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Does online technology provide sustainable HE or aggravate diploma disease? Evidence from Bangladesh—a comparison of conditions before and during COVID-19

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ABSTRACT

Higher education (HE) serves to produce well trained and job-ready graduates. Despite this belief, whether HE produces certificates/qualifications or job-ready graduates—this debate remains unsettled. To date, the current COVID-19 pandemic which erupted in late 2019 continues to create much economic, social and political dislocation throughout the world. Consequently, one outcome for HE during this crisis is the much greater dependence on online/digital technology to deliver courses and programs. Although it is not considered to be a complete substitute, critics argue that education delivered through online technology has expended the ‘diploma disease’ crisis and subsequently may pose a threat to the viability of producing HE graduates. It has been suggested that this can result in significant long-term problems that may be impossible to recover from. This study was based on a ‘empirical survey’ where the sample incorporated 240 people in two groups (before and during COVID-19, for a total of 120 in each), and the objective was to examine academic and job-readiness of graduates in greater depth. Findings demonstrate that pre-pandemic students scored poorly academically compared to their post-pandemic classmates. Pre-pandemic graduates, on the other hand, had higher work readiness scores in terms of both aptitude and practical aspects. Furthermore, both groups outperformed their job-readiness scores in terms of learning performance. This raises the question: is it the job of higher education to promote sustainable production of graduates or deliver certificates and degrees? COVID-19 appears to have been utilised by the HE system as an excuse to exacerbate the “diploma disease crisis,” a scenario that must be resolved by developing a proper policy framework that allows HE to play the necessary role in an emergency. Meaningful measures should be taken so that online technology is employed properly in this situation.

1. Introduction

The purpose of sustainable higher education is to produce and to deliver knowledge and skills that are fundamentally important for graduates’ employability [1]. While universities’ contribution to knowledge production is measured by research output and publications, ‘graduates’ employability’ is the parameter to measure a university’s ability to deliver skills [2]. In practice both the quantity and quality of publications are dramatically increasing. However, despite the increase in peer-reviewed papers and graduates’ academic success, graduates’ unemployment rate is unexpectedly climbing [3]. Zimmerman [4] argued that graduates do not accrue the necessary skills to do the jobs in which they are employed. Alam [5] observed that too many universities have become overly committed to produce graduates in order to survive in the era of ‘diploma disease’. Hence, universities’ competition is

restricted to producing certificates and other qualifications that hinder the delivery of sustainable or even meaningful higher education.

Sustainable higher education refers to a university’s ability to meet a particular industry’s demands. University and industry tend to be isolated from each other—a common proposition often asserted to describe the relationship between HE and the job market. This often morphs into a crisis labelled as ‘diploma disease’ [6]. Both the demand and supply sides should collaborate better in order to curtail the diploma disease crisis. Effective mechanisms should be devised so that the universities and industries function better together. While a face-to-face delivery option often creates difficulties for such a mechanism to work, it is vital to comprehend if online technology will solve or worsen such challenges.

Generally, technology helps a sector of society or industry to function more effectively through ‘changes’ that improve the procedures,

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processes, etc. [7]. Additionally, 'distinct and specialised' technological intervention should ideally be able to resolve the 'contextual constraints' that a sector may experience [8,9]. Moreover, Griffy-Brown et al. [10] asserted that the chief purpose of technological intervention is to ensure that a society's or sector's needs are met. Although the dynamics that characterise higher education sector may follow a global pattern, politics and traditions of particular societies can also shape how a higher education sector functions to a certain degree. An appreciation of innovative technology may also help to solve both cultural and political problems that are experienced in a particular context, as argued by Soroui [11]; Griffy-Brown [12] and Griffy-Brown [13]. While technology generally offers constructive supports, Alam and Parvin [14] found that "political and cultural constraints of a particular society" may restrict the technology to play a substantial role for the delivery of a 'sustainable higher education'. They further argued that technologies are misused by the HE sector during Covid-19.

Although an ample number of studies are conducted to understand the contribution of technology on social change, handful evidences are found that have investigated the role of online technology on higher education delivery during Covid-19. Keeping this in mind, this study investigated the impact of online technology on higher education and especially the mainstream provision using Bangladesh as a case study. Whether online technology has mitigated the challenges experienced in higher education or aggravated them is the key concern investigated here. Among little evidences, Daniel [15]; Agasisti and Soncin [16] and García-Peñalvo et al. [17] have studied the effectiveness of online delivery during COVID-19 but did not empirically compare two groups of students, namely before and during COVID-19; this is what the present study seeks to do. The research topic and questions are identified following the introduction, then the literature review, research context, and design are explained in that sequence. The findings and discussions are then provided, followed by the conclusions.

1.1. Problem, goal, objectives, and research questions

Higher education and the job market should ideally have a symbiotic relationship [18]. While higher education commonly teaches skills and concepts to students, many working professionals continue their further education in a chosen area or vocation in which they are currently engaged [19]. Despite this principle, the unemployability of tertiary graduates is actually rising [20]. For example, the global unemployment rate for graduates was 7% in 2010, but it has increased by 15% in the last ten years [5]. The unemployability of tertiary graduates is a serious issue for both developed and developing countries and efforts to address the crisis are significantly disappointing. Graduate unemployment rates in southern Asia and sub-Saharan Africa, for example, are 25% and 32%, respectively, representing rises of 14% and 16% in the last five years [5].

The unregulated growth of universities is considered to be the main hindrance for delivering sustainable higher education, and thus causing an increase in unemployment amongst tertiary graduates. There are simply more graduates than positions available [21]. Conversely, opponents have argued that more graduates are not produced compared to the demands. They instead observed that it is the perceived incompetence or poor training of graduates to do their jobs that is the main cause of the rising unemployment rate. For instance, Nghia et al. [22] argued that graduates do not yet have the skills required for the workplace as they are not being properly trained. Their lack of appropriate skills makes them an economic burden. If the graduates had the expertise, their employment would help the national economy. A vibrant and diversified national economy could create a successful job market, as argued by Nghia et al. [22]. Ensuring that graduates have the competencies is the fundamental responsibility of universities but they are blinded by the 'diploma disease' emphasis.

Both the economy and education system can collapse in the event of a disaster [23]. COVID-19 has lately been dubbed the "toughest-ever pandemic" and it is a very difficult and prolonged worldwide disaster to

navigate through [23]. The world economy was severely damaged, resulting in widespread unemployment and underemployment [24]. Only competent and well-trained human resources will be able to solve this global pandemic during the recovery period [15,16]. Those nations with adequate human resources should eventually reap the rewards, while those with inadequately prepared graduates will lag behind in many ways [16]. As a result, HE institutions cannot afford to be kind and compassionate at the expense of graduates' ability to do the job for which they are trained. Unfortunately, research suggests that in order to demonstrate their 'compassionate' credentials, some institutions are sacrificing the quality of their education delivered via 'online technology' by issuing certifications too quickly [25]. The fast expansion of private sector universities in developing countries is exacerbating the situation. Alam [5] suggested that higher education given via online technology during a crisis is a weapon used by many private sector universities to generate cash and clients by exacerbating the "diploma disease."

With the aforementioned viewpoint in mind, the goal of this study is to assess if the concept of sustainable higher education is jeopardised via online technology during the COVID-19 pandemic. To achieve this goal, the following objectives were developed: first, compare the academic performance of before and during COVID-19 graduates; second, understand the difference between academic achievement and job-readiness of these two groups in order to map the diploma disease crisis; and third, examine the impact of COVID-19 on long-term higher education and qualifications development. In order to achieve these goals, the following research questions have been proposed:

- 1) Does HE delivery via online technology aggravate the diploma disease crisis?
- 2) What is the impact of this aggravated diploma disease crisis on sustainable HE?
- 3) How can sustainable HE be guaranteed during an emergency?

2. Literature review

Firstly, this section explains the concept of diploma disease and its impact on the sustainable production of education with particular focus on HE. It will further explore the role that online technology plays in delivering sustainable HE.

2.1. Measurement in education: diploma disease vs sustainable education

Based on the type of product, specified parameters and scales are used to measure the variables. For example, parameters such as kilogram, pounds and metric-ton are used to measure some solid items (i.e., rice, wheat), whereas liquid items (i.e., water, oil) are often measured by other parameters such as litre, gallon and barrels. Although the criteria of parameters and scales for measurements and their schemata have evolved out of historical social practices and circumstances, providing a quantitative indication is their fundamental function [26]. Studies on measurement-related sciences have also discovered many parameters and scales that support and determine the qualitative features of a product [27]. After all these efforts, it is not known if all the parameters and scales for measurements are enough to ensure the quality of a product unless a substantial production and delivery cycle is ensured [27].

Identifying the nature of a product is in fact the key to ensuring appropriate parameters and scales for measurements [28]. Acknowledging the complexity involved in identifying the nature of education as a product, certificate, diploma and other qualifications are used as parameters to measure education, while divisions (such as first, second, third class), CGPA and GPA are used as scales [29]. Various forms of such parameters and scales serve to measure both quantitative and qualitative outcomes of education. In the absence of a substantial product, using measurement parameters and scales represents neither

quantitative nor qualitative attributes [26]. For example, an extra 'cautionary eye' may confirm that a desired amount of powder-milk is supplied. However, if this product was mixed with boric powder, then what is the point of paying extra attention to the measurement parameters and scales? Hence, a substantial production and delivery cycle would help but this is only possible if the efforts made by both the demand and supply sides are commensurate.

Unfortunately, both sides pay too much emphasis to the parameters (certificate, diploma, degree, etc.) and scales (CGPA, GPA, divisions) without ensuring substantial production and delivery functions [29]. This attitude is termed 'diploma disease' and it is something that undermines the production and delivery of sustainable or meaningful education. Ideally, the purpose of technology is to ensure positive changes by removing what is not constructive, however, it may also become the subject of criticism [7,11[7,11,14]. Hence, the role of online technology in higher education is critical to constructing a well-functioning society by delivering a sustainable HE, which is argued by Alam and Parvin [14] and Kim and Feng [30].

2.2. Role of sustainable production in product quality

Sustainable production's meaning and definition, as well as its schemata, have evolved over time as a result of historical social and cultural practices, traditions, and changes in policy and economic systems [31]. Many factors can have an impact on these scenarios [32]. The so-called "product perspective" is one of them. One school of thought proposes making a 'durable product' that lasts longer since a long-lasting product is less detrimental to the environment or to people, so it helps with the 'sustainability crisis' [32]. For instance, if one sort of infrastructure lasts two centuries but others do not, the former is a "sustainable product" in comparison to the latter. Each production method is said to produce several "environmental dangers" so the concept of "longevity" becomes critical to "sustainable production."

Being fashionable and modern are the current 'buzz words' that apply to items and goods or services, according to modernists [33]. Azat et al. [32] pointed out that modernists frequently believe that economic growth depends on a continuous production and consumption cycle. This cycle is analogous to a 'wheel' that must continue to turn in order for the economy to function. As a result, they believed that the concept of 'durability' would disrupt the concept of 'liquidity,' causing the economy to contract if new products or goods/services were not devised and then purchased [33]. This philosophy promotes the concept of 'comfort' as a criterion for judging a product's quality and long-term viability [34]. This is something that completely debunks the claims of 'environmental sustainability' [32]. To ensure 'environmental sustainability,' a new idea known as the 'sustainable production method' was recently created [35]. The core of this approach is to maintain an "environmentally friendly production function" in order to ensure long-term viability.

Liberals seek to draw a compromise between the two ideas. The goal of sustainable production, according to Bartkowiak and Bartkowiak [36]; Azat et al. [32]; and Karimov [35]; is to maintain economic progress without jeopardising future generations' ability to meet their own requirements. As a result, they emphasise the concept of sustainable technical innovation, whose core assumption is to create environmentally friendly, long-lasting goods that balance both [35]. Fashion is one, and "eco-sustainability" is the other. This strongly suggests that these products would theoretically provide two attributes while ignoring the 'durability idea' [37]. These notions are particularly applicable to industrial businesses' "tangible products" [38]. These businesses transform physical raw materials and chemicals into another tangible product [39].

While only the processing formulae employed in manufacturing sectors are abstract, the raw materials/ingredients and processing formulas utilised by service industries to create an intangible product are rigidly conjectural [38,39]. For an intangible product, this frequently

results in a "complex production function" [40]. None of the principles of sustainable production function outlined earlier would work effectively in such a "complex production function" scenario [41]. Because education is a complicated intangible product, its long-term production function is distinct, as more details are described below.

2.3. Role of demand and supply sides on sustainable production of HE

The service sectors' intangible goods are frequently recognisable [41]. These items' demand and supply sides are also well-defined, as also are their responsibilities, but this is not the case in the education sector [28]. A service industry or a corporation operating within it can often describe its sustainable production function using the recognised product and defined responsibilities of stakeholders [42]. Education's outcome is still an ambiguous entity. Unterhalter and Howell [43]; for example, claimed that graduates are the products of the education system, but Chankselian et al. [44] said that knowledge and skills are the products. While the discussion over what an education system produces is heated, little attention is paid to the demand and supply sides of an education system, as well as the roles they play [18].

The extant literature is divided on the demand and supply sides of education, as well as their respective functions. Suleman [45]; for example, argues that students and parents are the primary demand sides, while teachers and the system, which includes both the public and private sectors, are the supply sides. Biagi et al. [46] stated that industries and societies are the end demand sides, and that both parents and students are part of the supply side and, in fact, the beneficiaries. Alam et al. [6]; for example, suggested that the HE system's knowledge and skills would help companies advance the economy and, as a result, a nation's progress. Consequently, the nation is proposed as the final demand side as far as education is concerned.

These vague and undefined duties may have generated an "unaccountable climate" in some education systems, particularly in poor countries, where each participant seeks to profit from the "blame-game theory." This is a more serious issue for the 'sustained production function' [18]. For this reason, the planned 'sustainable HE product' is in jeopardy [45]. Despite the disagreement, a consensus emerged in which different aspects of education - primary, secondary, and higher education - have a mutually beneficial relationship [47]. This demonstrates that each level serves as both a supply and demand for the others. Primary and secondary schools, for example, serve as "supply sides" by supplying competent "inputs" for university education [18]. The former is also a demand side for the latter, as they rely on higher education to provide them with qualified teachers and a well-designed course curriculum.

This symbiotic interaction between various provisions serves as the 'educational sustainable production function' [48]. Unfortunately, in many ways, this symbiotic relationship on the brink of commercialisation in education has been misguided. Alam et al. [6] pointed out that HE frequently claims the appropriate inputs have not been received from primary and secondary education, which jeopardises universities' ability to produce high-quality outputs. Similarly, [60] noted that HE in many countries suffers from a lack of knowledge discovery, forcing primary and secondary schools to rely on undertrained teachers and outdated course curricula, making them unable to provide a sustainable or educationally valid outcome. In this case, the "inputs and outputs paradigm" created to assess the quality of sustainable products is rendered useless [29].

2.4. Quality assurance vs sustainable production function of HE

The 'sustainable production function cycle' in HE may have been limited by unidentified and ambiguous demand and supply sides, as well as their non-delineated functions [28]. Under such constraints, the concept of 'quality assurance' has emerged as a controversial topic for determining if HE satisfies the 'realism test' or not [49]. To assess the

'quality of HE', several methods are being studied, three of which are widely accepted. The first is the 'inputs and outputs tests', the second is the 'functional test', and the third is the 'job-market validity' [29].

The 'inputs and outputs tests' methodology is commonly used to verify the 'quality of HE', and it is an orthodox approach to the subject [28]. This model is used by the HE institution without the participation of the demand side [49]. The system of exams is used as a fundamental parameter in this approach. The total scores obtained by the 'outputs' are subtracted from the scores obtained by the 'inputs'. Positive correlation is warranted in the event of a surplus [28]. The originality of this paradigm is questioned in an era of 'commodification in education' [50].

The second approach focuses on the goal, objectives, mission(s), and vision(s) that have been determined by a certain institute/sector or system [22]. To ensure their accuracy, they are subjected to a thorough check. Following validation, the specific or exact nature of raw materials (known as curriculum) and processors (such as academics, infrastructure, logistics, and support services) is investigated in order to comprehend the 'quality assurance system' [22]. This method can only offer a signal as to whether or not a benchmark has been fulfilled, but it cannot confirm the benchmark's integrity [5]. The benchmark's definition and implementation are very subjective, and the influence of cultural and economic factors cannot be ignored [15].

To enhance the economy, the HE sector should ideally inject job skills, and so "job-market validity" is considered to be another key indicator [47]. The wage/salary of graduates is regarded as reflecting the quality of a certain HE institution when analysing 'job-market validity' [5]. A crucial postulate stated by Spence's [51] notion known as "signalling theory" is that the higher the compensation, the better the quality. This hypothesis could be useful in mature countries where there is a clear link between the job market, higher education, and skills, as evidenced by extensive mapping and projection [5].

Unfortunately, political ties, social networking, and socioeconomic situations or conditions can greatly affect certain workplace positions and the incomes or salaries that come with them in developing countries [6]. As a result, 'wage-market legitimacy' through the wage scale is now regarded as outmoded. Furthermore, this paradigm is ineffective in ensuring that employed graduates have the necessary job skills. Poon [52] and Al-Tabbaa and Ankrah [53] claimed that if an education system fails to generate competent graduates, employers are forced to choose from the pool of candidates that the system has created.

2.5. Role of industrial collaboration in sustainable production of HE

The question of whether industries or the nation-state are the final arbiters of HE demand—is unresolved [53]. Industries, on the other hand, should be considered the most important stakeholder in HE [54]. The growing number of graduates working in the private sector has driven the higher education system to acknowledge that industries are the most significant demand side [6]. Subsequently, it is argued that industries should play a more active role in what HE creates. Preparing raw materials (course curricula) and infrastructure (laboratories), as well as setting up lectures and evaluating graduates, are all part of this process [28]. According to Al-Tabbaa and Ankrah [53]; 'financial engagement of industries in the HE production process is a necessary' to ensure meaningful participation because the absence of industry would leave a gaping hole in the system.

Some nations have enacted 'HE levies' to secure industries' financial participation, and as a result, some concepts (such as 'factory-driven learning,' 'work-place learning centre,' and 'industry evaluation hat') have emerged in which industries and higher education have interacted [1]. Such involvement is regarded by adherents as a viable production function in HE, while opponents believe that it would jeopardise the philosophy, traditions, integrity and logic of the organization [45]. Many nations, particularly underdeveloped countries, are outspoken in their opposition to industry participation in 'HE production' [6]. However, this conflict may have emerged as a result of a country's 'culture

complexity,' in which both academics and affiliated industry workers suffer from a 'cultural complexity sickness,' which makes it difficult to determine which group is superior [5]. This limits the capacity to form a partnership between industry and higher education institutions. According to Refs. [20,20]; the HE system would gradually eradicate this "cultural complexity" for its own sustainability.

2.6. Online technology: developing sustainable HE or aggravating the diploma disease

Online education is a misunderstood concept that has been used in order to obtain business clout and leverage [15]. The COVID-19 epidemic has mistakenly or intentionally aided the emergence of this situation [39]. Garca-Pealvo et al. [17] suggest that online learning may be an insufficient substitute for face-to-face learning. Communication is not a necessary component of production. A complete production cycle involving raw materials¹ is required for a sustainable production system, processors² and delivery [39]. Only then should a delivery take place if the correct product³ has been created in the first place.

In different situations, multiple means of delivery may be used. Physical delivery, on the other hand, is the final stage of any manner of distribution [39]. We can purchase meals online without going to the restaurant, but neither the manufacture nor the delivery of the food can be done without physical movement. Furthermore, some orders require actual presence of people due to their particular character or function, as well as for greater utility. As a result, online technology is a logistical resource, but it should not be used to replace certain production and delivery techniques [39]. Expanding on this, production processes and sensitive distribution are essential for a high-quality product, and this necessitates engaging with humans, whereas online technology approaches serve only as a process management tool. Unterhalter and Howell [43] asserted that graduates are the education system's products, yet Chankselian et al. [44] indicated that knowledge and skills are the products. While the discussion over education's product is heated, little attention is paid to the demand and supply sides of the equation, as well as the responsibilities they play in ensuring active education [5].

Knowledge discovery is solely dependent on study in this scenario [1]. Higher education's fundamental business is research, and the knowledge/skills output is made possible by teaching and practise [55]. For efficient delivery, a variety of teaching tools could be used. Some of these tools may benefit from online implementation, but a wholesale shift to online education is a risky move to take [15]. The passive agent, namely 'online education,' will jeopardise higher education and its distinctive product knowledges/skills discovered through the research process [17]. Although many internal and external agencies advocate for the transformation of the paradigm into online technological learning, its vested interests, and especially in the private sector [56], a passive agent should not dominate an active learning model in higher education.

The contribution of an active learning process to the growth of graduates is frequently used to assess its performance [55]. Academic achievement is used as the key criterion, and it is mostly applicable to primary and secondary education [56]. While academic achievement is one of the indications, knowledge creation and job-ready graduates are the most important indicators for determining the usefulness of an active learning process in higher education [1].

We evaluate academic knowledge and job-readiness competencies of students who studied before and throughout COVID-19 to see if online education is an active agent of change. As a result, a positive association for active learning in higher education would be a higher reaction to job-

¹ Course curricula are referred as raw materials of education.

² Human resources and infrastructure.

³ Hence the right product offered by education is one that generates knowledge and skills.

readiness competencies. Since ‘fabricated grades’ are being provided in an era of ‘commodification in higher education’, where higher education has become a part of the ‘diploma disease’, academic performance scores provided by a university’s internal evaluation unit will be considered as a secondary indicator for the effectiveness of active higher education [29]. Because analysing it requires longer time series data, comparing the generation of knowledge through the university before and during COVID-19 is not feasible given the research timeframe. As a result, the purpose of this study is to assess the quality of graduates created through the use of online technology to support the concept of long-term higher education. Before we get into the concept of sustainable higher education, we take a look at the specific issues that emerging economies confront when it comes to offering higher education using online technologies.

2.7. Online technology and delivery of HE: challenges in emerging countries

In a developing society, three major issues have been highlighted that are particularly applicable to HE given via online technologies. To begin with, online education technology facilities in an emerging society are fairly disappointing [17]. In developing nations, both the accessibility and speed of the internet have yet to be standardised or guaranteed, so that urban and rural students from a variety of socioeconomic backgrounds can benefit from higher education offered via online technology [15]. Daniel [15] also stated that a large percentage of students do not have access to a reliable device, which is critical for obtaining education offered via online technology.

Second, in emerging economies, online education symbolises a new culture [39]. Because of the nature of the new rules, course content has yet to be created to suit the needs of online technology delivery, forcing emerging countries to rely on developed equivalents [17]. Students frequently struggle to discover relevant references that can meet the contextual criteria, according to Garca-Pealvo et al. [17]. Furthermore, already industrialised countries design, build and sell the majority of online delivery platforms. As a result, these platforms are best suited to the internet speed and gadgets used in those countries [39]. The end result is that the majority of students have difficulty using such platforms in developing nations.

Third, the transmission of internet technologies has psychologically challenged students in emerging societies. In underdeveloped nations, the cultural norm has typically established a gap between students and faculty, with students being hesitant to ask questions [5]. Universities in poor countries lack a strong participatory learning culture. The use of online technology to deliver services is not ideal for closing this gap; in fact, it may increase it [17]. Having said that, no one can deny the importance of campus life in developing students’ physical and psychological maturity and ability to communicate with others.

2.8. HE and emergency situation

Because it possesses the intellectual qualities required, the HE system frequently serves as an apex body in the event of an emergency [6]. An emergency can refer to a political crisis or a natural disaster that requires immediate and critical attention, which may necessitate the suspension of other operations [57]. Political conflict can result in an emergency scenario, such as a war, civil unrest, or a major natural disaster, which may necessitate the use of emergency measures [57]. Here, intellectual and dedicated communities or resources associated with higher education institutions can be dedicated to saving their country [17].

The HE system may be temporarily halted in an emergency, but quality assurance should not be jeopardised [17]. Higher education is a sensible public good that can be used to channel public opinion so that a state-threatening emergency may be addressed collectively [17]. When an emergency crisis arises, this psychological incentive may prevent the HE sector from taking advantage of the ‘diploma disease’ [17]. When

neoliberal ideals are introduced into higher education, it implies that universities and their communities would prioritise their own ‘vested interests’, and the national interest will become secondary [6]. This type of psychological shift may help HE institutions function more efficiently, but it degrades the quality of information produced [6]. Such compromises could be a long-term setback for HE, putting its ideology and position in shaping the global economy in danger [17]. As a result, the higher education sector would be in significant trouble. Therefore, sustainability of HE is critical if the entire system is to be spared, as higher education wields a significant impact on how a country functions [5].

3. The research context

Bangladesh was a British colony and then a part of Pakistan until becoming an independent country in 1971 [58]. The university community in Bengal region, especially Dhaka University (DU), played a crucial role in the independence movements to end both British and Pakistani regimes [18]. Other public universities joined the DU in supporting major emergency movements. Despite their strong association with “emergency movements,” the DU and its allies did not sacrifice their promises to develop a knowledge-driven society [6]. As a result, DU earned the moniker “Oxford of the East” and contributed significantly to the historical growth of the modern state of Bangladesh [58]. Sadly, the DU has recently been relegated to the bottom 300 universities in Asia’s university ranking league table, and it is not internationally competitive. The downfall of Bangladesh’s premier and foundation university is emblematic of the country’s overall higher education situation. Bangladesh’s ability to generate job-ready graduates is woefully inadequate. According to a survey undertaken by the Bangladesh Institute of Development Studies (BIDS) in 2018, university graduates had a 43% unemployment rate. Private university graduates made up a larger proportion of this group [59].

Bangladesh transformed its university system in recent decades to follow the US model [6]. The growth of all kinds of universities generally known as “man as man,” “land-grants,” and “machine-grants” delivery modes is evident. DU is the apex ambassador of Bangladeshi universities, while BUET and Bangladesh University of Agriculture, respectively, serve the ambassadorship for ‘machine-grants’ and ‘land-grants’ delivery modes [5]. Following the GATS agreement and the WTO’s prescription to embrace neoliberal ideas and practices in higher education, Bangladesh founded the private university sector in 1992 to end the “anarchy” of the government monopolised university system [6]. Currently 46 public universities and 111 private universities are operating [62]. In addition to these, several public universities/institutions of higher education have opened private wings where students who pay the necessary fees can receive weekend and evening services [6].

The definition of universities and what they produce in the name of higher education was challenged in many ways and a number of paradigm transformations took place [6]. Critics argue that these paradigm transformations have developed a CGPA-driven HE. Providing and acquiring knowledge has become an optional part of the demand and supply sides of HE [6]. Both sides are harvesting the ‘crops of reputation’ of higher education without cultivating it for future generations. Most public universities were closed during COVID-19, but private wings of public universities remained open and provided online education. Private universities have been delivering higher education via online from the beginning of pandemic and they never stopped their operation.

According to the Private University Association, private universities were able to provide exceptional programs during the pandemic and address the challenges of not providing face-to-face delivery. Both enrolment and student performance rates have significantly increased in most of the elite private universities. The Private University Association is also lobbying for changes to the rules and regulations so that local private universities can deliver higher education via online as a regular part of their business. It is worth noting that, at the start of 2020, the

Private University Association was adamantly opposed to foreign universities offering online and distance education because they thought online delivery would jeopardise the standard of higher education. The Private University Association's sudden change of heart could be due to the realisation that online delivery is more profitable than face-to-face delivery. This move is unacceptable for a variety of reasons, the most important of which is that allowing neoliberal principles to dominate higher education while ignoring the role of public policy is unfair.

4. Research design and method

In Bangladesh, neither the legislation nor practices encourage industries to participate in the production or assessment of HE. Academics are the ones who create, deliver, and evaluate curricula. The only scale that justifies graduates' skills is academic success as judged by universities. In this study the academic and job-readiness of the two groups of students are compared. Secondary data, such as student academic results obtained from the university, is utilised to assess academic achievement. Primary data collected using established instruments produced by professional groups is used to evaluate a student's job-ready performance. The outcomes of "experimental tests" and apprenticeship scores are among these instruments. Simple statistical metrics known as "mean" and "median" are used to analyse the data generate the findings. Grading in education such as CGPA/GPA and score in examinations follows a standard mechanism set up, which does not necessarily demand the *t*-test value. In the event of perception survey, *t*-test value is commonly used to determine standard deviation and its significance, which may not necessarily be needed for the scores archived via scholastic and aptitude tests. Since this research compares the grades achieved by the students in the two groups (before and during COVID-19) in the three domains, namely academic, aptitude and practicum, *t*-test value was not the prime focus here. To draw a causal association, no dependent or independent variables were used. As a result of the normative and narrative modes, this study is considered to be qualitative.

4.1. Sampling

The majority of Bangladeshi universities do not qualify for or compete for international rankings (such as QS or THE). Given the lack of an international rating, several local agencies (such as StudyBarta.com and UniRank) frequently produce local rankings that use the University Grants Commission-criteria which constitute the basis of the Bangladeshi system. To choose one university, we looked at the rankings of three local agencies over the last ten years. The sampled university is a private sector institution that has consistently ranked in the top five for the past ten years in each of the rating bodies we consulted.⁴ Because we intended to compare students before and during the COVID-19 pandemic, we needed a private university because public universities were closed during the contagion. The sampled university follows a trimester academic calendar with an "open credit system," as a result of which two semesters were completed during COVID-19 and one was still running when this research was done. Students from the two completed semesters who studied online, as well as their COVID-19 counterparts, were sampled. For each semester many sections of a subject were offered.

Parents' income, social position, and past academic results (such as secondary school certificate, higher secondary school certificate) were analysed to ensure that students in each category shared similar characteristics before and during COVID-19. Before and throughout COVID-19, 40 'heterogeneous' undergraduate students were chosen at random from each of the three groups. Science, business, and the arts are the three categories are used in this study. A total of 240 students were

randomly selected, with 120 from each group (before and during COVID-19). Within the science category, 40 students were chosen who studied two subjects before COVID-19, namely 'Computer Science Application' and 'Electrical and Electronics Communication,' and another 40 students were chosen who studied these two subjects but did it online during the pandemic.

Students from the business and arts streams were sampled using the same method. For example, disciplines like Applied Financial Accounting, Business Communication, and Civil Law, Language for Law Communication were considered for the business and arts streams, respectively. Meanwhile, to allow for triangulation of the data, several sectors were chosen, as well as practical-oriented themes to maintain the research focus.

4.2. Instrument development and scoring

The registrar's office was contacted for each counterpart's subject-by-subject academic results. The Bangladesh Computer Council, the country's leading professional group which deals with the growth of computer business, was given the syllabuses for "Computer Science Application" and "Electrical and Electronics Communication". The council was asked to create an aptitude-based questionnaire to assess both groups' abilities. They administered the tests and collected the results for both groups, which is used to compare job competencies labelled with the term "aptitude score". The Bangladesh Institute of Bank Management (BIBM) and the Bangladesh Bar Council, respectively, were advised on the testing of both business and arts counterparts. To ensure that the students were not identified, a code was issued to prevent them from being identified.

Before and during COVID-19, the top seven students from each category (science, business, and arts) were assigned a supervisor to work for five days. As the supervisor, one professional from each discipline with more than ten years' experience was deployed. This supervisor assigned a practical score to each student after they completed the tasks. As a result, aptitude and practicum scores are combined and used to define job-ready competencies. The university employs a software program to convert each subject's grades into a CGPA, which is referred to as the academic score. The marks earned in the aptitude and practical tests were converted using the same formula. The ability to make better comparisons is confirmed by the alignment of three sorts of scores.

4.3. Data collection and analysis

To eliminate personal subjectivity and assure objectivity, data collection and analysis were done in that order. In the first step, students' personal data was collected and analysed to ensure sample heterogeneity without collecting academic results. In the second phase, aptitude tests to assess job-ready skills were administered. During the third phase, data from academic outcomes and aptitude tests were collected and analysed at the same time to minimise possible academic results biasing the researchers. The best seven students from both the before and during COVID-19 groups were chosen to be the supervisors based on their combined results. Both students and supervisors were unaware of the criteria used to assign supervisors, giving the impression that different supervisors had been given to others. As a result, a graduate's previous performance had no bearing on the supervisors' assessments. Similarly, students could complete their work in a free and equitable way.

5. Findings and discussion

This section looks at how the Bangladesh HE sector responded in order to create a long-term HE culture. Academic performance, aptitude-based competencies, and job-ready performance are all scrutinised. The comparison is based on two groups of students: before and during COVID-19. First, let us clarify the general scenario in order to explain the

⁴ Both public and private sector.

following: how does HE in Bangladesh operate in such a way that quality assurance leads to a long-term product?

5.1. Diploma disease vs sustainable production of HE

Overall academic outcomes are always superior than aptitude-based abilities, as shown in Fig. 1. When compared to academic outcomes and aptitude-based competencies, practicum ratings are lower. For example, the average academic score is 3.39, whereas aptitude-based and practicum scores are 2.93 and 2.26, respectively. It does not exempt any streams. Although the science stream also witnessed a decline in performance, it fared marginally better than the business and arts streams. We dug deeper into the reasons for the students from science cluster superior academic achievement in order to understand the situation better.

The academic scores are divided into two categories: theoretical knowledge and practical knowledge. Both sorts of knowledge are supplied and examined only by academic advisors in order to get an academic score, but without their counterparts who work in industry. It is interesting to learn that most students scored higher on the practical portion than on the theoretical one. Those in science courses did better academically than students in business and arts courses due to higher grades in the former. Unfortunately, science graduates' aptitude-based abilities and practicum scores have dropped when they were tested by the colleagues from the industry (see Figs. 2 and 3).

It was expected that, because science graduates acquired higher academic scores through practical knowledge, their scores for aptitude-based competencies and practicum offered by academic and industry specialists would ideally not fall. We were surprised to learn that both types of scores of science students were fall when they were tested by the industrial colleagues. This discovery raises several serious questions: do academics provide 'fabricated' score for practical knowledge? Are these laboratories obsolete in comparison to modern industrial settings? Are academics and others trained to inject practical knowledge? And does practical knowledge necessitate specialised infrastructure and human resources?

These fundamental problems must be answered in order to secure the long-term and meaningful production of higher education, which is not confined to the science stream because business and arts graduates require practical knowledge as well. This principle is obvious given that students in the business and arts courses performed poorly on their aptitude and practical tests. After observing an unsatisfactory overall picture of sustainable output in higher education, let us see if online education during COVID-19 has raised any further problems towards diploma disease.

5.2. Diploma disease vs sustainable HE: comparison between before and during COVID-19

Following the last section, it was expected that both groups of students (before and throughout COVID-19) would do better academically than the aptitude-based skills and practicum scores. Figs. 2 and 3 appear

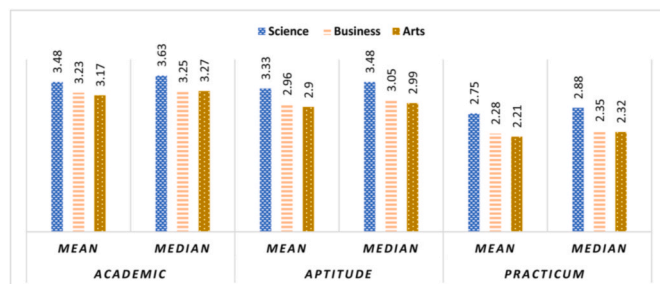


Fig. 2. Collective scores of before COVID-19 group.

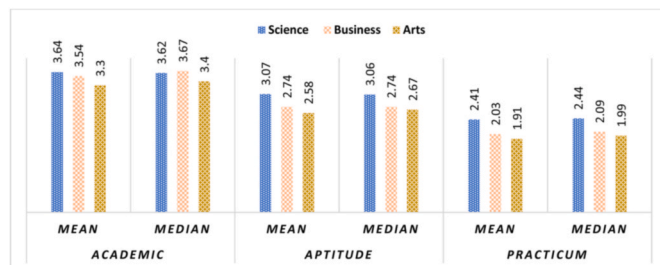


Fig. 3. Collective scores of during COVID-19 group.

to be unsurprising at first glance, since they both show that academic performance of both groups is better than aptitude-based skills and practical scores, as expected. The results displayed in Fig. 4 are fairly impressive, as the group studying online during COVID-19 outperformed the group who learned face-to-face previously. For all streams, the scenario was the same (science, business and arts). As a result, online education is better than the traditional face-to-face instruction method. Here the COVID-19 group was expected to do better in terms of aptitude-based skills and practicum ratings. Further investigation reveals that our predictions were incorrect. Both aptitude-based skills and practicum scores were significantly higher in the prior group than in the COVID-19 group (Figs. 5 and 6). This could indicate that the crucial relationship between higher education and the development of job-ready graduates is frequently dysfunctional, and that the COVID-19 pandemic has simply exacerbated the situation. For example, the prior group's overall academic performance was 3.29 for the three streams, but this climbed to 3.49 for the COVID-19 group (Fig. 4). This particular group's academic achievement in the business stream rose to greater levels (Fig. 4).

All streams of the 'during COVID-19 group' saw a significant drop in aptitude-based skills and practicum results. For example, the total aptitude-based competencies and practicum scores for the before group were 3.07 and 2.41, respectively, while the results for the 'during COVID-19 group' were 2.80 and 2.11 (Figs. 5 and 6). This trend is more pronounced in the business stream (Figs. 5 and 6). As the business stream is currently an example of 'commercial products', this strongly

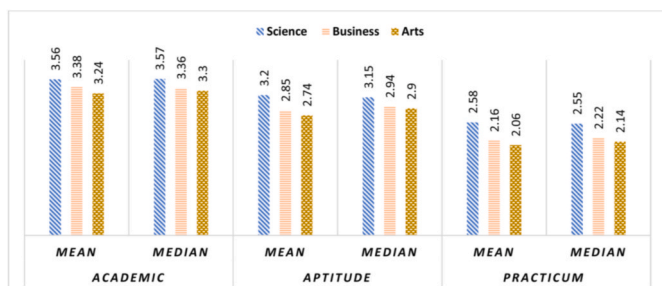


Fig. 1. Collective scores of both groups.

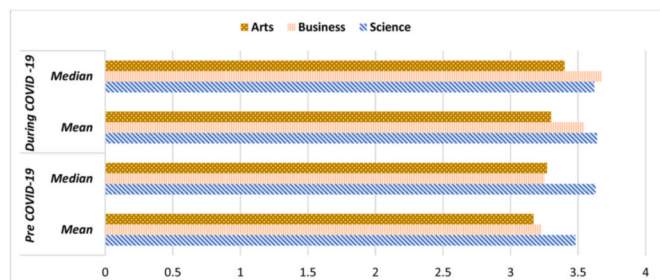


Fig. 4. Academic scores of the two groups.

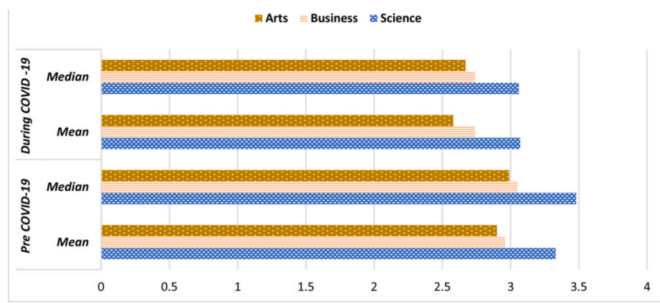


Fig. 5. Aptitude test scores of the two groups.

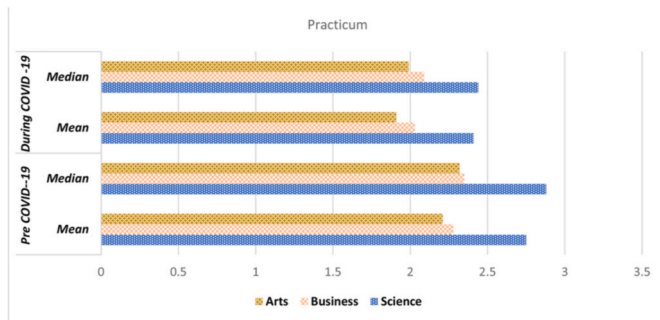


Fig. 6. Practicum score of the two groups.

suggests that ‘commodification in HE’ is one of the likely explanations for this unanticipated outcome [6]. Such grading fabrication may be made during COVID -19 without taking into the account of job market’s needs. Hence, higher education is provided to meet the demand of diploma disease by compromising the concept of sustainable production of HE [29].

5.3. Policy-framework: addressing the diploma disease crisis during emergency

The preceding data may raise doubts regarding the efficacy of online delivery. However, we must consider whether the HE system has been very liberal in granting better grades during COVID-19. Because this function is not proportionately linked to aptitude-based competencies and practicum scores, it raises several important questions: are higher education institutions ethical and true to their philosophy during COVID-19? is this online mode of learning acceptable for a long-term planning strategy? and does this ad hoc measure taken during COVID-19 help or hinder the institution’s philosophy?

When the most appropriate action is unavailable due to an emergency, Garca-Pealvo et al. [17] proposed that a better technique should be employed. This technique is good for meeting requirements, but not at the expense of eroding HE’s essential nature. The most concerning truth is the “creation of grading,” which would permanently tarnish higher education’s good reputation, which would be impossible to restore. Universities will lose their traditions and prestige if the gradings they issue do not reflect the realities of the job market or what employers need. Graduates and their credentials or qualifications have a short shelf-life when compared to the reputation of higher education. Its reputation, on the other hand, is built on the work of all of its stakeholders. In any case, we must defend higher education’s reputation by preventing “commodification in education”.

While a higher education program such as a Bachelor’s degree has a certain concentration, it should also be able to train students in a variety of areas due to the job market’s requirement for flexible skills in the workforce. Furthermore, graduates must be more adaptive and flexible in the job, as well as able to modify their talents fast. Likewise, the job

market is in flux, forcing graduates to compete for a variety of positions in the private and public sectors. Graduates must be given the opportunity to master a variety of skills that cover a wide range of jobs and industries in such circumstances. According to this strategy, universities should provide both theoretical and practical courses that lead to graduates finding work.

Some theoretical courses, or portions of them, could be extremely effective if offered online. Academics will appreciate the time saved by collaborating with students in this manner. Unfortunately, the profit-driven HE system has placed an excessive weight on the concept of ‘commodification in HE’, transforming ‘sustainable production’ into something undesirable. During an emergency, a specialised policy framework might aid the generation of long-term HE (see Diagram 1).

To ensure that the HE sector runs sustainably during an emergency, a specialised taskforce integrating professionals from multiple sectors (ICT, HE philosophy and policy, private and public sector industrial specialists, etc.) should be constituted. This taskforce should ideally create a well-planned and timely prototype project capable of dealing with the current challenges. To prevent being purely guided by market interests, the pilot project should be supported by a public body whose governance and regulatory procedures are not compromised. Only those HE institutions with a track record of success should be allowed to participate in the pilot phase. After the pilot phase is completed successfully, a number of internal and external evaluations are required. Refining the pilot project, based on the recommendations of these evaluations, could help limit a market-driven approach to how the HE sector operates during an emergency. A purely market-driven approach could jeopardise HE’s long-term viability.

5.4. Implications and limitations

Online technology in delivering HE should not be a permanent alternative for people studying in mainstream education services. Online technology has somewhat contributed to fostering the knowledge of students who normally learn through face-to-face or other traditional modes of education. In order to ensure the benefits offered by online technology, cautious steps are needed as argued by Geels [7]; Griffy-Brown [13]; Alam and Parvin [14] and Kim, and Feng [30]. An ad-hoc system can only be a temporary solution. It may, however, offer a number of pragmatic lessons that often benefit the regular operation of a

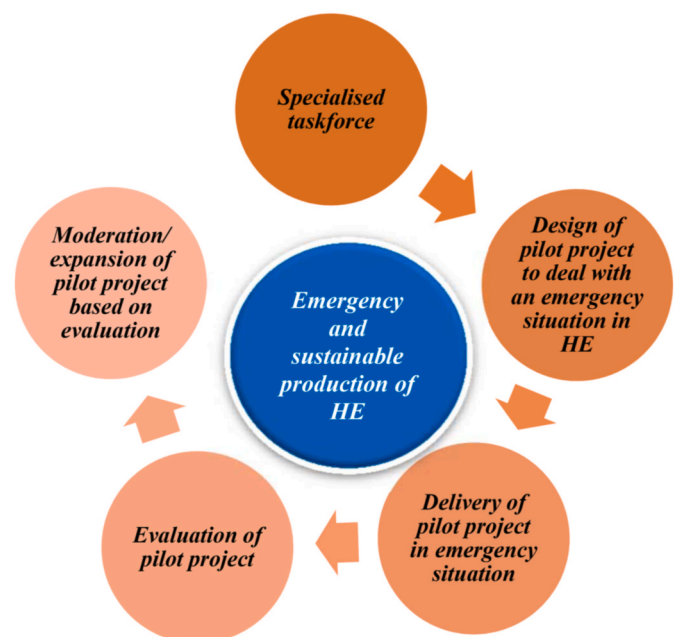


Diagram 1. Policy framework for HE to use in an emergency scenario.

system.

While online technology does have a great deal of shortcomings in delivering HE during COVID-19, it offers a number of innovative ideas that do benefit HE on many occasions [14,30]. In order to ensure the longevity of such benefits, the taskforce should devise a substantial action plan. Without support from the institutions, a nationwide action plan often fails, so a consultative forum representing both public and private sectors' universities should collaborate with the taskforce. While the vice-chancellors (VC) of public universities are the heads of the organisations, the VCs of private sector universities are ornaments or figureheads [29].

Private universities are rigidly controlled by the Board of Trustees. Therefore, a well-coordinated consultative forum is needed to ensure the proper execution and delivery of the taskforce's agenda. Concerning the limitations, the objective here is to contribute to the public policy discourse. Consequently, statistical or empirical modelling was avoided to cover a wider audience, as critics argue that gathering a larger amount of data by adopting a model is what helps to draw a causal relationship between variables. With only limited funding available for this research, collecting a large amount of data was not realistic. It may not be possible to generalise the findings of a particular case study (here, Bangladesh) because of political, economic and cultural differences between countries. However, some emerging nations that do share some common features with Bangladesh may actually benefit, and subsequently be able to develop their own higher education policies and practices via online technology. Alternatively, they may wish to conduct research in this area to assess its future viability. Despite these limitations, the present analysis has been able to generate important insights about the policy situation regarding HE in Bangladesh.

6. Conclusion

HE injects a system of skills that make it possible to create graduates who find work in their chosen professions, valuing the concept of "human capital theory". Universities either produce tangible or intangible goods. Adopting online technology as the exclusive form of education delivery has called into question the conceptual foundations of higher education, posing a threat to the long-term purpose of higher education in developing countries like Bangladesh and what is being produced. If online technology in higher education disrupts the sustainable production of HE programs, industries are unlikely to embrace the concept of sustainable production. This would also make collaboration between industry and higher education institutions more difficult to continue. Under no circumstances should a system be precluded from delivering long-term HE programs, courses, or subjects. In order to find a better strategy to deliver sustainable HE programs via internet technology in an emergency, more comprehensive research must be undertaken. Before the method is executed on a much bigger scale, an experimental or pilot project should be done and validated.

Declaration of competing interest

The authors whose names are listed immediately below certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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