discussed how getting permission to access the field to collect primary data was a challenge in certain parts of the country. This was, in part, attributed to "permissions or local sensitivities … putting a bit of a barrier to the research production here". This appears to support how, in recent years, the operations of international non-governmental organisations and their local partners have been subject to increasing restrictions introduced by the Government of Pakistan through the refusal of visas, or else

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[8] While education think tanks are clustered in Lahore and Islamabad, Faculties of Education at various Higher Education institutes are more geographically spread out, meaning that universities may be key to generating more context-specific research (↑Naveed, 2013).

[9] Among the largest donors, the World Bank, for instance, had a clear preference for Punjab and Sindh while DFID's efforts were focused on Punjab and Khyber Pakhtunkhwa.

[10] One respondent indicated that even in the case of Punjab this can be problematic, with Southern Punjab being particularly challenging.

requiring layered approvals (↑Naviwala, 2017).[11] More generally, this point applies to the difficulty faced by researchers coming from international academic institutions or think tanks, in securing permission to carry out primary data collection or in securing a visa.[12] Consequently, "foreign institutions often feel other countries in South Asia [Bangladesh and India] are much easier to access than Pakistan" (donor official).

Another reason identified by stakeholders from government and donor officials for the preference to work in Punjab relative to other regions was the relatively higher levels of capacity of government officials with whom donor officials could work with. The government mechanisms in other provinces were discussed as being weak, meaning that there was "nothing to work with." As discussed by other interviewees — and supported by the data — Punjab has comparatively higher educational outcomes compared to other provinces (↑National Institute of Population Studies, 2019; ↑ASER, 2019). These then translate into the differing capacity levels of civil servants employed by the provincial government. This means a greater competency to interpret data and evidence for related policy decisions.

Finally, the visibility and communication of educational research done in Punjab was discussed by government and EdTech industry officials as being superior to that of research conducted in other provinces such as Sindh, leading to the long-standing perception that educational research continues to be Punjab-centric.[13] An example of where the communication of evidence has been an important instigator of change has been the Alif Ailaan campaign, which ranked districts according to education performance. The campaign was effective insofar as it set a precedent for data-informed journalism and reporting on education and, according to one donor official, created "a bit of a clamour amongst Members of the National Assembly who were like 'well my district is a bit rubbish' and I don't want to be called out for having bad numbers so what are we going to do about it."

The Punjab-centric nature of educational research may be problematic when it comes to how relevant this is for policy in other provinces throughout the

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[11] This, in part, has been driven by the increased suspicion of foreign-funded NGOs over the last decade due to a number of incidents occurring, which have blurred the lines between developmental work and foreign espionage.

[12] An example cited was one of JPAL wanting — but failing — to conduct an RCT in primary schools in Pakistan. A year on, the official discussed how it was not clear if permissions had been granted for the JPAL project.

[13] The perception among stakeholders was that the factors driving these differences was huge donor investment in Punjab. Additionally, the involvement of high-profile individuals such as Michael Berber in the education sector in Punjab meant that what was happening in this province received a lot more traction.

country. The latest ASER data from 2019, for instance, illustrated the huge disparities in infrastructure by household and school depending on the province they are in (see Appendix 1). For instance, the percentage of households in possession of a mobile phone ranged from 50.5% in rural Sindh to 79.5% in rural Islamabad (↑ASER, 2019). While it is encouraging that the scan for literature on EdTech for this review identified a few studies (12 out of 52) which were based on Khyber Pakhtunkhwa, the problem — as identified in Section 3 — remains the lack of rigour or reliability. Unlike studies conducted in Punjab, for example, the sample size of research produced in Khyber Pakhtunkhwa was small. No studies identified in the scan were geographically specific to Balochistan or Gilgit-Baltistan.

6.4. Capacity constraints in linking evidence to policymaking

The interviews reflected how problems of government capacity are one of the barriers preventing the incorporation of evidence into policymaking. This supports what other studies also point to, which is the declining in-house capacities of policymakers to engage with research (↑Ikram, 2011). According to the ↑World Bank, (2018), "the impact of research on public policymaking decisions has long been identified as weak due to the limited capacity of government bureaucrats in being able to absorb complex analysis" (p. 77). This was supported by both government and donor officials with one donor interviewee commenting that the struggle to "interpret and take action based on the data" was less of a problem among provincial government officials in Punjab, where education outcomes are better (↑National Institute of Population Studies, 2019; ↑ASER, 2019). However, in other provinces and their accompanying districts, these capacity constraints are more evident when it comes to making the best use of evidence and data. Elsewhere, responses from researchers appeared to indicate low demand for research-driven products among government officials. This supports what other studies conclude when exploring the research–policy interface (↑Khattak, 2009; ↑Wood, 2013).

At federal and provincial levels, capacity to translate evidence into policy was discussed by government and donor respondents in the context of the short-termism relating to technocratic posts, with government officials regularly being transferred. The instability characterising Pakistan's political system is mirrored when looking at its civil service given that these appointments are politically motivated. This has the adverse consequence of negatively affecting capacity in terms of executing decisions based on evidence. Among many of the stakeholders interviewed for this paper, there was a recognition that the current political establishment is keen to incorporate evidence into policymaking. However, the discontinuity in

government posts impedes this from being translated into practice. The current Minister of Education has "appointed a technical adviser who is going to roll in the door and out again four months later" (government official). Other stakeholders discussed how the uncertain tenure and high turnover within the civil service bureaucracy lead to fundamental shortcomings in leadership and reform. The frequent transfer of postings and delayed allocation of resources, according to one interviewee, allowed for political interference in programmes and meant that "an embedded evidence culture is very limited" (donor official). These findings reflect what ⇡Ahmed, et al. (2020) found in their study.

Viewed from another perspective, other interviewees discussed how the capacity problem in interpreting research is often exacerbated by the way academics communicate it so that it is packaged in a format that is not user-friendly. One donor stakeholder gave the example of a recent publication by a well-known academic in the education sector. The interviewee indicated how they, despite coming from a policy background, had to read it several times before fully understanding it due to its heavy academic jargon. As another stakeholder put it "there is something to be said about how research is presented and how easy it is for others to understand and take action." The example of the ASER data came up, whereby the evidence shows poor learning outcomes by district, but where the challenge was to turn the data into steps required to come up with actionable policy. As one interviewee from the EdTech industry put it, there needs to be a focus on "bridging that gap between researchers and government actors."

6.5. Interference by non-formal institutions and players in policymaking decisions

Within the policymaking space, many studies have written of the lack of "political respect for an informed basis for policy options, let alone opportunity cost considerations of any initiative" (⇡Wood, 2013). This has been attributed to the high levels of political insecurity defining Pakistan's political system and, as a result, policy decisions are defined by short-termism, and highly politicised decision-making as opposed to evidence-based choices (⇡Wood, 2013). Political insecurity can lead to government departments being reluctant to collect and disseminate evidence so as not to annoy powerful political interests. For example at the end of Pervez Musharraf's regime in 2008, official poverty figures were released indicating a low incidence of poverty. It was, however, politically risky for successive governments to endorse these figures without knowing for certain that they would be able to bring these figures

down even further[14] (↑Ahmed, et al., 2020). Another reason, aside from electoral concerns, relates to the self-interests of politicians or elites and the extent to which they may align with the evidence that is produced. Much has been written about the dominance of rent-seeking within the policy discourse, with politicians or elites leveraging great influence on policy reforms depending on how this shifts the power dynamics against or in favour of them (↑Ahmed, et al., 2020).

Interviewees from the government, donor organisations, academia, and the EdTech industry all corroborated how various interest groups not officially responsible for policymaking are able to influence the process. It was inferred that policy processes typically started with "some elected official engaging with the government to explore a particular problem that needs policy intervention" (EdTech industry official). However, "there is a chronic lack of focus on political agendas being [guided] by credible data" (government official). One donor official with intricate knowledge of the Punjab and Khyber Pakhtunkhwa provinces indicated that a lot of what is prioritised in decision-making processes is "determined by the political priorities of that province" rather than evidence itself. A number of stakeholders did acknowledge that the current Federal Minister for Federal Education and Professional Training (Shafqat Mahmood), who has been in office since 2018, was more inclined to policy to be more strongly guided by evidence and is supportive of implementing more transformational policies. Specifically in relation to the EdTech sector, for instance, the Ministry has recently employed a Technical Adviser to help support the education sector with incorporating EdTech into the sector's strategy going forward.

However, the volatility of Pakistan's political landscape led one government official interviewed to reflect on how change needs to come from the bottom, because "you cannot depend on a minister for change. This minister may be good, the other minister may be bad." In spite of the current government being more receptive to evidence-based research, interview responses largely supported what past studies have indicated, which is that the use of evidence — and more importantly the demand for evidence — has been an atypical characteristic of the policymaking process. One donor official interviewed gave the example of EMIS data, observing that despite these being four years out of date, there has been no "clamour" for more recent data from political figures. However, other discussants reflected on how evidence could support decision-making processes when an issue that is being explored is already high on the political agenda.

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[14] For instance, the most recent poverty data corresponds to 2014–15, which is when the last IMF bailout was administered to Pakistan.

Specifically, in terms of EdTech interventions, government and academic officials interviewed reflected on where the resistance to changing the curriculum to make it more aligned with 21st-century skills was coming from. First, this comes from bureaucracy and school-level actors who do not want the status quo to change. This is due to the perception that, at least in the short term, change will create more work for them. Discussants also reflected on how teachers — especially older teachers — could be more resistant to change in how lessons are delivered through the use of new technologies. This reflects what ↑Arif & Riasat (2019) discuss regarding teachers' resistance to change more generally, and how this has become a perennial phenomenon with which the education sector in Pakistan has had to grapple. One government official interviewed reflected on how the roll-out of EdTech "endangered" certain stakeholders within the current ecosystem, namely textbook publishers. This group, according to this stakeholder, had been able to use their links with the political and bureaucratic establishment to lobby against the widespread implementation of changes suggested in the 2007 curriculum, which focused on 21st-century skills. A wider consequence of the resistance to curriculum change has been the negative effect this has had on employer satisfaction regarding graduates they employed. A recent statistic found that 78% of employers are unhappy with the quality of college or university graduates (↑Ahmed, et al., 2020).

7. Emerging priorities and opportunities for collaboration

This review has identified a number of emerging priorities, opportunities, and challenges that should be further explored through collaborative research. Based on what is known about Pakistan's education system more generally, this section considers some of the emerging priorities to take forward for future research in the context of EdTech. These are discussed according to the five areas on which the EdTech Hub focuses.

7.1. Technology to support personalised learning and teaching at the level of the student

As of now, there is a lack of evidence concerning how technology can be used most effectively to personalise learning in an effective, cost-effective, and contextually appropriate way in Pakistan. This reflects the paucity of EdTech research in this area, in LMICs more generally, which has given scant attention to the role of the teacher in making technology-supported personalised learning a part of everyday teaching practice. Part of this research gap is the extent to which personalised approaches featuring technology can lead to better learning outcomes. Related technical, classroom, and system factors also need to be explored.

7.2. In-service teacher professional development, structured pedagogy, and technology

Teacher development: A further opportunity for EdTech Hub to better align itself with the evidence base relates to using blended approaches to teacher development. Recently, MoFEPT announced it was intending to roll out a Blended Learning Programme in August 2021. This will target 60 schools (200 classrooms) within the Islamabad Capital Territory. Currently, the evidence is limited that digital devices are effective in training teachers to effectively deliver blended approaches to learning. Of the reviews undertaken in this area, the sample size of teachers included in the studies was small (see Section 5). The Blended Learning Programme provides EdTech Hub with a unique opportunity to build a more robust evidence base on interventions that target teachers through a larger sample size, together with more confidently engaging with lessons learnt and considering how these could be applied to other provinces.

Teacher adoption of EdTech: Beg, et al. (↑2019) suggests that providing teachers with technology can have a greater impact on student learning than directly providing learners with the same tools. A focus on teachers' technology adoption as an area for future research could be important for a number of reasons. First, this could draw on the broader literature on the cost-effectiveness of investing in EdTech for teachers before learners. A second case for research in this area is the need for qualitative research incorporating teachers' voices in the research design. The lack of systematic mixed methods in the studies reviewed left a particular gap in hearing directly from the needs of teachers, a crucial element given the large influence teachers have in the system.

7.3. Technology to advance data use and decision-making in education

Other areas where the EdTech Hub has an opportunity for further exploration relate to the potential of system-wide use of technology for improving data systems to both facilitate management and inform policymaking. This is aligned to using technology to advance data use and decision-making in education. In line with the four priorities outlined by the Government of Pakistan in 2018, there is an emphasis on better monitoring compliance of teachers throughout the system (↑Academy of Educational Planning and Management, 2021). Of the studies sourced for this review, the limited research available explores what impact the use of technology for data collection has had on teacher attendance in Punjab and Sindh (Section 5). However, there are a number of opportunities that present themselves in exploring these themes further. First, the evidence around the impact of using technology can be extended to provinces with less research in this area. For instance, Section 6 contextualised how, in a province such as Balochistan, fewer data may be available due to the security concerns around data collection in these geographic areas. A second opportunity presents itself in corroborating — through more robust evidence — whether more and timely data collection made available through technology can positively affect behavioural change within the education system.

7.4. Technology to promote participation in school

This review has highlighted the sobering statistics concerning the large numbers of out-of-school children and adolescents who are unable to access Pakistan's education system. Besides the numbers, there is a strong political will attached to helping address access-related issues concerning out-of-school children. Out-of-school children are one of four main priority groups underscored by the Government of Pakistan within the 2018 National Education Policy Implementation Framework. The large gender,

socio-economic, and geographic disparities among different populations of out-of-school children is pinpointed as a cause for concern (↑Academy of Educational Planning and Management, 2021). The extent to which EdTech can help in providing accelerated education for out-of-school children is a potential area for future research, with there being little research in this area to date.

Children with SEND: As well as the significant number of children with SEND in Pakistan (one in ten), the learning outcomes for these children are among some of the worst in Pakistan (↑Rose, et al., 2018; ↑Malik, et al., 2020). The large number of children with SEND means that EdTech Hub can more meaningfully engage in research relating to SEND and access to education. Past research on children with SEND, has demonstrated the potential there is to elicit positive change. Findings from the TEACh project, for instance, were influential and led to the research team behind this project being asked by the School Education Department to provide input into the government's new inclusive education policy (↑Tofaris, et al., 2019).

7.5. Girls' education and technology

Of the total numbers of out-of-school children, girls make up a disproportionate share, a situation made worse by the Covid-19 pandemic. The review of the literature on girls' education and technology, however, demonstrates that unlike the greater volume of research on barriers to girls education in Pakistan more generally, there is a lack of evidence specifically looking at what impact EdTech has had on girls' education. The case to be made for focusing on this area is further justified by the priority that both the government and donors have afforded it. Of the largest donors working in the education sector in Pakistan, there is a prioritisation on improving girls' access to quality education.[15] Given the different intersectionalities of disadvantage faced by girls (e.g., regional, geographic and socio-economic status), there is an opportunity for EdTech Hub to build a more robust evidence base as to the extent to which technology can help improve access to quality education for girls suffering from a multitude of challenges.

Any opportunities concerning research areas prioritised by the Hub would need to contextualise these areas of focus in relation to broader political economy factors concerning Pakistan's education system. Interviews conducted with stakeholders highlighted how, for instance, there was a

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[15] Provision of 12 years of quality education for girls is one of the top priorities expressed by the FCDO, who are currently the largest donors investing in education research in Pakistan. Similarly, as part of its Covid-19 response, the Global Partnership for Education has prioritised girls as they are more prone to dropping out of school and have less access to digital devices (↑Global Partnership for Education, 2021).

propensity for informal interference, and how the "voices" of certain stakeholders, who would consider these interventions through a more critical lens, were missing in studies on EdTech. It is therefore not enough to simply measure the efficacy of EdTech as a technical solution to the educational challenges faced by the educational system. As an example, understanding the complex political economy factors affecting girls' education in Pakistan need to be further understood. Similarly, studies focusing on the better availability of teacher attendance data through technological approaches would need to consider to what extent changes in behaviour are affected by the broader political economy factors affecting these changes.

8. Bibliography

Academy of Educational Planning and Management. (2021). *Pakistan Education Statistics 2017-18*. Government of Pakistan. http://www.aepam.edu.pk/Index.asp?PageId=27

Ahmad, A. (2018). *Classification of HEC Recognized Journals*. https://draftab.wordpress.com/2018/03/30/classification-of-hec-recognized-journals/

Ahmad, I., Rehman, K., Ali, A., Khan, I., & Khan, F. (2014). Critical Analysis of the Problems of Education in Pakistan: Possible Solutions. *International Journal of Evaluation and Research in Education (IJERE)*, *3*. https://doi.org/10.11591/ijere.v3i2.1805

Ahmed, K., Ahmed, V., Javed, S. A., Jillani, A., Khan, A., Khaver, A. A., Nadeem, U., Pellani, A., Shah, Q., Shaxson, L., Suleri, A. Q., Zaidi, A., & Zaidi, M. (2020). *The Role of Evidence in Policymaking in Pakistan: Political Economy Analysis Report*. Oxford Policy Management.

Ahmed, R. (2016). Social Media Integration in Secondary Education in Pakistan. *Journal of Education and Educational Development*, *3*(1), 74–99. https://doi.org/10.22555/joeed.v3i1.712

Alston, P. (2019). *Report of the Special Rapporteur on extreme poverty and human rights*. United Nations General Assembly. https://undocs.org/A/74/493

Andrabi, T., Das, J., Khwaja, A. I., Vishwanath, T., & Zajonc, T. (2008). *Pakistan - Learning and Educational Achievements in Punjab Schools (LEAPS): Insights to inform the education policy debate*. /paper/Pakistan-Learning-and-Educational-Achievements-in-%3A-Andrabi-Das/758108c56b7c6a01e290a1ff5972f155c667abd7

AOE Research, & Qazilbash, Z. (2019). *Willingness and ability of LCPS to pay Ilm: A for products and services* [Presentation].

Arif, S., & Riasat, L. (2019). *Teachers resistance towards change in Punjab public schools: Implications for school effectiveness*. https://www.researchgate.net/publication/337415153_TEACHERS'_RESISTANCE_TOWARDS_CHANGE_IN_PUNJAB_PUBLIC_SCHOOLS_IMPLICATIONS_FOR_SCHOOL_EFFECTIVENESS

Asare, S., Mitchell, R., & Rose, P. (2021). How Accessible are Journal Articles on Education Written by Sub-Saharan Africa-based Researchers? *Development and Change*, *0*(0). https://doi.org/10.1111/dech.12639

ASER. (2019). *Annual Status of Education Report*. ASER.
http://aserpakistan.org/document/aser/2019/reports/national/ASER_Nati
onal_2019.pdf

Asian Development Bank. (2019). *School Education in Pakistan: A Sector
Assessment*. Asian Development Bank.
https://doi.org/10.22617/TCS190039

Ball, S. (2010). The Teacher's Soul and the Terrors of Performativity. *Journal
of Education Policy*, *March-April 2003*, 215–228.
https://doi.org/10.1080/0268093022000043065

Baloch, I., Kaye, T., Koomar, S., & McBurnie, C. (2020). *Pakistan Topic Brief:
Providing Distance Learning to Hard-to-reach Children*. EdTech Hub.

Baloch, I., & Taddese, A. (2020). *EdTech in Pakistan: A Rapid Scan*. EdTech
Hub. https://doi.org/10.5281/ZENODO.3911655

Banerjee, A. V., Glennerster, R., & Duflo, E. (2008). Putting a band-aid on a
corpse: Incentives for nurses in the Indian public health care system.
Journal of the European Economic Association, 6(2–3), 487–500.
https://doi.org/10.1162/JEEA.2008.6.2-3.487

Barber, M. (2013). *The Good News From Pakistan*. Reform.
https://assets.website-files.com/59ca37d5fcfbf3000197aab3/5be1df67f39
5d780786441d8_Pakistan%20final.pdf

Barber, M., Moffit, A., & Kihn, P. (2011). *Deliverology 101: A Field Guide For
Educational Leaders*. Corwin Press.

Bari, F., & Najam, A. (2017). *Pakistan National Human Development Report:
Unleashing the Potential of a Young Pakistan*. UNDP.
file:///Users/samwilson/Downloads/NHDR_Summary%202017%20Final.
pdf

Beg, S. A., Lucas, A. M., Halim, W., & Saif, U. (2019). *Engaging Teachers with
Technology Increased Achievement, Bypassing Teachers Did Not*.
National Bureau of Economic Research. https://doi.org/10.3386/w25704

Beg, S., Lucas, A. M., Halim, W., & Saif, U. (2019). *Beyond the Basics:
Improving Post-Primary Content Delivery through Classroom
Technology*. 41.
https://riseprogramme.org/sites/default/files/inline-files/Beg.pdf

Béteille, T., Tognatta, N., Riboud, M., Nomura, S., & Ghorpade, Y. (2020).
Ready to Learn: Before School, in School, and beyond School in South

Asia. In *World Bank*. World Bank Publications.
https://eric.ed.gov/?id=ED604408

British Council. (2018). *The University Research System in Pakistan.*
https://www.britishcouncil.pk/about/research-reports/university-researc
h-system-pakistan

Coffey International. (2016). *Process Evaluation Report 2016: Evaluation Services Provider for the Pakistan Innovation Fund Phase II.*
https://assets.publishing.service.gov.uk/government/uploads/system/up
loads/attachment_data/file/701020/Pakistan-Innovation-Fund-Phase-2.
pdf

Das, J. (2013). A Data Guide to Sir Michael Barber's "The Good News from Pakistan". *World Bank Blogs*.
https://blogs.worldbank.org/developmenttalk/data-guide-sir-michael-b
arber-s-good-news-pakistan

DevelopmentAid. (2018). *Khyber Pakhtunkhwa Education Sector Programme (KESP) 2*. DevelopmentAid.
https://www.developmentaid.org/

DFID. (2012). *Education Fund for Sindh Pilot Programme: 2012/13-2014/15: Business Case*. Department for International Development.
https://devtracker.fcdo.gov.uk/projects/GB-1-202378/documents

Economist. (2018). Pakistan is home to the most frenetic education reforms in the world. *The Economist*.
https://www.economist.com/briefing/2018/01/04/pakistan-is-home-to-t
he-most-frenetic-education-reforms-in-the-world

Faize, F. A., Khan, A. S., & Kalim, I. (2018). Revamping Higher Education Research in Pakistan. *Policy Perspectives*, *15*(2), 85–97.
https://doi.org/10/ghzt9d

Family Educational Services Foundation. (2020). *COVID Response Report*.
FESF.
https://www.fesf.org.pk/wp-content/uploads/2020/09/Covid-Response-
Report.pdf

Farooq, M. S., Aasma, & Iftikhar, U. (2015). Learning through Assistive Devices: A Case of Students with Hearing Impairment. *Bulletin of Education and Research*, *37*(1), 1–17.

Ferreira, F. (2017). *Reaching the Unreached Through Open and Distance Learning (ODL) in Bangladesh, India and Pakistan* [Report].

Commonwealth of Learning (COL).
http://oasis.col.org/handle/11599/2757

Ferreira, F., Cruz, C., Smith, K., & Commonwealth of Learning (COL) (British Columbia). (2018). *Baseline-Endline Report: Reaching the Unreached (RtU) through Open and Distance Learning (ODL) in Bangladesh, India and Pakistan.* Commonwealth of Learning.
http://oasis.col.org/handle/11599/2848

Foreign, Commonwealth and Development Office. (2011). *Khyber Pakhtunkhwa Education Sector Programme.*
https://devtracker.fcdo.gov.uk/projects/GB-1-202328

Foreign, Commonwealth and Development Office. (2018). *Ilm Ideas Education Innovation Programme—Phase II (Ilm-2).*
https://devtracker.fcdo.gov.uk/projects/GB-1-204277/documents

Foreign, Commonwealth and Development Office. (2020a). *Punjab Education Support Programme II.*
https://devtracker.fcdo.gov.uk/projects/GB-1-202697

Foreign, Commonwealth and Development Office. (2020b). *Punjab Education Support Programme II.*
https://devtracker.fcdo.gov.uk/projects/GB-1-202697

Geven, K., & Hasan, A. (2020). *Learning Losses in Pakistan Due to COVID-19 School Closures.* World Bank, Washington, DC.
https://doi.org/10.1596/34659

Global Partnership for Education. (2021). *Education in Pakistan.* Global Partnership for Education.
https://www.globalpartnership.org/where-we-work/pakistan

Government of Pakistan. (2018). *Pakistan Education Statistics 2016-17.* Government of Pakistan.
http://library.aepam.edu.pk/Books/Pakistan%20Education%20Statistics%202016-17.pdf

Government of Pakistan. (2020a). *Pakistan National Education Response and Resilience Plan (K-12) for COVID-19.* Government of Pakistan (MoFEPT).
http://mofept.gov.pk/SiteImage/Misc/files/0_%20NERRP%20COVID-19%20MoFEPT%204%20May%202020%20Ver%2001.pdf

Government of Pakistan. (2020b). *Pakistan Social & Living Standards Measurement Survey (PSLM) 2018-19 National /Provincial (Social Report).* Government of Pakistan.

https://www.pbs.gov.pk/sites/default/files//pslm/publications/pslm2018-19/pslm_report_2018-19_national_provincial.pdf

Hanemann, U., & Scarpino, C. (2016). *Harnessing the Potential of ICTs: Literacy and Numeracy Programmes Using Radio, TV, Mobile Phones, Tablets and Computers*. UNESCO Institute for Lifelong Learning. https://eric.ed.gov/?id=ED573633

Haßler, B., Nicolai, S., McBurnie, C., Jordan, K., Wilson, S., & Kreimeia, A. (2020). *EdTech and COVID-19 response*. The EdTech Hub. https://docs.edtechhub.org/lib/IA9PL99D

Higher Education Council. (n.d.). *HJRS | HEC Journal Recognition System*. Retrieved 3 March 2021, from https://hjrs.hec.gov.pk/

Higher Education Council. (2018). *NRPU Approved Projects 2017-18*. https://hec.gov.pk/english/services/universities/nrpu/Pages/NRPU%20Approved%20Projects.aspx

Higher Education Council. (2020). *HEC Recognised National Research Journals of Social Sciences*. Higher Education Council. https://www.hec.gov.pk/english/services/faculty/journals/Documents/Social%20Sciences/Most%20Updated_List%20of%20Social%20Sciences%20Journals%20updated%20%20July%2007,%202020.pdf

Hoodbhoy, P. (2009). Pakistan's Higher Education System—What Went Wrong and How to Fix It. *The Pakistan Development Review*, *48*(4), 581–594. https://doi.org/10/ghzt9f

Hussain, I., Suleman, Q., ud Din, M. N., & Shafique, F. (2017). Effects of Information and Communication Technology (ICT) on Students' Academic Achievement and Retention in Chemistry at Secondary Level. *Journal of Education and Educational Development*, *4*(1), 73–93. https://doi.org/10.22555/joeed.v4i1.1058

IDEAS. (2017). Technology for Teacher Training. *IDEAS | Institute of Development and Economic Alternatives*. https://ideaspak.org/human-development/technology-for-teacher-training/

IDRC. (2009). *IDRC in Pakistan*. IRDC. https://www.idrc.ca/sites/default/files/sp/Documents%20EN/idrc-in-pakistan.pdf

Ikram, K. (2011). *Revitalizing the Planning Commission: Some Recommendations* (Working Papers). eSocialSciences. https://ideas.repec.org/p/ess/wpaper/id3586.html

Impedovo, M. A., & Malik, S. K. (2019). Pakistani Teacher-Educator Professional Learning through an International Blended Course. *Open Praxis*, *11*(2), 157–166. https://doi.org/10.5944/openpraxis.11.2.928

Impedovo, M. A., Malik, S. K., & Kinley, K. (2019). Global South teacher educators in digital landscape: Implications on professional learning. *Research on Education and Media*, *11*(2), 19–28. https://doi.org/10.2478/rem-2019-0018

Jan, S. (2018). Investigating the relationship between students' digital literacy and their attitude towards using ICT. *International Journal of Educational Technology*, *5*(2), 26–34.

Khattak, S. G. (2009). *Research in Difficult Settings: Reflections on Pakistan and Afghanistan*. International Development Research Center (IDRC). http://hdl.handle.net/10625/40067

Lieven, A. (2012). *Pakistan: A Hard Country*. PublicAffairs.

Mactaggart, I. (2013). *The Key Informant Child Disability Project in Bangladesh and Pakistan*. London School of Hygiene and Tropical Medicine. https://www.lshtm.ac.uk/media/23731

Mahbub ul Haq Human Development Centre. (1999). *Human Development in Asia 1999: The Crisis of Governance*. Oxford University Press. https://books.google.co.uk/books/about/Human_Development_in_South_Asia_1999.html?id=n9XsAAAAMAAJ&redir_esc=y

Malala Fund. (2020). *Girls' education and COVID-19 in Pakistan*. Malala Fund. https://malala.org/newsroom/archive/girls-education-and-covid-19-in-pakistan

Malik, R., Raza, F., Rose, P., & Singal, N. (2020). Are children with disabilities in school and learning? Evidence from a household survey in rural Punjab, Pakistan. *Compare: A Journal of Comparative and International Education*, *0*(0), 1–21. https://doi.org/10.1080/03057925.2020.1749993

Martínez, E., & Human Rights Watch. (2018). *'Shall I feed my daughter, or educate her?': Barriers to girls' education in Pakistan*. Human Rights Watch. https://www.hrw.org/report/2018/11/12/shall-i-feed-my-daughter-or-educate-her/barriers-girls-education-pakistan

Ministry of Federal Education & Professional Training. (n.d.). *AEPAM Online Library*. http://library.aepam.edu.pk/

Muborakshoevaa, M. (2015). Impediments to Enhancing Research within Universities in Developing Context: The Case of Pakistani Universities. *Journal of International and Comparative Education*, 4, 1–13. https://doi.org/10.14425/00.76.05

The Constitution of the Islamic Republic of Pakistan, (2012). http://na.gov.pk/uploads/documents/1333523681_951.pdf

National Institute of Population Studies. (2013). *Pakistan Demographic and Health Survey 2012-13*. USAID. https://dhsprogram.com/publications/publication-fr290-dhs-final-reports.cfm

National Institute of Population Studies. (2019). *Pakistan Demographic and Health Survey 2017-18*. USAID, UKAID and UNFPA. https://dhsprogram.com/publications/publication-FR354-DHS-Final-Reports.cfm

Naveed, A. (2013). *Paper 3. Landscaping the Institutions of Educational Policy Research in Pakistan: Who is doing what?* (No. 3). Department for International Development. https://www.gov.uk/research-for-development-outputs/paper-3-landscaping-the-institutions-of-educational-policy-research-in-pakistan-who-is-doing-what

Naveed, A., & Suleri, A. Q. (2015). *Making 'Impact Factor' Impactful: Universities, Think Tanks and Policy Research in Pakistan*. Think Tank Initiative. https://researchportal.bath.ac.uk/en/publications/making-impact-factor-impactful-universities-think-tanks-and-polic

Naveed, S. (2018). The Importance of Educating Girls in the Newly Merged Districts of Khyber Pakhtunkhwa, Pakistan: Policy Paper. In *Center for Universal Education at The Brookings Institution*. Center for Universal Education at The Brookings Institution. https://eric.ed.gov/?id=ED592792

Naviwala, N. (2016). Pakistan's education crisis: The real story. In *Woodrow Wilson International Center for Scholars*. Woodrow Wilson International Center for Scholars. https://eric.ed.gov/?id=ED570671

Naviwala, N. (2017). Pakistan uses regulations to tighten grip on INGOs. *Devex*. https://www.devex.com/news/sponsored/pakistan-uses-regulations-to-tighten-grip-on-ingos-91003

OECD. (2020). *Creditor Reporting System (CRS)*. Organisation for Economic Cooperation and Development (OECD). https://stats.oecd.org/Index.aspx?DataSetCode=crs1

Pakistan Institute of Development Economics. (n.d.). *Is Technology the Panacea and are we using it?* Retrieved 12 February 2021, from https://pide.org.pk/index.php?option=com_content&view=article&id=779

Pasha, H. A. (2018). *Growth and Inequality in Pakistan Volume 1*. Friedrich-Ebert-Stiftung (FES). http://library.fes.de/pdf-files/bueros/pakistan/14113.pdf

Qazilbash, Z., & Javeed, K. (2020). *Digital & Innovative Learning in Pakistan: The domestic K12 products and services industry overview and enterprise directory*.

Rashid, A., & Ahmed, S. (2018). *Language, Teaching and Learning in Punjab Schools: Are we on the right track to destination English'?* http://www.sahe.org.pk/wp-content/uploads/2021/02/Language-Teaching-and-Learning-in-Punjab-Schools.pdf

Rose, P., Singal, N., Bari, F., Malik, R., & Kamran, S. (2018). *Identifying Disability In Household Surveys: Evidence On Education Access And Learning For Children With Disabilities In Pakistan*. REAL Centre, Faculty of Education, University of Cambridge. https://doi.org/10.5281/ZENODO.1247087

Saleem, K., Farid, S., & Atiq, H. (2019). *Technological Hazards in Classroom Instruction: Rebooting the School Education System in Pakistan. Volume 39*(Issue 2). http://pjss.bzu.edu.pk/website/journal/article/5ed12246219ad/page

Shabab, M. H. (1995). *Documentation of educational research in Pakistan, 1947-1995: An annotated bibliography*. Academy of Educational Planning and Management. https://www.worldcat.org/title/documentation-of-educational-research-in-pakistan-1947-1995-an-annotated-bibliography/oclc/37129977

Society for the Advancement of Education (SAHE), & Institute of Development & Economic Alternatives (IDEAS). (2016). *Learning While You Teach Project Report*. http://www.sahe.org.pk/wp-content/uploads/2021/02/Learning-While-You-Teach-LWYT-Report.pdf

StateUniversity.Com. (N/A). *Pakistan*.
https://education.stateuniversity.com/pages/1141/Pakistan-HISTORY-BACKGROUND.html

Suleman, D. (2014). Effects of Classroom Physical Environment on the Academic Achievement Scores of Secondary School Students in Kohat Division, Pakistan. *International Journal of Learning and Development*, *Volume 4*(Number 1). https://doi.org/10.5296/ijld.v4i1.5174

Tabassum, R., Hadi, M., Qaisrani, A., & Shah, Q. (2020). *Education technology in the COVID-19 response in Pakistan*. EdTech Hub.
https://www.researchgate.net/publication/348002515_Education_technology_in_the_COVID-19_response_in_Pakistan

Tofaris, E., Bari, F., & Malik, R. (2019). *Research on Children with Disabilities Influences Education Policy in Pakistan*. REAL Centre, University of Cambridge and The Impact Initiative.
https://doi.org/10.35648/20.500.12413/11781/ii333

Touqeer, I., & Rontoyanni, C. (2019). *Technology is transforming governance in Pakistan*. World Bank Group.
https://blogs.worldbank.org/endpovertyinsouthasia/technology-transforming-governance-pakistan

UKFIET. (2019). *Research on children with disabilities influences education policy in Pakistan*. UKFIET: The Education and Development Forum.
https://www.ukfiet.org/2019/research-on-children-with-disabilities-influences-education-policy-in-pakistan/

UNESCO. (2017). *Supporting teachers with mobile technology: Lessons drawn from UNESCO projects in Mexico, Nigeria, Senegal and Pakistan*. United Nations Educational, Scientific and Cultural Organisation. https://unesdoc.unesco.org/ark:/48223/pf0000251511

UNICEF. (2020). *Education*. https://www.unicef.org/pakistan/education

Unwin, T. (n.d.). *Education for the most marginalised post-COVID-19: Guidance for governments on the use of digital technologies in education*. Retrieved 3 February 2021, from
https://edtechhub.org/education-for-the-most-marginalised-post-covid-19/

Unwin, T., Naseem, A., Pawluczuk, A., Shareef, M., Spiesberger, P., West, P., & Yoo, C. (2020). *Education for the most marginalised post-COVID-19: Guidance for governments on the use of digital technologies in education*. United Nations Educational, Scientific and Cultural Organisation.

https://edtechhub.org/education-for-the-most-marginalised-post-covid-19/

Wood, G. (2013). *Architects and contractors: Political economy analysis of policy research in Pakistan*. University of Bath. https://researchportal.bath.ac.uk/en/publications/architects-and-contractors-political-economy-analysis-of-policy-r

Wood, G. (2014). *Protecting the Space for Policy Research: Comparing Think Tanks and Universities in South Asia*. Think Tank Initiative. http://www.thinktankinitiative.org/content/protecting-space-policy-research-comparing-think tanks-and-universities-south-asia

World Bank. (2017). *Smart Solutions to Improve Pakistan's Education*. World Bank Group. https://www.worldbank.org/en/news/feature/2017/02/13/smart-solutions-to-improve-pakistans-education

World Bank. (2018). *Pakistan@100: Shaping the Future*. World Bank Group. https://www.worldbank.org/en/region/sar/publication/pakistan100-shaping-the-future

World Bank. (2019a). *Pakistan—Learning Poverty Brief*. World Bank Group. https://www.worldbank.org/en/topic/education/brief/learning-poverty

World Bank. (2019b). *Population growth (annual %)—Pakistan*. World Bank Group. https://data.worldbank.org/indicator/SP.POP.GROW?locations=PK

World Bank. (2019c). *Population, total—Pakistan | Data*. World Bank Group. https://data.worldbank.org/indicator/SP.POP.TOTL?locations=PK

World Bank. (2019d). *The Third Punjab Education Sector Project (PESP III)*. World Bank Group. http://documents1.worldbank.org/curated/en/422121565181941577/pdf/Pakistan-Third-Punjab-Education-Sector-Project-Mid-Term-Review-Mission-April-23-to-30-2019.pdf

World Bank. (2019e). *Urban population—Pakistan | Data*. World Bank Group. https://data.worldbank.org/indicator/SP.URB.TOTL?locations=PK

World Bank. (2020). *Pakistan | Data*. World Bank Group. https://data.worldbank.org/country/pakistan

Zualkernan, I. A. (2016). Personalized Learning for the Developing World. In Kinshuk, M. Maina, & B. Gros (Eds.), *The Future of Ubiquitous Learning:*

Learning Designs for Emerging Pedagogies. Springer-Verlag.
https://doi.org/10.1007/978-3-662-47724-3

Appendix 1: Provincial inequalities in educational technology access by school and household, 2019

Table 3. *School and household access to educational technology in 2019. Source: ↑ASER (2019)*

Household access	Possession of mobile phone	National: 66.2% Azad Jammu and Kashmir: 86.4% Balochistan: 59.2% Gilgit-Baltistan: 70.8% Islamabad: 79.5% Khyber Pakhtunkhwa: 69.5% Punjab: 71.1% Sindh: 50.5%
	Mobile phone users using Whatsapp	National: 89.8% Azad Jammu and Kashmir: Not available Balochistan: 96.4% Gilgit-Baltistan: Not available Islamabad: 94.6% Khyber Pakhtunkhwa: 84.1% Punjab: 88.4% Sindh: 78,4%
	Mobile phone users using SMS	National: 59.0% Azad Jammu and Kashmir: 66.6% Balochistan: 67.2% Gilgit-Baltistan: 62.4% Islamabad:87.4% Khyber Pakhtunkhwa: 52.7% Punjab: 57.5% Sindh: 54.6%
	Solar panels	National: 34.3% Azad Jammu and Kashmir: 13.1% Balochistan: 34.1% Gilgit-Baltistan: 27.3% Islamabad:6.8% Khyber Pakhtunkhwa: 41.3% Punjab: 20.7% Sindh: 45.1%
	Computer / Laptop	National: 14.1% Azad Jammu and Kashmir: 20.8% Balochistan: 9.4% Gilgit-Baltistan: 22.0%

		Islamabad: 25.5% Khyber Pakhtunkhwa: 14.9% Punjab: 17.2% Sindh: 8.9%
Government Schools	Solar panels	National: 17.9% Azad Jammu and Kashmir: 7.9% Balochistan: 9.3% Gilgit-Baltistan: 16.1% Islamabad: Not available Khyber Pakhtunkhwa: 35.9% Punjab: 23.1% Sindh: 26.6%
	Computer labs	National: 43.6% Azad Jammu and Kashmir: 50.7% Balochistan: 12.0% Gilgit-Baltistan: 23.5% Islamabad: Not available Khyber Pakhtunkhwa: 30.4% Punjab: 67.1% Sindh: 9.7%
	Smartboards	National: 25.0% Azad Jammu and Kashmir: 17.6% Balochistan: 21.7% Gilgit-Baltistan: 12.3% Islamabad: Not available Khyber Pakhtunkhwa: 26.1% Punjab: 32.5% Sindh: 32.3%
Private Schools	Solar panels	National: 24.6% Azad Jammu and Kashmir: 10.7% Balochistan: 22.2% Gilgit-Baltistan: 15.8% Islamabad: Not available Khyber Pakhtunkhwa: 34.1% Punjab: 24.4% Sindh: 49.5%
	Computer labs	National: 38.3% Azad Jammu and Kashmir: 43.1% Balochistan: 0.0% Gilgit-Baltistan: 40.9% Islamabad: Not available Khyber Pakhtunkhwa: 36.7% Punjab: 35.8% Sindh: 44.4%
	Smartboards	National: 31.0% Azad Jammu and Kashmir: 20.8% Balochistan: 0.0%

		Gilgit-Baltistan: 26.7% Islamabad: Not available Khyber Pakhtunkhwa: 37.9% Punjab: 35.5% Sindh: 25.0%

Appendix 2: Terms used in literature search

Table 4. *Search terms used to conduct a Boolean search*

Topic	Search Term
Pakistan	Pakistan AND
Education	Education OR Learning OR Teaching OR Classroom OR Learner OR Student AND
EdTech / Technology	EdTech OR Technology OR Digital OR Remote OR Internet OR "Social Media" OR "Distance learning" OR Online OR Mobile OR Phone OR Virtual OR Laptop OR Tablet OR Computer OR Device OR Software OR MOOC OR MOOCs OR ICT OR Video OR Blended Learning OR e-learning OR learner management system OR Web OR OER OR Open Educational Resources OR handheld device OR eBooks OR game-based learning OR Supportive Technology OR Assisted Technology OR Instructional Technology

Appendix 3: Research landscape

Key stakeholders within the research landscape on EdTech

I. The leading academics and independent researchers with EdTech research interests / Experiences:

Punjab — Lahore:

Yasira Waqar

- Assistant Professor at the School of Education at LUMS

- Interested in the use of technology to augment student learning, and in applying cognitive psychology to inculcate thinking skills in students

Irfan Muzaffar

- Associate fellow, IDEAS and former Technical Lead, KESP, KP

- Research interests in teacher education, mathematics education in multilingual contexts, and politics of education reforms

Sindh — Karachi:

Azra Naseem

- Associate Director, Blended and Digital Learning Network, AKU-IED

- Research interests in Appropriate and enabling e-Learning design, ICT literacy and collaborative e-Learning

Islamabad:

Khurasan Ali Shah

- Technical Advisor for ICT in Education at International Rescue Committee Pakistan

Consultants / Managers / Others :

Nadya Karim Shaw

- Former Country Head of the Pakistan Reading Project, World Learning (WL)

- Academic training with specialization in ICT in education

Imdad Baloch

- Has led project with the World Learning in the past and worked as consultant for various education-related projects

Helen Kamal

- Senior Education Advisor, Cambridge Education / Ilm Ideas 2 Programme

Javed Ahmad Malik

- Former Education Advisor, UKAID for the Innovation Fund, Political Advocacy in Education and FATA Education Programme

- Former Education Adviser, Punjab Education Sector Reform

Umar Saif

- Former Chairman PITB and ex-Vice Chancellor ITU Lahore

- Leading role in various initiatives on technology integration in education sector including LND, the eLearn Project among others

Ayesha Razzaque

- Former Monitoring and Evaluation Specialist, Ilm Ideas 2 Programme

Naveed Saleh Siddiqui

- Team Lead, PESP 3 at Cambridge Education

Zulfiqar Qazilbash

- Principal Consultant, Islamabad Consulting and ILM Association

- Authored a report on Pakistan's Digital and Innovation Learning Industry (⬆Qazilbash & Javeed, 2020)

- Serves as technical advisor to the Federal government on blended learning pilot in Islamabad

- Compiled a study on private schools' willingness to pay for EdTech products and services (⬆AOE Research & Qazilbash, 2019).

Waqas Halim

- Director, Centre for Technology in Education at ITU

- Former Project Lead, the eLearn Initiative funded by Ilm Ideas 2

■

Research on Education in general:

Punjab — Lahore:

Faisal Bari

- Interim Dean, School of Education (SOE) at Lahore University of Management Science (LUMS)

- Interested in development economics and education economics

Tayyaba Tamim

- Associate Professor at School of Education LUMS

- Interested in equity in education, gender, second language education, language policy and teacher education

Gulab Khan

- Assistant Professor at School of Education LUMS

- Interested in equity of educational access, quality, technology, and student achievement, teacher evaluation and educational governance

Rabea Malik

- Assistant Professor, LUMS School of Education

- Research Fellow at the Institute of Development and Economic Alternatives (IDEAS)

- Country co-PI in Pakistan for Teaching Effectively All Children (TEACh)

- Country team for Research on Improving Systems of Education (RISE)

Soufia Anis Siddiqi

- Assistant Professor, LUMS School of Education

- Interested in political economy and service delivery of education

Ali Cheema

- Associate Professor, Department of Economics, LUMS

- Co-founder of CERP and Senior Research Fellow at IDEAS

- Interested in political economy and service delivery, impact evaluation of education

Maryam Chugtai

- Assistant Professor, LUMS School of Education

- Research focuses on education policy, leadership and politics of education

Abbas Rashid

- Chairman of Society for the Advancement of Education (SAHE); convener for the steering committee of the Campaign for Quality Education (CQE); and member of the steering committee for the Pakistan Association for Research in Education (PARE)

- Lead researcher for the "Education in Pakistan: What Works & Why" research initiative

Monazza Aslam

- Associate Fellow, IDEAS; Research Associate at the Centre for the Study of African Economies (CSAE) at Oxford University; and a Senior Research Fellow at Idara-Taleem-o-Agahi (ITA)

- Research interests in educational economics and student learning issues

Javeria Qureshi

- Assistant Professor of Economics, University of Illinois at Chicago and member of IDEAS

- Interested in research on economics of education and relationship between school quality and student achievement

Baela Raza Jamil

- CEO of Idara-e-Taleem-o-Aagahi (ITA), former Technical Adviser to the Federal Ministry of Education Pakistan

- Interested in research on right to education; sector-wide approaches from ECD to post-secondary education; inclusion, public-private partnerships; innovations and financing

- Leads the citizens' accountability learning initiative, the Annual Status of Education Report (ASER) Pakistan

Islamabad

Nabi Bux Jumani

- Professor of Education/ Director, Distance Education, International Islamic University, Islamabad

- Interested in Teacher Education, Curriculum Development, and Distance Education

- Worked in the Curriculum Wing of Federal Ministry of Education Pakistan

Momina Afridi

- Research Consultant on education for the World Bank

Arshad Saeed Khan

- Associated with CIDA as 'Monitoring and Evaluation Specialist' and worked with Federal Ministry of Education and UNESCO

- Coordinated the implementation of projects like Education For All (EFA), including Early Childhood Care and Education (ECE) and Universal Primary Education (UPE)

- Interested in educational planning, project implementation, monitoring, curriculum and material development, training of teachers

Nasir Mahmood

- Professor, Allama Iqbal Open University

- Interested in Science Education, Educational Assessment, Educational Research

Abdul Hameed Nayyar

- Former Professor and directed research programs at SDPI and served as the Director of the Ali Institute of Education

- Interested in curriculum issues, science education

Shahid Siddiqui

- Has taught at Aga Khan University, Lahore University of Management Sciences

- Areas of interest include language issues, educational change, and critical pedagogy

Nadia Naviwala

- Researcher on access to education and quality issues

Sindh - Karachi

Dilshad Ashraf

- Associate Professor, Aga Khan University Institute for Educational Development (AKU-IED)

- Interested in equity issues in education, gender, curriculum, learning processes, school improvement and educational governance

Razia Fakir Mohammad

- Assistant Professor, Aga Khan University, Institute for Educational Development

- Interested in Teaching and learning and assessment and evaluation

Azra Naseem

- Associate Director, Blended and Digital Learning Network, AKU

- Research interests in Appropriate and enabling e-Learning design, ICT literacy and collaborative e-Learning

Muhammad Memon

- Former Director of the Institute of Educational Department, Aga Khan University, Karachi

- Interested in education policy and curriculum

Shahzad Mithani

- Assistant Professor at Institute for Education Development, Aga Khan University and introduced a school monitoring system while establishing a process of Schools Self Evaluation and School Readiness Toolkit

- Teacher education, education management and monitoring and evaluation

- Working with USAID evaluation study of the Pakistan Reading Project with Chicago University

Khyber Pakhtunkhwa — Peshawar

Fawad Shams

- Worked as Technical Lead with Adam Smith and KPK Government as well as Chemonics International on education

- Worked to support Punjab Government's teacher development and management reforms under DFID funded PESP

Researchers/Practitioners based abroad

Michael Barber

- Chairman of Delivery Associates and former Advisor to Punjab Government

- Interested in school improvement, standards and performance; system-wide reform; effective implementation and access issues in education

Natalie Bau

- Collaborating team partner on the RISE Project Pakistan

- Assistant Professor at University of California

- Researches the economics of education and its relation with industry

Pauline Rose

- Professor of international development at Cambridge University

- Principal Investigator, Teaching Effectively All Children (TEACh) project

Nidhi Singal

- Professor of disability and inclusive education at Cambridge University

- Researcher on the Teaching Effectively All Children (TEACh) project

Anna Vignoles

- Professor of Education, Faculty of Education, Cambridge University

- Researcher on the Teaching Effectively All Children (TEACh) project with the IDEAS team

Adnan Khan

- Academic Director at London School of Economics

Mir Afzal Tajik

- Associate Professor, Nazarbayev University, Kyrgyzstan

- Research interests in teachers and learning, school improvement and effectiveness

Tahir Andrabi

- Professor of economics at Pomona College, USA

- Founding board member of Centre for Economic Research in Pakistan and former Dean of School of Education, LUMS and founding director of the Active Learning Initiatives Facility, which brought educational television to Pakistan

- Author of the Learning and Educational Achievement in Punjab Schools (LEAPS) report, an extensive study of the schooling environment in Punjab

Dr Sabrin Beg

- Assistant Professor, University of Delaware

- Published an RCT study on the impact of teacher tablets on student achievement level

- Interested in Randomized controlled trials on education, use of tablets in schools and learning outcomes

Jishnu Das

- Professor of economics at Georgetown University, USA

- Senior Economist in the Development Research, World Bank

- Interested in service delivery issues in education and associated with CERP

Reehana Rifat Raza

- Senior Human Development Economist in the Education Global Practice of the World Bank

- Research interests in the economics of education

Adeela Arshad-Ayaz

- Associate Professor at the Department of Education at Concordia University in Montreal

- Research interests lie in political economy and social justice in relation to advancement in interactive technologies

Najeeb Shafiq

- Associate Professor of Education, Economics & International Affairs, University of Pittsburgh

- Interested in the political economy of education

Ameena Ghaffar-Kucher

- Senior Lecturer; Assistant Director, IEDP (International Educational Development Program), University of Pennsylvania School of Education

- Interested in Issues of educational access, equity, and quality

Bilal Ahsan Malik

- Assistant. Dean of Harvard College; Lecturer in Anthropology at Harvard University

- Researches on anthropology of Islamic seminary education in Pakistan

Adrienne Lucas

- Associate Professor of Economics, University of Delaware

- Research interests in education access, quality and use of education technologies

Consultants and Bureaucrats

Kamran Iftikhar Lone

- Former Deputy Team Lead, Khyber Pakhtunkhwa Education Sector Reform Programme

Allah Buksh Malik

- Recipient, of the UNESCO Confucius Award and has represented Pakistan and Asia Pacific nations on the Board of Global Partnership for Education for three years

- Has served as ex-Secretary Education, Punjab

Zehra Zaidi

- Director, Education, DAI Europe

- Team Leader for an Education Challenge Fund that invested in a portfolio of over 60 organisations working on education innovation and governance in Pakistan

II.   The leading in-country academic institutions, research centres and independent organisations working on education and EdTech research

Islamabad

Public Sector:

1. Academy of Educational Planning and Management (AEPAM)

   - Manages the National Educational Management Information System

   - Works on educational planning and management, educational evaluation and leadership

   - Funding and international collaborations with UNESCO, CIDA, UNICEF, World Bank, GIZ, JICA (↑Naveed, 2013)

   - Several publications on access, quality and capacity issues in the education sector

2. Pakistan Institute of Development Economics (PIDE)

   - Publishes Pakistan Development Review (PDR) which has various useful education-focused papers based on quantitative analysis

   - Thematic focus: education economics, governance and policy issues, economic growth and social policy linkages with education

3. Pakistan Bureau of Statistics (PBS)

   - Publishes the Pakistan Social and Living Standards Measurement (↑Government of Pakistan, 2020) every alternate year

   - Provides information on key indicators on usage of ICT along with other development indicators.

Private / Non-Profit / NGO Sector

2. APEX Consulting

   - Consulting and Monitoring and Evaluation work

- Focuses on monitoring and evaluation of results among other areas like health and growth

- Funding from UNICEF, UNDP, USAID, JICA, World Bank and Federal Government (↑Naveed, 2013)

3.   Management System International (MSI)

- A consulting firm

- Thematic focus: Monitoring & Evaluation of USAID projects

4.   Oxford Policy Management (OPM)

- An international development consulting

- Thematic focus: national surveys, monitoring and evaluation, risk assessment

- Partnered with IDEAS on PESP-II Evaluation and the Agha Khan Foundation in the past

6.   Pakistan Coalition for Education (PCE)

- A civil society advocacy organisation

- Focus area: Policy advocacy on education and the 18th Amendment

7.   Sustainable Development Policy Institute (SDPI)

- Publishes both qualitative and quantitative research

- Research funded by DFID, IDRC, CIDA (↑Naveed, 2013)

- Focus areas: Economic Development and Information and Communications and Monitoring and Evaluation

8.   Tabadlab

- A think tank involved in advisory and advocacy of education-related work with the Federal government

- Focus area: advocacy through strategic communications, and research

9.   ILM Association

- Association of EdTech start-ups and other related organisations

- Interested in representation of the EdTech industry in Pakistan

- ■ ILM association compiled a study on use of technology in 7,000 low-cost private schools (research funded by the Ilm ideas 2) (↑AOE Research & Qazilbash, 2019).

10. Islamabad Consulting

- ■ First consulting firm focused on EdTech interventions at a national scale

- ■ Works on strategy, training and implementation of projects

- ■ Published a report on Pakistan's Digital and Innovation Learning Industry (↑Qazilbash & Javeed, 2020)

Khyber Pakhtunkhwa

1. Institute of Education and Research-University of Peshawar

- ■ Publishes the Journal of Education and Research

Punjab: Public Sector

1. University of Education-Department of Education, Lahore

- ■ Dedicated university on education and teaching in Lahore with vast presence across Punjab

- ■ Publishes Journal of Research and Reflections in Education (JRRE)

2. Institute of Education and Research, Punjab University, Lahore

- ■ Research on Teacher Education in Content, Pedagogy and Research in the Field of Education

- ■ Publish a journal - Bulletin of Education & Research

3. Centre for Technology in Education, Information Technology University, Lahore

- ■ Works on research and implementation projects of EdTech

- ■ Collaborated with PITB to execute the eLearn Initiative

- ■ Other projects include collaboration with EdX in the USA to incorporate Massive Open Online Courses (MOOCs) in degree courses at ITU

Punjab: Private / Non-Profit / NGO Sector

1. Ali Institute of Education Lahore (AIE)

- ■ Focus area: Teachers training and English as a second language

- Funding sources include Babar Ali Foundation, UNICEF and UNDP (↑Naveed, 2013)

2. Centre for Economic Research in Pakistan (CERP)

- Research areas on education financing and private school education

- Funds received from DFID, World Bank, Poverty Action Lab MIT, USAID, and UKAID(↑Naveed, 2013)

- Strong global linkages and collaborations with international researchers

3. Centre for Research in Economics and Business-Lahore School of Economics (CREB-LSE)

- Publishes an economics focused journal - Lahore Journal of Economics and frequently features studies from renowned economists on education as well

4. Idara e Taleem-o-Aagahi (ITA)

- Major programmatic work on formal and informal education; not much research focused activities

- Thematic focus: Monitoring of data, achievement and learning outcome of students

- Publishes annual report on assessment, ASER

- Funding sources include CIDA, DFID, UNESCO, UNICEF, USAID and the World Bank (↑Naveed, 2013)

5. Institute of Development and Economic Alternatives (IDEAS)

- Mostly works on evidence-based research to inform policy and partners with government bodies

- Major reports include 'Investigation into Teacher recruitment and retention in Punjab' (IDEAS, 2015) analyzing public-private partnerships in education; ongoing evaluation of PESP-II and the Teaching Effectively All Children (TEACh) initiative

- Thematic focus: governance, financing, access, and quality of education research

- Funded by the Open Society Foundation, DFID/UKAID

6. Learning and Educational Achievement in Punjab Schools (LEAPS) Project

- Started in 2003 based on surveys and testing project and have published report on findings (↑Andrabi, et al., 2008)

- Led by Asim Ijaz Khwaja (EPoD co-director and CERP); Tahir Andrabi, Pomona College; and Jishnu Das (World Bank)

- Gathered information on every aspect of the educational marketplace

7. Mahbub-ul-Haq Human Development Centre (MMHHDC)

- Works on research in the area of human development including education and promoting human development paradigm

- Publishes Annual Human Development Reports on key development indicators and one special issue on education (↑Mahbub ul Haq Human Development Centre, 1999)

12. Society for the Advancement of Education (SAHE)

- Works on right to education, quality of education and social justice in the education system

- Funded by OSI, OXFAM, DFID Norway, Heinrich Boll Foundation (↑Naveed, 2013)

- Publications on 'Learning while you Teach' project (↑Society for the Advancement of Education (SAHE) Institute of Development & Economic Alternatives (IDEAS), 2016) and report on 'Language Teaching and learning in Punjab Schools' (↑Rashid & Ahmed, 2018) among others.

15. School of Education, LUMS

- Engages in teaching, policy and research of education

- Faculty with diverse areas of research interests and educated from world best universities

- Partnerships across Pakistan with different schools and educational institutes

- Involved in capacity building of entrepreneurs with the KPK Government and the Assistant Education Officers (AEOs) in Punjab

16. Centre for Development Policy and Research (CDPR)

- Non-profit association of CDPR, IDEAS through the IGC Pakistan

- Involves in policy work and dissemination of policy knowledge and does work on education too

17. The British Council, Pakistan

- Publication on University Research System in Pakistan (British Council, 2018)

- Monitoring Unit of Balochistan Education Department

- Provides database of schools in all districts

- Development partners in the project include UNDP, World Bank and European Union

Sindh: Public sector

1. Applied Economics Research Centre (AERC)

   - Research centre based at the University of Karachi

   - Mostly economics focused research centre and produces studies on education

   - Funding comes from the Federal and Sindh Government, HEC, World Bank, ADB and UNDP (↑Naveed, 2013)

Sind: Private / Non-Profit / NGO Sector

1. Aga Khan University- Institute for Educational Development (AKU-IED)

   - Thematic focus: Institutional capacity, education policy, teacher education

   - Publications related to Edtech include: 'Investigating the relationship between students' digital literacy and their attitude towards using ICT' (↑Jan 2018); many others on education in general on subjects like teachers education and education reforms

   - Funding sources include International Development Research Centre (IDRC), World Bank, UNESCO, Norwegian Agency for Development Corporation (NORAD) Norway, UNDP, British Council, USAID, Aga Khan Foundation, DFID, Commonwealth UK, Open Society Institute, Higher Education Commission and British Council (↑Naveed, 2013)

Government Implementing Departments and Authorities

Islamabad:

1. Non-Formal Education Management Information System (NFEMIS)

- Collects and provides information of learners, teachers, centres, learning achievement, daily attendance, tracking of the learners, Out of School Children

- Funded by Japan International Cooperation Authority

- Works in Sindh, Balochistan, Sindh and former Federally Administered Tribal Agencies

Sindh:

1. Sindh Education Foundation-Government of Sindh

- Semi-autonomous organisation working under the Government of Sindh to support education in the province

- Partners with SABAQ and other innovative technology-based ventures to roll out their programmes in schools

2. Directorate General of Monitoring and Evaluation, Jamshoro

- Works as an attached body with the Sindh Education and Literacy Department

- Maintains basic profiling of schools by gathering information about key HR indicators and monitors attendance and evaluate overall school conditions

3. Sindh Management Information System (SEMIS)

- SEMIS functions under the Reform Support Unit, Sindh

- Gather and demonstrates data in dashboards on key education indicators and other statistics

Balochistan:

Education Management Information System, Balochistan (EMIS)

- BEMIS functions under the Policy and Planning Implementation Unit (PPIU)

- Provides database of schools in all districts for policymakers and education managers

- Development partners in the project include UNDP, World Bank and European Union

Khyber Pakhtunkhwa:

1. Khyber Pakhtunkhwa Education Monitoring Authority (KPEMA)

    - Monitoring Unit of the Government of Khyber Pakhtunkhwa Education Department

    - Collects and shares monitoring and performance data on key education indicators

2. Khyber Pakhtunkhwa Education Sector Programme (KESP)

    - Support to the Government of Khyber Pakhtunkhwa (GoKP) to deliver improved quality education

    - Funding came from the DFID and the Australian Government

    - Total amount of funding: £283 million

Gilgit-Baltistan:

Gilgit-Baltistan Educational Management Information System (GBEMIS)

    - Functions as a data collection unit of the Government of Gilgit Baltistan Education Department and coordinates with districts managers to generate MIS reports

Punjab:

1. Punjab Education Assessment System (PEAS)

    - Supports the Education Department to assess students' learning outcomes

    - Produces assessment reports on factors that impact student learning in Punjab

2. Punjab Examination Commission(PEC)

    - Works on assessment of students' learning achievement by developing tests for Grade 5 and grade 8

    - Publishes annual assessment reports with a district-level disaggregation documenting the quality of education.

    - Provides suggestions that serve teachers, policymakers, educators and researchers for improving students' learning

3. Punjab Education Sector Reform Programme (PESRP)

- School Education Department led project focused on improving the education system at primary, middle and matriculate levels in Punjab schools

- Funded by the World Bank and DFID

4. Punjab Information Technology Board (PITB)

- Works as the technology arm of the Punjab Government

- Major initiatives in education include Measuring Student Learning Outcomes, Real-time Monitoring of Public Schools Across Punjab, School Information System for Public Schools, Online College Admission System Automation of Large-Scale Examination Systems, eLearn.Punjab and Private Education Provider Registration And Information System

5. Programme Monitoring & Implementation Unit (PMIU)

- Open-source real-time database on key education monitoring indicators across Punjab

6. Quaid-e-Azam Academy for Educational Development (QAED)

- Formerly known as Directorate of Staff Development Punjab

- Government of Punjab body working on teacher training in the province

- Collaborated with SAHE, IDEAS and Sub-National Governance Project on 'Learning while you Teach' project (↑Society for the Advancement of Education (SAHE) Institute of Development & Economic Alternatives (IDEAS), 2016)

7. Punjab Education Foundation (PEF)

- Works on the promotion of quality education through Public-Private-Partnership

- Gathers data on private schools in Punjab

Foreign Centres: United States of America

Harvard Evidence for Policy Design, Harvard University

- Engages with practitioners and policymakers on policy design and evaluation

- Works closely with CERP particularly on the LEAPS project

III. **The leading funders of research in the country:**
   1. Asian Development Bank (ADB)

■ Publication on Pakistan School Education: A Sector Assessment report (⬆Asian Development Bank, 2019)

2. Australian Department for Foreign Affairs and Trade (DFAT)

3. Canadian International Development

4. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH Pakistan

5. Research on Improving Systems of Education (RISE)

6. European Delegation to Pakistan

7. Foreign, Commonwealth and Development Office (FCDO)

■ Funds allocated: £420 million for the Punjab Education Support Programme (PESP) II with contributions from the World Bank, and the £283 million for the Khyber Pakhtunkhwa Education Sector Programme (KESP) with contribution from the Australian Government; £11 million for Ilm Ideas 1; and £25 million for Ilm Ideas 2

8. International Development Research Centre (IDRC)

■ International research programme focused on overcoming learning crisis in education systems

9. Japanese International Cooperation Agency (JICA)

10. Organisation of Islamic Countries (OIC)

11. The Abdul Latif Jameel Poverty Action Lab, MIT (JPAL)

12. The Gates Foundation

13. The World Bank

14. United Nations Children's Fund (UNICEF)

15. United Nations Educational, Scientific and Cultural Organization (UNESCO)

16. USAID

Other Organisations, bodies, funds, and programmes

1. Adam Smith International

2. Cambridge Education Foundation

3. VTT Global

4. DAI, Pakistan

5. The Malala Fund

6. Chemonics International Pakistan

7. RTI International Pakistan

8. International Growth Centre (IGC) Pakistan

9. Pakistan Education Innovation Fund (ILM Ideas 2)

10. The Delivery Associates

11. Coffey International

Table 5 *List of all academic journals in leading universities / research centres focused on education research.*

	Journal Title	**Publishing Institute**	**Website**	**HEC Journal Recognition System Status**
1	Journal of Research and Reflections in Education	University of Education, College Road, Township, Lahore	http://jrre.ue.edu.pk/index.php/JRRE	Y Category
2	Bulletin of Education & Research	University of the Punjab, Lahore	http://pu.edu.pk/home/journal/32	Not ranked now (Previously ranked as Y Category as of June 2020)(⬆Higher Education Council, 2020).

3	Journal of Elementary Education	University of the Punjab, Lahore	http://pu.edu.pk/home/journal/36	Not ranked now (Previously ranked as Y Category as of June 2020) (↑Higher Education Council, 2020).
4	Journal of Educational Research	Islamia University of Bahawalpur	http://jer.iub.edu.pk/	Not ranked now (Previously ranked as Y Category as of June 2020)(↑Higher Education Council, 2020).
5	Journal of Distance Education & Research	Virtual University of Pakistan	https://journal.vu.edu.pk/	Not Recognised
6	Pakistan Journal of Special Education	University of Karachi	https://www.uok.edu.pk/faculties/specialeducation/pjsp.php	Not ranked now (Previously ranked as Z Category as of June 2020) (↑Higher Education Council, 2020).
7	Journal of Educational Sciences and Research	Dept of Education University of Sargodha	https://jesar.uos.edu.pk/admin/ojs/index.php/JESAR	Y Category
8	Journal of Education & Social Sciences	Iqra University Karachi	https://geistscience.com/journals/jess	Y Category
9	Journal of Education and	Institute of Business	https://journals.iobmresearch.co	Y Category

	Educational Development	Management Karachi	m/index.php/JoEED	
10	International Journal of Distance Education & E-Learning	International Islamic University, Islamabad	http://irigs.iiu.edu.pk:64447/ojs/index.php/IJDEEL/?page_id=22883	Not ranked now (Previously ranked as Y Category as of June 2020)(⬆Higher Education Council, 2020).
11	Journal of Inclusive Education	Allama Iqbal Open University Islamabad	http://journal.aiou.edu.pk/journal1/index.php/JIE	Y Category
12	Sir Syed journal of Education and Social Research	Sir Syed College of Education Mardan	https://sjesr.org.pk/	Not ranked now (Previously ranked as Y Category as of June 2020)(⬆Higher Education Council, 2020).
13	Journal of Contemporary Teacher Education	Allama Iqbal Open University Islamabad	http://jcte.aiou.edu.pk/index.php/	Not Recognised
14	Pakistan Journal of Education	Allama Iqbal Open University Islamabad	http://pje.aiou.edu.pk/	Y Category
15	Journal of Early Childhood Care & Education (JECCE)	Allama Iqbal Open University Islamabad	http://jecce.aiou.edu.pk/	Not ranked now (Previously ranked as Y Category as of June 2020)(⬆Higher Education Council, 2020).

16	Pakistan Journal of Literacy (PJL)	Allama Iqbal Open University Islamabad	http://pjl.aiou.edu.pk/	Not Recognised
17	Journal of Educational Leadership and Management (JELM)	Allama Iqbal Open University Islamabad	http://jelm.aiou.edu.pk/	Not Recognised
18	UMT Education Review	University of Management and Technology Education Review	https://ssh.umt.edu.pk/uer/home.aspx	Not Recognised
19	The Sindh University Journal of Education	University of Sindh, Karachi	https://sujo.usindh.edu.pk/index.php/SUJE	Not Recognised
20	International Journal of Innovation in Teaching and Learning (IJITL)	International Islamic University Islamabad	http://irigs.iiu.edu.pk:64447/ojs/index.php/IJITL/index	Not Recognised
21	Journal of Education And Humanities Research	University of Balochistan, Quetta	http://jehr.uob.edu.pk/	Not Recognised
22	Pakistan Journal of Educational Research (PJER)	Society for Social Sciences and Research Association	http://pjer.org/index.php/pjer	Not Recognised
23	Pakistan Journal of Distance	Allama Iqbal Open University, Islamabad	http://journal.aiou.edu.pk/journal1/index.php/PJDOL	Y Category

	Education and Learning			
24	International Journal of Innovation in Teaching and Learning	Islamia University of Bahawalpur	http://irigs.iiu.edu.pk:64447/ojs/index.php/IJITL/index	Y Category
25	International Journal of Education and Practice	Pak Publishing Group	http://www.conscientiabeam.com/journal/61	X Category

Appendix 4: Donor funding on education research

The majority of funding for educational research comes from the FCDO. Table 6 shows some of the trends in disbursements over time.

Table 6. *Aid disbursements for education research, current prices. Source:↑OECD (2020)*

	2011	2012	2013	2014	2015	2016	2017	2018
Total aid to educational research (US millions)	0.03	0.6	1.4	2.2	2.4	1.1	5.8	7.5
U.K. aid to educational research (US millions)	-	0.4	1.2	2.0	2.2	0.9	5.8	7.5
Share of total education aid (%)	0.01%	0.1%	0.3%	0.3%	0.4%	0.2%	1.5%	2.0%
Share of UK education aid (%)	0.0%	0.6%	0.6%	1.1%	1.3%	0.6%	3.5%	4.9%

Table 7. *Where aid for education research is channelled, current prices. Source: ↑OECD (2020).*

	2011	2012	2013	2014	2015	2016	2017	2018
Public sector	-	-	-	-	0.03	0.01	2.6	2.5
NGOs & civil society	-	0.3	0.6	0.4	0.3	0.1	0.1	0.0
Multilateral organisations	-	-	-	0.5	-	-	0.3	0.1
Teaching institutions, research institutes or think tanks	0.02	0.1	0.4	0.3	0.1	0.1	0.0	0.1
Private sector institutions	-	-	-	-	-	-	2.9	4.8
Other	0.0	0.1	0.4	0.9	2.0	0.9	-	-

Appendix 5: High potential evidence gaps

Table 8. *High potential evidence gaps by EdTech Hub theme*

Learners	Teachers	Systems
HPEG L1: Use of technology to help improved access to education and increased learning	**HPEG T1:** Technology, modalities and blended approaches to teacher development	**HPEG S1:** Data for Education (EMIS, big data)
HPEG L2: Use of technology to support personalised learning	**HPEG T2:** Teacher agency and needs - accounting for contextual variation in tech-supported TPD	**HPEG S2:** Mutual accountability (downward - schools - parents)
HPEG L3: Use of positive messaging to increase participation in school	**HPEG T3:** Using technology in teaching that adapts to marginalised learners' needs	**HPEG S3:** Child protection-safeguarding and privacy
HPEG L4: Use of technology for learning in appropriate languages	**HPEG T4:** Using technology to develop and support facilitators and coaches	**HPEG S4:** Learning futures (21st-century skills-school-work transition
HPEG L5: Use of technology to improve the assessment of student learning	**HPEG T5:** Using technology to support non-formal educators	**HPEG S5:** Policy and planning (political economy analysis-diagnostics-multi-stakeholder partnerships-transparency and accountability)
HPEG L6: Use of technology to help children with SEND to have improved access to education and increased learning	**HPEG T6:** Supporting teachers' technology adoption	**HPEG S6:** Teacher management and progression
HPEG L7: Use of technology to help improve access to education and increased learning for refugee and forcibly displaced children		

Appendix 6: List of participants interviewed

Table 9. *Participants interviewed and their accompanying institution*

Participant name	Institution	Date interviewed
Umbreen Arif	Ministry of Federal Education and Professional Training (MoFEPT)	20 November 2020
Zulfiqar Qazilbash		
Umar Nadeem	Tabadblad	26 November 2020
Rabia Tabassum	Sustainable Development Policy Institute (SDPI)	30 November 2020
Amna Zaidi		
Yasira Waqar	Lahore University of Management Sciences (LUMS)	1 December 2020
James O'Donoghue	FCDO, Pakistan	4 December 2020
Mehjabeen Zameer		
Hassan Bin Rizwan	Sabaq	11 December 2020