



What Has Been the Impact of COVID-19 on *Driving* Digitalization, Innovation and Crisis Management of Higher Education and Quality Assurance?—A Taiwan Case Study in Alignment with the INQAAHE Virtual Review

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Abstract

The impact of COVID-19 on higher education and quality assurance (QA) has already elicited global attention and discussion. QA agencies and networks quickly learned to adapt in order to carry out assessments, accreditations, recognitions, and reviews in a full virtual mode. These practices include using shared folders for virtual desk review, video conferencing platforms for interviews, and virtual site visits. In order to respond to the 2020 pandemic, The International Network for Quality Assurance Agencies in Higher Education (INQAAHE) swiftly adopted a virtual mode of the GGP review exercise for the GGP alignment applicants. The Higher Education Evaluation and Accreditation Council of Taiwan (HEEACT) was the first case that underwent a thorough virtual review process of GGP alignment during the 2020 pandemic. Therefore, this study aims to outline the impact of the pandemic in Taiwan higher education as well as provide the meta-analysis of the virtual review process of the INQAAHE GGP alignment by using HEEACT as a case study.

Keywords INQAAHE guidelines of good practice · Virtual review · Quality assurance · HEEACT

Introduction

Virtual technologies have long been used by HEIs and quality assurance agencies (QAA) to facilitate teaching, learning and knowledge production on campuses and to ensure quality of education. The implication of virtualization in

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higher education (HE) has not only created new thoughts of “spatiality, materiality and embodiment” (Taylor and Dunne, 2011) in the teaching and learning environment but also driven innovative QA practices. Taylor and Dunne (2011, 623) argued that “this transformative power of digital technology is reconfiguring learning, knowledge and academic identities in the contemporary university”. While HEIs often use online learning platforms to facilitate institutional governance and teaching and learning activities, QAA also attempts to take advantage of an online review system to monitor quality of HIEs and programs on a regular basis before a physical onsite visit takes place (Hou et al., 2021).

The impact of COVID-19 on HE and QA has already elicited global attention and discussion (Brown and Salmi, 2020, 2020; Hou et al., 2021). The institutional swift move to online education forced QA networks and agencies to mitigate negative consequences and find new ways to adapt. Inevitably, QA networks quickly learned to adapt to carry out assessments, accreditations, recognitions, and reviews in a full virtual mode. These practices include using shared folders for virtual desk review, video conferencing platforms for interviews, and virtual site visits. As Grolimund, the European Association for Quality Assurance in Higher Education’s (ENQA) President, stated, “onsite visits were previously considered the core of external quality assurance. If COVID-19 stays with us, we will have to rethink our methodologies” (Grolimund, 2020, 1).

Founded in 1999, the International Network for Quality Assurance Agencies in Higher Education (INQAAHE) aims to be a platform for information-sharing on good practices for quality improvement in HE between QAA (International Network for Quality assurance Agencies in Higher Education (INQAAHE), 2018). To assist in the self-review of QAA and ensure the quality of external QA mechanisms, it has developed good principles and practices, entitled *the Guidelines of Good Practice in Quality Assurance* (GGP) in 2003. In 2016, INQAAHE revised the GGP, with focuses on QA of cross-border HE, integrity of quality assurance agencies and the links to the quality assurance community. Currently, 11 national QAA have been recognized as the GGP aligned agencies (International Network for Quality assurance Agencies in Higher Education (INQAAHE), 2021). In order to respond to the 2020 pandemic, INQAAHE swiftly adopted a virtual mode of the GGP review exercise for the GGP alignment applicants. The Higher Education Evaluation and Accreditation Council of Taiwan (HEEACT) was the first case that underwent a thorough virtual review process of GGP alignment in 2020 during the pandemic (Higher Education Evaluation Accreditation Council of Taiwan (HEEACT), 2020). Therefore, this study aims to outline the impact of the pandemic on Taiwanese higher education, as well as provide the meta-analysis of the virtual review process of the INQAAHE GGP alignment by using HEEACT as a case study. Based on the discussion above, three research questions are addressed as follows:

1. What was the impact of the pandemic on Taiwanese higher education, according to the perspectives of university administrators and faculty members participating in the HEEACT INQAAHE GGP Review?

2. How did the HEEACT GGP reviewed participants perceive the innovative efforts and digital procedures of the INQAAHE virtual onsite visit?
3. What was crisis management model developed by quality assurance agencies and the emerging issues and challenges during and after the pandemic?

Literature Review

Covid-19 Impact Over Higher Education and Quality Assurance and International QA Network Principles

In order to drive economic growth and develop a knowledge-based society, HE expansion has become integral in a globalized world since the 1990s (Marginson, 2011; Mok and Neubauer, 2016). Doubling enrolment in HEIs represented a growing demand for students, required to acquire a set of new skills at HEIs in order enter the job market. At the same time, pressured by “increasing public accountability and the expectations of continuous improvement” (Sun, 2017, 35), state regulation over university’s quality, underpinned the establishment of national quality assurance systems worldwide (Shin, 2018; Hou et al., 2015). To date, more than 150 nations have established a national quality assurance system (International Network for Quality Assurance in Higher Education (INQAAHE), 2020a).

COVID-19 produced an immediate global lockdown that forced governments and universities to adopt a contingency plan for teaching and learning activities on campus. The abrupt transition to online learning under COVID-19 established remote working models with dependable IT infrastructure, which indeed challenges the traditional mode of external reviews undertaken by most QAAs. Although QA may not be at the forefront of most governments’ concern during this pandemic, it can definitely affect the academic development of universities and QA implementation (International Network for Quality Assurance in Higher Education (INQAAHE), 2020a). On one hand, the conventional model of onsite visits has quickly shifted into a virtual mode; on the other hand, the accreditation validity would likely be extended due to limitation of technology and travel (Martin and Furiv, 2020; Brown and Salmi, 2020, 2020; Hou et al, 2021). The CHEA US and INQAAHE both conducted a survey of the impact of COVID-19 on quality assurance agencies, and their responses after the outbreak of the pandemic. Both surveys found that QAA and accrediting bodies readjusted the traditional mode of EQA and paid more attention to online learning quality. The CHEA study showed that more than a half of QAA in the US had postponed some visits and made others virtual. 71% of respondents had extended the terms of accredited status. When it comes to the standards for online learning, 80% of respondents replied that they requested institutions or programs to continue to meet the existing standards via a remote-learning approach. Only a small percentage, less than 11%, said that they applied some special standards or policies on a temporary basis for the scrutiny of remote learning (Council for Higher Education Accreditation (CHEA), 2020). The 2020 INQAAHE global report found that 74% of responding agencies were running remotely and 51 % of INQAAHE full members faced a financial crisis due to cancellation of onsite visits and withdrawal

of EQA applications. To some extent, quality assurance agencies were attempting to support HEIs by providing online materials and resources, developing QA guidelines for their transition to online learning and launching QA action plans in conjunction with government policies (International Network for Quality Assurance in Higher Education (INQAAHE), 2020b).

In support of QAA and HEIs dealing with the emergency situation, INQAAHE published the statement “*INQAAHE’s affirmation of support during COVID-19 pandemic*” on April 23, 2020, with eight principles for crisis management in QA, including adherence to integrity in assuring quality in HEIs; maintaining student learning experiences and engagement; ensuring equity and access as the top priorities; remaining close to higher education institutions and sharing quality guidelines with them; launching clear communication plans for confidence building over QA agencies; continuing to enhancing the role of enhanced partnership and sharing good practices; and adapting to unforeseen circumstances in the unprecedented crises (International Network for Quality Assurance in Higher Education (INQAAHE), 2020c). Similarly, ENQA, as the regional QA network in Europe, published a statement for its members regarding review methodology, QA integrity and emergency legislation for accreditation and licensing periods, alternative forms of assessments, and recognizing online degrees. It allowed QAA to “conduct review processes and site visits entirely online and/or extend the validity of accreditations are fully permissible under the ESG” (Gover, 2020, 1). In other words, QA would not be explicitly required to conduct a site visit as part of review processes, or to insist on the frequency of review processes under the crisis. However, the statement claimed that QA integrity in virtual visits shall be confirmed, and QAA are encouraged to explore “the options for conducting review processes online in order to restart their activities if social distancing measures remain in place for some time” (Gover, 2020, 1) (Table 1).

Conceptualizing Digitalization, Innovation and Crisis Management in Higher Education and Quality Assurance

Digitalization and innovation have been key catalysts driving HE reform. (Pavel et al., 2015, 705–706) highlighted that “ICT is central to today’s most modern economies and the money spent on IT and IT related processes worldwide is continually growing” and “the development of ICT’s readiness, intensity and impact would lead the nation toward an information and knowledge-based society”. Innovation is characterized as a changing concept, behavior, and policy (Aceto et al., 2010), which would “take into account the community where it is located, with the aim of responding to its real, internal and surrounding needs” (Pavel et al., 2015). There is considerable literature indicating that innovation is supposed to intertwine with digitalization in order to drive an expansion of distance provision and a change to brick and mortar universities (Naidu, 2003; Guri-Rosenblit, 2014). As a matter of fact, it has been argued that digitalization may not substantially change traditional behaviors, if it adopted incrementally instead of with a disruptive approach (Flavin and Quintero, 2018). *Incremental innovation* means to make “self-improvement” internally in products, processes, organizations and

Table 1 Changes and challenges for QA agencies and HEIs in six dimensions. *Source:* By authors

Items/issues	QA	Higher education institutions	Challenges
Methodology	Change Review procedures/Virtual visit	Measuring student learning experiences and engagement in practical training	Effectiveness of virtual on site is questioned
Accreditation status/validity	Prolong accreditation period	Validity of the program	Termination of program accreditation would lead to emergence of low quality of provisions
Integrity	Confidentiality of review panel discussion and documents reviews	Academic integrity in student recruitment, class participation, examination, and assessment	Reliability of review decisions
Equity	Different standards for online degrees	Inequality for the underprivileged groups of students without sufficient technology for online learning	Lack of IT infrastructure for on line learning mode and QA
Finance	No fees from reviewed universities	Can't afford accreditation fees	Sustainability
Partnership	Guidelines and support for higher education providers	Communication and support with QA agency are insufficient	No guidelines and resources in place for universities

existing social systems (Aceto et al., 2010; Arruda et al., 2018; Flavin and Quintero, 2018). In contrast, *disruptive innovation*, which is associated with disruptive technologies (Flavin and Quintero, 2018), refers to the situation that “it emerges in an exploratory way, and greater opportunities to innovate do not improve what is already there, but create solutions for needs still unmet” (Arruda et al., 2018, 4). Accordingly, ICT is expected to focus on disruptive innovation in order to execute “significant explanatory power in thinking through the challenges and changes confronting higher education under crisis” (Al-Imaraha and Shieldsa, 2019, 261). Electronic documents, files, and online systems for cross-institutional data collection had been widely adopted in HE and QA systems prior to the pandemic, as a matter of fact, digitalization is often applied in a blended model including both online and offline practices in an incremental innovation mode (Eaton, 2020). It is argued if a disruptive innovation approach would better find a quick solution to the crises under the pandemic.

In response to the global health crisis, governments, HE and QAA widely adopted an approach for crisis management International Network for Quality Assurance in Higher Education (INQAAHE), 2020c; Hou et al., 2021). When a “salient, unexpected, and potentially disruptive crisis” occurs in an organization, it threatens organizational operation (Bundy et al., 2017, 1162). The issue of how to manage, or handle, the crisis is imperative for the survival of an organization. Crisis management is defined by the International Organization for Standardization (ISO) as a process used to identify “potential impacts that threaten an organization” and to provide “a framework for building resilience, with the capability for an effective response that safeguards the interests of the organization’s key stakeholders, reputation, brand, and value-creating activities, as well as effectively restoring operational capabilities” (ISO 2011, 3). Most importantly, it involves a variety of stakeholders rapidly developing a plan for “mitigation response, and continuity or recovery in the event of an incident”. All in all, governments, HEIs and QAA are required to produce contingency plans to tackle negative impacts resulting from any occurrence of crisis. Hou et al. (2021) proposed that a new relationship among governments, universities and QA should be formed with a triangular coordination of autonomy, flexibility and digitalization in order to handle unexpected consequences and negative impacts under the pandemic. Based on this framework, the revised model includes the concept of disruptive innovation to interpret how flexible QA practices and university’ strategies should be in an international context, while they are adopting a crisis management approach (Figure 1). In addition, the disruptive digitalization over QA practices and institutional governance likely led to the concerns of integrity, inequality, validity and reliability addressed in the INQAAHE statement of crisis management (International Network for Quality Assurance in Higher Education (INQAAHE), 2020c). This revised model mode is implicated to analyze the case study (Fig. 1).

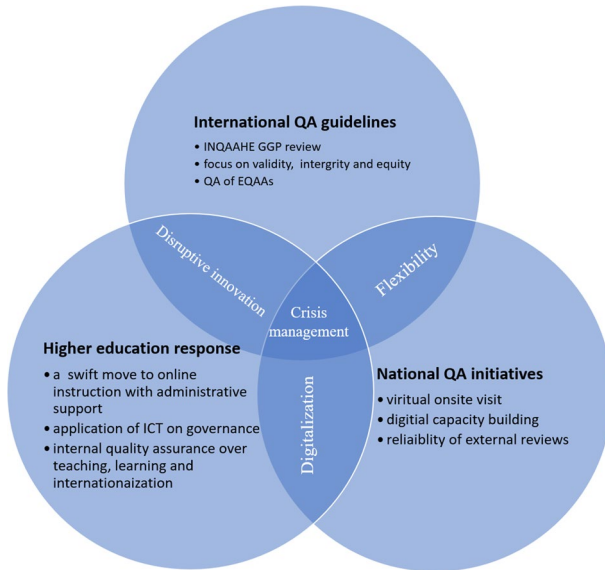


Fig. 1 Conceptual framework of crisis management in higher education and quality assurance in an international context

HEEACT and INQAAHE GGP Review Under COVID-19

HEEACT and Its Contingency Plan Under the Pandemic

As a national accreditor, HEEACT was established in 2005 under the Revised University Act, with joint funds from the Taiwan government and 153 universities and colleges. Institutional accreditation, HEEACT program accreditation, self-accreditation recognition, recognition of local and international accreditors, and overseas program accreditation are the four major QA services provided by HEEACT under a national mandate. In 2017, the MOE decided that program accreditation would be a voluntary process, in which institutions are able to decide whether to conduct their own self-accreditation or, in line with MOE's provision of diverse channels to select one of the recognized EQAA to carry out the process (Hou et al., 2020). By 2021, HEEACT had completed 2 cycles of institutional and program accreditation, and the second phase of self-accreditation recognition. In addition, more than 4 local accreditors and one international accreditor were recognized by HEEACT. Over past two decades, HEEACT has learned and developed its accreditation processes to meet changing global trends and national requirements (International Network for Quality Assurance in Higher Education (INQAAHE), 2020d). It has adopted a student learning outcome-based QA model to empower institutions to develop internal QA mechanisms (Higher Education Evaluation and Accreditation Council of Taiwan (HEEACT), 2020). Under COVID-19, HEEACT shifted its conventional mode to a blended approach due to health safety measures published by Taiwan government. By April 2021, HEEACT could still operate normally, but university and

reviewer workshops were conducted fully online. 130 programs in eight universities completed HEEACT reviews in the year of 2020.

INQAAHE GGP Compliance Review and HEEACT Application

Since QA became recognized as a profession in recent years, QAA, like institutions, “are supposed to be under review and development to ensure that they remain current and relevant on the basis of a systematic scheme for quality” (Hou et al., 2015, 96). As the public becomes more concerned with the effectiveness of quality assurance activities, demonstrating the ‘quality of quality assurance’ is an area of growing interest for all quality assurance agencies (Hou et al., 2015). In other words, QAA are expected to demonstrate accountability and strengthen credibility throughout EQA process. Notably, international QA networks are considered the final quality guardians to “review the reviewers”, that is, they scrutinize agency reviewers to determine whether reviews are conducted in an appropriate manner and in adherence to international standard (Szanto, 2010; Hou et al., 2015).

As part of its ongoing quest for QA enhancement, in 2019, HEEACT undertook an inaugural external review for its compliance with the INQAAHE GGP under the following 6 standards, the structure of the EQAA, accountability of the EQAA, the EQAA’s framework for the external review of quality in higher education institutions, the EQAA and its relationship to the public, decision-making, the QA of cross-border higher education (International Network for Quality assurance Agencies in Higher Education (INQAAHE), 2018). The review was conducted based on HEEACT’s self-assessment report, accompanied by relevant supporting documents, interviews with 48 stakeholders and responses from 61 written submissions. The Review Panel followed closely the GGP External Review Standards in its consideration of the evidence presented during the external review process.

In early 2020, HEEACT submitted the self-assessment report to INQAAHE secretariat and scheduled it to be reviewed by the international review panel in April 2020. Owing to the outbreak of the pandemic, an actual onsite visit was postponed to September 2020. After few months of discussions and communication with the INQAAHE secretariat, HEEACT was informed that a virtual site visit would be carried out instead of a physical visit. Finally, it was determined that a 4-day virtual onsite would be held from October 5 to 8, 2020. As the first case of the INQAAHE GGP virtual review, HEEACT underwent five stages to complete the review successfully, including preparatory stage, SAR writing and consultation, application and communication, virtual onsite visit, and final report and decision (HEEACT, 2020b) (Table 2).

Methodology

The study adopted the HEEACT INQAAHE GGP review as an intrinsic case study because of its unique nature. Via multiple sources of data, the researchers have genuine interests to gain a thorough understanding of the Covid-19 pandemic on Taiwan higher education, as well as to evaluate the implementation of

Table 2 Five stages for HEEACT GGP compliance review. *Source:* authors

Preparatory stage (2017–2018)	<ol style="list-style-type: none"> 1. Stipulate mid- and long-term development project plans according to the HEEACT's historical data. 2. Organize a Task force for INQAAHE GGP review 3. Collect data and relevant documents and translation 4. Improve English website 5. Enhance ICT infrastructure
Self -assessment report writing and consultation (2019)	<ol style="list-style-type: none"> 1. Perceive the content of GGP Review standards and criteria 2. Share the parts of SAR within sections and units at HEEACT 3. Get the feedbacks from Board of Trustees and two independent experts from Australia
Application and communication (Jan–Sept., 2020)	<ol style="list-style-type: none"> 1. Submit the application 2. Digital communication with INQAAHE secretariat 3. Change from a physical visit to a virtual mode 4. Reschedule virtual visit dates
Virtual onsite visit (Oct., 2020)	<ol style="list-style-type: none"> 1. Four-day virtual interview 2. Receive the draft final report 3. Give feedbacks to the draft final report
Final report and decision (Dec., 2020)	<ol style="list-style-type: none"> 1. Decision made 2. Release final report 3. Set the date for self-improvement report submission

the INQAAHE virtual review. According to Crowe et al. (2011, 1), the feature of employing a case study is “to obtain an in-depth appreciation of an issue, event or phenomenon of interest, in its natural real-life context”, while “the boundaries between phenomenon and context are not clearly evident” (Yin, 2009, 18). As the first INQAAHE GGP virtual review case, first, this case study employed both quantitative and qualitative approaches to collect the feedback of the participants of the HEEACT GGP review, including INQAAHE review panel and coordinators, HEEACT working group, HEEACT senior administrators, HEEACT Board of Trustees, and selected university administrators, reviewers, and student representatives during the virtual visit. Based on the three QA experts' consultations, after the INQAAHE review decisions was announced publicly on Dec. 30, 2020 on the website, the study firstly conducted an online survey with a five-point Likert scale from January 1 to February 5, 2021 to perceive the participant opinions over COVID-impacts on Taiwan higher education, their attitude about actual implementation of INQAAHE virtual review, and the future development of the new EQA mode after COVID-19. The survey was distributed to a total of 92 participants, including 6 Directors of Board, 28 university representatives, 13 HEEACT university representatives, 6 student interviewees, 12 international

Table 3 Groups of participants

Groups of participants	No.	%
HEEACT working group	10	21.28
HEEACT staff (members at working groups are not included)	7	14.89
Directors of Board and MOE representatives	4	8.51
University administrators	13	27.66
HEEACT Reviewers	10	21.28
Student representatives	2	4.26
None	1	2.13
Total	47	100.00

Table 4 Codes of participants by nationality and backgrounds

Country	Background	Coding
Australia	Review coordinator	Q1
Honduras	Review coordinator	Q2
UK	Review panel	Q3
Indonesia	Review panel	Q4
Malaysia	Review	Q5
Russia	INQAAHE of Board of Director	Q6
Spain	INQAAHE of Board of Director	Q7

collaborative partners and 27 HEEACT staff. Overall, the return rate is 51% with a number of 47 responses. The collected responses are simply analyzed by mean and STD. Histograms and Normal curve are used to check the frequencies of the distribution (Table 3). The consent form was signed by all participants, who were invited to complete in the survey voluntarily.

Secondly, between May 2021 and July 2021, four review experts, one INQAAHE Directors of Board and two INQAAHE GGP review coordinators were invited to provide their opinions through both virtual interviews and electronic emails with their consents. In compliance with conceptual framework of the study (Figure 1), the interview questions were categorized into four major sections: *crisis management mode for QA and HE under Covid-19, digitalization and flexibility, innovation and QA, challenges for a virtual quality review and the prospect of INQAAHE GGP review, and its impact over QA system in future*. All interviews were transcribed verbatim and transcripts used as one of the major sources of data analysis. To facilitate data analysis, and avoid preconceived ideas or bias, all respondents were given a code that summarized backgrounds (Bazeley and Jackson, 2013). The representatives from QA agencies were coded from Q1 to Q7 (Table 4).

The study used MAXQDA, a software system for qualitative research and text analysis, to identify main themes. Based on preliminary analysis, the Miles and Huberman (1994) method was applied for meaning generation and verification. The method of noting patterns and themes; clustering items into categories; building logical chains of evidence through noting causality and making inferences; and

making conceptual coherence allows typically large amounts of qualitative data to be reduced (Cohen et al., 2007). Triangulation, involving multiple data sources in an investigation to produce understanding, was adopted as a method for verification of major findings (Patton, 2001). Initial findings of the online survey, and interview results were examined closely by cross-verification. Subsequent consistent data and information directly contributed to major findings and conclusion. Those deemed inconsistent were marked as discussion points. To comply with the ethical code, as well as to avoid conflict of interests, three researchers did not occupy their positions at HEEACT while the study was carried out.

Major Findings

The Results of the Survey

COVID -19 Impact Over Taiwan Higher Education According to the Perspectives of University Representatives and HEEACT Staff

Regarding COVID-19's impact on Taiwan higher education, it was found that respondents highly agreed on the university policies and related support and resources provided under the pandemic with faculty members and students scoring between 4.32 and 4.55. In general, effectiveness of online instruction, student learning outcomes and internationalization are the three areas seriously affected by COVID-19 with a lowest score. The survey also showed that there was a gap between an abrupt move to online instruction, teaching efficiency and student learning outcomes with a drop from a score of 4.66 to 2.71 and 2.55, respectively. Even so, more than 90% of the respondents indicated that there was no specific need for readjustment, change and flexibility in learning outcomes assessment measures. In addition, internal QA exercises were neither reduced nor cancelled on campus, but a concern about the negative impact on the implementation of virtual QA exercises remained (Table 5).

When it came to the significance on all dimensions, it was found that there was a high level of consistency among different types of respondents. In other words, the different types of respondents' attitude toward COVID-19 impact on Taiwanese higher education and quality assurance reach consensus, to some extent (Table 6).

INQAAHE GGP Virtual Onsite Visit and HEEACT Role as a Coordinator

Regarding the appropriateness of the online survey conducted by the INQAAHE review panel, less than 80% of the Taiwanese respondents agreed on the use of English to answer the open-ended questionnaires. In contrast, there was a high level of agreement among participants toward the quality of the online interview platform, with a ratio of 4.14. Relatively speaking, use of English and providing interpreter during the interview during virtual onsite became two of the major concerns in the INQAAHE virtual interviews. Besides, 90% of the respondents highly agreed over quality of HEEACT's coordination and its virtual onsite

Table 5 Level of respondents' agreement toward the COVID-19 impact on Taiwan universities

Dimensions	Items	Average recog- nition	SD	95% CI upper limit	95% CI lower limit
Administrative support	Effectiveness of the related policies	4.55	0.69	4.78	4.33
	Sufficient support and resources for students, faculty member and staff	4.32	0.84	4.59	4.04
Faculty teaching	Appropriate responses to the students, faculty members and staff demands	4.32	0.74	4.56	4.07
	Being required to adjust and change of teaching pedagogy	4.66	0.48	4.82	4.50
	Being required to apply online instruction	4.18	0.80	4.45	3.92
Student and learning	Not lowering teaching efficiency	2.71	1.09	3.07	2.35
	Being required to apply new modes of assessment and measures	4.21	0.66	4.43	3.99
	Being required to measure student learning outcomes according to their online learning performance	3.66	0.85	3.94	3.38
Internationalization	No COVID-19 negative impacts on student learning outcomes	2.55	1.03	2.89	2.21
	No reduction of related international activities	1.47	0.56	1.66	1.29
Quality assurance	Increase in online international exchange activities	4.37	0.79	4.63	4.11
	No influencing internal quality assurance exercises	3.11	1.03	3.45	2.77
	Virtual onsite visit by quality assurance agencies	3.21	1.02	3.55	2.88
	No COVID-19 negative impacts on QA overall	2.89	0.92	3.20	2.59

Table 6 Different types of respondents' perception and attitude toward COVID-19 impact on Taiwan higher education

Dimension	Item	HEEACT working group and BOT		HEEACT staff		University administrator/student repres		HEEACT reviewers		P-value
		M	SD	M	SD	M	SD	M	SD	
Administrative support	Effectiveness of the related policies	4.63	0.52	4.00	0.00	4.73	0.46	4.45	1.04	0.273
	Sufficient support and resources for students, faculty member and staff	4.00	0.76	3.75	0.50	4.67	0.49	4.27	1.19	0.131
	Appropriate responses to the students, faculty members and staff demands	4.13	0.64	3.75	0.50	4.53	0.52	4.36	1.03	0.243
Faculty teaching	Being required to adjust and change of teaching pedagogy	4.63	0.52	4.50	0.58	4.67	0.49	4.73	0.47	0.882
	Being required to apply online instruction	3.88	0.99	4.25	0.50	4.13	0.83	4.45	0.69	0.485
	Not lowering teaching efficiency	2.75	1.16	2.75	0.96	2.87	1.30	2.45	0.82	0.830
Student and learning	Being required to apply new modes of assessment and measures	4.25	0.46	4.00	0.82	4.13	0.83	4.36	0.50	0.764
	Being required to measure student learning outcomes according to their online learning performance	3.38	0.92	3.75	0.96	3.67	0.90	3.82	0.75	0.737
	No COVID-19 negative impacts on student learning outcomes	2.50	1.07	2.75	0.50	2.33	1.11	2.82	1.08	0.683
Internationalization	No reduction of related international activities	1.38	0.52	1.75	0.50	1.60	0.63	1.27	0.47	0.339
	Increase in online international exchange activities	4.50	0.76	4.00	0.82	4.40	0.74	4.36	0.92	0.785
Quality assurance	No influencing internal quality assurance exercises	3.00	0.76	2.75	0.50	3.47	1.06	2.82	1.25	0.368
	Virtual onsite visit by quality assurance agencies	3.13	0.99	2.50	1.29	3.27	0.80	3.45	1.21	0.458
	No COVID-19 negative impacts on QA overall	2.75	0.89	3.00	0.82	2.93	1.03	2.91	0.94	0.967

P-value is set at 0.05. If it is higher than 0.05, it means that there is no significant difference among varying respondents

arrangement. The respondents thought HEEACT staff sent them the clear messages of the content and procedures of the virtual onsite schedule and the whole procedures (Table 7).

HEEACT Administrators and Staff Attitude Toward Implementation of INQAAHE GGP Review

HEEACT working group and staff were specifically asked to share their attitudes toward the implementation of the INQAAHE GGP review from the preparation, communication, virtual interviews, feedback mechanism and decision-making. The survey showed that HEEACT respondents highly agreed over the virtual onsite arrangement by the INQAAHE GGP coordinator and the imminent feedback over SAR report from the review panel. However, it seemed quite challenging for HEEACT staff to answer English open-ended questionnaires conducted by the review panel. In addition, digital communication between HEEACT and INQAAHE, at the preparatory stage, was another issue, which could be improved more in future. Overall, more than 75% of HEEACT respondents considered that the virtual mode of the INQAAHE GGP review has ended with a good quality and a higher degree of flexibility under the pandemic (Table 8).

Interview Results

Crisis Management Model and a Virtual Mode of QA Should be Adopted Swiftly by Government, Institutions and QA Agencies Under the Pandemic. As a Matter of Fact, Quality Assurance Is Not the Top Priority According to the QA Expert Perspectives

Seven interviewees all thought that the governments, QA agencies, and the HEIs should quickly respond to the impact of COVID in terms of keeping on assuring the quality in HE as well as operation of virtual QA exercises. As the interviewees stated,

The Governments should start to implement crisis manage mandates relating to social interactions in public areas, workplaces, educational institutions (such as the duration of each lockdown, voluntary isolations for a minimum of 14 days for individuals who have been tested COVID positive), as well as the administration of COVID-19 vaccines to the general population (Q1).

In our context, universities think that survival is the highest priority. Then quality comes later (Q4).

In the first instance as an emergency response, most HE sectors aimed to ensure continued delivery of teaching and assessment and quality assurance was secondary during that period. The QA agencies in Europe were very focused on supporting HEIs to continue with their delivery, rescheduled many accreditation and review visits and this, in turn, was supported by ENQA (Q3).

Table 7 Table: level of respondents' agreement toward INQAAHE GGP virtual onsite visit and HEEACT role

Dimension	Item	Mean	SD	95% CI upper limit	95% CI lower limit
On line Survey	The way HEEACT staff contact interviewees to take part in online questionnaires	4.32	0.79	4.61	4.03
	Format of On-line questionnaires (essay and open -ending questions) 。	4.13	0.72	4.39	3.87
	The content of the questions	4.00	0.86	4.31	3.69
Virtual interviews	Use of English to answer the questions	3.94	0.85	4.25	3.62
	The way HEEACT staff contact interviewees to take part in virtual interviews	4.33	0.58	4.60	4.07
	HEEACT clear message of virtual interviews to the interviewees	4.38	0.59	4.65	4.11
	Quality of virtual platform on the interview date	4.14	0.57	4.40	3.88
	The number of interview group (at least 3)	4.00	0.77	4.35	3.65
	The interview schedule in the afternoon	4.00	0.63	4.29	3.71
	The length of interview (50 min in one interview section)	4.00	0.71	4.32	3.68
Use of English in interview	3.94	0.66	4.28	3.60	
Simultaneous interpreter	3.58	0.79	4.09	3.08	
Interview questions by the panel	4.10	0.54	4.34	3.85	

Table 8 Level of Agreement of HEEACT administrators and staff on INQAAHE GGP Review quality

Dimension	Item	Mean	SD	95% CI upper limit	95% CI lower limit
Communication on preparation prior to onsite visit	INQAAHE secretariat communicating with HEEACT	3.20	0.92	3.86	2.54
	Project coordinator communicating with HEEACT	4.10	0.57	4.51	3.69
	Project coordinator guidance over virtual onsite visit and online questionnaires	3.50	1.08	4.27	2.73
	GGP review feedback mechanism toward SAR	4.00	0.00	-	-
	GGP review schedule INQAAHE GGP	3.70	0.82	4.29	3.11
Online questionnaires	The selection of interviewees and number	3.60	0.97	4.29	2.91
	Format of On-line questionnaires (essay and open -ending questions)	3.40	1.07	4.17	2.63
Virtual onsite visits	The content of the questions	3.60	0.97	4.29	2.91
	HEEACT clear message of virtual interviews	3.88	0.35	4.17	3.58
	Quality of virtual platform	4.13	0.35	4.42	3.83
	The number of interview group (at least 3)	4.13	0.35	4.42	3.83
	The interview schedule in the afternoon	4.13	0.35	4.42	3.83
	The length of interview (50 min in one interview section)	4.00	0.00	-	-
	Use of English in interview simultaneous interpreter	3.83	1.17	5.00	2.61
Feedback mechanism after onsite visit	interview questions by the panel	4.29	0.76	4.98	3.59
	Initial review report and feedback mechanism	4.13	0.35	4.42	3.83
	quality of final report INQAAHE	4.00	0.47	4.34	3.66
	publication of final report INQAAHE GGP	4.10	0.32	4.33	3.87
Overall view over quality of INQAAHE GGP review	follow up mechanism INQAAHE	4.10	0.88	4.73	3.47
	overall quality of INQAAHE GGP review	4.00	0.47	4.34	3.66
		3.80	0.63	4.25	3.35

In most contexts, institutions and quality assurance agencies were guided by the government regulations to develop contingency plans and to shift the conventional external reviews into a virtual mode immediately in a flexible mode.

Quality assurance agencies responded to the COVID pandemic by maintaining certain level of flexibility in their respective evaluation procedures. Instead of in-person site visits, virtual audits were introduced as part of the external assessment process (Q1).

QA agencies, following the directives of government agencies, have permitted teaching and learning, and assessments to be undertaken remotely (Q5). Governments, QA Agencies and HEIs did everything they could to cope with crisis. Governments allowed QA Agencies to conduct their procedures online, for instance (Q6).

Moreover, the interviewees believed that autonomy was not diminished, even though contingency plans were imposed by the government under the crisis. Interestingly, this finding is quite different from the study by Hou et al. (2021).

Very interesting, some QA agencies were not highly affected in terms of autonomy over decision-making and QA activities. But I think it was because of their nature. For example, THE-ICE in Australia who have always worked and functioned for online, their operation run 100% virtually (Q2)

I haven't seen any evidence of a weakening of autonomy due to government contingency plans (Q3).

Indeed, digitalization and ICT not only reduced bureaucratic burdens of QA activities but also facilitated environmental protection. yet, inequality is getting worse and worse during the pandemic and in the post era. As the interviewees indicated,

My opinion is that in post pandemic era it will help to ease the processes for IQA and EQA. For EQA, for instance, it can help decrease the expenses on site-visit and gather feedback if needed. For IQA it can be used to lessen the bureaucratic burden in terms of automation some control and monitoring functions and feedback mechanisms (Q6).

Digitalization and ICT play a vital role in the execution of IQA and EQA during the pandemic. They are the enabling factors underpinning and facilitating the continual operations of all businesses with minimum interruptions and maximum outcomes (Q1).

The digitalization has become one of the main factors of the success of this process. For example, in our EQAA we have organized already 100 on-line visits... and we don't use paper anymore at all (Q7).

Due to lacking ICT infrastructure and unavailability of internet access, yet, inequality is a contributing factor in a widening quality gap between the advantaged and the disadvantaged in some higher education systems. One of the interviewees observed,

Clearly, if digitalization and ICT were strongly embedded in a country during the pandemic then they proved to be invaluable. However, the unevenness in their availability has become another measure of global inequality and even domestic inequality in the country where poorer students were disadvantaged start to emerge (Q3).

Lack of personal interaction, accessibility to a comprehensive information, and inability to look at the non-verbal cues are three main challenges for a virtual quality review, which would lead to the issues of EQA reliability

The key challenges in the virtual mode are difficult to feel the real spirit of organization, inspect the premises. Psychological disadvantage of the virtual form in terms of personal interaction. Not everything can be asked in terms of virtual review. Some things may never come to your mind until you see them in real life in organization (Q6).

There are resources and facilities that require in-person examination, which may not be familiar to assessors who have not visited the HEI in person. There is also this notion that during virtual review, the HEIs direct the assessors on what the HEIs want the assessors to see. There is also a possibility of interviewees being guided in their responses (Q5).

Besides, there is a divergence of whether if virtual QA practices can fully replace the traditional practices among the interviewees after the crisis ends. Some interviewees are quite positive about the future prospect; others put the stress on human interactions.

In short, if done properly, it is highly possible for site visit to be conducted virtually instead of the traditional practices (Q1).

Nearly 90% of the HEIs are very satisfy with the on-line model, and they are expecting a blended model in future. During 2021 we will work still on the on-line model, but in 2022 we have already approved to implement the blended model (Q7).

Virtual QA practices cannot completely replace the traditional practices. There are resources and facilities that require in-person examination, which may not be familiar to assessors who have not visited the HEI in person (Q5).

Not fully replace the traditional practices but to make QA practices more efficient instead. There is always the human interaction variable which is very important (Q2).

Lastly, one of the interviewees was worried that the failure of IT system while the review is conducting, weak staff IT capacity as well as different time zones could pose a potential threat to the implementation of a virtual QA mode effectively (Interviewee Q2).

Discussions

Digitalization Is a Solution As a Part of Crisis Management Model But the Concern About Validity and Reliability on a Virtual Measure Remain

Digitalization provides a solution to lack of readiness for campus closure and sudden suspension of physical onsite visits. The HEEACT GGP review case study demonstrates that online instruction would protect students from stopping learning, and virtual site visit could make the EQA process a great success under this health crisis. It was also found that governments, institutions and QA immediately made a swift adjustment over teaching and learning in higher education on a basis of crisis management model, while quality assurance was not considered as the first priority. Hence, the above discussion clearly answers the first research question as to the pandemic's impact on Taiwanese higher education.

Yet, one of the leading concerns of digital QA practices is how to develop appropriate methods to ensure teaching efficiency and to measure student learning outcomes. Given the fact that most national QA agencies that did not establish specific standards for online education, it is quite challenging for them to respond to urgent need from institutions shortly. As one of the interviewees indicated, "I would say that perhaps it is time to take some time to think about EQA, what it is for, what we want out of it, how we do it and, importantly, what is its relationship to IQA? What have we learned from the pandemic that will help us change EQA to better meet future needs?" (Interviewee Q3). The study shows that digitalization may provide a fast alternative for teaching, learning and QA activities under the pandemic, but validity and reliability are two of the big concerns according to QA experts. In other words, the concerns about how virtual QA can guarantee quality of teaching and learning will remain strong if the core standards of assessment are not refined. Many scholars reminded that it is imperative to revisit the current QA standards framework and include an innovative concept into the new system in the era of the post pandemic (Coates, 2020; Brown and Salmi, 2020, 2020).

Will There be a Paradigm Shift for QA Scheme or Just a Temporary Disruptive Innovation?

To comply with national health safety measures, digitalization, innovation and flexibility in QA measures and governance were implemented in support of international QA networks. For example, The INQAAHE final report for HEEACT GGP review clearly commended that HEEACT should adapt to "an online environment and flexibility in working with reviewers' preferences" and "consider the best way to ensure that reviewers are trained effectively, whether the training is conducted online, face-to-face or blended" (International Network for Quality Assurance in Higher Education (INQAAHE), 2020d, 34–35). The study found that the reliance over digitalization and ICT to assess the performance of institutions and monitor the accountability of QA agencies would likely trigger the emergence of a paradigm shift in future.

Yet, the issues, such as inequality and integrity, have drawn global attention (Furceri et al., 2020). Some expert interviewees are quite concerned that the abrupt shift to online education and virtual quality assurance had resulted in the widening gap of ICT capacity among varying higher education stakeholders accordingly. Moreover, it can be challenging to maintain the integrity of virtual EQA while quality assurance agencies are striving harder to maintain QA exercises in order to survive. As the *INQAAHE Principles for Crisis Management* clearly identifies “integrity” as the top priority in higher education and quality assurance, “It is more critical now than any time before to adhere to integrity and make the best use of technology to support it. Remaining vigilant to the challenges that can undermine integrity while remaining compassionate to each other is key in assuring quality in HE provisions” (International Network for Quality Assurance in Higher Education (INQAAHE), 2020c, 1). Therefore, regarding the second research question on the perception of the participants in the INQAAHE GGP review, the study demonstrated that the virtual mode was considered by them as an innovative and flexible practice.

On one hand, ICT application in HE, which is quite beneficial when tackling an imminent crisis, has transformed QA. On the other hand, it is considered as a disruptive innovation to the traditional mode with a focus on in-person interactions and comprehensive engagement of HE stakeholders for a long time. In this regard, it is still uncertain that whether a paradigm shift over QA system will occur, and new quality standards will be developed fast, or the innovative mode just served as a temporary solution under the disruptive era. Yet, it is still hard to predict whether the emerging virtual QA will either fully replace the conventional mode or become a new normal, in response to the third research question. As Salmi (2020, 101) warned, “the main question is whether the majority of institutions and agencies just want to go back to the “normal state” of the past, as happened after previous crises, or whether they are ready to embrace and mainstream some of the disruptive practices that they have implemented during the pandemic?”.

Conclusion

Under the disruptive era, digitalization not only provides an alternative for HE and QA practice but overwhelmingly drives innovation. Due to the 2020 pandemic, HEEACT became the first agency of the INQAAHE’s GGP virtual review. Both parties were driven to adopt the new QA mode swiftly and reshape the conventional interview arrangement shortly. Throughout the EQA virtual review process, they both learned to adapt to this shifting paradigm and started to think of a more flexible, innovative and effective way to maintain QA exercises. The study demonstrated that a virtual mode for quality review will likely become a new normal in most countries although there is still concern as to whether key challenges can be eradicated, such as integrity, inequality, validity and reliability. Nevertheless, the HEEACT case study, not only provides a new insightful practice for QAA and accrediting bodies who were used to carry out physical onsite visit but also pressure them to rethink immediately of a new set of suitable standards and QA procedures for universities in

order to assess quality of their online programs, digital instruction and student learning outcomes in an appropriate manner.

The aim of the innovative disruption is to break away from the traditional concept and operation in HE and QA. Seemingly, innovative, creative and visionary conceptions not only serve the current global agendas for crisis management, but also pave the way for a future learning community (Al-Imaraha and Shieldsa, 2019). Most importantly, government, institutions and QAA should acknowledge that the appropriate use of digitalization and innovation of QA would benefit HE quality and maintain QA exercises under such a crisis. However, they still need to realize that critical issues and challenges would continue to disrupt the positive impacts which have brought into the globe. Therefore, awareness of the relevant issues that digitalization may cause is considered as the key element to the good practices of online education and virtual QA in future. As the CHEA emphasized, it is time to mobilize all relevant stakeholders to create a new era for higher education and quality assurance with the values of “diversity, equity and inclusion” inextricably linked each other (Council for Higher Education Accreditation (CHEA), 2020, 1).

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Declarations

Conflict of interest No potential conflict of interest was reported by the author(s).

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