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# Technopreneurship Education: The Way to Rebuild COVID-19 Affected Economy

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## Abstract

Technopreneurship is a new mode of entrepreneurship that can help us rebuild the devastated economy. With COVID-19 posing rising unemployment and growth related challenges, technopreneurship can prove to be rewarding by decreasing the burden of government, improving socioeconomic conditions, and creating employment opportunities. Technopreneurship has gained significant traction in Pakistan and successive governments have made considerable efforts to promote this concept. In this regard, universities have been directed to include courses of entrepreneurship and IT in their graduation programs, since universities play a major role in transforming the youth into competent professionals. However, actual technopreneurial activities are still limited. Since the efforts to support technopreneurship are ongoing, the current study tends to evaluate the extent to which educational institutes contribute to these efforts. For this reason, 15 semi-structured interviews were conducted with technopreneurs to take their viewpoint regarding the courses of entrepreneurship and IT taught to them and the role of these courses in their success. Thematic analysis was performed on the collected data. The findings identified that although the courses offered by universities are a motivator for students to adopt technopreneurship as a field, still there exist some significant gaps in teaching methodology and course design. There is a need for additional and latest courses, field-experienced faculty, and the overhauling of the curriculum to create more successful technopreneurs. Suggestions were also provided at the end of the study regarding how educational institutes can strategize to create more technopreneurs in the future. The current study was limited to the vicinity of Lahore, as time and resources were not sufficient to cover other cities. It used a mixture of purposive and snowball sampling techniques which may have impacted the findings, since the individuals in the population did not have an equal chance of being selected for the sample.

**Keywords:** entrepreneurship, entrepreneurial education, information, information technology (IT), technopreneurship

## List of Abbreviations

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COVID-19 - Coronavirus disease of 2019

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## List of Abbreviations

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OECD - Organization for Economic Cooperation and Development

GEM - Global Entrepreneurship Monitor

GUESSS - Global University Entrepreneurial Spirit Students' Survey

TEA - Total Entrepreneurial Activity

IT - Information Technology

HEC - Higher Education Commission

UK - United Kingdom

US - United States

ICT - Information and Communications Technology

SME - Small and Medium Enterprises

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## Introduction

The COVID-19 pandemic has adversely affected the socioeconomic situation all over the globe. Developing countries were already facing critical issues such as unbalanced development, poverty, and unemployment prior to the pandemic (Dev & Mahajan, [2003](#)). The situation has since grown worse. In 2020, global economic output saw a decline of 3.4%, while economic growth was expected to decrease by 5.6% in 2021 (Organisation for Economic Co-operation and Development [OECD], [2021](#)). Although several vaccines have been developed to create immunity from the virus since then; still, it is likely to remain resilient due to the emergence of its new variants.

According to Liñán and Jaén ([2020](#)), the recession caused by the pandemic is possibly the most serious among all recessions since World War II. According to the World Bank ([2021](#)), COVID-19 initiated a severe contraction of economic activities in Pakistan with a 1.5% contraction in GDP growth. Moreover, poverty increased from 4.4% to 5.4% in 2020. Indeed, half of the workforce participants either lost their jobs or faced losses in income, while 40% of households experienced food insecurity. In these critical times, securing employment can be a big challenge for fresh graduates (Koe et al., [2021](#)). Maritz et al. ([2020](#)) claims that entrepreneurship can be a catalyst to growth and transformation in this uncertain era. As the young generation has both passion and novel ideas, the critical need is to introduce them to the concept of entrepreneurship. Pakistan has a talented and highly capable pool of young individuals that can be developed by providing proper education and training, as well as by inculcating creativity, inventiveness, and risk-taking in them (Muhib & Khan, [2010](#)). Based on the ideas of youth

mobilization and empowerment, entrepreneurship acts as a base over which science, technology, and industry can grow for the economic benefit of the country.

Although the concept of entrepreneurship has captured the attention of researchers, theorists, and policymakers, actual entrepreneurial activities are somewhat limited in Pakistan. According to the Global Entrepreneurship Monitor (2012), Pakistan has a lesser number of opportunity-driven individuals who adopt entrepreneurship (as a profession) as compared to China. Global University Entrepreneurial Students' Survey (2011) also positioned Pakistan on the lowest rank with respect to the students' intentions to involve in entrepreneurial activities after studies. The rate of Total Entrepreneurship Activity (TEA) is 9.08%, which is less than the normal average rate of 11.7% (Alam, 2011). It is also cited by Iftikhar (2016) that Pakistan ranks at the lowest position in entrepreneurial activities. It is worth mentioning that entrepreneurship is an umbrella term which covers various sub-types of this profession. One of the sub-types of entrepreneurship is 'technopreneurship', which is known as the "new breed of entrepreneurship" (Koe et al., 2021). Technopreneurship encompasses technology and its use for the creation of business products. It is a process of blending technological skills with entrepreneurial competence (Selvarani & Venusamy, 2015). In brief, technopreneurship is about identifying the latest technology and employing it for creative purposes. With the world transforming into a virtual realm, technopreneurship remains intensely connected with entrepreneurship (Okorie et al., 2014). The advantage of starting a business in the field of IT is that it requires minimal capital investment (Özbilgin, 2010). It is exacerbated with the absence of geographical limitations and a higher potential for return (Abbas, 2018). Also, due to the COVID-19 scenario, a lot of businesses have moved towards technology adoption in their operations to meet the unprecedented challenges (Sallomi, 2020). According to Muhib and Khan (2018), business skills (without technological skills) are out of date. Hence, educational institutes should focus on technopreneurial skills to train the youth so that they can find opportunities, think strategically, and bear risks. The aim of business and IT schools should not be to produce employees only, rather they should aim to create resilient technopreneurs.

For countries to stay in the developmental race, especially after the COVID-19 pandemic causing widespread unemployment and local business downturns, it is high time that they reflect on various strategies to overcome the pandemic induced disruption. Pakistan has also recognized the innumerable benefits of entrepreneurship education. Hence, the Higher Education Commission (HEC) of Pakistan has directed the universities to include entrepreneurship courses in their curriculum, launch technology incubators, and offer access to capital and loans for new startups (Nasrullah et al., 2016). Despite the efforts to improve the educational framework, the rate of technopreneurial activities still remains inadequate. Although technopreneurship is not a product that can be made overnight, it is

important to evaluate the extent to which it contributes to the success of the economy. Post COVID-19 era seemingly has a high potential for individuals to grow in the field of technopreneurship. Consequently, it is the right time to evaluate the role of technopreneurial education and the extent to which it has helped technopreneurs in their journey so far.

The current study aims to identify the role educational institutes of Pakistan play in the development of technopreneurship, keeping in view the stance of real-life technopreneurs. This aim was achieved by evaluating the effectiveness of technopreneurial courses, that is, entrepreneurship and IT courses taught in educational institutes that the technopreneurs attended during their tenure of study. The study also contributes to the existing literature by highlighting the need and importance of technopreneurship, as previous studies mostly examined the traditional concept of entrepreneurship, leaving technopreneurship understudied (Sussan & Acs, 2017; Koe et al., 2021). The current study is novel as there are hardly any studies available that discuss the development of technopreneurship, specifically in the context of Pakistan. It also highlights the need for technopreneurship education after COVID-19.

## Literature Review

### Technopreneurship

Technopreneurship is defined as the combination of technological competence and entrepreneurial expertise (Selvarani & Venusamy, 2015). It is a sub-domain of entrepreneurship that includes technology. The idea is to create a mix of business skills, scientific and technical expertise, and intelligence possessed by individuals who work to form a digital and smart society (Abbas, 2018). It can be put into practice by strategic thinkers who are competent enough to identify advanced technology and utilize it for the creation of business products. Technopreneurship is a profound notion linked with many important disciplines. It integrates the world of technology business with academic entrepreneurship. Being highly advanced in technology has become the new norm with academic entrepreneurship providing information related to professional and strategic knowledge, entrepreneurial ecosystem, history, and developments (Abbas, 2018). Today, it is seen as a business opportunity created through the application of both technology and entrepreneurial knowledge. Various terms have been used in literature for technopreneurship such as “technology-based enterprise”, “technology entrepreneurship”, “technology enterprise”, “high-tech venture”, “technology entrepreneurial ecosystem”, “technoentrepreneurship”, and “digital entrepreneurship” (Dahlstrand, 1999; Kraus et al., 2018; Oakey, 2003; Thérin, 2007; Yli-Renko et al., 2002). In this paper, the term ‘technopreneurship’ is used.

The concept of technopreneurship emerged in Singapore in 1983, where it was used for the first time in the business world (Jolly, [1997](#)). It started gaining currency after the dot-com bubble (Hoque et al., [2017](#)). Developed nations such as the UK and US started the technopreneurial process in the late 20<sup>th</sup> century by offering exciting opportunities to technopreneurs, while developing countries participated in this process via the inclusion of related subjects in their higher education institutes (HEIs) (Paramasivan & Selladurai, [2017](#)). Although the movement related to startups and technopreneurship is getting a boost worldwide, researchers have not addressed the topic adequately and scarce literature is available about it (Kraus et al., [2018](#)).

With the advancements in ICT (Information and Communication technology), businesses now operate through their software application. Facebook, Amazon, Uber, and Airbnb are some of the pioneers that upturned the state of technology and entrepreneurship on a massive scale (Stone, [2017](#)). Digitalization is considered the multiplying mechanism for socioeconomic stability (Satalkina & Steiner, [2020](#)) and socioeconomic progress in the future will be heavily influenced by technopreneurs (Hoidn & Karkkainen, [2014](#)). Researchers in the past highlighted various business models for emerging technopreneurs, which allow businesses to be carried out digitally. Cloud gaming industry (Ojala, [2016](#)), home-based online venturing and mental mobility (Domenico et al., [2014](#)), innovative service-based model (Kuester et al., [2018](#)), transformation in healthcare using innovation-driven model (Herrmann et al., [2018](#)), design community (Troxler & Wolf, [2017](#)), and digital business for lawyers (Van der Ven, [2017](#)) are high-potential industries that technopreneurs can engage in.

In addition to the opportunities created by technopreneurship, some of the businesses are entirely moving from the traditional mode to the digital mode. To fight unemployment and other social challenges, increasing technopreneurial potential among the young can be the most effective mitigation tool (Masenya, [2021](#)). SME development and technopreneurship are channels for economic progress and self-employment in developing countries as they deliver income, self-independence, and the grooming of human capital (Schoof & Semlali, [2008](#)). It is impossible to deny the fact that technology has indeed changed our lives, allowing businesses to rethink their traditional modes of operations. According to Rossmiller et al. ([2017](#)), a significant reason why SMEs tend to fail is that they still follow the conventional mindset of focusing more on business processes, rather than relying on a technology-supported business model. In the Pakistani perspective, the struggle is to meet and manage the 21<sup>st</sup> century technological changes. When we talk about world-renowned technopreneurs, it is a sad fact that individuals from Pakistan do not make it to the top of the list.

## Entrepreneurial Education

Education is a vital asset as well as an investment not only to gain knowledge and skills but also to improve the quality of life. It is mentioned in the literature that raising educational standards rewards the students in the form of boosted earnings and success. There are two main objectives of education: knowledge transfer and skill development. It is one of the most powerful tools used to alter an individual's perspective and their capacity to execute an intended action. Recently, entrepreneurship has captured the attention of academicians and educationists (Ndou et al., [2019](#)). It is recognized as a key skill of the 21<sup>st</sup> century and is one of those disciplines that can be learned (Grivokostopoulou et al., [2019](#)).

The concept of entrepreneurship started to emerge in late 1980s and early 1990s (Audretsch, [2021](#)). It was introduced for the first time in 1971 at the University of Southern California in the postgraduate program and the following year, in the undergraduate program (Muhib & Khan, [2010](#)). By the 1980s, almost 300 universities all over the world began to offer entrepreneurship as a subject and the number of universities reached 1050 by the end of 1990s (Solomon et al., [1994](#)). Literature suggests that there exists a strong link between entrepreneurial education and actual accomplishment (Acs et al., [2009](#)). Education in entrepreneurship has helped to create a conducive culture in Europe for entrepreneurs to grow by giving them a vision and providing them with sufficient skills to realize that vision (Wilson, [2008](#)). Entrepreneurial education has a profound effect on students' behaviour by assisting them to attain the required competencies (Grivokostopoulou et al., [2019](#)). Research conducted in a UK based university concluded that students who received entrepreneurial education during their tenure did not opt for jobs later on (Matlay, [2006](#)). Indeed, all of the 64 participants of the above research went for self-employment or creation of entrepreneurial ventures with a 0% failure rate. Some of them established small enterprises and others went for inter-firm collaboration.

Based on a holistic perspective, it has been argued that entrepreneurial activities are carried out through the interplay of institutions, education, stakeholders, and most importantly of entrepreneurs themselves (Palmer et al., [2021](#)). Since universities are training centers for young people, it is required to train them to become strategic players who can survive in a dynamically changing world (Fowosire & Idris, [2017](#)). Entrepreneurship teaching can nurture the entrepreneurial spirit in students to choose entrepreneurship as a career later on. The goal of entrepreneurial education should be to develop students to carry out entrepreneurial activities, rather than merely educating them about entrepreneurship. Business and IT institutes today are producing capable employees but fewer businessmen and technopreneurs. University graduates prefer to look for jobs; however, many of them are left to be accommodated due to surplus



talent and fewer employment opportunities. Furthermore, keeping in view the repercussions of COVID-19, it will be increasingly difficult to find jobs in the coming years. Through education, we should alter this traditional mindset of job hunting among students and educate them about how to set up successful startups. Although businesses and IT universities already teach entrepreneurship as a subject in the curriculum, they have not been very successful in securing fruitful outcomes. A primary reason can be that the courses taught are not well-organized. A combination of theoretical and practical knowledge is necessary before the students begin their journey of entrepreneurship. Many universities lack with regards to teaching the practical side of entrepreneurship. Fiore et al. (2019) mentioned that teaching entrepreneurship with a practical orientation is more effective than its theory-based teaching. Curriculum should include the study of role models and their success stories to enhance the motivation of students (Zozimo et al., 2017). Boldureanu et al. (2020) stated that most of the students are inspired by the role models in their field, who stimulate confidence in them needed to initiate their own businesses. When the course is well-designed, graduates transfer knowledge back to the society in terms of applying it practically. This transferability is the tool that leads to economic development (Feliu & Rodriguez, 2017). Keeping in view the trend of technology usage in businesses after the COVID-19 pandemic, it is evident that the majority of businesses have mobilized technology operations and included them as an agenda in their strategic business development (Sallomi, 2020). It is also certain that there will be an increased demand for software apps that support remote operations. It requires developing competitive technopreneurs who can introduce new services to the market at large. Using educational institutes as a tool to fulfill this demand, we can engage our energetic pool of students in technopreneurship.

The theory of Triple Helix is weaved around three primary players in the society that are enablers of economic development. It refers to the sequence of connections between the academic community, industry, and government that act as primary stakeholders in knowledge creation and the promotion of socioeconomic development within a country (Mêgnigbêto, 2018). The theory argues for the integration of these three players in order to convert knowledge and technology into resources that bring economic stability. The first evolution in universities brought the addition of research along with other major teaching tasks. Today, the second evolution emphasizes teaching, research and a third major factor, that is, taking part in socioeconomic development through knowledge capital (Yildiz, 2021). Giuri et al. (2019) explained that the best way through which knowledge can be transmitted to the industry is entrepreneurial education, which can make students capable enough to introduce new technology to the market.

Technopreneurship has its roots in the Triple Helix theory which interprets the process via the notion that universities are capable of producing and marketing



scientific and technological advancements to the society through the creation of a technopreneurial environment that can shape students' decisions and choices. This is especially true when the COVID-19 pandemic has made us all realize the importance of technological infrastructure, hence there is a dire need to develop competitive technopreneurs to address the market needs. It would be appropriate to view this scenario through the lens of current technopreneurs operating in the market, since they are in a better position to assess if their education has aided them to achieve their technopreneurial vision and transfer knowledge to the society. So, the current study attempts to explore the role of educational institutes in technopreneurship development. Since technopreneurship is a career that was affected the least during the COVID-19 pandemic, it is imperative to identify the factors that can facilitate its development. Indeed, university education is the primary instrument that needs to be effective in this scenario. The role of university education and the perspective of technopreneurs about it is examined in this study. It is unique as the previously available literature mainly focused on "traditional entrepreneurship" (Koe et al., [2021](#)), whereas there is a noticeable gap in research regarding technopreneurship, especially in the context of Pakistan.

## Research Methodology

### Research Design

The current study utilized interpretivism to elaborate the stance of technopreneurs regarding the courses of entrepreneurship and IT taught to them during their undergraduate university education. It also magnifies the extent to which these courses helped them accomplish their quest for technopreneurship. Interpretive paradigm is used to interpret the subjective views of individuals regarding the topic of interest. It is based on the premise that every individual has their own viewpoint and an individualized perception of reality (Bryman, [2016](#)). The inductive approach was used in the current study, since the perspectives of respondents were analyzed subjectively to arrive at certain conclusions regarding the slow development of technopreneurship in Pakistan. Semi-structured interviews were conducted for data collection. Afterwards, data was transcribed, coded, and meaningful themes were extracted from it (Sauro, [2015](#)).

### Population and Sample

The population of the current study comprised all the technopreneurs working in Pakistan who had a bachelor degree and graduated from either a business or an IT school, where they were taught courses regarding entrepreneurship and IT. Purposive and snowball sampling methods were used for collecting data. Purposive sampling was used to select the technopreneurs who can best provide the information relevant to the topic of interest (McMillan & Schumacher, [1994](#)). Similarly, snowball sampling helped to identify new technopreneurs through

networking or via the referrals of previous respondents (Parker et al., [2019](#)). It was hard to find technopreneurs in the field who had formally undertaken entrepreneurship and IT courses at their grad schools.

### **Data Collection Method**

The authors conducted 15 in-depth semi-structured interviews using open-ended questions from an interview guide. The interviews were conducted with technopreneurs working in the field. Sample size was sufficient to reach saturation. The interview guide contained ten questions and the responses were recorded so that no important information would be missed. The main questions included in the interview guide are stated below.

1. Since how long you started your startup and what your startup is about?
2. Who are your biggest supporters behind your startup?
3. Have you undertaken an entrepreneurial course, IT course or both during your professional degree?
4. Do you think it is more beneficial to take both the courses for becoming a technopreneur?
5. How much the course/s helped you become a technopreneur?
6. What kind of practical exposure is provided to you along with theoretical knowledge?
7. How effective were the strategies of your educational institute in making you a technopreneur?

New questions were asked wherever it was necessary to probe the respondents. Before conducting interviews, permission was taken from each interviewee and interview guide was emailed to them. The interviews were conducted at the mutually decided time to avoid any inconvenience for the respondents.

### **Data Analysis Technique**

Thematic analysis was performed on the data collected through the interviews. The data was transcribed and thematic analysis was conducted to code textual data in order to derive meaningful themes. The inductive method of research was used in this study, corresponding to the fact that the subjective perspectives of respondents were used to arrive at certain conclusions (Bryman, [2016](#)).

### **Data Analysis**

The interviews were conducted with a total of 15 respondents, including 5 female and 10 male respondents. These respondents had established their startups at least three months prior to their interview and had been doing business since then, were in the age bracket 22-32 years, and graduated during the last five years. They were asked about the contribution of IT and entrepreneurship courses in their success. Major themes generated during the interviews are given below.

## **Lack of Practical Exposure in Course Design**

A major theme that emerged repeatedly was that course outlines were mostly designed with a theoretical focus, while the nature of the subject is practical. The respondents indicated that universities should revise the course outlines by adding practical projects, role models, business case studies, and a lab for creative experiments. An interviewee said, “The culture in educational institutes of Pakistan is based on teaching theory. Only a few of them teach practical knowledge. We study theories in our institutes about how things work but we do not know how to apply it practically.” The purpose of the courses should be “to act on”, rather than merely acquiring theories.

Another interviewee further added that “the main problem in our educational sector is that they do not provide practical exposure. A student completes his whole degree but after graduation, he has no idea what he has to do.” Without incorporating the practical side, the transferability of knowledge is hindered and it results in disrupting the cycle of entrepreneurial creation.

## **A Single Course on Entrepreneurship is Insufficient**

Interviewees elucidated their concerns about the availability of only a single course of entrepreneurship in their respective degree programs, which is insufficient to gain an in-depth understanding of the subject. They were of the view that the tenure of a semester is already short, around 4.5 months only, during which a single course cannot cover all the essential aspects of the field. As said by an interviewee, “We had only one course of entrepreneurship and it was basic, with not much content covered.” So, there must be an additional two to three courses for students so that they may grasp the real essence of this subject.

## **Separate Course on ‘Technopreneurship’**

The respondents were of the view that a technopreneurial journey requires the knowledge of two subjects, that is, entrepreneurship and IT. They stressed the importance of amalgamating the courses of these two subjects, which can be introduced in the form of ‘technopreneurship’. The interviewees believed that a course on technopreneurship can provide better results if entrepreneurial skills are taught in combination with IT skills. An interviewee mentioned, “A tech startup consists of two words, that is, tech and startup. Tech requires technical skills and a startup requires entrepreneurial skills.”

## **Need for Advanced Courses of IT**

With reference to IT, the respondents proposed the need for the latest courses. Since IT is a field with fast pace advances and improvements in technology, the respondents emphasized that the curriculum should also take into account the modern high-end technology. They pointed out that the courses they were taught

were outdated and did not help them to survive in this hyper-competitive and fast-changing technological world. Hence, they needed better courses to compete effectively. An interviewee said, “The IT courses I studied were not of much use in the field. IT skills I used for my venture helped me for searching from Google, learned a few things from YouTube tutorials, and read research papers every day.”

The interviewees highlighted the above premise as the main gap in course design. They were of the view that developed countries have top-notch successful businesses because of the fact that they use the latest software and technology to enhance their competitiveness. While, in Pakistan, students are still taught out-of-date or beginner level courses that have little to no practical value in the real world.

### **Faculty with On-the-Ground Experience**

Another significant theme identified by the interviewees was that the faculty teaching the courses of entrepreneurship is related to academia. They have limited experience and knowledge of on the ground realities. The respondents explained that students learn better from their role models who have contextual knowledge and information about the challenges and opportunities available in the market. They expounded that the faculty assigned to teach entrepreneurial courses should be either entrepreneurs themselves or corporate professionals who can provide the students with vital business tips. As mentioned by an interviewee, “Educational institutes have teachers that have never been through entrepreneurship themselves. Entrepreneurship courses are taught by PhD instructors, not entrepreneurs. So, the decisions of potential entrepreneurs are taught by people who are not entrepreneurs themselves.”

### **Global Approach**

With globalization being the new norm, working in isolation is unimaginable. Starting a business for the local community which also has global relevance is the key to creating worldwide opportunities and achieving success. The respondents explained that this awareness needs to be inculcated in students by educational institutes. They should train students and modify their original ideas into a solution that caters for a wide market. The faculty, course outlines, and teaching methods should be aligned in a way that shows the global picture of the technopreneurial world and potential areas for innovation. The interviewees said that many startups failed because of the fact that the education and training of technopreneurs familiarized them with the local perspective only. An interviewee highlighted,

“Thinking global is necessary. They start with things going in the local ecosystem, that is why they end up underperforming with few customers only.”

### **Courses Play the Role of Motivator**

This theme highlights an essential point that despite the bottlenecks in the current education system, courses motivate students to adopt technopreneurship. The respondents explained that the knowledge they gained from studying the courses might not be up to the mark but it did improve their soft skills and inspired them to embrace technopreneurship as a career. One of them stated, “My university supported me to much extent in building confidence and motivating me towards entrepreneurship.”

### **Course Knowledge Prepares to Fight Obstacles**

Several respondents highlighted the fact that the courses they learned prepared them to fight various obstacles. They believed that the knowledge gained from the courses diverted them towards the entrepreneurial path and its unforeseen complexities. They knew that this journey was not going to be easy which made them persistent enough not to leave it halfway as many others did. The courses taught them that a technopreneurial voyage is full of hardships and the process follows step by step progression. An interviewee remarked, “If you combine your course knowledge with your passion for entering into this field, the path will become easier.”

## **Discussion**

Data analysis showed that although the concept of technopreneurship has not matured sufficiently in Pakistan, it has managed to gain a central place in the curriculum of universities. Most of the IT and business schools of Lahore have realized the need for these courses and offer them in their graduate programs. It clarifies that the universities are well-aware of the attached benefits and hence involve students through courses in technopreneurship. The courses currently offered improve students’ understanding of entrepreneurship and technological businesses. However, there are a lot of flaws in the process that the respondents pointed out. The courses taught depict more of educating “about technopreneurship” stance, rather than “for technopreneurship” stance. Kirby (2004) claimed that this is where most educational institutes fail. IT courses have a practical experimentation aspect in them to a certain extent but the courses on entrepreneurship cover major theories only. The respondents said that they were not provided with adequate skills to apply this knowledge, practically. Hence, the transferability of knowledge remains limited. Feliu and Rodriguez (2017) stated that the aspect of knowledge practicality is what contributes to the development of the economy and the society at large. Universities need to modify their course

design by adding case studies, applied projects, and an open platform where students can experiment and test their ideas. The use of case studies educates the students about business problems, its challenges, and what the outer context of a business looks like. Applied projects and experimentation labs give students a platform to demonstrate their business ideas on a small scale to check their feasibility.

Rauf (2019) mentioned that the scarcity of quality education in Pakistan is affecting the critical thinking and potential of the youth. The educational industry is under pressure more than ever since the crisis induced by the COVID-19 pandemic and questions are being asked about the quality of education delivered with online education delivery methods. It is the right time to strategize improvements in educational policies through the revision of curriculum, teaching methods, and course effectiveness. The current study highlights that there is only a single course of entrepreneurship in the entire business graduate degree program, which is insufficient to provide the necessary information. Chia (1996) postulated that one or two entrepreneurial courses in a degree program are not enough to build an entrepreneurial intent among students.

In the same way, students related to the fields of business and management remarked that they were taught only one or two IT courses. These were all basic courses with no focus on skills needed for building IT startups. Almost all the businesses today are supported by technology in one way or another. Hence, it is the need of the hour to develop the technical competence of students. The current situation demands adding more courses of entrepreneurship and IT to the curriculum with a well refined practical focus. Educational institutes can also amalgamate the courses in both fields and introduce a new course labeled as 'technopreneurship'. Indeed, universities should also initiate Master and PhD programs in entrepreneurship and technopreneurship (Khan, 2008), covering the students who want to adopt this field or are already in the field. Such students can enroll in these programs and universities can equip them with advanced skills and training.

Another ubiquitous view was that the faculty teaching the courses of entrepreneurship is inexperienced in entrepreneurial activities and has a solely academic background. Business and academia are two entirely different fields. Hence, regardless of how knowledgeable and competent the instructor might be, the results may not turn out to be effective. Garavan and O' Cinneide (1994) cited that entrepreneurship is an expertise to deliver, not something to be simply communicated. Faculty related to entrepreneurship is hardly available in universities (Muhib & Khan, 2010). There is also a scarcity of instructors who hold PhD in this field (Khan, 2008). PhD programs in technopreneurship or entrepreneurship are not offered in Pakistan. HEC can take into notice such

considerations and should make some policy reforms. Moreover, universities have a job fair trend where employers come to look for potential employees. This trend can be extended in universities in the form of investment hunt fairs, where investors or interested companies may seek out innovative business ideas expounded by students in order to provide them with financial assistance to start a business, with their vested shares in it. Either way, they can pick students for their venture teams.

## **Practical Implications, Conclusion, and Limitations**

### **Practical Implications**

Educational schools and universities can make good use of this study to amend and improve their current policies and refine their courses and programs. They can also improve their hiring process while recruiting faculty for the subjects of IT and entrepreneurship. The suggestions provided in this study can help to overcome post COVID-19 challenges by promoting technopreneurial led growth necessary to rebuild the devastated economy. Pandemic of COVID-19 presents an excellent opportunity for technopreneurs to innovate, with their innovations addressing the challenges raised by the restrictions imposed on businesses and services due to the pandemic. Effective development and utilization of the country's human resources through technopreneurial education, especially that of its youth, will allow the country to weather the economic challenges posed by these restrictions.

### **Conclusion**

The current study highlights the critical role of technopreneurship in the economy, especially after the COVID-19 pandemic. While COVID-19 caused a severe health and economic crisis, it also paved the way for some long-term opportunities. It is suggested that educational institutes should re-strategize their current framework to develop competitive technopreneurs. Since these institutes are obliged to contribute their share in economic development, it is the best time for them to focus on technopreneurship. Technopreneurs can be used as a resource to build digital technologies to provide solutions to the pandemic related problems and for the sake of economic recovery. Moreover, these ventures would also include SMEs that can create job opportunities in the market. With increased adoption of online businesses and remote work, technopreneurs can introduce new services/products to empower workers in these areas.

The biggest strength of technopreneurial businesses is that they are independent of the various limiting factors affecting traditional businesses, such as geographical presence, physical operations, high capital investment, and many others making them more resilient. Whether it be COVID-19 or any other natural calamity, such businesses are less prone to loss. During the COVID-19 pandemic, these businesses boomed when the traditional ones were trying to remain viable.



This fact equally requires research in parallel to explore the factors that can help build a better policy framework to conduce these businesses.

The current study focused on the academia and its role in bolstering technopreneurship. The findings revealed that although the courses initiated by universities act as a motivator for students to adopt it as a field; overall, teaching methods and curriculum should be overhauled to create more successful technopreneurs. Practical knowledge is an indispensable part of courses and it should be taught by field-experienced faculty. Including entrepreneurship and IT courses in primary school curriculum can educate students from an early age about these subjects and may create in them a passion for commercial creativity. IT courses can be included in school syllabus at the primary level. Teachers should start by ensuring basic IT literacy and gradually move towards advanced learning, including IoT, robotics, automation, web and app development. As students' progress towards high school, a lot of them will achieve mastery in tech by the time they reach university. Then, technopreneurship related courses would be helpful to refine their skills, instigating them to use these skills in initiating businesses, and testing some actual products/services before they graduate.

Alongside these courses, technopreneurial incubators can also be built in universities where interested students may get additional guidance and training from their mentors. Students should also be given a chance to attend sessions delivered by successful industry experts. To make it all happen, there is a need of synergy between educational institutes and the efforts made by government and industry professionals.

The findings also relate to the Triple Helix theory which highlights the integrated communication between three key players, that is, educational institutes, government, and industry for the creation of knowledge and socioeconomic development. Using this theory as a base, we can enable the phenomenon of technopreneurship in Pakistan. The current study is among the pioneer studies regarding the importance of 'technopreneurship' in the Pakistani context. Moreover, it discusses how the loopholes in educational courses can be fixed to expedite the phenomenon of technopreneurship, when traditional businesses have become less operational and less profitable due to COVID-19.

### **Limitations and Future Directions**

There were insufficient resources and time available to cover technopreneurs working in places other than Lahore. Future studies can take into account the perspective of technopreneurs from other cities. The current study also used a mixture of purposive and snowball sampling. The use of blended sampling may have impacted the findings in a way that the individuals in the population did not have an equal chance of being selected for the sample. Moreover, researchers can

conduct a post-COVID study evaluating the effectiveness of courses taught to students during COVID-19. Other than education, researchers can also study factors that hinder the growth of technopreneurship in the country. Future researchers can also do a cultural and comparative research, comparing the results of other countries (with different cultures) with those of Pakistan.

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