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# Evaluation of choices and time spent on an open online elective course by undergraduate medical students during the COVID-19 pandemic

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**Background.** The COVID-19 pandemic highlighted the weakness of relying on in-person tuition in higher education. Massive open online courses (MOOCs) have been a successful addition to higher education. In this study, educators had to replace a planned elective in the medical curriculum with an online option during the pandemic. The roles of the competency framework of the Health Professions Council of South Africa (HPCSA) (Leader and Manager, Health Advocate, Professional, Communicator, Collaborator, Scholar, and Healthcare Practitioner) were used to guide its development. This elective emphasised the non-clinical roles of medical practitioners and was offered in 2020 and 2021.

**Objectives.** To describe the choices of third-year medical students and time spent participating in a modified online elective in 2020 and 2021.

**Methods.** A descriptive cross-sectional study design was used, involving the participation of 629 medical students. Data were collected and analysed from three primary sources: registration data from LinkedIn Learning, data from the Foundation for Professional Development, and self-reported estimates by students of the average time spent on selected courses. Data included identification of the associated competency acquired. Data analysis was conducted using Python, version 3.10.11.

**Results.** The course choices of 629 students were analysed. In 2020 there were 300 participants and in 2021 there were 329. All the students had one compulsory inclusion in the elective (Management and Leadership Short Course for Undergraduate Healthcare Students). Students in both years reported spending the most average time on courses related to clinical knowledge (Healthcare Practitioner), followed by financial literacy and management (Professional), diversity management (Collaborator), and priority actions to identify and/or respond to (Health Advocate). The most popular courses related to the Leader and Manager role were around decision-making in human resources, problem-solving, and managing healthcare teams. Based on the top 10 LinkedIn Learning course selections of both cohorts, there appeared to be a preference for courses that were consistent with the role of medical professionals in practice. The most popular LinkedIn Learning course was The Six Morning Habits of High Performers.

**Conclusion.** Students gravitated toward courses aligned with their role as professional doctors within the HPCSA competency framework. More studies are needed to understand how medical students develop the six non-clinical roles in the HPCSA framework and the effectiveness of MOOCs in a medical curriculum.

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Medical education in South Africa (SA) consists of an in-person theoretical teaching component as well as a clinical, work-integrated learning component. However, during the COVID-19 pandemic, the clinical component proved to be extremely challenging owing to the measures such as stay-at-home orders, social distancing and travel restrictions that were implemented at various times. Many academic institutions switched to an entirely emergency online teaching strategy during the pandemic to overcome the uncertainty. Programmes were forced to search for solutions to minimise disruptions to students' academic progress. Massive open online courses (MOOCs) were identified as a potential substitute for some of the traditional in-person instruction.[1] These courses were designed to meet the learning objectives of students while harnessing their dedication and ensuring mutual benefits.[2] They make use of a variety of learning tools, including short video lectures, slide presentations and online examinations.[3]

The potential impact of MOOCs on medical education has been acknowledged as a game changer that could satisfy the needs of the healthcare system and society to deliver better health outcomes.[4,5] The advantages of integrating MOOCs into the curriculum include the construction of a single course or module that can be used repeatedly with little or no additional work or expense.[6,7] In addition, MOOCs present a possibility for broadening participants' social connections.[8] MOOCs also promote improvements in pedagogy by allowing educators to share teaching strategies and form a community of practice.[9] However, MOOCs can also be a 'disruptive innovation'[4] in that they allow students to interact with knowledge that was previously unavailable for a variety of reasons, 'but not to the extent that medical education requires'.[9]

Lack of evidence of success, financial expenditure for both students and faculty to access courses, and the fear of departing from traditional, tried-and-true teaching methodologies are considered obstacles to the use of MOOCs.[8,9] Only 54 (2.2%) of the 2 400 MOOCs in health professions education assessed in a 2019 systematic evaluation by Rowe *et al.*[8] were appropriate for inclusion in teaching strategies. This review determined that there was minimal high-quality evidence in terms of the evaluation framework pillars of pedagogy: learner experience, feasibility, efficacy and economics. Furthermore, students with poor self-regulated learning (SRL) skills may struggle in an online environment, resulting in poor learning experiences and retention.[10] It has been suggested that MOOCs have low completion rates, lack interaction between educators and

students, and result in limited learning evaluation.[11] However, educators can use strategies described by De Jong *et al.*[12] and others[6,10] to provide SRL assistance to students when incorporating MOOCs into courses.

Because the COVID-19 pandemic conditions posed a significant infection risk to the students, the University of Pretoria (UP) redesigned an in-person option for the elective to a self-paced online elective for third-year medical students. This 23-credit elective (GNK 488)-was redesigned as an opportunity to acquire knowledge, skills and experience in the medical practice environment. Before the pandemic, third-year medical students were expected to self-select and organise their elective and had 4 academic weeks to complete this activity in their second semester. The decision to replace this activity with an online elective allowed for a review of the elective and identification of the potential for learning more about the non-clinical areas of medical practice that may have been overlooked in the existing curriculum. The credits attached to the elective could not be reviewed owing to the pandemic environment, and this was an issue that would be addressed before the next curriculum accreditation. The Health Professions Council of South Africa (HPCSA)'s competency framework was used as a framework for selecting potential courses for inclusion in the elective.[13] This framework outlines the envisaged roles of practitioners based on the core competencies of the medical, dentistry and clinical associate professions and consists of the roles of Leader and Manager, Health Advocate, Professional, Communicator, Collaborator, Scholar, and Healthcare Practitioner (Fig. 1).

## Intervention

In 2020 and 2021, students had one compulsory course (Management and Leadership Short Course for Undergraduate Healthcare Students), presented by the Foundation for Professional Development (FPD).[14] The FPD is a private higher education institution that offers certified credentials, short courses and degrees using various modalities including online learning. The compulsory course comprised six sub-topics: quality improvement in health, decision-making in finances, decision-making in human resources, decision-making in data/information, managing healthcare teams, and problem-solving.[15]

In 2020, the online elective included two sponsored courses (out of a total of nine) offered via the FPD and another global health online platform (data not available), as well as any two courses of the student's choice available on LinkedIn Learning (USA). LinkedIn Learning is an online educational platform that uses expert-led course videos to provide opportunities for people to learn about topics related to business development, technology-related topics and creative skills.[16] In summary, the 2020 students had to choose five courses, one being the compulsory management course.

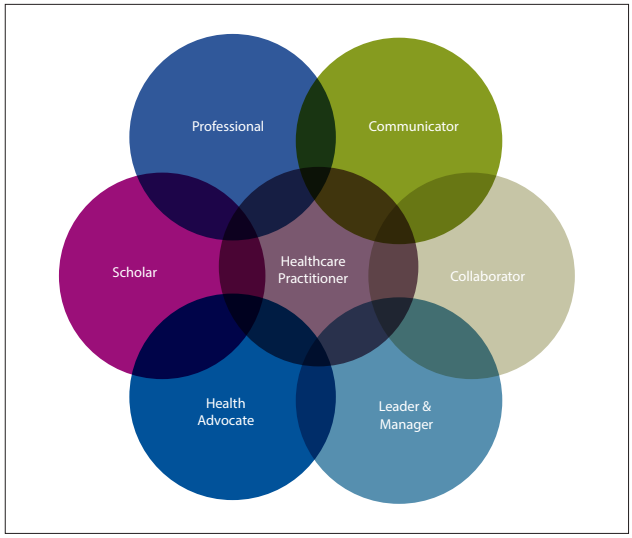


*Fig. 1. The seven roles of healthcare professionals according to the 2014 Health Professions Council of South Africa core competencies framework.*[13]

In 2021, owing to the unavailability of other courses, students had to participate in two LinkedIn Learning courses. Students were provided with descriptions of the HPCSA roles and were requested to choose one course related to the Health Advocate or Professional role, while the other could be of their own choice. In 2021, students therefore had to choose three courses, one being the compulsory management course. The required notional hours stayed consistent even though the students did fewer courses.

Students were given an interactive Excel version 1808 (Microsoft Corp., USA) template to complete as a record of their activities. The template, which consisted of a sunburst graphic, was downloaded by each student individually. When students populated this template with details of the courses completed, the graphic provided them with a colourful illustration of the HPCSA roles and competencies, while highlighting the competencies that needed to be strengthened during the remaining years of their medical studies (Fig. 2). Students also had to upload certificates of completion of courses where this function was available.

The present study aimed to describe the course selections and self-selected focus areas of third-year medical students in relation to the HPCSA core competencies framework in their online elective rotations (GNK 488) at UP in 2020 and 2021.

## Methods

A descriptive cross-sectional study design was employed to analyse the course selection data from three sources: LinkedIn Learning (course selection and completion data), FPD data (course selection data), and students' self-reported estimates of time spent on selected courses. The analysis of the data was confined to comparative descriptive statistics of the course selections over the two years, coupled with an examination of the self-selected focus areas of the students in relation to the HPCSA core competencies framework.

All collected data were encoded in Excel sheets, version 15.0 (Microsoft Corp, USA), and analysed using Python version 3.10.11 (Python Software Foundation, USA), a programming language widely used for data analysis and visualisation. Data processing and visualisation were performed using the Seaborn and Matplotlib graphical packages in Python.[17,18] Bimodal entries were processed using the appropriate functions available in the Pandas package in Python.[19] Communication about the studies was done and informed consent obtained using the institutional learning management system and class representation. Ethical approval was granted by the UP Faculty of Health Sciences Research Ethics Committee (ref. no. 316/2021) as well as the institutional Survey Coordinating Committee that ensures compliance with the Protection of Personal Information Act 4 of 2013 (POPIA).[20]

## Results

This study involved a total of 629 students who participated in the online elective. In 2020 there were 300 participants, and in 2021 there were 329.

### Foundation for Professional Development courses

In 2020 and 2021, students had one compulsory inclusion in the elective (Management and Leadership Short Course for Undergraduate Healthcare Students); the participation rate was

therefore 100%. In 2020, students had access to additional donor-sponsored courses offered by the FPD that were not available to the 2021 students owing to the discontinuation of donor funding. The distribution of choices by the 2020 cohort (excluding the compulsory course) is displayed in Fig. 3.

Apart from the compulsory management course, the most popular choices were a short course on financial literacy (*n*=65), a course related to respiratory support (*n*=63) and a course on gender-based violence (GBV) (*n*=48), while a course on COVID-19 for healthcare professionals was done by the fewest students (*n*=6). A short course on HIV and tuberculosis in the context of COVID-19 (not shown in Fig. 3) was not selected by any students.

## LinkedIn Learning courses

In 2020, students could choose any two courses, while in 2021, students had to choose one course related to the Professional or Health Advocate HPCSA roles and to do another course of their own choice on the LinkedIn Learning platform. Table 1 summarises the top 10 choices for each cohort.

The course on The Six Morning Habits of High Performers appears as one of the top three choices in both years. Courses with a focus on self-confidence and communication skills had a high number of views in both years.

| Competency | Sub-Topic | Hours |
|---|---|---|
| Health practitioner | Clinical knowledge | 1 |
| | Attitude to clinical care | 2 |
| | Clinical skills | 0 |
| | | 0 |
| Collaborator | Conflict management | 1 |
| | Collaborative negotiation skills | 2 |
| | Diversity management | 2 |
| Communicator | With patient/client | 0 |
| | With peers/health professionals | 0 |
| | With communities | 0 |
| | With families of patients/clients | 0 |
| | With statutory and professional bodies | 0 |
| Leader & Manager | Quality improvement in health | 0 |
| | Decision-making: finances | 0 |
| | Decision-making: human resources | 0 |
| | Decision-making: data/information | 0 |
| | Managing healthcare teams | 0 |
| | Problem-solving | 0 |
| Health Advocate | Identify vulnerable/marginalised groups | 2 |
| | Communication with groups | 1 |
| | Actions to identify/respond | 3 |
| Scholar | Asking and formulating research questions | 0 |
| | Locating and appraising evidence | 1 |
| | Study design and data collection | 4 |
| | Data analysis | 1 |
| | Research ethics | 2 |
| | Applying findings | 0 |
| Professional | Own professional practice: data literacy | 1 |
| | Own professional practice: financial literacy | 1 |
| | Professional, legal and ethical codes of practice | 1 |
| | Ethics and human rights | 1 |

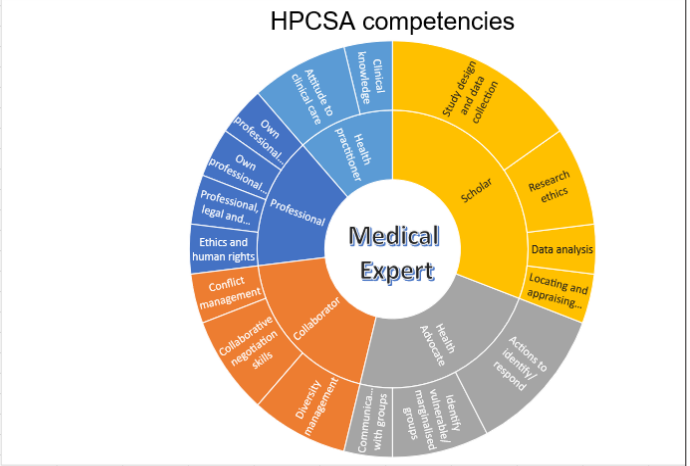


*Fig. 2. Example of a completed sunburst.*

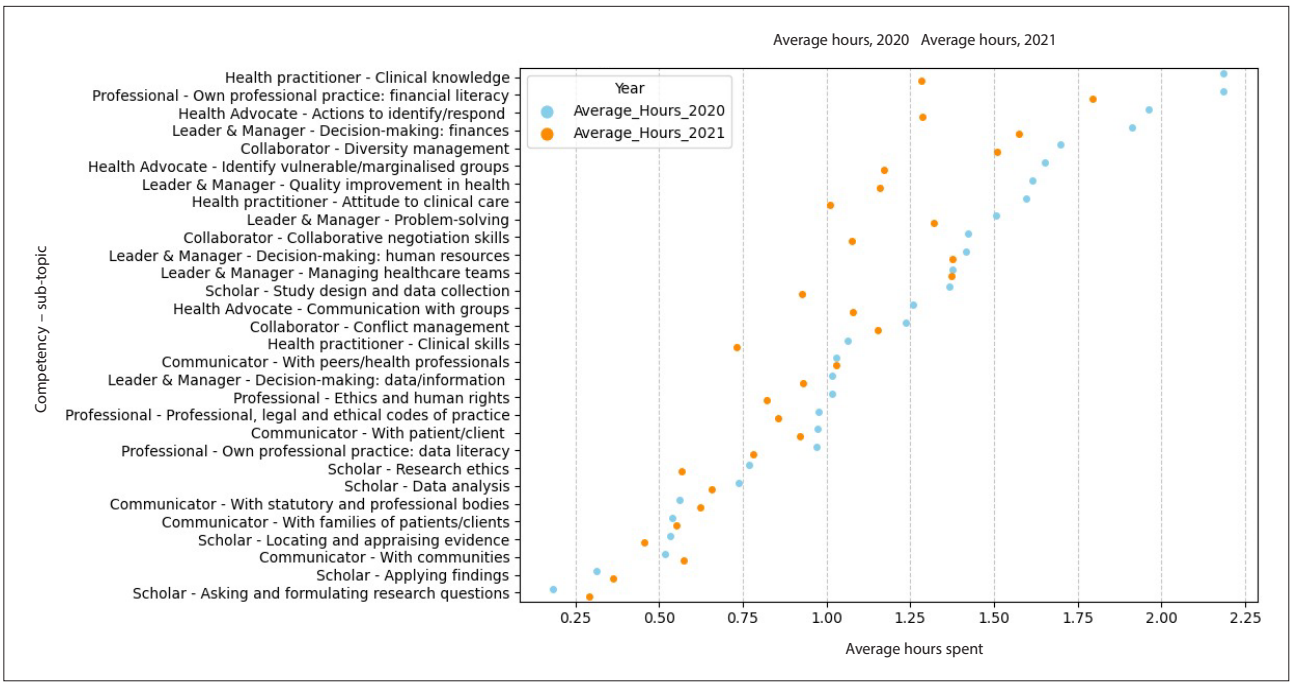


*Fig. 3. Distribution of course choices offered by the FPD (2020 students only). (FPD = Foundation for Professional Development.)*

### Overview of choices and average time spent by the 2020 and 2021 student groups

Sub-topics related to the different HPCSA roles were developed for the self-reporting template that students had to complete. The sub-topics took into consideration the available courses that students were offered, as well as the key and enabling competencies described under the HPCSA roles in the competency framework. Students had to estimate the average time spent on the courses under the sub-topics. The details of their choices are presented in Fig. 4. Students in both years reported spending the most time on courses related to clinical knowledge (Healthcare Practitioner), financial literacy and management (Professional), diversity management (Collaborator), and priority actions to identify and/or respond to (Health Advocate).

The most popular courses related to the Leader and Manager role were around decision-making in human resources, problem-solving, and managing healthcare teams.

## Discussion

This study describes third-year medical students' choices in an online elective rotation (GNK 488) at UP in 2020 and 2021.

Both the 2020 and 2021 students demonstrated a preference for courses related to the Healthcare Practitioner role, followed by the Professional role as described in the HPCSA competency framework. The popular choice of courses related to financial management (besides that which was already included in the compulsory course) suggests that students are eager to enhance their financial literacy and management. Improved financial literacy among medical students helps them in making informed decisions such as contract negotiation and deciding which specialty to choose.[21] Moreover, student debt among medical students is increasing significantly, and financial management can help them manage their loans effectively and plan for repayment. Previous studies have shown low financial literacy among medical students.[22]

Gaps in training for the Health Advocate role have been acknowledged despite studies that have shown that SA medical students understand the importance of health promotion, disease

**Table 1. The top 10 LinkedIn Learning choices for the 2020 and 2021 student cohorts**

| 2020 | | 2021 | |
|---|---|---|---|
| **Course** | **Viewers, *n*** | **Course** | **Viewers, *n*** |
| The Six Morning Habits of High Performers | 67 | Speaking Confidently and Effectively | 46 |
| Financial Basics Everyone Should Know | 33 | Six Practices to Get Back on Track | 46 |
| Building Self-Confidence | 28 | The Six Morning Habits of High Performers | 46 |
| Leading Yourself (2017) | 27 | Great Speaking Skills Are a Must-Have | 46 |
| Improving Your Thinking | 26 | Give Your Audience Only What They Need to Know | 41 |
| 15 Secrets Successful People Know About Time Management | 20 | Identify a Need or Challenge | 41 |
| Confronting Bias: Thriving Across Our Differences | 20 | Communicating with Confidence | 40 |
| Photography Foundations: Mobile Photography | 18 | Your Audience Wants You to Succeed | 40 |
| Critical Thinking | 17 | Speak in Sync with Your Audience | 40 |
| The Data Science of Healthcare, Medicine, and Public Health, with Barton Poulson | 16 | Change Your Focus to Calm Your Nerves | 40 |

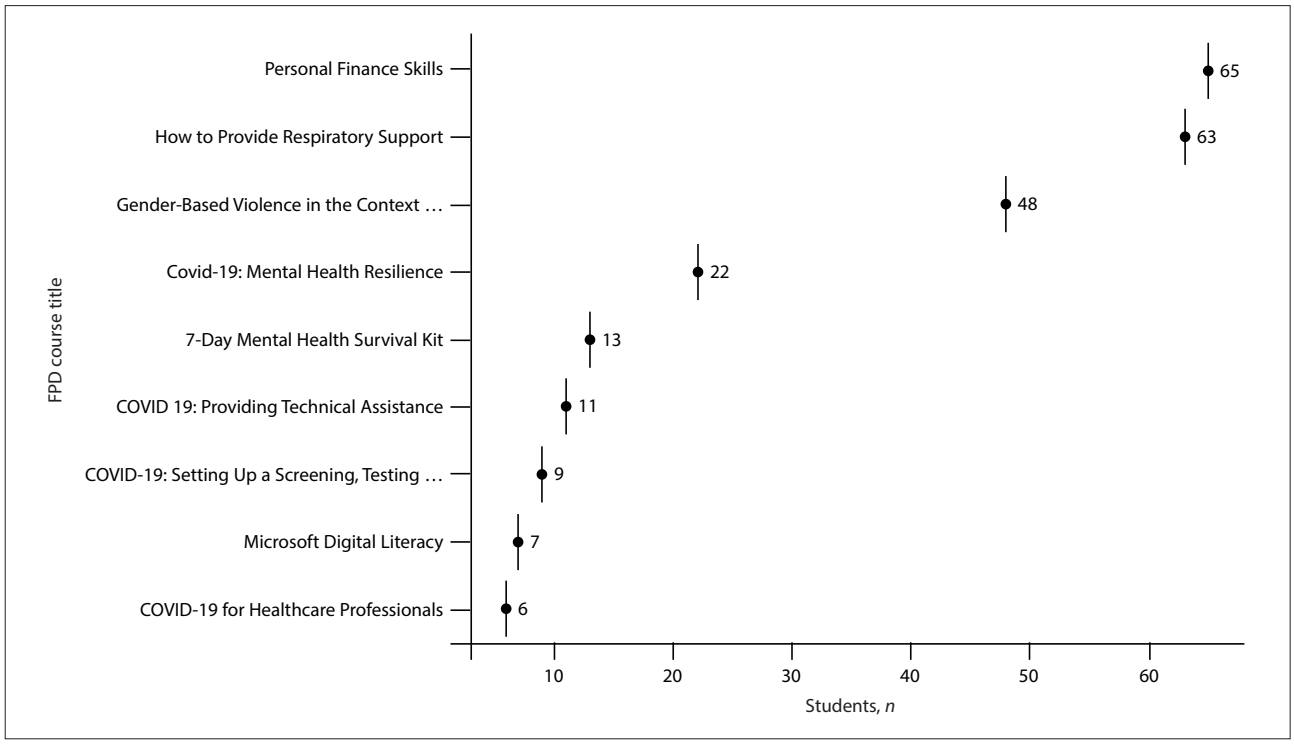


*Fig. 4. Average self-reported time allocation for all sub-topics developed for the Health Professions Council of South Africa roles (by year).*

prevention, and empowering patients with knowledge to improve their conditions.[23] It is the duty of medical professionals to treat every patient equally, irrespective of their age, gender, race, religion, social standing or financial status. In addition to helping medical students see patients as unique people whose lives are influenced by their age, gender and cultural background, diversity management courses in medical education also help students feel respected and acknowledged as unique people whose experiences are closely tied to their socioeconomic status, sexual orientation and ethnicity.[24] Medical students are interested in diversity management courses to improve their chances of promotion or leadership positions.[25]

The course related to GBV for doctors in the context of the COVID-19 pandemic was also a popular choice in the 2020 group. GBV is widespread in southern Africa and is a significant contributor to the burden of disease. Sexual assault and other forms of GBV have wide-ranging current and future effects on individuals as well as communities. For example, children who experienced sexual abuse are more likely to test positive for HIV and engage in high-risk behaviours as adults.[26] Healthcare practitioners and medical students can play a vital role in research by collecting data on GBV prevalence, risk factors and outcomes, which can inform prevention strategies and interventions.[27] Healthcare workers can offer medical care, psychological support and referrals to other services such as counselling and social work.[27] Therefore, any additional training that medical students are able to access should consolidate skills to enable them to recognise signs and symptoms of GBV, facilitating early identification and intervention.[28]

The top 10 course selections from the LinkedIn Learning platform gravitated towards the Professional role. Courses on financial literacy, developing confidence and communication skills reflect the personal self-improvement needs of students and possible recognition on their part that these would not be met in the medical curriculum with its emphasis on clinical training. This finding reflects the known benefits of having access to diverse perspectives and materials that are not traditionally included in a curriculum,[8] and perhaps if not broadening participants' social connections as reported by Rowe *et al.*,[8] at least exploring social and personal development topics.

The study had several limitations. The unavailability of sponsored courses in 2021 and data related to the global health online platform in 2020 limits detailed comparisons between the choices of the two cohorts. As the self-reporting of time estimates was not verified – it was based on the honesty principle – the data may not be a true reflection of the students' experiences. Lastly, the reasons behind the choices, where a choice was possible, could not be determined. These limitations suggest that the results of this study should be viewed as suggested, rather than confirmed, preferences.

More studies are needed to understand how medical students develop the six non-clinical roles in the HPCSA framework. More guidelines are needed in national frameworks on the practicalities of addressing professional, management and advocacy competencies required by graduates in a medical curriculum. Discussion and consensus among educators involved in medical curriculum design are needed. Furthermore, educators who choose to include MOOCs in their curriculum should be mindful of the known strengths and limitations, especially regarding assessment.

## Conclusion

Third-year medical students were found to be interested in topics related to financial management, communication and development of personal confidence during the online replacement courses presented during the COVID-19 pandemic in 2020 and 2021. Currently, the undergraduate medical curriculum does not include topics on financial management or personal development. It is suggested that these topics should be considered for inclusion in this curriculum and in other health sciences curricula that might have similar gaps. The forced choices required by the pandemic resulted in an appreciation of the possible benefits of MOOCs. This research confirmed that MOOCs are a viable alternative to full personal attendance at lectures, and as such they could be potentially valuable additions to or substitutions for any residential programme.

**Declaration.** The research for this study was done in partial fulfilment of the requirements for ZM's MPH degree at UP.

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**Author contributions.** AT planned the elective project. AT and JEW secured permission to use the MOOCs and designed and submitted the study for ethical approval. The data were collated from the various sources by AT. DM performed the statistical analysis. ZM interpreted the findings and wrote the first draft. AT and JEW edited the manuscript. All authors read and approved the final manuscript.

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