

Opportunity Amid Crisis in Medical Education: Teaching During the Pandemic of COVID-19

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Purpose: The pandemic of COVID-19 had reinforced adaptations in medical education. It was challenging, especially for developing countries where resources were scarce. This study examined the implementation of teaching and learning adaptation during the pandemic in a low-resource country as perceived by teachers. We also present the opportunities that arise from the adaptation process.

Participants and Methods: The participants of this study (n=24) were teachers in an undergraduate medical program. This study employed a qualitative approach using focus group discussions (FGDs) to collect the teachers' perceptions. Thematic analysis was performed to analyse the data.

Results: Teachers' perceptions were categorized into 19 subthemes and were accentuated into four general themes; learning facilitation, assessment during the pandemic, learning resources, and competence achievement. We discovered both challenges as well as opportunities in each theme due to the shifting of learning from offline to online learning. Flexibility and innovation were regarded as the most important opportunities and were perceived to hold potential for medical education in the future. Knowledge acquisition was most benefited from this adaptation. Facilitating skill acquisition and burnout were the major challenges.

Conclusion: Despite the challenges, including burnout, skills acquisition, and risk in academic integrity, innovations in medical education were strengthened during the pandemic of COVID-19. They also provided a positive influence regarding achievement in the cognitive aspect. Faculty development programs need to be encouraged to improve teachers' capacity in the future.

Keywords: medicine, teaching, undergraduate, pandemic, opportunities, challenges

Introduction

Medical education has been severely affected by the COVID-19 pandemic since 2019. It is forced to adapt to infection control and prevention measures by shifting activities to online learning. Such prevention measures affected the learning activities during the pre-clinical and clinical years. In clinical years, almost all hospital-based activities were halted, and the students were deployed to ensure their safety as soon as the situation regarding COVID-19 was declared a pandemic. In pre-clinical years, medical schools were forced to optimise technology to sustain learning activities. Lectures have been shifted to online synchronous sessions and pre-recorded lectures. Online practical sessions have replaced laboratory-based practicum temporarily. Clinical skills learning has been modified to assignments and video-based learning. Students also performed community education programs virtually using online platforms. Assessments and examinations were also affected and were conducted online at most. However, there is hesitance and doubts about whether online learning activities might not adequately support medical students in achieving the intended learning outcomes.

Online learning, often called e-learning, is a general term that applies to preparation, education and instruction on a digital medium, such as computer software and mobile devices.¹ Teachers and students access and interactively deliver learning materials through synchronous or asynchronous environment.² Online learning has more potential to improve the knowledge and skills of medical students compared to conventional offline learning.³ The growth of online education is supported by continuous innovations in technology-based learning resources, namely medical apps, games apps, online

learning platforms, and virtual conference platform.⁴ Those resources were used to assist teachers in designing learning activities.⁵

Online learning is reported as a safe approach to allow physical distancing while maintaining educational and learning activities as an “emergency remote teaching”.⁶ Literature also suggests that online learning could be as effective as face-to-face learning to achieve an extent of competencies if designed appropriately.⁷ Lectures are the most common example to be changed to online lectures or pre-recorded lectures. The accessibility of recorded lectures is a significant assistance for students to learn and revisit learning materials.⁸ Practical sessions were also delivered online using a demonstration video. The video might assist students in comprehending the steps of experiments, equipment, and laboratory safety.⁹ Online practical sessions may be a good option as it costs less than face-to-face due to fewer lab kits and resources used.¹⁰ Course directors should carefully examine and decide on practical sessions to be delivered online. Clinical skills training is another learning activity that could be delivered using an online approach. It is suggested that clinical skills training facilitation using blended learning effectively improves competence and confidence.¹¹ Clinical skills examination is also reported using an online method (eg, online OSCE) to successfully examine history taking, communication, clinical reasoning, and analysing physical examination findings.¹² Teachers are demanded to be competent in facilitating students’ learning in a virtual environment. Mobile devices are preferable to laptops, desktop computers, and tablets.¹³ Videos, podcasts, games, and online platforms such as websites and social media were utilised to assist learning.¹⁴ Some faculties found the transition and demand quite challenging—limited interaction among teachers and students and technology literacy. Most of them, however, are optimistic about using innovations and technology to ensure the sustainability of medical education.¹⁵

Adaptations of medical education in response to the pandemic have been widely examined. Positive and negative impacts due to the social restriction policy were identified.¹⁶ Developing countries face relatively similar challenges due to limited resources and infrastructure. Access to high-quality internet and the cost to establish online learning also became an issue for both individual and institutional level.^{17,18} Such challenges might cause technical problems during the learning activities that hinder interaction and communication between teacher and students.¹⁹ The challenges were also exacerbated by the lack of institutional preparation in performing administrative management and support for online learning.^{18,20}

Medical teachers play a significant role in supporting students during difficult times. This study intended to explore medical teachers’ perceptions of their experiences regarding medical education changes during the COVID-19 pandemic. Some suggestions for improvements were also explored during the study.

Materials and Methods

Design

We used an exploratory qualitative design using the phenomenology approach in this study. This approach best captures the phenomenon of teaching and learning during the pandemic as experienced by the faculties. By exploring the experience through the lens of the faculties, we expected to have an in-depth understanding of education changes during the COVID-19 pandemic.

Subject

The study was conducted at the Medical School of Universitas Gadjah Mada in January 2022. A total of 24 medical teachers in the medical school, including those in managerial posts, participated in the study. A purposive sampling approach was applied to ensure the maximum variance of the participants. The recruitment criteria considered subjects’ level of working experience (ie, junior, mid-level, and senior medical teachers/professors), area of expertise (ie, preclinical, public health, and clinical departments) and gender. We also recruited participants with experience in managerial positions in the medical school to allow the inclusion of perspectives related to policy, safety measures, resources management, and the support system of the educational program during the pandemic.

Data Collection

Three focus group discussions were conducted to collect participants’ perspectives on medical education during the COVID-19 pandemic. Each group consists of 7–9 participants. Participants were divided based on their involvement in

the medical school: preclinical year medical teachers, clinical year medical teachers and managerial team members. The FGD applied a set of questions developed based on the research objective. The discussion in each group was led by two facilitators and one observer to ensure robust data collection and discussion observation. Notes were taken by the observer during the discussion. The FGD guides consisted of questions related to experience in facilitating learning during the pandemic, the changes and their impact, the countermeasures to ensure learning outcomes achievement, and the need for faculty development. All facilitators convened to discuss the questions before the FGD to agree on how to moderate the discussion and explore participants' perspectives. The FGDs were conducted using Zoom Meetings to adhere to the physical distancing policy. The FGDs were video and audio-recorded after the facilitators received consent from all participants. There was no internet connectivity, and timing issues occurred during the data collection.

Data Analysis

This study applied thematic analysis to enable us to work with the epistemological framework in our study. FGD recordings were transcribed into verbatim transcripts before data analysis. A total of 4 coders were involved in coding and analysis. The coders were briefed on the research questions and a set of initial themes expected to emerge from the transcript. Initial coding was conducted by two-independent coders using open coding. The coders discussed the initial codes to achieve consensus. A third coder was involved whenever the initial pair coders could not resolve disputes. After coding all transcripts, thematic analysis was conducted where all coders convened to synthesise categories further, and sub-themes emerged from the codes. Categories were then grouped into themes to incorporate the initial and newly emerged themes. The involvement of multiple coders in each transcript was done to maintain the data's trustworthiness through triangulation.²¹ We ensured reflexivity by regularly discussing our standpoint and any possible bias within the research team. Every step of the data collection and analysis was recorded to ensure the dependability of the findings.

Ethical Issues

This study obtained ethical clearance from the Human Research Ethics Committee, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada (Certificate Number KE/FK/0543/EC/2021). All participants completed informed consent before the focus-group discussion. During obtaining the consent, participants were informed that the responses were to be published anonymously to ensure privacy.

Results

Medical teachers perceived that, through changes during the COVID-19 pandemic, medical education has not only encountered barriers but also discovered several opportunities to improve the quality of teaching. Four themes emerged as the result of this study (Table 1).

Learning Facilitation

The shift in learning modes brought several benefits and opportunities. Teachers highlighted that the adaptations during the pandemic were mainly about adjusting teaching to online or hybrid mode. Both synchronous and asynchronous modes were used as singular and complementary learning activities. It influenced the facilitation technique and instructional design. The primary advantage, as perceived by the teachers, was flexibility.

Scheduling shifts [rescheduling] can be minimised. If you go out of town, you can use videos, send questions, or maybe a module. Also, the video can be viewed over and over again by the students. (Group 1)

Teachers also responded positively to the convenience of learning facilitation using the technology. Teachers found themselves more adaptive towards facilitation skills and working with technology. It reflects that the teachers responded positively to the opportunities for capacity building to improve their teaching skills in an online environment.

So, we also feel that literacy technology is very important, we have to be technology literate, and if we don't, we will not be able to progress. (Group 2)

Table 1 Emerging Sub Themes and Themes

Themes	Sub Themes
Learning facilitation	Adaptation of method Hybrid and online learning Lecture Tutorial Practical session Simulation-based learning Community-based learning Clinical rotation
Assessment during pandemic	Adaptations of method Objectivity Skill assessment Assessment drives learning
Learning resources	Simulation center Mannequins Learning media Technology-enhanced learning
Competence achievement	Cognitive domain Skill domain Professionalism

The main challenges faced by medical teachers during the pandemic are ensuring student engagement and optimising technology to facilitate learning.

For example, we use Google Teams for most practical sessions. you can see who fills in it, you can see who fills in here and there, but it's quiet. No direct communication, silent. (Group 1)

Teachers perceived the lacking of student engagement was similar between offline and online activity in large-group learning sessions.

Students in large classes, the engagement is like those in offline classes. But if it's in a small class, it's easier, so we try our best to attract their involvement and keep the spirit of the discussion going. (Group 1)

Another challenge of going online also arose in practical sessions. Before the pandemic, the practical sessions focused on hands-on activity based on the practicum guideline. During the pandemic, the hands-on activities were replaced with videos followed by small-group discussions. However, students showed minimum participation during the sessions.

The students, they are off-camera, always. I'd have to pick them by name. (Group 3)

Those challenges in students' engagement and motivation to actively participate in the learning activity were thought to be influenced by several factors, such as boredom, burn-out, and unfamiliarity towards the technology or instruction that was used, which were faced by not only the students but also the teachers as well.

The motivational aspect of the students is also important; how do they renew their motivation during the pandemic because it's very difficult, burn out, with so many cases at that time. (Group 2)

From the aspect of the lecturer, maybe we also have a burn-out. Concerns mainly lie on how to guide, to help students to achieve their competence. (Group 3)

Assessment During Pandemic

There were relatively few challenges in terms of assessing clinical skills. Hybrid Objective Structured Clinical Examination (OSCE) was developed by combining on-site and online proportions during the examination. Students were present on-site at the examination stations while the examiners observed the performances live through cameras and online conference calls.

As for skills, I don't think there's a problem since we're performing direct observation in the examination; we can do it objectively.

However, concerns were raised in favour of the cognitive assessment. Assignments were often utilised to assess cognitive performance. It created more burdens for the students due to hectic schedules.

Completion of tasks piled up behind (Group 2)

Several cases of academic misconduct were found during the computer-based test, where the students took the online test at home through a rigid protocol to ensure orderliness.

So [we] rely on the integrity of students (Group 3)

Peeking at the answer by hacking the system (Group 3)

Learning Resources

The social restriction policy created innovations in learning resources and brought varieties of learning media. The institution was compelled to provide supportive resources for blended learning. Videos were vastly developed as complementary resources in aiding synchronous learning activities.

We can add videos on how to do a practicum. Maybe we also need to add an introduction to our lab, including the tools that will be used in our lab. (Group 2)

Another benefit of the shift to online learning is the availability of interactive learning platforms that can be utilised during learning sessions. Those platforms were mostly easy to use for any operating system.

Online learning also gives one of the opportunities the flexibility to use anything. (Group 1)

The learning management system (LMS) was optimised for repository purposes such as videos, lecture recordings, and other learning materials.

During this pandemic, we prepare materials, they [students] access it in Gamel [LMS]. It is quite complete. (Group 3)

Competence Achievement

Competency achievement was diverse among cognitive, skills, and attitude domains during the pandemic. Teachers perceived that knowledge acquisition during the pandemic was even better than before.

For the knowledge achievement, I think everyone agrees; maybe they are even better during the pandemic because of many supporting activities (Group 3)

The learning material is quite complete; the students come with various questions that actually show they understand about the material (Group 1)

However, this is not the case with community-based learning. Due to social restriction policies that also influence educational policy in the institution, students could not perform direct interaction (ie, physical assessment and health intervention) with the targeted community.

We assigned the students to 10 families. They just got 3, that's all; we have tried all kinds of ways to engage the families; it won't be so easy (Group 1)

Professionalism is also another facet that was negatively affected by the situation. Teachers reported that students tended to show a nonchalant attitude during online activity.

There needs to be a balance of opportunities to enter the campus to see the atmosphere and interact with their lecturers and seniors and understand the profession. (Group 1)

The lack of context and real-life interaction might cause the lowering achievement of professional competence. The shift of learning modes during the pandemic affected the achievement of psychomotor competencies. This was due to challenges of the skills training facilitation. The opportunity for the students to practice physical examination and other procedural skills was very limited since they could not learn in an ideal environment using standardised resources.

Even though online teaches a lot of things, I really hope there are enough offline sessions, including skills, psychomotor skills. (Group 1)

There are several competencies that must be performed; they cannot be represented, not only by looking, let alone seeing virtually. (Group 3)

Discussion

Learning Facilitation

Regarding learning facilitation, this study indicated several advantages. Firstly, there was an increase in student-faculty contact hours as online meeting applications have made discussion and learning encounter more extensive and flexible. As preferred by students and clinical supervisors, discussion and mentoring were performed during and after clinic hours. Learning flexibility is an advantage of online learning, as reported in a systematic review.²² The increase in contact hours and supervision showed supervisors' devoted time to education, which is appreciated by students.²³ Secondly, the use of flipped classrooms, which was limited before the pandemic, has now become more popular. The medical school provided lecture recordings for students. Hence, the synchronous sessions were more effective and allowed more discussion. Flipped classrooms have been proven more engaging to facilitate case-based discussions, preclinical learning activities, and clinical education.²⁴ Thirdly, the use of online learning and flipped classrooms triggered medical teachers to develop technology-based learning resources to adapt to the current needs. Medical educators must develop appropriate learning resources to facilitate students effectively.²⁵ Technology-based learning resources might increase student and faculty engagement, satisfaction and knowledge retention.²⁶

Some areas for improvement were also suggested. Online learning led to less motivation and engagement during learning activities. The problem might be due to connection problems and burnout. Screen fatigue (eg, "Zoom fatigue") has been reported as a significant challenge in the massive use of online learning during the pandemic.²⁷

Assessment During Pandemic

Examination misconduct appears as one of the significant challenges with remote E-exams. It can negatively affect academic integrity. This study found several academic misconduct cases during the cognitive test using computer-based testing. A study²⁸ showed that more than half of the students (55.07%) reported no exam dishonesty or misconduct, while the other half reported that they sought assistance from friends (20.41%) or all other possible sources (24.52%). It may be significantly associated with efforts/time spent on exam preparation and the inappropriateness of exam questions with study materials. The possible solutions could involve more rigid proctoring, modifications of exam structure (using different forms, one-way exams, reducing time limits), or changing the assessment mode.

This study also shows an additional burden caused by more assignments for the cognitive domain. This finding supports previous study,²⁹ which found that students' negative experiences during the pandemic, for instance, productivity, motivation, workload and health.

Learning Resources

This study shows that the COVID-19 pandemic has been strengthening teachers to create innovations in learning resources and bring varieties of learning media. This is due to the medical school having initiated grants for teachers to develop IT-based learning resources several years before the COVID-19 pandemic. The pandemic has helped to convince the teachers of the importance of this initiation and motivate them to continue this practice. This finding supports previous study²⁹ that reported their study participants were mostly satisfied with their ability to adapt and adopt the new technologies.

Competence Achievement

Skills acquisition was compromised during the pandemic due to restrictive regulations and also decreasing case variation in academic hospitals. Academic hospitals prioritised COVID-19 patient management. Hence, elective procedures and cases were significantly reduced. The lockdown regulation introduced by the government affected all medical schools and impacted less clinical skills training on campus. Simulation-based training might be an alternative to this problem, as it has been proven effective in achieving clinical skills competencies in many areas of medicine. However, online clinical skills training has a limited value in skills acquisition as students cannot simulate and perform procedures in an appropriate simulation setting.⁷ Using low-cost, home-available materials for simulation might be a solution, as high and low-fidelity simulators might provide similar educational outcomes when administered appropriately.³⁰ There is a need to develop home-available software and simulators, such as virtual reality and augmented reality, to lower dependency upon mannequins and instructors for skills learning. Nevertheless, significant financial investments would be required to achieve quality technology-enhanced simulators.

The disruption to learning activities compromised competence achievement in preclinical and clinical education. This study found that while knowledge achievement was not a major concern with adjustment in learning methods and the use of technology, clinical skills acquisition was severely compromised. The need for hands-on practice, and training skills with proper manikins and instruments, were not fulfilled in remote and online learning.^{31,32} Practising skills at home with limited resources were insufficient. The challenge of teaching clinical skills and simulation was prominent, especially in countries like Indonesia, where students may be widely spread across the archipelago with uneven support of internet access and facilities. Our institution took several measures to aid clinical skills acquisition. LMS provides learning resources (eg, videos, games, AR), and case-based discussion helps students prepare a good foundation for practising skills.^{32,33} Guiding using whatever tools they can find at home, developing simple videos of students' skills practice, and maximising peer feedback were our countermeasures for decreasing hands-on clinical skills training. Peer learning has been known for its advantages during the pandemic, which also benefits student motivation and support.^{34,35} Once students were back to partial offline learning, they would have a "catch-up" training, practising clinical skills with manikins and standardised patients intensively that they could not do at home.

In the clinical rotations, fewer opportunities for patient encounters because of the restriction of learning activities in teaching hospitals led to less competence acquisition. The lack of hands-on experience has been commonly found in countries facing challenges during the pandemic.^{31,36,37} Departments with the most procedural competence were the most adversely affected. Students might need to catch up with competence once they are back in hospitals or add supplementation to remedy "the gap" before they complete their clinical rotations.³⁸ This study revealed that adding a supplementation in catching up the competence through simulation at the end of clinical rotation might help students in their internship/ clinical placement. Educators should also consider focusing on the outcomes of clinical rotations, adjusting clinical learning activities, training telemedicine competence, and modifying assessment in the clinical setting to ensure competence achievement.^{39,40}

Opportunities for Further Development

This study has found that teachers perceived several opportunities in teaching-learning activities during the COVID-19 pandemic, such as flexibility of learning delivery and better knowledge acquisition. This finding is like a blessing in disguise from the COVID-19 pandemic that should be continued during the transition from the pandemic to the endemic

situation or even beyond. Institutions should continue to reinforce and amplify robust programs to support teachers. There are several areas in that teachers should be supported, for example various online learning methods, instructional design for online learning, attractive online learning facilitation, how to engage students during online learning, effective feedback during online learning, developing digital learning resources, and security issues of online assessments. Obviously, the delivery of faculty development through online platforms is another challenge. It is not only how to deliver the content but also how to provide examples to the teachers and ascertain that all teachers, regardless of seniority level, can do that in their online teaching sessions. Although there are practical tips for educators in delivering education during the pandemic setting,⁴¹ as mentioned in the previous study, evidence for good faculty development during the pandemic was lacking and needed urgent attention.⁴² As the transition of covid-19 from pandemic to endemic level has occurred, hybrid faculty development can be offered. Essential features of a faculty development approach that had existed before or emerged during the COVID-19 period can be implemented and studied further to find better approaches and models.

Limitations

This study explored different perspectives from faculties with different roles in a medical school. Even though we applied a rigorous qualitative method by considering the sampling of participants, an in-depth exploration of each department or medical field on the changes in teaching and learning could add to the richness of the data. The perspectives of one medical school in this study might be similarly found in other institutions with similar contexts, contributing to this research's transferability. Multicenter research can offer a more thorough exploration of the impact of the COVID-19 pandemic on health professions education.

Conclusion

Knowledge acquisition is benefited the most from the adaptation to online learning activities. Innovations in the development of learning resources are also strengthened through this adaptation. The significant challenges are skills achievement, students' burnout and possible examination misconduct during online cognitive tests. Institutions should continue reinforcing and amplifying robust programs to support teachers in improving online teaching-learning activities. Based on these challenges, faculty development opportunities were identified and recommended for future improvement in medical education.

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