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Does Online Education Support High Impact Educational Practices (HIEPs)?

Majed Alenezi[1], Mubarak Altwaiji[2] and Yousef Sanjalawe[3]

[1]English Language and Translation Department, Northern Border University, Kingdom of Saudi Arabia
E-mail: Maajed274@hotmail.com
[2]English Language Skills Department, Northern Border University, Kingdom of Saudi Arabia
E-mail: Mubarak2006ye@gmail.com
[3]Computer Science Department, Northern Border University, Kingdom of Saudi Arabia
E-mail: Yousefsinjlawi@gmail.com

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ABSTRACT With the advancement of information technologies, the digitalisation of education has taken place in the form of High Impact Educational Practices (HIEPs). However, the COVID-19 outbreak in 2020 led to transition from traditional education to online education. However, while online education tools serve different educational purposes they are still associated with challenges like income inequalities, lack of technical expertise, or limited availability of resources, which tend to hamper HIEPs effectiveness in higher education. Thus, this study aims to determine the impact of using online educational tools on developing HIEPs in higher educational institutions. Empirical examination of (220) respondents from the Northern Border University (NBU) showed the role of online education in providing better understanding of information or better communication facility. Examination of online education role in supporting effectiveness of implementing HIEPs stated that situational factors, institutional factors, and dispositional factors of online education motivate students and faculty members, thus contributing to effectiveness in HIEPs implementation.

INTRODUCTION

The Kingdom of Saudi Arabia (KSA), the global economic power with a population of over 34 million people has come a long way as far as the development of education is concerned (Dakhiel 2017; IMF 2021) . The country traditionally had an education system that was based on religious Islamic studies (Alnesyan 2012; Saleh and Alabdulaziz 2015). Gender-based discrimination was prevalent in the society, as the education of women used to cease after they reached puberty (Hamdan 2005; Alabbasi 2016). The first move towards higher education was made in 1957, and by 1982, 7 more universities were developed (Alamri 2011). However, the country has been improving its score among the OECD nations as far as the state of education is concerned.

The Saudi government has realised the need to rapidly expand and modernise its education system. As part of "The Saudi Vision of (2030)", introduced in 2016, the nation is all set to develop a world-class educational system (Alharbi 2016; Yusuf 2017). There is an escalated focus on English language learning, attracting investments from the private sector, enhancing educators' skills through training, digitalisation of the education, and curriculum advancement are being taken (Alebaikan and Troudi 2010).

Over the years, the global job market has witnessed revolutionary change with most of the jobs getting automated, thus demanding newer educational systems that accommodate to these novel job market needs (World Economic Forum 2016; Pew Research Center 2017). Apart from this, the current workforce is also demanded to demonstrate problem-solving, inter-personal communication, and critical thinking skills. This led to the emergence of High-Impact Educational Practices (HIEPs) (Kuh 2008; Cathy 2012). HIEPs were introduced by George Kuh (2008) who asserted that these practices enhance learners' engagement, that is, the time and efforts they dedicate towards understanding the course con-

Address for correspondence:
Yousef Sanjalawe
Mobile: 00966580406050
E-mail: yousefsinjlawi@gmail.com

tent and completing their course (Morris et al. 2019).

Northern Border University (NBU) is a Saudi university, which was established in 2007 and is located in the north region of Saudi Arabia (that is, Arar city). NBU offers a great example of technology adaptation and improvisation to meet the standards of world-class education under the Vision 2030, but also confronts the challenges relating to infrastructure, technology, and faculty's reluctance to learn the required skills (Saqlain and Mahmood 2013; Alenezi 2018).

With the evolution of the job market, the focus is not just on the theoretical knowledge but instead the workforce is required to be competent enough to meet the changing demands of the market. Though Saudi Arabia is steadily working towards accomplishing its ambitious Vision 2030, there are significant barriers in its way. Even now, online education has become the new normal education manner, especially after the emergence of the COVID-19 pandemic, so there is a need of having HIEP implementation being done effectively in this new virtual education environment. Thus, this study would help in providing a clear picture of the entire scenario and offer valid suggestions to utilise online education capabilities and opportunities in implementing HIEPs in NBU efficiently.

Research Gap and Significance of Study

HIEPs are a recent but crucial development in the field of higher education. The implementation of these practices is even newer in the virtual learning mode. However, there have been researches in this area but most of them mainly focused upon describing the benefits, mechanism of even effectiveness of HIEPs implementation in case of conventional classroom settings. However, as the popularity and need of online education is growing, it is imperative to determine how to implement HIEPs in novel learning environments efficiently and determine the associated opportunities, challenges, strengths, and weaknesses. Furthermore, herein Saudi Arabia is taken in consideration as many studies are now focusing on studying the criteria or the strategies of meeting "The Saudi Vision of 2030" but still no focus was there on having the integration of HIEPs and online education. Thus, this study with its assessment of HIEPs in the new online education environment could help the higher education institutions provide a better learning experience to students and decision makers, and work towards accomplishment of the Saudi 2030 Vision as well.

Research Questions

The main question of this research is, "does online education support the implementation of HIEPs?"

The following questions are derived from this main question:

1. How can HIEPs be implemented in online education?
2. How does online education influence the development of HIEPs?
3. What are the challenges and opportunities of applying HIEPs in online education?

Research Aim and Objectives

The main aim of this research is to determine whether online education supports the development of HIEPs or not. Based on this aim, following objectives are specified to achieve the main goal of this research:

1. To determine the ability to develop HIEPs in higher education using online education.
2. To evaluate the effectiveness of implementing HIEPs in higher education using online education.

Literature Review

This section provides a research background by discussing the status of IT implementation in the education sector in KSA, scope of HIEPs, HIEPs in online education, factors affecting effectiveness of applying HIEPs in higher education using online education, and empirical review of related studies with respect to HIEPs, respectively.

Status of IT Implementation in Education Sector in KSA

The development of the education sector in KSA has been a long journey. History reveals that education only existed in informal formats, basically through "Kuttabs", which imparted re-

ligious education (Alabbasi 2016). Formal education began in 1930 but could not prosper much due to paucity of funds, lack of qualified faculty, large size of the country, and prevalent illiteracy. With the ambitious Saudi Vision 2030, these challenges are not still prevalent, and revenues from oil is not becoming the basis for social development in the nation, including the growth of education (Almarzoqi and Mahmah 2020).

While the use of technology in education began in 1959 in KSA, when the government established the first audio-video unit to facilitate learning, the implementation of IT in the education sector, in the real sense, can be traced back to 1975 with the Second National Plan (1975-1980) (Abouelnaga et al. 2019).

Over the years, there has been fast-paced development in the education sector in KSA. In order to accomplish excellent learning outcomes, educators in KSA are adopting innovative teaching-learning methods (Abouelnaga et al. 2019) . Blended learning, which includes a combination of both conventional face-to-face learning and virtual technology-based methods, is getting increasingly popular in the educational institutions in KSA (Abouelnaga et al. 2019; Alebaikan and Troudi 2010). In present times, smartphones and electronic Learning Management Systems (LMS) have also emerged as an integral part of higher education in Saudi Arabia to facilitate easy communication between the educators and learners (Alenezi 2017; Rabeh 2019). Thus, with the statement of the Kingdom's 2030 Vision, the education sector of KSA has evolved to match the advanced countries' education level and have the integration of IT for developing world class universities (Alharbi 2016).

Due the outbreak of the COVID-19 pandemic in December 2019, the closure of the educational activities worldwide led to an unplanned shift in traditional learning structure to a newly emerging setup of involving digital learning and teaching. Saudi Arabia's Ministry of Education ordered the establishment of virtual schools and remote education for ensuring a secure and sensible manner proceeding of the learning phase (Khalil et al. 2020; Tanveer et al. 2020). For this, the Ministry supported higher education universities to increase virtual classroom capacity by 40 times and triple the speed of data centres. However, the lack of access to computers and access devices, training issues of faculties, internet difficulties, system change anxiety among teachers and students, and technology setbacks (tools like Moodle, MS Teams, or Blackboard) created prominent challenges for implementation (MOE 2020).

Scope of HIEPs

HIEPs refer to the designs or techniques that are used by different institutions in their teaching and learning mechanism for improving the education experience and having better student engagement (AACU 2013). It mainly consists of 11 different practices including first-year experiences, common intellectual experience, learning communities, writing intensive courses, collaborative assignments and projects, undergraduate research, diversity/global learning, internships, service learning or community-based learning, capstone courses and projects, and ePortfolios. HIEPs help in the implementation of the strategies, which provide a deep learning experience (University of Waterloo 2020; UW-Eau Claire 2020). By supporting the knowledge of human culture and the physical and natural world, personal and social responsibility, integrative and applied learning, and intellectual and practical skills, HIEPs create a pathway for students to have these learning outcomes derivation (Jenkins 2020). Today, not many institutions are focused on implementing these practices, however the incorporation of HIEPs in higher education opens a wider scope for education through increased persistence of students, increased writing and critical thinking skills, providing a deep approach of learning, more student-faculty interaction, diversity appreciation, and an opportunity of applying the knowledge to the real world (Perrotta 2020).

HIEPs are the educational practices wherein teaching and learning mechanisms are designed in a way to enrich the learning experience and improve student engagement (AACU 2013). Through intentional programs, designs and advanced pedagogy the HIEPs in higher education contribute to improving grade points, narrowing down achievement gaps among students, earn degrees quickly, and enhance student learning. Further, incorporation of these deep learning practices in higher education contribute in build-

ing relationships for improving mindset and attitude, making student meta learners, and bring guidance to leaning structure (Ricardo Montelongo 2019; University of Colorado Boulder 2020).

Among all the 11 HIEPs of first-year experiences, learning communities, common intellectual experience, writing intensive courses, undergraduate research, collaborative assignments and projects, diversity/global learning, service learning, internships, capstone courses, and ePortfolios, first-year experiences is the most prominent HIEP for higher educational institutions (University of Waterloo 2020; UW-Eau Claire 2020). This is because, in higher education institutions wherein the students have just moved from the traditional schooling mechanism to more practical and advanced education, there is a need to keep them motivated and engaged. Thus, HIEPs in this requirement help in increasing student persistence towards graduation, student engagement, and student retention by providing an active learning environment (San Antonio College 2020).

HIEPs in Online Education

The implementation of HIEPs has popularly been subjected to conventional face-to-face classroom settings. On account of the escalating demand for online education and the changing demands of the job market, the HIEPs are implemented with online education (Faulconer 2020). Through innovative and interactive teaching pedagogy, the implementation of HIEPs can enhance the overall learning experience (Montelongo 2019). Online education also has the benefits of removing the time and location barriers, thus making HIEPs accessible to a larger student community. Further, online education facilitates one-to-one individualised interaction between educators and the learners, which enhances the effectiveness of HIEPs (Faulconer 2020).

But, HIEPs implementation in online education should not be mistaken to be similar of that in the physical classroom environment (Morris et al. 2019). HIEPs implementation in online education requires a deeper understanding of the peculiarities of the online learning environment. As online education caters to a diverse range of learners, the need to understand individual differences among learners is very important in the online mode. In addition, the familiarity of learners with the online learning environment, and the faculty's competence to impart higher education based on the principles of HIEPs need to be considered (Faulconer 2020).

The effective implementation of HIEPs in online higher education also depends significantly on the availability of financial resources (Montelongo 2019). At times, HIEPs implementation in online education may require considerable changes in the existing curriculum. Apart from this, it may be difficult for the institutions to deal with faculty's reluctance to upgrade their skills through training (Faulconer 2020). The challenges in the implementation of HIEPs in online education can be many, and may vary across different HIEPs and different curriculums and institutions, but it enhances the faculty-student interaction and becomes instrumental in students' success in the long-run (Morris et al. 2019; Faulconer 2020).

Factors Affecting Effectiveness of Applying HIEPs in Higher Education Using Online Education

Different studies have been conducted to investigate the factors that affect the efficiency and effectiveness of HIEPs implementation in higher education under virtual arrangements. Among them characteristics of learners is a major factor (Muilenburg and Berge 2005; Kuh 2008). Demographic factors like higher age (adult learners) impose additional responsibilities of family, job, and the community, hence engagement to HIEPs can be low (Morris et al. 2019). These factors have been classified under "situational barriers" to HIEPs based online education. Other factors include "institutional barriers" and "dispositional barriers" that impede the success of HIEPs in online higher education. Situational barriers are the ones that emerge out of the learners' life situations and may include the family and financial responsibilities of adult learners. Institutional barriers refer to the institution's failure to adopt learner-friendly policies and teaching methodologies thereby impeding the channel of learning (Bolliger and Wasilik 2009). Dispositional barriers, on the other hand, are the barriers in the mind of the learner, that is relating

to his self-beliefs about HIEPs in virtual higher education (Muilenburg and Berge 2005).

The willingness of educational institutions to invest financial resources for effective implementation of HIEPs in higher education is another major factor in this regard (Montelongo 2019). Implementation of HIEPs in online higher education requires a lot of time and efforts from the educators. As many of the faculty members might not be well versed with online communication tools, more time and training are needed to prepare learner-centred course modules and teaching communication technologies. The institutions' willingness to invest resources on faculty development as well as on the development of a robust infrastructure that accommodates the needs of online education is therefore important (Opacich 2019).

Traditionally, the focus has always been laid by educational institutions on estimating costs and revenues in terms of students' enrolment. But, the effective implementation of HIEPs in online education requires that institutions also look after the professional development of their staff to help them cope up with the needs of high-impact practices and build an innovative, learner-friendly, technological infrastructure to facilitate student engagement (Faulconer 2020). The role of educators is of immense importance, as they need to have good knowledge about the digital environment. Contrary to the belief that online education is individualised in nature and encourages self-paced learning, the effective implementation of HIEPs require a better overall synchronicity, and educators must find ways to facilitate real-time interaction of students with the staff members and their peers (Montelongo 2019).

Overall, it has been emphasised that focusing on aspects like individual learner differences, situational factors, depositional factors, faculty training, infrastructural development, and learners' motivation will improve the quality of education and learners' engagement in HIEPs implementation in online education.

Empirical Review and Synthetic Analysis

This section is an attempt to highlight an empirical review of related studies with respect to HIEPs.

To investigate the factors that affect students' satisfaction level in e-learning, an empirical study was conducted among six state universities in Serbia by Stefanovic et al. (2011). The study interviewed 54 faculty members across these universities using a closed-ended questionnaire and analysed their responses through SPSS. It was concluded that the effectiveness of e-learning depends on the timeliness of educators' response, quality and flexibility of the course, state of internet technology, diversity of assessment, and the opportunities for interaction. In 2012, when e-learning was evolving, Bentley and Selassie (2012) attempted to assess the effectuality of a global e-learning Master of Business Administration program offered by a UK university. With analysis of 149 students' responses, the authors showed presence of high student satisfaction. The collaborative efforts of both students and faculty can make e-learning more enriching. Also, integration of latest technologies can refine the ecosystem, making it fruitful for all.

In the context of assessing HIEPs impact on students' engagement levels, those belonging to racial and ethnic minorities, a study has been conducted by Sweat et al. (2013), which included a sample of 268 undergraduate students in the USA. The study stated that HIEPs enhance the students' engagement and retention levels. However, certain practices like group work, undergraduate course, and learning communities out of the 11 HIEPs, tend to have more effect on minority group students' engagement. Murray (2014) in their assessment of the public master universities for determination of HIEPs role stated that except some of the practices, all HIEPs helps in maintaining and promoting student retention. Thus, higher educational institutions should focus on implementation of them. Lastly, Attah-Mensah et al. (2016) studied effectiveness of teacher distance education by studying the perceptions of 366 student teachers, 210 tutors, and 22 coordinators. The analysis revealed that these programs are successful and provide better experience but still aspects like student support, instruction design, instructional delivery, and student assessment quality need attention.

Gipson and Mitchell (2019) examined the relationship between HIEPs and academic outcome by assessing public institutions of a USA dataset for 652 undergraduate students studying in first

and second year. The analysis showed that practices like first-year seminars/experiences, internships, writing intensive courses, collaborative assignments and projects, diversity/global learning, undergraduate research, and service learning/community based learning help improve the performance of students. Coman et al. (2020) examined the perception of students for understanding the contribution of online education in higher education during the 2020 global COVID-19 pandemic. With the assessment of 762 students, the analysis revealed that Romanian higher educational institutions were not prepared for online education implementation. The online environment became more difficult limiting the applicability of practices. Shahzad et al. (2020) assessed the online education portals' effectiveness for male and female students and determined that though they have different usage of e-learning portals, both consider effective role of e-learning portals in education experience and user satisfaction. Lastly, Mishra, Gupta and Shree (2020) examined the online teaching and learning process during COVID-19 by examining perception of 20 teachers and 20 students, and thus, though online education helps in providing education but there are various challenges associated.

RESEARCH METHODOLOGY

Research methodology acts like a scientific step-by-step guide for the researcher to accomplish the research objectives (Kumar 2014). The current study is based on the usage of an explanatory research design and quantitative analysis method for fulfilling the aims of discovery and to test the relationship between HIEPs and online education and apply the findings to a larger population.

With the focus of study on the NBU in KSA, the targeted population involves both the faculty members as well as the students in the university. The sampling method utilised under study is stratified random sampling, which involves dividing the target population into sub-groups and selecting the sample units from each subgroup/stratum (Singh and Mangat 1996). This is because the targeted population comprises members from different disciplines of the NBU. Thus, for encompassing relevant information derivation and covering all elements of the targeted population, it is essential to divide the entire dataset into different groups, that is students and faculty members under which a sub-group is based on department and then on the gender. Thus, the stratified sampling is in below stated form.

The determination of sample size has been done using Cochran's formula at five percent level of significance, that is:

$$n = \frac{z^2 * p * (1 - p)}{e^2}$$

Equation 1: Sample size formula (Israel, 2018)

$$n = \frac{1.96^2 * 0.83 * (1 - 0.17)}{0.05^2} = 216.82 \approx 217 \text{ (approx.)}$$

Wherein,

n: sample size

z: confidence level z score value (that is, 1.96 at 95.0 percent confidence level)

p: proportion of the population participating in the study (83.0 percent or 0.83)

e: desired level of precision or margin of error (that is 0.05)

As the sample size derived is 217, and thus, approximately 220 respondents were considered from which data would be collected using Google Forms. Here, the 185 students were divided as, 90 male students of engineering, 45 male students of nursing, and 50 female students nursing, besides 35 faculty members of NBU, divided as 20 males and 15 females. Table 1 shows samples categories.

Table 1: Stratified sampling method used for sample selection

Members of NBU	Student	Engineering	Male
		Nursing	Male
			Female
	Faculty member	Engineering	Male
		Nursing	Male
			Female

The primary data under study has been collected through a close-ended, semi-structured questionnaire that contains questions under three heads, namely, demographic, background information, and inferential. Demographic profile consists of all questions related to demographical characteristics, that is, age, gender, income, or profession, the background helps in assessing the knowledge of respondents about

the concerned area, that is, HIEPs and Online education, and the inferential section consist of questions on online education influence on HIEPs effectiveness. Herein, below stated hypothesis is tested at (5%) level of significance.

H_{01}: Online education does not have any significant influence on the effectiveness of applying HIEPs in higher education.

The sub-hypotheses are stated below.

$H_{01.1}$: Situational factors do not have significant influence on the effectiveness of HIEPs using online education.

$H0_{1.2}$: Institutional factors do not have significant influence on the effectiveness of HIEPs using online education.

$H0_{1.3}$: Dispositional factors do not have significant influence on the effectiveness of HIEPs using online education.

The demographic and background analysis has been done using frequency-based analysis in SPSS while the inferential section is examined using statistical tools, that is, correlation and regression analysis.

To ensure that the study is reliable and valid, since there is uniformity in the data throughout, and the research instruments, processes, and analysis tools used in study are trustworthy, Cronbach's alpha test has been applied to the questionnaire for determining the reliability of questionnaire. As reliability is an important component, which defines the effectiveness or applicability of results, it is essential to examine the reliability. Cronbach's alpha test with assessment of all the independent statement capacity defines whether the derivation made from including these statements in the model to compute impact on dependent variable are significant or not (Mohamad et al., 2015). If the value is more than 0.7, then efficient results could be derived while examining the relationship. This study also adheres to the required research ethics, and hence the anonymity of respondents has been maintained in the study and the findings are kept secured in accordance with the university guidelines. It has also been assured that the study is plagiarism-free by providing a compiled list of data sources. Thus, the results derived from the analysis would be valid, reliable, and ethical.

RESULTS AND DISCUSSION

With the aim to examine the impact of online education on the effectiveness of HIEPs in higher education, the statistical examination of the perception of students and faculty members would be done. Online education in this time of COVID-19 serves as a medium to support the educational qualifications of students, but the existing complexity and accessibility issues tends to impose challenge in virtual environment. Thus, this section would examine the perception of 185 students and 35 faculty members of NBU using a close-ended questionnaire. Assessment of their demographical characteristics is shown in Table 2, which shows that most of the respondents are from the age group below 20 years, that is, 40.5 percent. Further, 26.8 percent of them are between 20-30 years, 15.9 percent between 30-40 years, 11.8 percent from the 40-50 years age group, and remaining 5.0 percent are above 50 years. 70.5 percent of the participants were male and only 29.5 percent of the respondents were female. The demographic characteristics thus show presence of high gender inequality.

Table 2: Demographical profile analysis

		Percent
Age	Blow 20 years	40.5
	20-30 years	26.8
	30-40 years	15.9
	40-50 years	11.8
	Above 50 years	5
Profession	Student	84.1
	Faculty member	15.9
Gender	Male	70.5
	Female	29.5
Working	Full time	100
Department	Engineering	48.2
	Nursing	51.8
Monthly income	Below 10k SR	21.8
	10k-20k SR	26.4
	20K-30K SR	18.2
	30K-40K SR	20.05
	Above 40K SR	13.2

Profession of participants represents that about 84.1 percent are students while only 15.9 percent are faculty members wherein all of them are a full-time part of the institution. Among the total 220 respondents, 48.2 percent of them are from the Engineering department while 51.8 percent were from Nursing. Lastly, the monthly family income level depicts that most of the participants belong to the middle class income level with 26.4 percent having an income of SAR 10,000-20,000, 18.2 percent with income of SAR 20,000-

30,000, and 20.5 percent as SAR 30,000-40,000. Further, in order to understand the knowledge level of the respondents about the HIEPs and the contribution of online education in their institution, the background analysis is done.

Table 3 shows that 92.7 percent of the institutions under Northern Border University work on implementation of HIEPs. Mostly, at 35.3 percent, the respondents stated that their institutions work on implementation of first year seminars and experience, common intellectual experience (20.9%), learning communities (17.7%), and undergraduate research program (25.9%). Further, about the contribution of online education in supporting HIEPs, about 77.3 percent accepted its role in improving higher education experience.

Table 3: Awareness about HIEPs and online education

		Percent
Implementation	Yes	92.7
	No	7.3
HIEPs	First year experiences	35.5
	Common intellectual experiences	20.9
	Learning community	17.7
	Undergraduate research	25.9
Usage	Yes	77.3
	No	22.7

Examination of the respondents, as shown in Table 4, depicts that 29.1 percent mention that online education supports the HIEPs in providing better understanding of information, 18.2 percent about the personal development, 16.4 percent on better communication facility, 10.9 percent on the better student faculty interaction, and 9.1 percent on the aspect of higher student engagement. Further, highlighting about weaknesses, about 20.5 percent mentioned that online education does not support transferability of skillset, 14.1 percent identified difficulty in having substitution availability for teaching mechanism, 13.6 percent stated requirement of technical skill set, 12.7 percent mentioned about lack of accreditation with online education, 11.8 percent of them described about too much reliance on internet and technology for education, and about 10.5 percent stated about more efforts and time requirement for supporting HIEPs with online education.

Table 4: Background analysis- strength vs. weaknesses

		Percent
Strength	Deep learning	5.5
	Academic performance	7.3
	Writing and critical thinking	3.6
	Student interaction	10.9
	Student engagement	9.1
	communication	16.4
	Personal development	18.2
	Understanding of information	29.1
Weakness	Non-transferability of skills	20.5
	Technical skill set requirement	13.6
	Too much reliance	11.8
	Substitution difficulty	14.1
	Lack in online quality	8.2
	constant change	8.6
	Constant efforts and time	10.5
	Lack of accreditation	12.7

Discussing about the opportunities available with usage of online education in supporting HIEPs, as shown in Table 5, about 20.9 percent mentioned competitive advantage availability, 16.4 percent of them defined availability of smart technologies, 13.6 percent stated about students' persistence, 11.8 percent identified promotion of diversity with online education, 10.9 percent of them mentioned about innovative environment availability, and 10.9 percent about meeting market demand. Lastly, about the threats associated with this virtual environment-based education, about 32.3 percent mentioned about lack of trained faculty, 25.9 percent about limited resources, 14.5 percent about large investment required, and 10.5 percent about the continuous upgradation need. Thus, the background analysis of the participants knowledge show that most

Table 5: Background analysis- Opportunities vs. threats

		Percent
Opportunities	Competitive advantage	20.9
	Student persistence	13.6
	Long term success chance	8.2
	Smart technologies	16.4
	Meeting market demand	10.9
	Innovative environment	10.9
	Appropriate decision making	7.3
	Promotion diversity	11.8
Threats	Continuous upgradations need	10.5
	Limited resources	25.9
	Lack of trained faculty	32.3
	Large investment	14.5
	Mismanagement	9.1
	Lack of institutional data	7.7

of the institutions are implementing HIEPs and even believe that online education supports the HIEPs implementation. Further, respondents stated that online education helps in a better understanding of information, personal development, or better communication facility whereas non-transferability of skillset, difficulty in substitution, requirement of technical skill set, and lack of accreditation are the weaknesses of using online education in higher education.

Online Education on the Effectiveness of Applying HIEPs in Higher Education

H_{01}: Online education does not have any significant influence on the effectiveness of applying HIEPs in higher education.

For assessing this hypothesis statistically, the effectiveness of HIEPs using online education is determined by examining the influence of situational, institutional, and dispositional factors of online education.

Impact of Situational Factors on the Effectiveness of HIEPs Using Online Education

As with online education, the environment and the existing situations change, thus they could influence the effectiveness of HIEPs in higher education. The statements considered for the situations factors with online education are allotted a code for simplifying the analysis procedure. Coding for these statements is shown in Table 6.

Table 6: Coding for situational factors of online education

Statement	*Code*
Situational factors on the effectiveness of HIEPS using online education	SFHIEP
The learning environment motivated the students to be engaged	SF1
Reduction in other work obligations could improve my learning experience	SF2
Better interaction and presence of mutual respect promote effective teaching	SF3
Effective usage of time with online education enhances learning experience	SF4
With more practical and interactive approach, students are motivated	SF5
Prior knowledge and skill set of individuals makes the process more effective	SF6
Balanced and smart working enable effective functioning	SF7
Better applicability of knowledge is available with online education	SF8

As per the above stated coding, the efficiency of the statements in measuring situational factors need to be determined. For this, reliability analysis is done. Results shown in Table 7 depict that for the selected 8 statements used to represent situational factors, the value of Cronbach's alpha is ($0.91 > 0.70$). As the value is more than the required level, thus, the selected statements are efficient enough to measure the impact of them on HIEPs effectiveness.

Table 7: Reliability analysis for situational factors of online education

Cronbach Alpha value	*No. of statements*
0.91	8

Now, linkage between the statements needs to be built using the correlation analysis. Results of the analysis are shown in Table 8.

Table 8: Correlation analysis for situational factors of online education

SFHIEP	*Pearson Correlation*	*Significance value*
SF1	0.76	0.00
SF2	0.72	0.00
SF3	0.65	0.00
SF4	0.60	0.00
SF5	0.53	0.00
SF6	0.54	0.00
SF7	0.42	0.00
SF8	0.55	0.00

Correlation analysis shows that the significance value for all the statements is 0.00, which is less than the significance value of 0.05. Thus, there is possibility of having significant linkage between the variables. The Pearson correlation value further represents that other than SF7 (0.42) all statements have value more than required level of 0.5. Hence, a significant relationship between the situational factors of online education and effectiveness of HIEPs in higher education exists. Further, the impact determination could be done by having statistical testing of the below stated hypothesis, that is:

$H0_{1.1}$: Situational factors do not have significant influence on the effectiveness of HIEPs using online education.

$HA_{1.1}$: Situational factors have significant influence on the effectiveness of HIEPs using online education.

Herein, regression analysis would be done for determination of the situational factors of online education influence on HIEPs effectiveness in higher education. Results of the analysis are shown in Table 9.

Table 9 shows that R2 and adjusted R2 is 0.70 and 0.69 respectively, wherein adjusted R2 value depicts that about 69.0 percent of variation in the HIEPS effectiveness is being represented by the situational factors of online education. F-ratio value of the model is 70.61 > 1, thus more precision in the computation of impact is determined by having the inclusion of situational factors of online education as independent variable. Further, the p-value testing shows that for SF1 (0.00), SF2 (0.01), SF3 (0.00), and SF4 (0.01), the value is less than 0.05. Thus, the null hypothesis of not having any significant influence of situational factors on the effectiveness of HIEPs using online education is rejected. Lastly, coefficient value depicts that a one percent increase in SF1, SF2, SF3, and SF4 will lead to rise in effectiveness of HIEPs by 0.40 percent, 0.20 percent, 0.22 percent, and 0.19 percent, respectively. Hence, with the availability of a motivated learning environment for engaging students, reduction in other work obligations, better interaction, presence of mutual respect, and effective usage of time with online education, tend to improve the effectiveness of HIEPs in higher education.

Impact of Institutional Factors on the Effectiveness of HIEPs Using Online Education

The institutional factors tend to influence the teaching and learning facilities, and thus, they could have an impact on the effectiveness of HIEPs in higher education. Thus, coding for the selected institutional factor statements is shown in Table 10.

Table 10: Coding for institutional factors of online education

Statement	*Code*
Institutional factors on the effectiveness of HIEPS using online education	IFHIEP
Fewer resources requirement with online education improves the effectiveness of learning	IF1
Less workload is imposed on teaching and learning procedure with online education	IF2
More preparation time is involved with the online education	IF3
Pressure of regular upgradation is imposed for providing effective knowledge	IF4
Better infrastructural facilities for supporting online education motivate students	IF5
Smart technology is available for linking theoretical knowledge with reality	IF6
Better compensation opportunities are available	IF7
Technical issues and lack of technical expertise support hamper the learning experience	IF8

Based on the above stated coding of the institutional factors and HIEPs effectiveness, the efficiency of the statements in measuring the institutional factors need to be examined. Herein, the reliability analysis would be done wherein, the value of Cronbach's alpha for the selected statements is 0.90 > 0.70, as shown in Table 11. Having the value of Cronbach's alpha more than the required value, the analysis represents that statements could efficiently measure the impact of online education institutional factors.

Table 11: Reliability analysis for institutional factors of online education

Cronbach Alpha value	*No. of statements*
0.90	8

Table 9: Regression analysis for situational factors impact on HIEPs effectiveness using online education

SFHIEP	*Coefficient*	*T-statistic*	*p-value*	R^2	*Adjusted* R^2	*F ratio*
Constant	-0.11	-0.63	0.53	0.70	0.69	70.61
SF1	0.40	5.44	0.00			
SF2	0.20	2.53	0.01			
SF3	0.22	4.89	0.00			
SF4	0.19	2.72	0.01			
SF5	-0.05	-0.64	0.52			
SF6	-0.08	-0.95	0.34			
SF8	0.11	1.21	0.23			

The linkage between the variables needs to be studied before deriving the impact. For this correlation analysis would be done, results of which are shown in Table 12.

Table 12: Correlation analysis for institutional factors of online education

IFHIEP	*Pearson Correlation*	*Significance value*
IF1	0.67	0.00
IF2	0.44	0.00
IF3	0.33	0.00
IF4	0.68	0.00
IF5	0.65	0.00
IF6	0.67	0.00
IF7	0.69	0.00
IF8	0.62	0.00

The significance value for all statements is $0.00 < 0.05$, and even the Pearson correlation value for statements is above the required value of 0.5 except for IF2 (0.44) and IF3 (0.33). As there is existence of significant linkage between the institutional factors of online education and effectiveness of HIEPs, thus their impact could be studied further. For this, below stated hypothesis would be statistically tested at five percent level of significance, that is:

$H0_{1.2}$: Institutional factors do not have a significant influence on the effectiveness of HIEPs using online education.

$HA_{1.2}$: Institutional factors have a significant influence on the effectiveness of HIEPs using online education.

Based on the above stated hypothesis, relationship between the variables could be built using the regression analysis. Results of analysis are shown in Table 13.

With the R2 and adjusted R2 value of 0.69 and 0.68, the adjusted R2 value represents that about 68.0 percent variation in the effectiveness of HIEPs is represented by institutional factors. F-ratio value of 77.56 is more than one depicting derivation of precision with inclusion of institutional statements as independent variables. The p-value test of the model represents that for IF1, IF2, IF6, and IF7 the value is $0.00 < 0.05$, and thus, the null hypothesis of not having any significant influence of institutional factors on the effectiveness of HIEPs using online education is rejected. Coefficient value further represents that with one percent rise in IF1, IF2, IF6, and IF7 level, there is improvement in effectiveness of HIEPs by 0.26 percent, 0.23 percent, 0.17 percent, and 0.27 percent, respectively. Hence, with online education, as the requirement of resources decreases at a higher level, more reduction of workload takes place, linkage is drawn between theoretical knowledge and reality more smartly, and better compensation opportunities are available, and thus, these aspects would lead to improvement in effectiveness of HIEPs in higher education.

Impact of Dispositional Factors on the Effectiveness of HIEPs Using Online Education

As the attitude and behaviour of an individual have an influence on the educational experience, thus herein the impact on the effectiveness of HIEPs will be determined by statistical examination. Coding for the dispositional factors is shown in Table 14. The coding is for the dispositional factors and the effectiveness of HIEPs. However, before proceeding with the analysis, it is essential to determine the efficiency of selected 7 statements in measuring dispositional factors. For this, reliability analysis is done wherein the Cronbach's alpha value is $0.91 > 0.70$. Thus, with the value of more than the required level, the analysis depicts that selected statements are

Table 13: Regression analysis for institutional factors impact on HIEPs effectiveness using online education

SFHIEP	*Coefficient*	*T-statistic*	*p-value*	R^2	*Adjusted* R^2	*F ratio*
Constant	0.08	0.44	0.66	0.69	0.68	77.56
IF1	0.26	3.02	0.00			
IF4	0.23	4.51	0.00			
IF5	-0.02	-0.28	0.78			
IF6	0.17	3.11	0.00			
IF7	0.27	5.17	0.00			
IF8	0.10	1.61	0.11			

Table 14: Coding for dispositional factors of online education

Statements	*Code*
Dispositional factors on the effectiveness of HIEPS using online education	DFHIEP
More familiarity with online learning technical tools improved my experience	DF1
Enough training is provided to improve the skill set for online learning	DF2
Timely feedback facility is available for ensuring the effectiveness of educational mechanism	DF3
Online learning environment is not inherently motivating	DF4
My preference is for impersonal communication	DF5
More probability of distraction hampers my learning experience	DF6
Less demanding and more practical aspect of assignments motivates me to be engaged with learning	DF7

reliable and efficient to measure dispositional factors of online education, as shown in Table 15.

Table 15: Reliability analysis for dispositional factors of online education

Cronbach Alpha value	*No. of statements*
0.90	8

Based on these coding and reliability results, the linkage of the variables is studied using correlation analysis before having any impact derivation. Results of the analysis are presented in Table 16, which shows that the significance value for all statements is less than 0.05, and thus, there is a possibility of having a significant linkage between variables. Further, having the Pearson correlation value of all statements except DF2 (0.34) as greater than 0.5, thus, there is presence of a linkage between dispositional factors of online education and effectiveness of HIEPs. Hence, the impact assessment of the variables could be done by having statistical examination of the below stated hypothesis, which are:

Table 16: Correlation analysis for dispositional factors of online education

DFHIEP	*Pearson Correlation*	*Significance value*
DF1	0.55	0.00
DF2	0.34	0.00
DF3	0.61	0.00
DF4	0.63	0.00
DF5	0.69	0.00
DF6	0.58	0.00
DF7	0.63	0.00

$H0_{1.3}$: Dispositional factors do not have a significant influence on the effectiveness of HIEPs using online education.

$HA_{1.3}$: Dispositional factors have a significant influence on the effectiveness of HIEPs using online education.

Thus, for relationship building between dispositional factors of online education and effectiveness of HIEPs, the regression analysis would be done, results for which are shown in Table 17.

The R2 and adjusted R2 value is 0.60 and 0.58 respectively, representing about 58.0 percent variation in the effectiveness of HIEPs, as being represented by the dispositional factors of online education. The F-ratio value of 52.24 > 1 depicts more precision derivation by inclusion of all the statements of dispositional factors as independent variables. The P-value testing represents that for statements like DF1 (0.00), DF3 (0.00), DF5 (0.00), DF6 (0.02), and DF7 (0.05), the values are less than the required level of 0.05, and thus null hypothesis of having no significant influence of dispositional factors on the effectiveness of HIEPs using online education is rejected. Lastly, coefficient value represents that with 1.0 percent improvement in DF1, DF3, DF5,

Table 17: Regression analysis for dispositional factors impact on HIEPs effectiveness using online education

DFHIEP	*Coefficient*	*T-statistic*	*p-value*	R^2	*Adjusted* R^2	*F ratio*
Constant	0.28	1.47	0.14	0.60	0.58	52.24
DF1	0.28	5.36	0.00			
DF3	0.30	3.61	0.00			
DF4	-0.13	-1.11	0.27			
DF5	0.53	6.70	0.00			
DF6	-0.25	-2.40	0.02			
DF7	0.19	2.00	0.05			

and DF7, and the effectiveness of HIEPs increases by 0.28 percent, 0.30 percent, 0.53 percent, and 0.19 percent respectively, while with the rise in DF6 by one percent the effectiveness decreases by 0.25 percent. Hence, as more familiarity with online learning tools takes place, rise in timely feedback facility takes place, more preference is for impersonal communication, and more practical aspect with online education tends to raise the effectiveness of HIEPs in higher education while with more probability of distraction the effectiveness of HIEPs decreases.

Thus, the analysis shows that online education through having its contribution in creating motivated learning environment, reduction in other work obligations, better interaction, effective usage of time, reduction in resources requirement, workload decrease, smart linkage with reality, better compensation, more familiarity with online learning tools, timely feedback, impersonal communication preference, and practical aspect, there is rise in effectiveness of HIEPs in higher education institutions.

The Kingdom of Saudi Arabia with the evolution of the job market needs and the advancement of technologies has focused on modernisation of their education system. With the escalation of focus on enhancing educators' skills, digitalisation of education, and the curriculum advancement, the higher education institutions has begun implementation of HIEPs. However, with the outbreak of COVID-19 and the promotion of digital education at a global level, there has been a transition of traditional education system to online education. This integration of IT in education though brings in the benefits, but still the associated challenges in form of income inequalities, lack of access to Internet, lack of technical expertise, or limited availability of resources hamper the effectiveness of HIEPs in higher education. Thus, focusing on this aspect, the study works on examining the role of online education in supporting HIEPs by evaluating the variation in effectiveness of HIEPs using online education.

Using the quantitative analysis focuses on collection of 220 respondents' perception from NBU wherein 185 of them were engineering students and 35 of them were faculty members. With mostly young and middle-aged people from the middle-class income family having monthly income between SAR 10,000 and 40,000, the respondents state that first year experience, common intellectual experience, learning communities, and undergraduate research are commonly used HIEPs in Northern Border University. Further, supporting the role of online education in higher education, respondents believe that online education helps in better understanding of information, personal development, or better communication facility but with issues like difficulty in substitution, requirement of technical skill set, and lack of accreditation.

Competitive advantage availability, defined availability of smart technologies, student's persistence, promotion of diversity, and an innovative environment are some of the opportunities available for online promotion but there are also challenges like lack of trained faculty, limited resources, large investment required, and continuous upgradation need, which work as threats for the virtual environment implementation. Examination of the role of online education in supporting effectiveness of HIEPs stated that situational factors, institutional factors, and dispositional factors of online education tend to help higher education institutions through creation of motivated learning environments, other work obligations reduction, better interaction, reduction in resources requirement, effective usage of time, smart linkage with reality, workload decrease, better compensation, timely feedback, more familiarity with online learning tools, practical aspect and impersonal communication preference. These aspects lead to motivating students and faculty members, which in turn leads to improvement in the teaching and learning experience and derivation of effectiveness in HIEPs implementation. Capstone projects, internships, undergraduate courses, and writing-intensive courses are some among the eleven HIEPs. This is supported by Kuh (2008), who suggested that the implementation of HIEPs contributes to improving the overall learning experience of students (Riehle and Weiner 2013). With the outbreak of COVID-19 and the preference towards adoption of education technology, there has been shift from the tradition education system to an online education system. However, this transition and integration of Information Technology (IT) in education has many challenges, that is without access to reliable internet, gap in income brack-

ets, or lack of technical expertise, and this is supported by Li and Lalani (2020). Even, the implementation of HIEPs with online education system still remains a major challenge, mainly due to a lack of professional competency among educators, and the paucity of required infrastructure, while this fact is in line with the study presented by Morris et al. (2019) and Montelongo (2019).

However, online education using HIEPs in higher education institutions have strengths such as better information understanding, personal development, communication facility improvement, high student engagement, and better study faculty interaction, and weaknesses of non-transferability of skillset, difficulty in substitution availability, requirement of technical skill set, more reliance IT, more time and efforts requirement, and lack of accreditation facility with a virtual environment. However, with the aspects like competitive advantage, availability of smart technologies, students' persistence, promotion of diversity, and innovative environment availability, there is opportunity available for establishing a well-developed online education environment but threats like lack of trained faculty, limited resources, large investment requirement or continuous upgradation need tend to hamper the growth path.

CONCLUSION

Online education is today's global education market with the shift to virtual environment-based learning and the outbreak of COVID-19 has become an effective tool. However, the associated challenges in form of limited access to Internet, income inequality, and even lack of technical expertise prevent this implementation in supporting HIEPs.

With the rise in focus on technical and more practical knowledge, Saudi Arabia has changed its traditional education mechanism and prioritised high quality of knowledge and skills for students. However, the existence of challenges like raising demands of students, difficulty in securing resources, and meeting education, have hampered the upgradation of system. Even though with time Saudi Arabia has started to adopt innovative learning mechanism and even implement online education, issues like lack of infrastructure, supportive local telecommunication facility not being available, technology gap, lack of student motivation, or course design in traditional form persist. HIEPs by overcoming the academic issues provide better academic performance, diversity appreciation, rise in student engagement, opportunity of applying the knowledge to real world or even deep learning experience, contributing to an improving learning experience and building in connection between student and faculties. However, the limitation is inability to attend the classes and traditionally implement HIEPs. Thus, there is a need to integrate HIEPs with the IT sector. In this scenario of COVID-19 or the virtual environment-based education, a deep learning mechanism through HIEPs is thus implemented via online education. Removing the time and location barriers and providing one-to-one individualised interaction between educators and the learners, online education serves to overcome geographical limitation and connecting students with faculties. Thus, online education not just provides education to students but also supports the effective HIEPs implementation.

Though the study has statistically examined the role of online education in supporting HIEPs and even drawn important conclusion about its contribution but still there is a limitation of a small sample size in the study and even not any specific assessment is done for identifying the effective HIEPs. Thus, future studies could focus on having the detailed examination of different higher education institutions in order to generalise the role of online education in supporting HIEPS for Saudi Arabia's 2030 Vision. A comparison of different HIEPs could be done to identify the most effective practice for higher education institutions in this modern technology-based era.

RECOMMENDATIONS

Based on the conclusions drawn above, government and institutions are recommended to use below stated strategies for coping with these issues of online education and inculcating a more effective learning experience.

Organisation of developmental workshops should be undertaken for faculty members and students in order to train them with technical skill sets and improve their ability to access online education.

In addition, appropriate infrastructural facilities should be developed, that is, the government should take efforts to increase the accessibility of internet by providing free internet facilities or taking help from the telecom sector should develop education packs of internet at least price. Besides, financial support should be provided to help the institutions and students in their education experience in the form of grants or scholarships.

On the other hand, centres should be built in education supporting virtual environment-based education, and regular monitoring and accreditation of these institutions should be undertaken by the government for having standardisation of education quality. Whilst development of virtual environmental portal or the application should be undertaken by the institution or in partnership with online education applications the online education needs to be provided to students for effective education delivery.

Lastly, regular monitoring should be done for keeping a track of the education quality and even feedback should be taken from students, parents, and faculty members to support the continuous upgradation need of online education tools.

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