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Character Building and Competence Development in Medical and Health Professions Education

The First Biennial Indonesian Medical and Health Professions Education Conference

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Character Building and Competence Development in Medical and Health Professions Education

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Towards the New Normal Era: Character Building and Competence Development in Medical and Health Professions Education

Springer

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Preface

The first Biennial Indonesian Medical and Health Professions Education Conference (INA-MHPEC) in July 2022 was hosted by the Department of Medical Education and Bioethics Faculty of Medicine Public Health and Nursing Universitas Gadjah Mada, Yogyakarta, Indonesia. As part of the global society in medical education, this proceeding serves as evidence of the effort and movement to strive for better medical education in the country and Southeast Asia region. As Indonesia is the fourth biggest populated country and the biggest archipelago in the world, the 1st INA-MHPEC was a significant step for better health education and healthcare services. The theme of: "*Towards the New Normal Era: Character Building and Competence Development in Medical and Health Professions Education*" was a response to a pandemic situation in which medical and health professions were the backbone of the era and were challenged with the social distance procedures; yet should maintain its professional and competences.

A series of pre-conference workshops have been done online six times since early 2022, focusing on research in medical education and three post-conference workshops focused on assisting the authors whose papers were accepted for this proceeding, to be ready to publish (from four countries: Indonesia, Malaysia, Singapore, and Sweden). In total, 548 pre-post and main conference participants from about 40 medical schools participated. We reflected on this collaborative conference as follows:

"There is no five-star doctor,
Medical doctors and allied health professions have personal and professional uniqueness as other human beings that should be carefully nurtured from early education to professional practice,
To feel the need for each other,
To learn and work together to combat diseases,
Together with patients."

We are thankful to collaborative partners and stakeholders in this regard:

- Rector Universitas Gadjah Mada (UGM)
- Dean of the Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada
- Co-hosts:
  - Department of Medical Education, Faculty of Medicine, Universitas Indonesia (UI)
  - Medical Education and Research Development Unit, Faculty of Medicine, Universitas Airlangga (UA)
- Master of Medical and Health Professions Education Programs (M.Med.Ed/MHPE) from UGM, UI, UA and Universitas Hasanuddin (UNHAS), together with students and alumni
- SPRINGER Publisher Singapore
- Southeast Asian Regional Medical Education (SEARAME)
- Association of Indonesia Medical Education Institution (AIPKI)
- Indonesian College of Medical and Health Professions Education (IAM-HPE)
- Indonesian Association of Medical Education (PERPIPKI/INAMED)
- Indonesian Association of Health Professions Education (IAHSE)
- Archipelago scholar
- Review boards who assisted in the review of papers in this proceeding (from Indonesia, Singapore, The Netherlands, and Australia)
- All speakers, moderators, participants, and committee members (from Indonesia, Singapore, Malaysia, Sri Lanka, The Netherlands, Australia, and The United States)

Yogyakarta, Indonesia

Mora Claramita
Chair

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Widyandana, MD., MHPE, Ph.D, (Universitas Gadjah Mada, Indonesia)

Best Oral and Poster Presentations

Best Oral Presentation: Emilia Award

Title: The relationship between academic burnout and empathy in medical students
Miko Ferine[1] Arfi Nurul Hidayah[1], Octavia Permata Sari[2] dan Alfredo Fernanda[1]
[1]Department of Bioethics and Humaniora, Faculty of Medicine, Universitas Jenderal Soedirman, Purwokerto, Jawa Tengah, Indonesia
[2]Department of Parasitology, Faculty of Medicine, Universitas Jenderal Soedirman, Purwokerto, Jawa Tengah, Indonesia

Best Poster: Dean FM-UGM Award

Title: Developing clinical skill videos as an instrument to assess objective structured clinical examination (OSCE) examiners' effect
Oscar Gilang Purnajati[1], Rachmadya Nur Hidayah[2], Gandes Retno Rahayu[2]
[1]Faculty of Medicine, Universitas Kristen Duta Wacana, Yogyakarta, Indonesia
[2]Department of Medical Education and Bioethics, Universitas Gadjah Mada, Yogyakarta, Indonesia
(Included in this proceeding)

Best Student Presentation: Archipelago Scholar Award

Title: Exploration of interprofessional education learning methods in achieving collaborative competencies during covid-19 pandemic (included in this proceeding)
Kevlar Azri Ghurafa[1], Atik Maftuhah[2], Bulan Kakanita Hermasari[2]
[1] Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia
[2] Department of Medical Education, Universitas Sebelas Maret, Surakarta, Indonesia
(Included in this proceeding)

Pre-conference Workshops

1. **Pre-conference workshop 1: 27th Jan 2022**. Topic: "*Research in Medical and Health Professions Education: Paradigm and Research Questions*." Speakers: Prof. Albert Scherpbier (Maastricht University the Netherlands), Dr. Astrid Pratidina, Sp.An, Ph.D. (Universitas Surabaya, Indonesia), Dr. Diantha Soemantri, MMedEd, Ph.D. (Universitas Indonesia, Indonesia), Dr. Ardi Findyartini, Ph.D. (Universitas Indonesia, Indonesia).
2. **Pre-conference workshop 2: 24 Feb 2022**. Topic: "*Research in Medical and Health Professions Education: Methods (Qualitative, Quantitative, Mixed Methods).*" Speakers: Dr. Widyandana, MHPE, Ph.D., SpM(K) (Universitas Gadjah Mada, Indonesia), Dr. Rachmadya Nur Hidayah, MSc, Ph.D. (Universitas Gadjah Mada, Indonesia), Dr. Ardi Findyartini, Ph.D. (Universitas Indonesia, Indonesia).
3. **Pre-conference workshop 3: 24th March 2022**. Topic: "*Publishing Medical and Health Professions Education Research.*" Speakers: Prof. Lambert M Schuwirth (Flinders University, Australia), Prof. Dr. Mora Claramita, MHPE, Ph.D. (Universitas Gadjah Mada, Indonesia).
4. **Pre-conference workshop 4: 21st April 2022**. Topic: "*How Adopting an Eco-ethical Leadership Approach and Help You Achieve Sustainable Change.*" Speakers: Dr. Yoga Pamungkas Susani, MMedEd (Universitas Mataram, Indonesia), Dr. Susi Ari Kristina, MKes, Apt (Universitas Gadjah Mada, Indonesia).
5. **Pre-conference workshop 5: 19th May 2022**. Topic: "*Professionalism: Western and Eastern Context*." Speakers: Prof. Madawa Chandratilake (College of Medical Education, Sri Lanka, SEARAME), Dr. Rita Mustika, MEpid (Universitas Indonesia, Indonesia).
6. **Pre-conference workshop 6: 16th June 2022**. Topic: "*Character Building in Medical and Health Professions Education: Undergraduate Students' Perspectives.*" Speakers: Undergraduate medical students from 3 institutions (Universitas Gadjah Mada: Giovanna Renee Tan, Universitas Indonesia: Fona Qorina, and Universitas Airlangga: David Nugraha), Dr. Astrid Pratidina, Sp.An, Ph.D. (Universitas Surabaya, Indonesia), Prof. Dr. Mora Claramita, MHPE, Ph.D. (Universitas Gadjah Mada, Indonesia).

Keynote Speakers/Speakers: Main Conference INA-MHPEC, 5th–6th July 2022

1. Professor K. H. Yudian Wahyudi, M.A., Ph.D. (Pancasila Institute Indonesia/ BPIP). Topic: "*The Role of National Outlook: Expected Values of PANCASILA for Health Professions Education.*"
2. Professor Patricia S. O'Sullivan, Ed.D. (University of California, San Francisco, USA). Topic: "*Character Building and Mentoring*."
3. Professor Vishna Devi V Nadarajah B.Sc., MHPE., Ph.D. (International Medical University, Malaysia). Topic: "*Teaching Values Through Leadership Training in Medical and Health Professions Education.*"
4. Professor Hiroshi Nishigori, M.D., M.M.Ed., Ph.D. (Kyoto University, Japan). Topic: "*Professionalism in Cultural Context*."
5. Prof. Dr. Herkutanto, Dr., Sp.FM(K), SH, LL.M, FACLM (Universitas Indonesia, Council of Medicine Indonesia). Topic: "*Philosophy and social contract of Medical and Health Professions*."
6. Dr. Dujeepa D. Samarasekera MBBS, MHPE, FRCP (NUS, Singapore). Topic: "*Enhancing professionalism of medical and health professions students*".
7. Prof. Dr. Nancy Margarita Rehatta, Sp.An., KIC., KNA (Universitas Airlangga). Topic: "*Symposium on Practical Experience in Character Building in Medical and Health Professions Education.*"
8. Prof. Achir Yani S. Hamid, MN., DNSc (Universitas Indonesia). Topic: "*Symposium on Practical Experience in Character Building in Medical and Health Professions Education.*"
9. Dr. Fatma Sylvana Dewi Harahap, SST., MA.Kes (IAIN SAS Bangka Belitung, Indonesia). Topic: "*Symposium on Practical Experience in Character Building in Medical and Health Professions Education.*"
10. Professor Yvonne Steinert, Ph.D., (McGill University, Montreal, Canada). Topic: "*Current Issues in Professional Development of Medical and Health Professions Education.*"
11. Professor Dr. Ova Emilia, M.Med.Ed., Ph.D., Sp.OG(K) (Rector Universitas Gadjah Mada, Indonesia). Topic: "*Creating Ideal Learning Environment for Character Building in Medical and Health Professions Education.*"

12. Professor Dr. Gandes Retno Rahayu, M.Med.Ed., Ph.D. (Universitas Gadjah Mada, Indonesia). Topic: "*Teachers as Role Models in Character Building in Medical and Health Professions Education.*"
13. Professor Dr. Budi Santosa, Ph.D. (AIPKI Chair, Universitas Airlangga, Indonesia). Topic: "*Teacher's Training Program for Supporting Character Building in Medical and Health Professions Education.*"
14. Dr. Setyo Widi Nugroho, Sp.BS(K) (Chair of Colleges of Medical Specialists Indonesia). Topic: "*Teaching Patient Safety in Medical and Health Professions Education.*"
15. Professor Dr. Ardi Findyartini, Ph.D. (Chair of PERPIPKI). Topic: "*Humanism in Medical Education.*"
16. Professor Mary Jo Good (Harvard Medical School, USA). Topic: "*Teaching Ethics in Big Data Era.*"
17. Professor Byron J. Good (Harvard Medical School, USA). Topic: "*A View of Ethics Beyond Rational Decision Making*."

Post-conference Workshops

1. **Post-conference Workshop 1 on manuscript/full-paper writing for publication, 9th September 2022**. Topic: Introduction, Research Question and writing method. Speakers: Prof. Dr. Mora Claramita, MHPE, Ph.D., Sp.KKLP (Universitas Gadjah Mada, IAM-HPE Chair), Dr. Astrid Pratidina Susilo, Ph.D., Sp.An. (Universitas Surabaya, Archipelago Scholar).
2. **Post-conference Workshop 2 on manuscript/full-paper writing for publication, 16th September 2022**. Topic: Principles of Writing Research Articles and How to Get Published, Writing Introduction and Research Questions, Writing Discussions and Conclusions. Speakers: Prof. Bridget O'Brien, Ph.D. (University of California, San Francisco, USA—Deputy Editor of Academic Medicine).
3. **Post-conference Workshop 3 on manuscript/full-paper writing for publication**, **28th October 2022**. Topic: Writing Results, Writing Discussion & Conclusion, Getting published in a Springer proceeding. Speakers: Dr. Rachmadya Nur Hidayah, M.Sc, Ph.D. (Universitas Gajdah Mada), Dr. Yoyo Suhoyo, MMedEd, Ph.D. (Universitas Gadjah Mada), Dr. Ardi Findyartini, Ph.D. (Universitas Indonesia, Chair of PERPIPKI).

Contents

Advancing Programmatic Assessment Using e-Portfolio for Undergraduate Medical Education: A National Development Report

Prattama Santoso Utomo, Nadia Greviana, Dimas S. E. W. Sumunar, Diantha Soemantri, and Mora Claramita

Abstract Programmatic assessment is an assessment system that ensures comprehensive decision-making concerning students' performance based on rigorous-multiple data points. Portfolios possess an essential role in the implementation of programmatic assessment. It serves as a platform to collect and record data points and reflect on students' progress and achievement. As a part of a larger project aiming to implement programmatic assessment as an undergraduate medical national exit exam in Indonesia, one of the first steps is to develop an e-portfolio system. We used the design thinking approach to develop the e-portfolio since it will be widely used throughout medical schools in Indonesia. Accordingly, the current study aimed to design a national-level e-portfolio system for undergraduate medical education in Indonesia. We conducted participatory action research as an iterative process to develop an e-portfolio design using the Stanford five-step design thinking approach. Best practices in developing and utilizing e-portfolios were reviewed by the research team based on several theoretical frameworks. The Stanford five-step design thinking includes empathize, define, ideate, prototype, and test. The generic e-portfolio was developed based on the ideation stage by applying the results of the define stage, leading to the prototyping phase. The national e-portfolio was established to incorporate several features clustered into the widely-known SOAP mnemonic: S (Subjective—Student Reflection), O (Objective—Assessment Outcomes), A (Assessment—Diagnosing Learning Issues), and P (Plan—Formulating Improvement and Learning Plan). The e-portfolio is intended to be used by students and faculty advisors. Applying e-portfolio and programmatic assessment requires students and advisors

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to be familiar with reflective inquiries. The e-portfolio should be managed and interpreted appropriately. Otherwise, it might become an assessment pile and thus will make all intensive work and resources in vain.

Keywords Programmatic assessment · e-portfolio · Medical education evaluation · Stanford five-step design thinking approach

1 Introduction

Programmatic assessment is a novel way to approach assessment as a more comprehensive decision-making process based on multiple and triangulated data concerning student performance. Given the strengths and weaknesses of each assessment instrument, the assessment decision of pass/fail should be made on something other than individual assessment but instead made after thoroughly considering all data collected regarding student performance. Within the scheme of programmatic assessment, students will first undergo training activities, and afterwards, there will be numerous assessment activities in which each activity will produce a data point. All data points will be collected and subjected to intermediate and final evaluations, with each aimed to evaluate students' progress and end achievement, respectively. Throughout training and assessment activities, students will be supported with supporting activities such as supervision, mentoring, reflection, and feedback. All these concepts and components of a programmatic assessment are elaborated in the work of van der Vleuten and colleagues [1].

Portfolios hold an essential role in a programmatic assessment. It functions as a platform to collect all data points, record, and reflect on student progress and achievement. By means of a portfolio, a longitudinal assessment of student performance can be made based on triangulated data points on assessment. An electronic portfolio (e-portfolio) is considered a robust system to collect all data points, including their feedback [2, 3] Overall, as Heeneman et al. [3] summarized, an e-portfolio serves as a repository of all student data to facilitate the administerial aspects of the assessment processes, to provide aggregated data, and facilitate student reflection on their learning. Therefore, an e-portfolio functions more than just as an assessment tool but also as a learning tool, aligned with the focus of programmatic assessment as an assessment for learning [3].

Despite the potential benefits of a programmatic assessment as widely discussed in the literature, especially ones that originated from the Western context, less is known about how programmatic assessment will fit into the context of medical education in the Eastern setting, including Indonesia. Applying a programmatic assessment requires a shift of mindset, especially in how we see, consider, and utilize assessment data. Unfortunately, studies on the development and use of programmatic assessment in Indonesia are still lacking. A study by Ainin et al. [4] was conducted to develop an instrument to assess programmatic assessment implementation in health professions

education institutions but has yet to examine the actual implementation of programmatic assessment. Therefore, more studies are required to establish the best ways to implement programmatic assessment in our own setting.

As a part of a larger project aiming to implement programmatic assessment as an undergraduate medical national exit exam in Indonesia, one of the first steps to be taken is to develop an e-portfolio system. We used the design thinking approach to develop the e-portfolio since it will be widely used throughout medical schools in Indonesia. Design thinking is an approach where we try to create an innovation, either a product or a solution, based on a deep understanding of the potential users, identification of problems and iterative process of prototyping and testing [5]. Thus, the current study aimed to design a national-level e-portfolio system for undergraduate medical education in Indonesia.

2 Methods

We conducted participatory action research [6] as an iterative process to develop an e-portfolio design using the Stanford five-step design thinking approach [5]: empathize, define, ideate, prototype, and test. These steps were conducted to be able to clearly define the priority features of the system by valuing opinions from stakeholders, evaluating its feasibility and acceptability, and improving the system iteratively [5, 7].

The application of learning and assessment methods, such as portfolios, should follow the best practices as well as consider local contexts and cultural backgrounds in its implementation [8]. Best practices in developing and utilizing e-portfolios were reviewed by the research team based on several theoretical frameworks: programmatic assessment, facilitating feedback provision and reflective practice. We conducted literature reviews on portfolio systems and implementation (i.e., van der Schaaf et al. [9]; Moores et al. [10]; Driessen et al. [11]; Buckley et al. [12]) and results of related pilot studies about portfolios conducted in Indonesia, which were still very limited [13, 14].

Intensive and iterative internal discussions were then conducted among the research team members and the information technology (IT) system developers in order to develop the baseline systems of the e-portfolio, consisting of the student interface, teacher interface, and backend system for the administrator. A linear-sequential life-cycle software development based on the Waterfall model (Fig. 1) was implemented in this project to complete each sequential stage and downward to the system deployment [15]. Initially, use-case diagrams were created to represent the interrelation between functional requirements. Non-functional requirements were also identified in this stage. The system development continued to design, implementation, pilot testing, and deployment within two months. The initial version of the system that was developed was built upon several generic features:

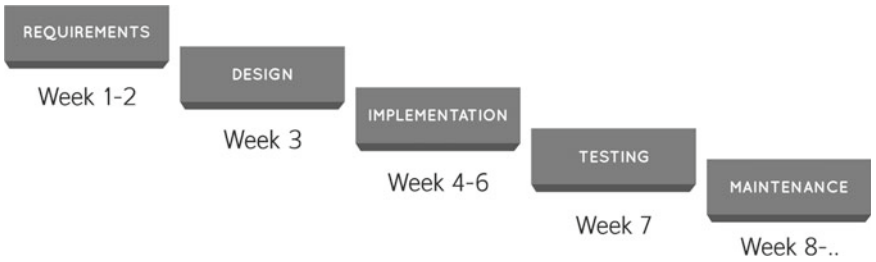


Fig. 1 Waterfall model with the corresponding schedule for e-portfolio system development

1. The e-portfolio system used the National Medical Doctor Competences (NMDC) as the final competence framework to comprehensively assess all competency areas and accommodate different medical schools' final learning outcomes.
2. Each medical school would be trained to prepare assessment data points and their connection towards their final learning outcomes and the NMDC.
3. The e-portfolio system allowed data points re-grouping according to the NMDC.
4. The piloting stage was planned to use retrospective data points from the past two semesters.
5. Self-reflection prompts were provided in the student interface.
6. Feedback prompts were provided in the teacher interface, including future plans for students' learning.

- **Empathize**

The process of empathizing was conducted by inviting stakeholders: medical teacher representatives from 93 medical schools in Indonesia, endorsed by the Ministry of Education, Culture, Research, and Technology Republic Indonesia, as well as the Indonesia Medical Education Association (IMEA). The workshop was conducted online using the Zoom Meeting platform. The workshop aimed to provide a venue for developing a shared vision/perception and further discussing the feasibility of e-portfolio implementation. The workshop began with a short presentation reviewing outcome-based education (OBE), programmatic assessment, and portfolio concepts and implementations, followed by a demonstration of the baseline e-portfolio systems for each interface. Workshop participants were then assigned to six breakout rooms with facilitators to further participate in focus group discussions to explore the current curriculum practices in their respective medical schools, potential data points, as well as expectations and concerns of the e-portfolio implementation. Data from the focus group discussions were audio recorded and analyzed thematically to identify

perceptions and needs of medical school institutions' stakeholders towards the e-portfolio implementation.

- **Define**

While engaging prospective stakeholders in focus group discussions, several problems and potential challenges in e-portfolio implementation were identified. The issues were related to four curricular aspects: OBE implementation, prior experience and familiarity towards the e-portfolio system, mentorship process, and faculty development program, as follows:

1. Implementation of outcome-based education

   Synchronization and implementation of OBE in each medical school varies and remains challenging, especially regarding aligning the assessment instruments or tools into the final learning outcomes. This challenge illustrated that the starting point for e-portfolio implementation would be different for each medical school and that the system needed to be made flexible enough to be adapted to the current curriculum structure at each medical school.
2. Prior experience and familiarity towards the e-portfolio system

   Generally, stakeholders had a positive perception towards the generic system being demonstrated and looked forward to its implementation nationally. The ability to include summative and formative assessment results as data points was mentioned by stakeholders. However, stakeholders' prior experience and familiarity with e-portfolio also varied. Only a few stakeholders had previous experience in piloting portfolios for clinical education. Some other stakeholders wondered how this e-portfolio system would differ from their respective schools' learning management or academic systems. Therefore, integration of this e-portfolio system with other existing systems was expected. Stakeholders also highlighted potential challenges concerning limited time and human resources in their respective medical schools to manage the backend data.
3. Mentorship process

   Stakeholders identified that the current challenges in conducting mentoring processes between academic counsellors and students were due to the large number of students in the program. The intensity, frequency, and quality of mentoring remain a challenge, especially for clinical students. Relationships between faculty members and students at a high-power distance affected students and faculty engagement in mentorship programs. Both academic counsellors and students often needed clarification about what to discuss during the mentoring program. Students' engagement in the mentorship program could have been higher. Academic counsellors found it challenging to decide to what extent they needed to assist students' learning and provide feedback.

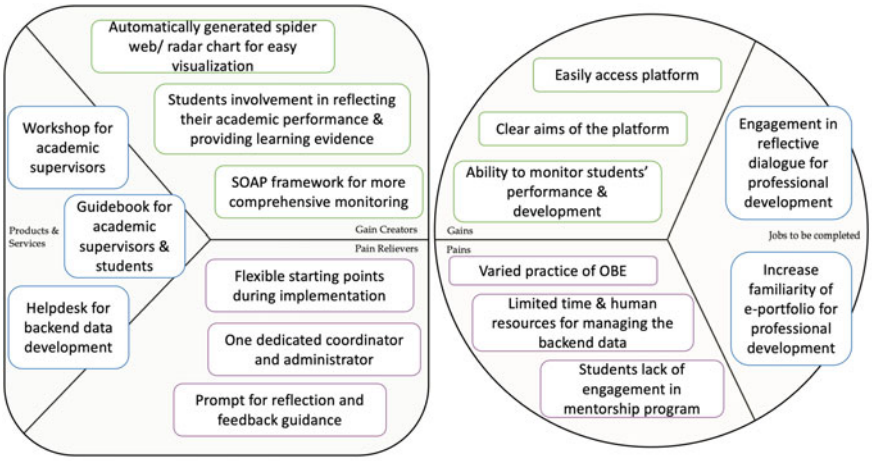


Fig. 2 The results of the ideation stage in 'value proposition canvas' [16]

4. Faculty development program

   Stakeholders identified the need for a continuous and longitudinal faculty development program in conducting a thorough and sustainable mentoring process and to maintain faculty members' motivation to utilize data in the e-portfolio systems thoroughly, being engaged in feedback dialogue to support student's personal and professional development. A faculty development program for the portfolio assessment team should also be provided.

- **Ideate**

We conducted the ideation stage using the 'value proposition canvas' [16] as depicted in Fig. 2.

1. Gains: Easily accessible platform across teacher generations was necessary; the e-Portfolio platform should have distinguished aims among other platforms (Learning Management System [LMS] and academic platforms) and help monitor students' academic performance development.
   Gain creator: Using spider web (radar chart) according to NMDC for easy visualization; The spider web was created automatically by the system according to the alignment of data points (assessment scores- quantitative); Comprehensive monitoring is conducted by asking students to reflect upon their academic performance and provide additional learning evidence upon reflecting on their performance followed with monitoring by academic supervisors using SOAP framework
2. Pains: OBE practice was found to vary across institutions; Institutions mentioned limited time and human resources in their respective medical schools to manage

the backend data; Feedback provision from faculty members was lacking; Reflective ability of students was still varied, and students' engagement in mentorship program was lacking.
Pain Relievers: the starting point for e-portfolio implementation will be different for each medical school (i.e., number of students and faculty members involved, types of assessments as data points, recorded period as data points, etc.), and the system needs to be made flexible enough to be adapted to the current curriculum structure at each medical school. Each medical school was expected to assign one e-portfolio coordinator (faculty member) and one e-portfolio administrator to be in charge of the piloting program; reflection has to be submitted by students before the mentoring session on their last semester performance for each competence with reflection prompts provided, while the feedback framework for the academic counsellor was also provided.

3. Customer Jobs: Engage students and teachers in reflective dialogue for students' professional development; Increase stakeholders' familiarity with e-portfolio utilization for professional development.
Product/services: System development consisted of features that encourage student reflection and feedback provision of teachers; Workshop for academic supervisor as well as for administrator were conducted; Guidebook for academic supervisors and students were provided; a Helpdesk for backend data development and collective/direct upload of curriculum matrix by IT development team was also provided

3 Results

The generic e-portfolio features above reflect the application of OBE and programmatic assessment. Enhancement of the features was conducted in the ideation stage by applying the results of the define stage, leading to the prototyping phase. The developed national e-portfolio integrates summative assessment results, maps students' performance with NMDC, and consolidates them with reflective inquiries. Based on the development approach above, a prototype of the national e-portfolio was established to incorporate several features clustered into the SOAP mnemonic below, which stands for S (Subjective—Student Reflection), O (Objective—Assessment Outcomes), A (Assessment—Diagnosing Learning Issues), and P (Plan—Formulating Improvement and Learning Plan).

3.1 Subjective—Student Reflection

This section allows students (Fig. 3) to conduct reflections based on their learning achievements and experience in the recent period, which is visualized through a radar chart according to each competency area in the NMDC. The reflection process

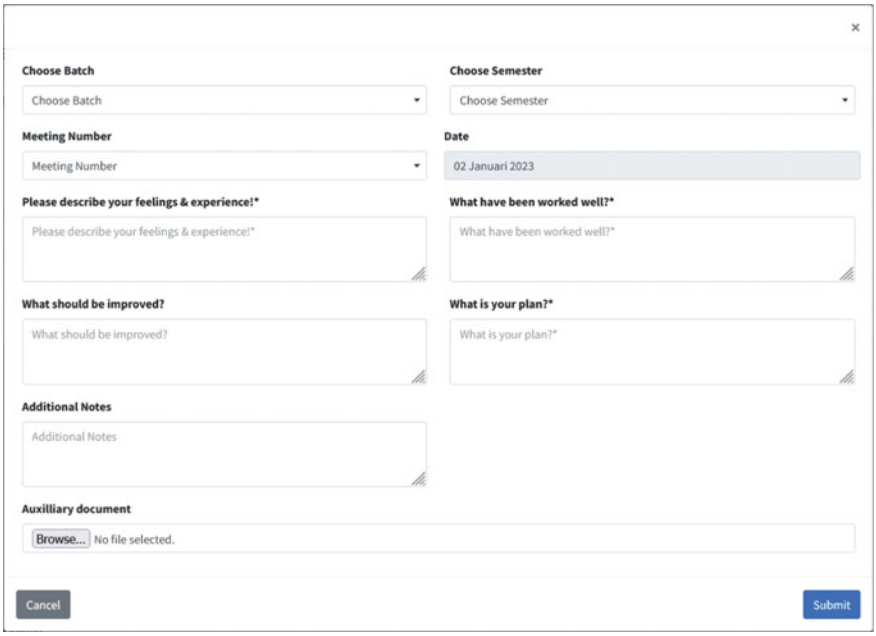


Fig. 3 Self-reflection form, allowing students to evaluate their current state [17]. This figure was taken from the Intellectual Property Rights Min. of Law Rep. of Indonesia by Utomo et al. [17], No. EC00202267866

applies a constructive reflection approach to incorporate the description of experiences, learning processes and difficulties that occurred. The academic advisors are able to see students' reflections before conducting advisory meetings. Hence, they are aware of the student's point of view and use it as the foundation for providing feedback and further discussion.

3.2 Objective—Assessment Outcomes

This section provides information on the student's academic performance. The distinctive approach of this national e-portfolio from other regular academic information systems is the attempt to quantitatively map the results of students' assessments (i.e., examination scores, scores acquired in problem-based learning (PBL) discussions, etc.) into the graduate learning outcomes in students' respective institutions and the national competencies achievement. Both students and advisors can monitor the achievements using radar charts (Fig. 4).

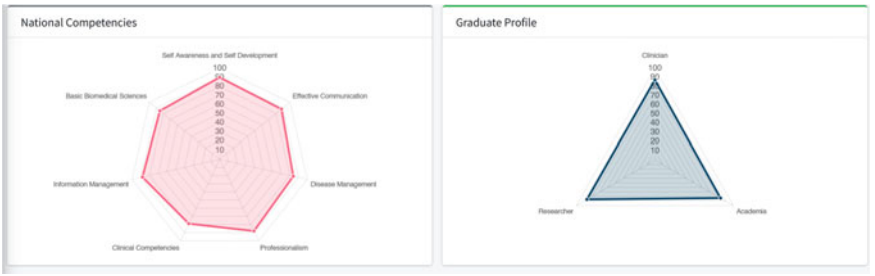
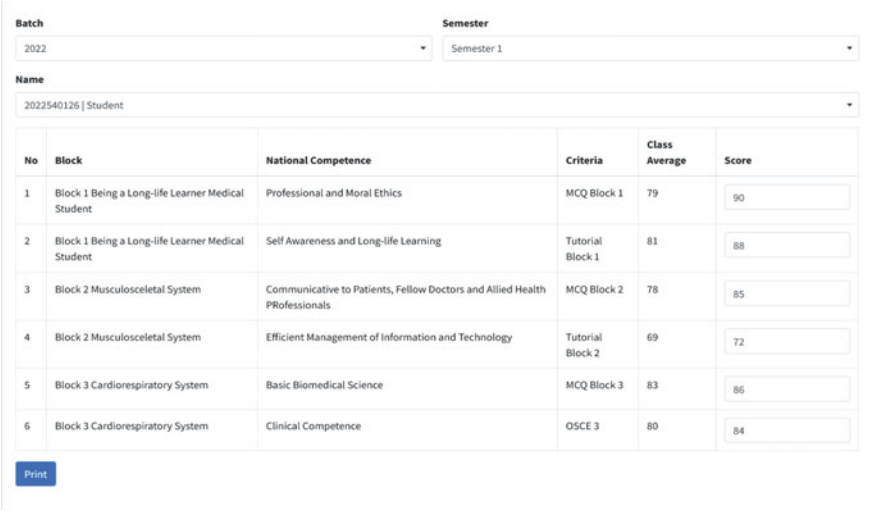


Fig. 4 NMDC achievement is illustrated in a radar chart in conjunction with the institutional graduate profile

3.3 Assessment—Diagnosing Learning Issues

Based on the Subjective and Objective data obtained and observed, the academic advisor as mentor evaluates students' progress, clarifies any learning issues, and provides feedback to be further discussed with each mentee. The written feedback in the system is used for advisors to provide mentoring advice and as guidelines for students in creating further action plans for their study. During this mentoring phase, students can also clarify any issues to the advisor. The 'Assessment' is a collaborative process facilitated by the advisor (Fig. 5).



Batch 2022 **Semester** Semester 1

Name 2022540126 | Student

No	Block	National Competence	Criteria	Class Average	Score
1	Block 1 Being a Long-life Learner Medical Student	Professional and Moral Ethics	MCQ Block 1	79	90
2	Block 1 Being a Long-life Learner Medical Student	Self Awareness and Long-life Learning	Tutorial Block 1	81	88
3	Block 2 Musculosceletal System	Communicative to Patients, Fellow Doctors and Allied Health PRofessionals	MCQ Block 2	78	85
4	Block 2 Musculosceletal System	Efficient Management of Information and Technology	Tutorial Block 2	69	72
5	Block 3 Cardiorespiratory System	Basic Biomedical Science	MCQ Block 3	83	86
6	Block 3 Cardiorespiratory System	Clinical Competence	OSCE 3	80	84

Print

Fig. 5 Objective data points originating from summative and formative assessments were recorded

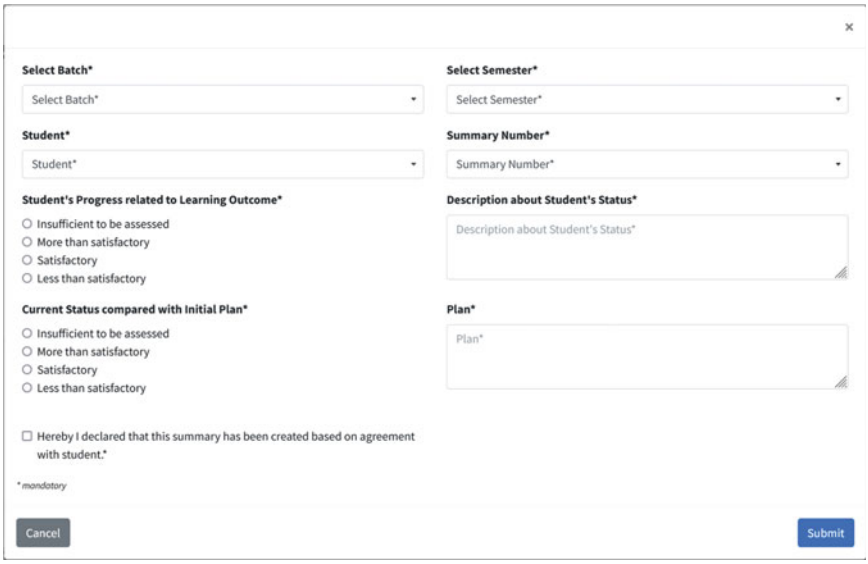


Fig. 6 An academic advisor is responsible for facilitating students to develop their future study plans

3.4 Plan—Formulating Improvement and Learning Plans

After completing the 'Subjective', 'Objective' and the 'Assessment' phases, the reflective journey comes to the 'Plan' phase, where students and advisors determine points for future improvement and plan subsequent learning goals. The process is collaborative and is documented in the e-portfolio. Both students and advisors should agree with the learning plans before submitting the advisory meeting report. The 'Plan' section can be reviewed in the subsequent advisory meeting (Fig. 6).

The national e-portfolio has been introduced to 34 medical schools to evaluate its adaptability towards curricular variation among medical schools. The current e-portfolio can facilitate medical school curricula with different graduate outcomes, since most medical schools already have assessment mapping towards the respective outcomes and the national competencies framework.

A training was also delivered to faculty advisors and institutional portfolio administrators. Hence, each medical school has distinct access to their respective e-portfolio to maintain data confidentiality. The training allows each medical school to operate and modify the e-portfolio independently.

4 Discussion

The use of e-portfolio benefited students and advisors in maintaining learning achievement and institutions or medical schools to evaluate the application of outcome-based curricula and align the assessment towards the expected competence. The portfolio may serve as an instrument to document students' progress in achieving the graduate outcomes of their medical education [18]. Introduction of the e-portfolio has triggered medical schools to reflect and re-examine whether OBE and programmatic assessment principles have been sufficiently incorporated into their curricula. Additionally, the process of developing the backend data of the e-portfolio has been used by medical schools to verify the alignment of each assessment instrument towards the course learning outcomes and graduate outcomes.

However, this piloting program shows that the initial process of creating, data input, and establishing the e-portfolio was rigorous and labor-intensive. There is a need for each institution to assign dedicated faculty members and supporting staff to prepare the backend data and further operate the e-portfolio. Moreover, faculty development programs are also required to ensure the appropriate use of portfolios [11], and to enhance the benefit of e-portfolio towards students' learning advancement.

The application of e-portfolio and programmatic assessment requires students and advisors to be familiar with reflective inquiries. The e-portfolio should be managed and interpreted appropriately. Otherwise, it might become an assessment pile and thus will make all intensive work and resources in vain. Hence, there is a need to provide training in reflective practice for students and faculty members so that the value of the e-portfolio might be enhanced. Even at a national level, a single assessment cannot necessarily reflect and predict medical graduates' performance [19]. Hence, using a portfolio with a comprehensive attempt to portray competency attainment and record the collaborative process between mentees and mentors during its implementation might also provide a better understanding and prediction of the graduates' competencies.

5 Competing Interests

The authors declare no competing interests related to the study and manuscript writing.

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Authors Contributions PSU designed the e-portfolio system, provided training and facilitations during the program, data collection and analysis, drafted the manuscript, edited, and finalized the manuscript. NG designed the e-portfolio system, provided training and facilitations during the program, data collection and analysis, and drafted the manuscript. DSWES designed the e-portfolio system, provided training and facilitations during the program, data collection and analysis, and drafted the manuscript. DS provided suggestions for the e-portfolio system, provided training during

the program, and drafted the manuscript. MC provided recommendations for the e-portfolio system, provided training during the program, drafted the manuscript, and supervised the project.

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Ethics and Consent The project and study were granted ethical approval by the Medical and Health Research Ethics Committee (MHREC) Faculty of Medicine Public Health and Nursing Universitas Gadjah Mada No: KE/FK/0833/EC/2022. All participants provided their consent prior to joining the project.

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An Exploration of Nursing Students' Experiences Using Case Report Design: A Case Study

Yayu Nidaul Fithriyyah, Arif Annurrahman, Khudazi Aulawi, Atikah Kurnia Alda, and Astrid Pratidina Susilo

Abstract Case report design in nursing practice and education encourages active learning, scientific writing, and critical thinking. This study explores the experiences of nursing students using a case report design. This study used a case study design. Data collection for the nursing student professional program from January to September 2022 included demographics, case report data, educational media, and semi-structured interviews. The thematic analysis followed Braun and Clarke's framework. The results showed no difference in the characteristics of the four nursing students, who are all women. Differences were found in the patient characteristics and the type of educational media. Two themes emerge: (1) Students learn from patient case reports; and (2) Students learning for scientific writing of case reports. Each theme consists of three sub-themes. Results showed that the case studies can improve students' clinical reasoning in providing quality care. In conclusion, according to the evidence, this study can assist professional nursing education in understanding and improving the integration of clinical practice skills and students' writing skills. In the future, clear guidelines, training, and guidance from lecturers and clinical supervisors are needed.

Keywords Case study · Final clinical skills assignment · Nursing student · Case report design

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Abbreviations

ESRD End-stage renal disease
HD Hemodialysis

1 Introduction

Humans are considered holistic individuals consisting of bio-psycho, socio, and cultural dimensions. Appropriately, case studies are widely used for integrated student clinical learning [1]. A case study, also known as a case report, is an in-depth study of a particular individual or group. The report will often use the terms: "review of a specific condition, disease, or problem [2, 3]. Case studies in nursing practice and health education promote active learning. In addition, these methods develop critical thinking skills and enable the healthcare community to share experiences [3–5].

In Indonesia, the Bachelor of Nursing study program includes the academic program stage (Bachelor of Nursing, four years full-time) and the nursing profession program stage (1 year full-time) [6]. Nursing students must complete a case report or case study at the professional nursing stage as a graduation requirement. The goal is for students to be able to practice comprehensive nursing care and scientific writing. In addition, combining nursing care plans with case reports is necessary because it can assist in managing patients with various health conditions to improve the quality of care [7, 8].

According to Gagnier et al. [9], the advantage of students using case reports can be increased scientific writing skills in disseminating information, interventions, or rare diseases and contributing to scientific progress [4]. However, the use of case reports is still rare among medical students. Out of 84 medical students, 67% have never written or presented a case report, and 98% consider the ability to find interesting cases necessary [10]. In a study to evaluate case study learning methods in nursing students for chest physiotherapy skills, the results showed a significant increase in knowledge and skills for nursing students [1]. These findings concluded that case studies are an effective strategy for student learning. However, that study did not explore the experience of nursing students during the case report process. Studies have been conducted regarding case studies which are focused on patients but few are from the perspectives of the nursing students' experiences. Therefore, the authors aimed to explore nursing students' experiences completing their final assignment using case studies to provide an overview of the processes and difficulties they may face. The hope is that the findings can become a recommendation for curriculum needs, including learning scientific writing.

2 Methods

Design

This case study design explores students' experiences in the nursing profession using case study designs for health education interventions in hemodialysis (HD) patients.

Participant Selection

We used a purposive sampling method for the nursing student profession program at the Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia. Inclusion criteria were: (1) nursing students who practiced in the HD unit for six weeks and completed their final assignment using a case report design with educational interventions. Students who met these criteria were 4 of 15 students.

Data Collection

Participants signed a consent form adapted from BMJ Case Reports consent form, developed by The University of Hawaii https://jabsom.hawaii.edu/wp-content/uploads/2022/05/Case-Report_sample-patient-consent-form.pdf. The authors collected demographic data, manuscript case reports, and media education from January to September 30, 2022. Furthermore, semi-structured interviews were conducted concerning: (1) Experience using case reports consisting of 5 questions; and (2) Identification of types of health education intervention media, consisting of the following questions based on the references [11–13]:

Main question: What is your experience in using case design reports?

Following questions: Differences in the use of educational media for HD patients:

(1) What media is used for educating your patient? (2) Why are you interested in using this media? (3) How are you determining the correct media type for your HD patient? (4) What do you think about the implementation of the media in patients? (5) Your opinion, what lessons can be learned from the implementation of educational media? (6) Do you think the media method used is effective and interactive? What are the drawbacks? What's the problem? (7) How can you improve or expand your patient health education program in the future according to the media you use? (8) In your opinion, is your use of educational media following the outcome you set? (9) Is the case method report helped you achieve that outcome?

Zoom interviews were recorded (30–62 min), and transcription was done within 48 h after the interview [14]. The authors independently used the thematic analysis framework developed by Braun and Clarke [15] and discussed the emerging themes.

3 Results

Participants Characteristics

The characteristics information of the four participants are presented in Table 1. Based on these data, the study results showed there were no significant differences in the characteristics of the four nursing students, except there were differences in the problems of each patient, for example, non-compliance with HD. Also, the third patient (P3) was pregnant, while the second participant (P2) was providing care for patients with fluid restriction problems (P2).

The type of educational media was adjusted to the patient's condition in (P1), (P3), and (P4). Flashcard media aimed to increase interaction and knowledge during HD (P1). However, the implementation of education was affected by the instability of the patient's condition.

Participant (P2) chose the Padlet educational media because patients and their families are familiar with using smartphones. In addition, there was easy access for the patients and families. In contrast, the participant (P4) made a flipchart due to a lack of skills in using digital information.

Table 1 Characteristics of participants and media education (n = 4)

Characteristics	Participant 1 (P1)	Participant 2 (P2)	Participant 3 (P3)	Participant 4 (P4)
Age (years)	25	24	23	24
Gender	Female	Female	Female	Female
Education	Undergraduate Nursing	Undergraduate Nursing	Undergraduate Nursing	Undergraduate Nursing
Patient	**Patient 1**	**Patient 2**	**Patient 3**	**Patient 4**
Age (years)	52	60	23	56
Gender	Man	Man	Woman	Woman
Diagnosis	ESRD history of diabetes mellitus	ESRD with hypertension	ESRD with pregnancy	ESRD with severe anemia
Problems	Non-compliance with HD	Volume-dependent hypertension	Non-compliance with HD and not routine antenatal checks	Non-compliance with HD and severe anemia (Hemoglobin 4.4 g/dL)
Media education	**Intervention**	**Intervention**	**Intervention**	**Intervention**
Media education	Flashcards	Padlet® Education Platform	A booklet with interviewing motivation	Flipchart
Outcome	Knowledge and HD compliance	Fluid restriction compliance	HD and antenatal checks routine	Knowledge and compliance with the treatment

ESRD: End-stage renal disease, HD: hemodialysis

For the participant (P3), educational media involved motivational interviews using a logbook as continuous monitoring to overcome the non-compliance of HD patients who are pregnant.

Emerging Themes and Sub-themes

Overall, the themes that emerged in this study are described in Table 2.

Theme 1: Students' learning from patient case report

In this theme, participants learn to recognize the nursing care process. However, all participants agreed that they had little experience. Participants feel they have limited time because they are simultaneously doing practical work and writing the case reports. Participants overcame this challenge by preparing nursing care plans, interacting effectively with patients, and managing their time.

> ... it's still not effective (intervention), because there are several conditions from the patient and maybe I also don't have much experience. (P3_23_Line 245).

> Yes, I usually write down what I want to convey before going to the patient... even though it's already listed when I meet them, I tend to forget too. (P4_24_Line 284).

> ...is this a bit difficult to pursue clinical nursing skills. So, you must be smart about dividing your time between doing your final assignment (case report) and pursuing nursing knowledge or skills (clinical practice). (P3_23_Line 206).

Participants in this study revealed that conducting nursing care through case reports can help them recognize the unique characteristics of patients being managed, thereby strengthening clinical reasoning in determining interventions that suit the patient's needs.

> In my opinion, the experience of using this case report is unique, ma'am. Because of the first one, we can do it first (study) related to unique cases and further adjust it to the patient's needs. So, because there are patients, this also motivates researchers to know more or review the literature. (P3_23_Line 203).

Something unexpected happened when the third participant (P3) identified the patient as pregnant but still taking irbesartan. Participants coherently identified the root of the

Table 2 Themes and sub-themes

Themes	Sub-themes
Students' learning from patient case report	Recognize the process of nursing care
	Recognize patient needs according to patient characteristics
	Helping to strengthen clinical reasoning
Students' learning for scientific writing of case reports	Finding the unique case to gain experience in clinical nursing care
	Challenging in writing a case report
	Trying to find a strategy for writing a case report

problem and found that the patient was ignorant of her condition and did not report her pregnancy to the doctor. Through the case reporting, the participants' clinical offerings can help improve the quality of life of the patients being managed.

> I was confused when patients were still taking irbesartan. I searched various literature and immediately examined the patient and reported the results to the doctor. P3_23_Line 215).

Then, all participants agreed that they must establish trusting communication with patients and involve their families so that interventions through educational media can be received by the patients properly and effectively. Some managed patients showed a positive effect with an increase in scores from the educational media intervention provided by the participants.

> ...So, after I did education with the Padlet media...after being exposed to several interventions, the patient's score increased (adherence to fluid restriction) and was also better (the HD process) than before the intervention. (P2_24_Line 151).

Theme 2: Students' learning for scientific writing of case reports

This theme revealed that participants learned to structure and correct scientific writing through case reports. All participants agreed that case reports have distinctive characteristics from other methods, such as having easier to follow flow, being flexible in writing, more concise, and considered more applicable in achieving outcomes.

> ... from me, it is very flexible too from this method (case report) ... it makes it easy for us too. (P1_25_Line 28).

> In my opinion, this (case report) is enough to measure patient outcomes to be applied later in clinical settings. (P3_23_Line 256)

In this study, several participants explained their steps when determining which cases to be managed coherently, starting with a survey of unique cases, and adjusting to the abilities and the needs of the patient. In addition, participants also believed that support from lecturers and clinical supervisors in selecting managed cases was significant.

> For yesterday's stages it was related to something more, such as a survey first for unique cases that can be appointed as case reports, then consulted with clinical and academic supervisors. Furthermore, after several unique cases were found, discussions and mutual agreements were carried out... (P3_23_Line 198).

In addition, all participants also revealed that scientific writing using the case report method was challenging because it was their first experience, so they were still confused. Therefore, a clear guide is needed regarding the rules for writing case reports so that they can guide students in correct and structured scientific writing.

> ... it is also a challenge for me because I do not have experience, so I am still figuring out kind of case report should be made. (P4_24_Line 274).

> ... there must be a special guideline (case report) with that standard (P2_24_Line 106).

> In this study, several participants expressed strategies for writing case reports, including knowing how to write a case report. In addition, look for similar references and serve as a

> benchmark in writing. For example, in this study, some participants mentioned using previous senior paper references. Then the most important thing is to actively consult with clinical supervisors and lecturers regarding the case report writing process.

> In my opinion, the lesson learned (writing a case report) is that when you want to examine a case, you have to be structured for its preparation (case report). So, starting from finding a unique case, reviewing it, then determining the problem (P3_23_Line 242).

> Then for writing it (case report), I also discussed it with my lecturer, and I also looked for references from previous friends, Mrs. who did the case study. (P4_24_Line 280).

4 Discussions

In this study, the authors explore the experiences and learning from nursing students' perspectives regarding using the case report method in final assignments. This study revealed two main themes that emerged from the interview results: students' learning from patient case reports and students' learning from scientific writing of case reports.

The learning gained by students from patient case reports in this study is that students can recognize systematic nursing processes. It starts with the participants looking for managed cases. Then, they make a nursing care plan from the assessment and the intervention for evaluation. Nursing planning requires analytical skills to relate theory to nursing practice [16]. Case reports are reported to have contributed to integrating knowledge with practice [17]. According to a study conducted by Boonkong et al. [16], case reports can improve systematic thinking, analysis, and the ability to plan nursing care and student confidence in clinical practice.

In this study, participants learned to recognize the characteristics of the patients being managed. Case reports are used to investigate in depth and systematically related to individuals, groups, or communities to increase the author's understanding [18]. A case report is a detailed report on the patient's signs, symptoms, diagnosis, treatment, and follow-up [19]. Case reports could improve the clinical reasoning of participants in this study, making it easier to determine the interventions needed by the patients. The case method is a means of bridging the gap between theory and professional practice [20]. This study proved that case reports help form good clinical reasoning in coherent students. Students are more sensitive in gathering information and understanding patient problems so they can implement interventions. These results are supported by research that case reports provide opportunities for students to practice clinical reasoning to create quality and patient-centered care [21].

The second theme is students' learning for scientific writing of case reports. All participants experienced confusion at first. A study by Yasir et al. stated that novice researchers usually experience confusion with using case reports and the differences with other methods [22]. Case reports motivate novice researchers to seek experience in writing more contextual research [23]. The findings in this study are that participants feel challenged with new situations and consider case reports to

be more flexible, practical, and applicable in the clinic. The results, in line with the study of Brogan et al. [24], stated that this design is flexible, in-depth, and contextual in understanding the phenomena of interest.

Participants started writing case reports by looking for unique and interesting cases, then consulted with clinical supervisors and lecturers. One of the stages of compiling case writing, according to Alsaywid and Abdulhaq [25] is consulting an expert or advisor in determining the case to be managed. A quality and communicative guidance process between supervisors and students is the key to success in the case report process [26–28].

The challenge in writing a case report in this study is that there are no clear and standard guidelines or guidelines. Even though it is very necessary to have concise guidelines that can be followed practically when using design case studies [29]. Efforts made by participants seeking references from seniors or similar reports were in line with the study of Alsaywid and Abdulhaq [25] indicating that the writing of case reports varies. Hence, it is necessary to understand the case report type. Support and guidance by lecturers and clinical supervisors are significant in improving knowledge and skills, overcoming challenges, and writing case reports. A survey conducted by Jha et al. revealed that the supervisor's role in facilitating the writing and presentation of reports is essential for producing a good case report [10].

5 Conclusions

Based on the findings of this study, all students initially experienced confusion in integrating the practice of nursing skills and scientific writing of case reports in nursing care. Participants completed the stages and considered how to overcome the same challenges. The study findings show that students could develop good clinical reasoning to improve the quality of patient care. Specific training and clear guidelines are needed to explain case reports, including the step-wise method in writing them. This case report approach can also help nursing education professionals understand students' perspectives on the final assignment. We highlight the significant role of lecturers and clinical supervisors in helping to understand case reports, best practices, and scientific writing.

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Authors' Contribution *Yayu Nidaul Fithriyyah*—responsible for the conceptualization, methodology of collecting data, and writing the initial manuscript draft.

Arif Annurrahman—responsible for collecting data, conducting transcription and analysis, and writing manuscript drafts.

Khudazi Aulawi—responsible for reviewing the data collection and analysis and revising the manuscript draft.

Atikah Kurnia Alda—responsible for collecting data, conducting transcription and analysis, and writing manuscript drafts.

Astrid Pratidina Susilo—responsible for methods and analysis and writing manuscript drafts. All authors have read and approved the published version of the manuscript.

Competing Interest There is no financial support from any organization. The authors declare that they have no conflict of interest.

Ethics Approval and Consent to Participate All the participants voluntarily participated in this study and provided written informed consent. Permission was obtained from the head of the medical-surgical nursing department.

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Assessment and Evaluation of Block of Disaster Preparedness: Implementing Problem-Based Learning in Clinical and Public Health Management

Amanatus Solikhah, Nurul Qomariyah, Bayu Praditya Indarto, and Afifah Khoiru Nisa

Abstract Disasters have increased worldwide. Disaster management requires extensively trained human resources, including medical doctors. The curriculum of the Faculty of Medicine Universitas Ahmad Dahlan was developed with excellence in the field of disasters which is distributed throughout all semesters. The disaster block introduces clinical and public health management in disasters with various learning methods to achieve the learning objectives. This study aimed to evaluate the achievement of learning objectives in the disaster preparedness block. The quantitative and qualitative data were collected from formative and summative evaluations from the routinely used evaluation process including written feedback from students and lecturers. The evaluations measured students' achievements on the various learning methods of disaster preparedness block (tutorial discussions, lectures, skills practices: tabletop exercise, improved medicine, journal reading, and field visits). Quantitative data from the formative assessment showed average scores of tutorial discussion (76.5), skills practice: tabletop exercise (81.0), improved medicine (89.4), journal review (95.8), and field visit report (80.9). The summative assessment showed the average score of the block examination (51.3). Based on the block examination result, only 40% of students scored >60. Qualitative evaluation of lecturers' written feedback showed an uneven distribution of learning objectives with the same time allocation for each tutorial discussion. Some scenarios could not stimulate discussion based on the expected learning objectives. Feedback from students, in general, showed a demand to increase the variety of learning methods, more appropriate time allocation for assignments, and adjustment of the number of assignment group members. The formative assessment showed a higher score than the summative

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assessment. The summative assessment showed low achievement. Students need more variety of learning methods to increase their participation in the learning process. Further analysis of each learning method is needed to increase students' achievement.

Keywords Evaluation · Disaster preparedness · Learning methods · Skills practice · Evaluative assessment

1 Introduction

In 2020, an Emergency Logistic Management Problems for Disaster Zones (EM-DAT) report explained that 389 natural disasters killed 15,080 people, affected another 98.4 million, and cost 171.3 billion US$. Apart from the Coronavirus Disease 2019 (COVID-19) pandemic, this year has been dominated by climate-related disasters [1]. The establishment of the Medical Study Program Universitas Ahmad Dahlan (UAD) was motivated by Indonesia's position on three earth plates (Indo-Australia, Eurasia, and Pacific) which causes this country to have the potential vulnerability to disasters. Ahmad Dahlan University Medical Study Program is located in the Province of the Special Region of Yogyakarta (DIY), a disaster-prone area in Indonesia. Geographically, it consists of the Bantul regency which borders on the Indian Ocean with the potential for a tsunami disaster, Sleman regency which has Mount Merapi, which has the potential for volcanic eruptions, Gunung Kidul regency which is a hilly area that is hit by drought almost every year, and Kulon Progo regency is an area of hills and valleys that are prone to flooding and landslides, as well as the city of Yogyakarta (DIY) which is densely populated and prone to fires. According to a report by the Center for Research on the Epidemiology of Disasters (CRED) in 2021, Indonesia has the highest number of disasters in the world (29 total incidents) and floods (hydrological) are the most frequent disasters experienced by Indonesia (25 incidents) [1]. Based on National Board for Disaster Management (BNPB) data, in 2020, there were 2,952 disaster events in Indonesia. In 2020, DIY recorded 102 disaster events consisting of 3 floods, 70 extreme weathers, 22 landslides, and seven other events. Based on that condition, medical institutions of Indonesia are urgently needed to prepare physicians in clinical and public health management in case of disasters.

Effective preparedness, response, and post-disaster recovery require integrated and planned actions. It also needs experienced human resources who can apply their knowledge and skills in critical care and emergencies [2, 3]. Physicians dealing with crises due to disasters often lack the knowledge and experience to work effectively in stressful disaster conditions [4, 5]. In Indonesia, during medical education, doctors are not fully equipped with emergency competencies due to disasters. It is because the 2012 Indonesian doctor competency standards (SKDI) stipulated by the Indonesian Medical Council (2012) only contain disaster matters in the health problem management section which reads as follows: "Performing management of outbreaks and

disasters, starting from problem identification to community rehabilitation." Considering the limited competency plans related to disasters and the Indonesia situations related to disasters, the Medical Education curriculum at the Medical Study Program of Universitas Ahmad Dahlan (UAD) is prepared with excellence in the field of disaster to prepare doctors in disaster management.

The disaster curriculum at the Medical Study Program UAD is distributed in the pre-clinical phase and the clinical rotation phase. Disaster materials in the academic stage of education are given through conventional face-to-face lectures (9 credits) and in the Block of Disaster Preparedness (5 credits). The curriculum is implemented in the learning process and collaboration with the Regional Disaster Management Agency/Badan Penanggulangan Bencana Daerah (BPBD) and the Muhammadiyah Disaster Management Center (MDMC).

The learning materials for the Block of Disaster Preparedness which is the 20th block in the competency-based curriculum of the Medical Study Program UAD are developed with the student-centered learning methods. The Block of Disaster Preparedness runs for six weeks with two key learning outcomes: clinical management and public health management in disasters. Learning outcomes are achieved through several learning activities: tutorial discussions, expert lectures, laboratory work, and student assignments. This block provides a comprehensive understanding and appropriate, practical, and simple skills according to the academic level of students in the field of disaster management. It aims at providing knowledge to distinguish between individuals and groups in taking action to reduce their vulnerability to disasters. It is because trained people can prepare for disasters and respond well. Trained people can protect themselves and others better. In addition, natural disasters require doctors to lead first aid efforts in the areas where they work until other aid arrives, or even have to work to overcome various medical and psychological impacts sometime after the disaster [6]. However, most physicians have never received formal training in this area. In fact, without experience and training, a physician cannot conduct these tasks well [3, 5, 7, 8]. Consequently, planning and designing a comprehensive medical education program is needed to prepare doctors to face disasters. The Medical Study Program UAD implemented Block of Disaster Preparedness for the first time in 2021 and this study aimed to evaluate the implementation of that Block.

2 Methods

The method in this evaluation was conducted based on the routine evaluation process of the block course. Block evaluation data were obtained from students and lecturers. Data from students were in the form of assessment results of learning activities, tutorials, and lecture evaluation questionnaires. Data from lecturers were in the form of assessments of learning objectives achievements and tutorial evaluation questionnaires. The formative assessments were conducted at [1] the end of the tutorials to assess students' performance and mini quizzes, and [2] practical sessions (including

tabletop exercise and improvised medicine), journal reading, and hospital field visits (observation reports). The summative assessment was obtained from the final cognitive theory examination at the end of the block using a computer-based multiple-choice question method. Analysis for the mean difference between the formative and summative assessments used student's t-tests. The authors also compared the summative scores between groups of students with formative assessments above and below the average. Qualitative data were obtained from the answers to the open questionnaire at the end of each tutorial activity. All students and lecturers who joined in block tutorials filled out the questionnaire. Questionnaires for lectures, practical sessions, and other activities were also distributed and completed by students at the end of the block.

3 Results

Participants consisted of a total of 50 students who were in the 7th semester (Table 1). All students who became subjects in this study participated in all learning activities in the disaster preparedness block.

Before implementing the block, the teaching team held a semi-workshop coordination meeting. The workshop was attended by institutions involved in disaster management in Indonesia, especially in Yogyakarta, namely the Regional Disaster Management Agency/Badan Penanggulangan Bencana Daerah (BPBD), Muhammadiyah Disaster Management Center (MDMC), PKU Muhammadiyah Hospital Bantul, and the Faculty of Medicine (FoM) UAD Disaster Team. The workshop discussed the learning objectives, the methods used, and the assessment plans to be used. The materials were listed in the block learning plan and became a reference during the block. To support learning activities, the teaching team also provided study guide books for students (containing an outline of schemes and plans for learning activities in blocks), tutor guidebooks (as a reference for tutors in guiding tutorials), and practical session guidebooks. All tutors and instructors involved in learning activities have previously attended training for instructors. The teaching team has also developed a rubric for formative assessment and assessment blueprints for summative assessment questions.

Block learning objectives comprised clinical (weeks 1 and 2) and public health management (weeks 2 and 3) in disasters. The first and second tutorial scenarios represent clinical management learning objectives with crush injury and mass poisoning topics. The expert lectures cover the topics of crush injury and crush

Table 1 Characteristics of study participants

Gender	Frequency	Percentage
Male	14	28
Female	36	72
Total	50	100

syndrome, blast injury, bioterrorism, pain management, hazardous material injury, and victim identification in disasters. Besides, there were a series of improvised medicine practical sessions in which students were expected to be able to implement improvised medicine in disaster clinical settings through video making. In the first scenario tutorial, evaluation from tutors showed insufficient discussion time, students were not motivated to find out more about the case, the scenario was too broad and the topic of discussion could be further developed. Whereas in the second scenario, the evaluation showed too many topics of discussion, students did not yet have the concept of handling mass cases (still using the mindset of handling individual clinical cases), and there was a need for the enrichment of case study objectives.

The tutorial scenarios 3 and 4 represented public health management during disaster learning objectives with health management in evacuation and outbreaks topics. Expert lectures covered the topics of post-disaster immunization, understanding and application of the Geographic Information System (GIS) in disasters, and a guest lecture related to health management in evacuees from BPBD. Evaluation from the tutors showed that tutorial scenario 3 was complete, well-organized, and following the learning objectives. Tutorial scenario 4 covered the topic of the COVID pandemic as an example of an outbreak. The evaluation results showed that some students were still focused on a specific topic. They only discussed COVID-19 related issues without discussing the outbreak in general. Apart from that, the tutors also said that the discussion related to outbreaks was too broad.

The 5th and 6th weeks integrated the previous modules and provided additional knowledge regarding bioethics and aspects of the Qur'an and Sunnah in disaster situations. Students were given assignments to discuss and present journals related to public health management in disaster situations. Students also received tabletop exercise lectures as disaster mitigation simulation and training. Later, students discussed technical plans for various disaster scenarios in small groups (9–10 people) and presented their work in the large class. To support their understanding related to illustrations of disaster management in hospitals, students also visited the PKU Muhammadiyah Bantul disaster preparedness hospital. Evaluations from students showed that the visit could not provide an overview of the hospital disaster management situation. It was because the materials delivered by the hospital were given through lectures due to the impossibility of direct observation during the visit. Table 3 shows the summary of the evaluation of the results of completing the questionnaire from lecturers and students.

The formative assessment components were obtained gradually throughout six weeks of block implementation. Tutorial activities consisted of eight meetings with four scenarios. The tutorial score consisted of activity assessments (82.14 ± 2.73) and mini-quizzes (70.90 ± 9.43). The activity assessments consisted of preparation of information, activeness and communication skills, cooperation, understanding, and attitudes. Mini-quizzes consisted of 10 multiple-choice questions related to the learning objectives of the scenario. Practical sessions comprised tabletop exercises, on which the students discussed under instructor supervision to design and present a training operation plan of specific disaster management and improvised medicine

with making a video of the implementation of improvised medicine as final assessment. The average score was 81.04 ± 5.21 for tabletop exercise and 89.38 ± 4.24 for improvised medicine. In week 5, students were assigned to search, study, and present disaster management journals with specific disaster topics. The average score of the journal presentation was 94.75 ± 6.23. In addition to classroom activities, in the disaster preparedness block, there was a field visit to PKU Muhammadiyah Bantul Hospital to give experiences to the students about disaster management plans implementation in hospitals. After the visit, students were given a task to make a report with a mean score for the report was 80.89 ± 5.04. The summative assessment component was collected from the cognitive theory examination at the end of the block. Questions were multiple-choice of all lecture materials. The mean score for the block final exam was 51.28 ± 15.59. All assessments of learning activities were individual except for improvised medicine practical sessions, journal reading, and visit reports. Table 2 shows student's formative and summative assessments summary in the disaster preparedness block.

At the end of the tutorial activities and block implementation, lecturers and students were given a questionnaire containing evaluations of the achievement of the learning objectives and suggestions for future improvements. Figure 1 presents the learning objectives' achievement evaluation. Table 3 shows the summary of evaluations from lecturers and students.

Table 2 Results of the students' formative and summative assessments in the disaster preparedness block

Assessment components	Scores (mean ± SD)	Assessment type
Tutorials (4 scenarios)	76.52 ± 5.41	Formative
Activities	82.14 ± 2.73	
Mini quizzes	70.90 ± 9.43	
Practical sessions	85.21 ± 2.56	
Tabletop exercise	81.04 ± 5.21	
Improvised medicine	89.38 ± 4.24	
Journal reading	94.75 ± 6.23	
Field visit report	80.89 ± 5.04	
CBT cognitive theory examination	51.28 ± 15.59	Summative

Note Knowledge assessment is obtained from tutorials (activities and mini quiz) and assignments (journal reviews), field visits (visit reports), lectures (MCQ exams); CBT, cognitive behavioral theory; SD, standard deviation

Note Skills assessment: practicum (Table top exercise, improvised medicine)

Table 3 Summary of evaluations and suggestions for disaster preparedness block from lecturer and students

	Evaluation	Suggestion
Lecturers	– Less time to discuss in detail (uneven distribution of learning objectives with the same time allocation for each tutorial discussion) – Students' understanding was not deep enough and still limited to scenario narration – Some scenarios have not been able to stimulate discussion to achieve the expected learning objectives – Students still need to be provoked by instructors regarding the learning objectives discussed in the mass casualty incident case (still used to the concept of individual management) – In some scenarios, students could have discussed learning objectives well	– Rearrangement of scenarios based on their specific evaluation – Evaluation and adjustment of the learning objective of each tutorial regarding its suitability with the allocated discussion time – A more thorough planning for hospital field visits so that learning objectives can be achieved (for example, more simulations and field practice
Students	– The improvised medicine assignment group was too big – There were still many learning activities that used classical methods – Less time for tabletop exercise activities	– Variety of learning activities (simulation, field practice, etc.) – Adjustment of the number of assignment groups – Adjustment of practical sessions allocation

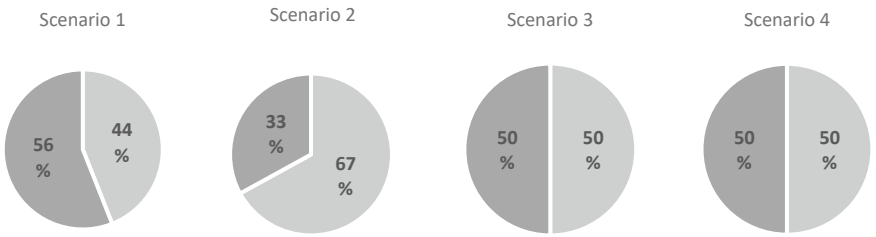

Fig. 1 Evaluation of tutorial learning objective achievement

4 Discussions

Disaster preparedness block curriculum development used the Problem-Based Learning (PBL) approach. In this method, the students are confronted with complex real problems so they are motivated to discuss and develop potential solutions according to the problem. The PBL theory is based on the constructivist theory in which learners actively construct their understandings through engaging in hands-on learning experiences that reflect the real world.

The instructional design in this block comprised several learning activity strategies. This instructional design refers to guidelines for effective instructional design, meaningfulness, assessing prerequisite knowledge and skills, conducting open communication, organizing essential ideas, considering learning aids, introducing novelty, modeling, implementing the active practice, creating positive conditions for learning, enforcing consequences, and maintaining consistency during the whole block.

This block consisted of several learning activity strategies:

1. Tutorial Discussion

   The discussion was based on the theory of seven jumps, using a complex scenario to trigger the discussions. This scenario plays the role as important as the facilitator. Based on the tutor's feedback, some scenarios could not trigger student discussions. In another discussion, the learning objectives (LO) were too broad and the time available was not enough to discuss all the LOs. It could be due to less preparation in making scenarios and distributing existing LOs. Another study also found this lack of faculty preparation. They found that students and faculty felt that lack of time in the curriculum and preparation time were barriers for faculty [9]. The data suggest that students are not familiar with the learning process and that more time is needed to help students develop lifelong learning skills. Another study by Bucklin et al. in 2021, in determining knowledge, usage, attitudes, and barriers to active learning use in academic Continuing Medical Education (CME) explored the reasons for the slow adaptation of active learning in medical education [10]. There were 350 professionals representing academic medical centers, teaching hospitals, and medical specialty societies in the United States (U.S.) and Canada who filled out an online questionnaire. The study found more efforts are needed to increase innovation and incorporate evidence-based active learning strategies in medical education, especially to foster learner engagement, critical thinking, and problem-solving ability.
2. Practical Training Sessions

   The practical session was about improvised medicine. The video making assignment group was too large so it was not effective. The enthusiasm of the students was very high. In the future, it is better to think about the effectiveness of group division in group assignments.
3. Lectures

   There were too many lectures. Several learning activities were using the classical method, which made students less interested and bored. More planning is needed with more various activities in the field and community so that it will be more interesting and real for students.
4. Field visits

   Indeed, field visits were planned to visit hospitals involved in disaster management so the students could learn directly about the team and hospital preparation

in disaster. However, the field visit was mostly filled with lectures in the hospital auditorium so students could not get the actual situation in the field.

5. Tabletop Exercise

   The tabletop exercise activities took too much time, and could not represent what was has been planned. Nevertheless, students still felt there was a lack of time allocated for this tabletop exercise. With this consideration, more time is needed for this activity in the future.

The Disaster Preparedness Block in Medical Study Program, Universitas Ahmad Dahlan (UAD) is a continuation of Non-Block Disaster Courses obtained in the previous semester. Learning objectives in the Disaster Preparedness Block are a part of the overall FK UAD disaster curriculum. Other learning objectives not included in the learning objectives of the Disaster Preparedness Block are studied in conventional lectures distributed in semesters 1 to 6. Learning objectives are arranged for an introduction to the concept of disaster to clinical management and public health in disaster situations. Overall, the FK UAD Disaster Curriculum contains a series of learning objectives as follows: basic disaster framework (semester 1), Prevention and risk reduction (semester 2), Disaster response (semester 3), Post-disaster recovery (semester 4), intermediate simulation, Research and modeling (semester 5), pre-and intra-hospital management (semester 6), clinical management and public health in disaster situations (semester 7/Disaster Preparedness Block), and grand simulations.

Efforts to increase the knowledge and skills of health workers in the field of disaster through training are based on the following data. A cross-sectional survey conducted among health workers at Petang and Abiansemal public health centers (PHCs) in Indonesia showed disaster preparedness among PHC health workers remains low. Perception of disaster preparedness and participation in training was significantly associated with disaster preparedness. Continuous training is needed to increase disaster preparedness among health workers.

A descriptive, cross-sectional, non-probability-based study was conducted in Yemen in 2017 using self-reported online and paper surveys showed the absence of teaching programs is a major issue in the lack of knowledge of health professionals regarding disaster preparedness. Thus, emergency and disaster preparedness has to be included in the primary medical school curricula and continuing medical education programs. Long-term formal training such as undergraduate and postgraduate programs is necessary.

Qualitative evaluation of the lecturer's written feedback showed an uneven distribution of learning objectives with the same time allocation for each tutorial discussion. Several scenarios have more learning objectives than others. Additionally, the students needed more time to discuss the topics. The scenario's effectiveness to stimulate discussion was low. Feedback from students generally indicated a demand to increase the variety of learning methods, more appropriate time allocation for assignments, and adjustments to the number of students in a group assignment.

The average score of the formative assessment was higher than the summative assessment. The formative assessment used multiple approaches but the impact on

student achievement in the final examination was still not obtained. Students did not get the result in real-time, such as mini quiz scores, because of system limitations.

Obstacles from the disaster preparedness block include too many classical lecture activities, a large group of improvised medicine assignments, and a lack of time for the tabletop exercise activities.

5 Conclusions

The formative assessment showed a higher score than the summative assessment. The summative assessment showed low achievement. Students need more variety of learning methods to increase their participation in the learning process. Further analysis of each learning method is needed to increase students' achievement.

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Case-Based Interprofessional Learning to Increase Health Professions Students' Perceptions of Communication and Teamwork

Bulan Kakanita Hermasari and Neoniza Eralusi Asrini

Abstract The Interprofessional Education Collaborative (IPEC) expert panel advocates for health profession students to learn to work together. This study examined the impact of the IPE case-based experience on health profession students. The exercise was a single IPE case-based learning in which students representing three health disciplines described and reflected the specific teamwork and communication skills needed to work effectively on an interprofessional health care team. The study used a mixed-method design with a concurrent approach. A quasi-experimental pretest–post-test design using the communication construct of the TeamSTEPPS™ Teamwork Attitudes Questionnaire (T-TAQ) was implemented. Qualitative phenomenology methods were used to gather feedback from participants about the learning activity. A total of 191 Undergraduate Medicine, Midwifery, and Pharmacy Study Program students who participated in the activity completed pre- and post-test questionnaires. A paired sample t-test was employed. There was an increase in scores on all subscales of the T-TAQ instrument ($p < 0.05$). The students mentioned that the program enabled interactivity and engagement. Moreover, the participants understood teamwork and communication in healthcare and the other professions' roles. These findings suggest that a case-based IPE forum is achievable and can effectively introduce students to other health science professions, increase perceptions of collaboration and teamwork, and increase understanding of the need for interprofessional communication.

Keywords Interprofessional education · Case-based learning · Communication · Teamwork

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List of Abbreviations

IPEC	Interprofessional Education Collaborative (IPEC)
T-TAQ	TeamSTEPPS™ Teamwork Attitudes Questionnaire
IPE/L	Interprofessional Education/Learning
CBD	Case-based discussion
WHO	World Health Organization

1 Introduction

The healthcare system is challenged by many problems and demands, such as lack of human resources, the burden of health care costs, and lack of collaboration, communication, and respect between health professionals [1–3]. The healthcare system consists of multiple specific health professions with complex workloads, which require multiple health professionals to work together as a unit [4]. Interprofessional teamwork can improve health outcomes, increase patient safety, suppress the length of hospital stay, reduce medical errors, optimize patient satisfaction, improve patient safety, and achieve better health outcomes [5, 6]. Therefore, students need to be exposed early to interprofessional education in undergraduate programs [6]. Furthermore, the World Health Organization (WHO) suggested an innovative strategy to overcome the global health workforce crisis by maximizing interprofessional collaboration in educational programs and clinical practices [7].

Designing interprofessional education (IPE) learning requires integrated models customized to the demands of clinical practice in the future. The old curriculums for healthcare professions were usually created for their professions, so innovation is needed to keep IPE learning still related to their professions and in accordance with their curriculum [1]. Many factors need to be considered to design IPE learning, such as time adjustment between many study programs, lack of resources, limited time and budget, different cultures, and specific requirements from each profession [2, 8]. Lack of learning preparation and planning will affect the stability of the curriculum and the inability to achieve learning objectives [8]. IPE learning needs innovative activities other than traditional one-way lectures to be effective and achieve its goal [9]. Abdelaziz et al. suggested several methods, including case-based learning and action-based learning using the problem-based case method [10].

Case-based learning (CBL) is a student-centered learning technique that encourages students to apply knowledge concepts, uses higher-order thinking abilities, and learn important skills such as decision-making and critical thinking, to solve problems in real practice [11–14]. CBL is applied in different health educations, such as medicine, dentistry, nursery, pharmacy, nutrition, physiotherapy, occupational therapy, and interprofessional programs. CBL can also be used in many different levels of education, from undergraduate students to postgraduate and residency programs [11]. CBL has also proven effective in achieving IPE learning objectives,

especially in understanding each profession's role and improving awareness of their value to each other [13, 15].

The Coronavirus Disease 2019 (COVID-19) pandemic impacted many sectors, including education. Virtual learning became a common activity during the pandemic. However, many challenges occurred, such as fewer effective interactions in class, lack of better understanding of technology and software, ineffective communication between students and their lecturers, higher costs, and it became harder to adjust timetables from different study programs [16]. Virtual learning also made practical learning and hands-on learning harder to achieve, and it was challenging to keep active participation from students with different backgrounds [10]. The complexity of IPE curriculum design, different backgrounds, and attitudes also became a challenge in implementing IPE during pandemics. However, IPE still needs to be implemented considering the importance of enriching interprofessional collaboration, especially during the pandemic [16]. With the growth of virtual learning during the COVID-19 pandemic, especially in the medical and health profession education context, it is essential to explore opportunities for students from different health disciplines to learn together. Although several researchers have evaluated the effectiveness of IPE programs conducted through traditional on-campus courses, there are relatively limited studies evaluating the implementation of online interprofessional learning (IPL). This study used a mixed-methods design to evaluate the effectiveness of online CBL IPE on communication and teamwork competencies among healthcare students.

2 Methods

a. Participants and Study Design

   A total of 304 students enrolled in an undergraduate healthcare institution focused on IPE/L were invited to participate in the study. Focusing on undergraduate healthcare students was crucial because most of their education/training occurred in silos with limited opportunities to collaborate with students from different health professions. A mixed methodology with a concurrent approach was implemented. The results were analyzed both quantitatively and qualitatively. This study provided a direct understanding of students' experiences with communication and teamwork since they learned in interprofessional teams. Students were invited to participate in the study during the IPL session and were provided the link to an online survey on Google Forms with Likert scales and free-text answers.

b. Description of the IPE Program

   The IPL workshop was designed and co-delivered by academics from the School of Medicine, the Pharmacy School, and the Midwifery School, Universitas Sebelas Maret, Indonesia. The course was scheduled for three hours and consisted of three one hour sessions with academic-led material, case-based discussion,

and presentation and feedback. The taught topics were delivered to the entire students from three schools and included: (1) defining IPL and (2) the role of health professional students during the COVID-19 pandemic. After that, a series of breakout sessions were conducted using the Zoom platform (Zoom Video Communications, Inc.), where students from three disciplines worked in groups of 10–11 students. There were 28 breakout rooms divided into two different schedules—14 groups each, supervised by four academic staff. Each group had to discuss a case study and four following discussion questions adapted from https://www.northeastern.edu/oralhealth/toolkit/6-case-based-learning/session-2-teamwork-and-communication-in-health-care/. The case study and questions focused on scenarios discussing the roles of the health professions, teamwork, and communication of topics where healthcare providers from different disciplines worked as a team. Students discussed the case and questions via Zoom meetings and then submitted their written responses to discussion questions via the university's online learning management system. Students could communicate with facilitators throughout the entire session using the chat function. After finishing the breakout session, students returned to the main room to present their discussion results and discuss them with the other groups. Each group received feedback from their peers and the facilitators. Figure 1 shows the process of this study.

c. Quantitative Study

This study used pre- and post-test methodology to assess the impact of the IPE course. All the students were required to complete a survey/questionnaire adapted from the *TeamSTEPPS™ Teamwork Attitudes Questionnaire (T-TAQ)* [17] prior to the beginning and after finishing the IPE course. The data analysis program SPSS 25.0 for Windows (IBM Corp., Armonk, NY, USA) was applied for storing data and analysis. Descriptive statistics were used to examine demographic data. For all the *TeamSTEPPS™ Teamwork Attitudes Questionnaire (T-TAQ)* subscales, items were totaled, and scores were calculated. The Wilcoxon test was conducted to compare pre-test and post-test scores. Because

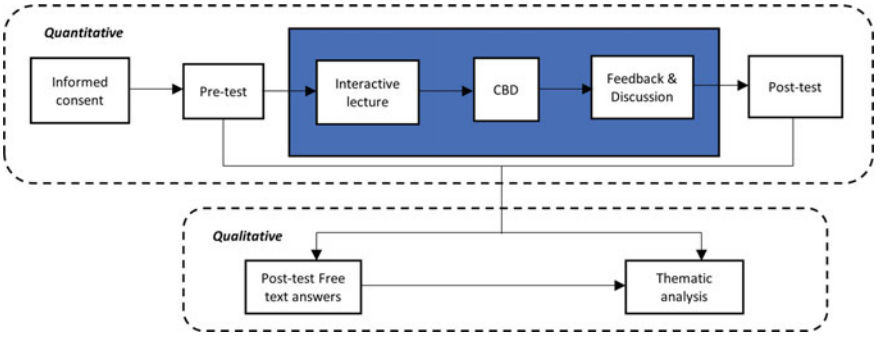

Fig. 1 Study flow diagram

the study population was small, there was not always statistical significance. The number of respondents from each question's pre-test and post-test scores have been determined and compared in calculating variation.

d. Qualitative Study

Descriptive Qualitative analysis was completed to analyze students' responses recorded after the IPE program. The free-text answers were analyzed using thematic analysis. The steps were as follows: the researchers individually read the data several times for familiarity and produced initial codes; the codes were then compiled to form initial themes. Two researchers then reviewed the themes, and finally, the themes were refined and agreed on collectively to produce the thematic analysis. This process was conducted to ensure triangulation.

3 Results

a. Results of Survey

A total of 191 students completed all pre-and post-test questionnaires. Table 1 shows the number of students from each profession enrolled in the course and the questionnaire respondents. The number of students enrolled in the course was dominated by students from the School of Medicine (210 of 304). The response rates ranged between 22.92% and 70.47%, with midwifery having the lowest rate and medicine having the highest. Approximately 76% of the respondents were females. Results of the T-TAQ scores demonstrated significant differences in pre- and post-test scores among the medical and midwifery respondents. However, there was no significant difference in the scores of pharmacy participants. Table 2 shows the results of T-TAQ scores of each discipline. The T-TAQ pre-test score ranged between 23.58 ± 2.22 and 24.7 ± 2.50, with midwifery scoring the lowest among the other education program and medicine scoring the highest. The T-TAQ post-test scores ranged between 25.38 ± 3.41 and 25.56 ± 2.15, similar to the pre-test scores. There were improvements in all discipline groups.

Table 3 shows the pre-test and post-test scores for each subscale of T-TAQ. It illustrates that all T-TAQ statements had significant differences. The highest difference was in the fourth subscale, "I prefer to work with team members who

Table 1 Number of students from each profession in the sample

Study program	N students enrolled in the course	N respondents (% response rate for the profession)	The % response rate of the total sample
Midwifery	48	11 (22.92)	77.5
Pharmacy	49	32 (65.30)	16.7
Medicine	210	148 (70.47)	5.8
Total	304	191 (62.6)	100

Table 2 Comparison of T-TAQ overall scores

Education program (n)	Pre-test scores (Mean ± SD)	Post-test scores (Mean ± SD)	*p*-value
Overall (191)	24.49 ± 2.50	25.37 ± 2.33	0.000*
Medicine (148)	24.7 ± 2.50	25.56 ± 2.15	0.000*
Pharmacy (32)	23.88 ± 2.45	24.50 ± 2.49	0.132
Midwifery (11)	23.58 ± 2.22	25.38 ± 3.41	0.027*

SD Standard deviation; *T-TAQ* Team STEPPS™ teamwork attitudes questionnaire; * significant

ask questions about the information I provide". Meanwhile, since it is a negative statement, the sixth subscale score decreased from pre-test to post-test.

b. Thematic Analysis of Free-text Answers

To evaluate the CBL and to have a deeper understanding of what students learned from and taught each other, a thematic analysis was directed toward the answers to the free-text questions: "What aspect of this interprofessional education session was most valuable to you?"; "What would you change in this interprofessional education session that would have made it more valuable to you?"; and "What follow-up activities or next steps do you see as a result of this interprofessional education session?".

Responses were analyzed and common themes were generated between the three questions. The three most dominant themes were as follows:

1. The roles of CBL in promoting cohesion and communication within the group;

Table 3 Comparison of T-TAQ sub-scales score

Sub-scale	Pre-test scores (Mean ± SD)	Post-test scores (Mean ± SD)	*p*-value
1. Teams that do not communicate effectively significantly increase their risk of committing errors	4.64 ± 0.69	4.85 ± 0.39	0.00*
2. Poor communication is the most common cause of reported errors	4.65 ± 0.58	4.82 ± 0.46	0.00*
3. Adverse events may be reduced by maintaining an information exchange with patients and their families	4.65 ± 0.52	4.79 ± 0.43	0.00*
4. I prefer to work with team members who ask questions about the information I provide	3.77 ± 0.83	4.14 ± 0.89	0.00*
5. It is important to have a standardized method for sharing information when handing off patient	4.57 ± 0.62	4.74 ± 0.56	0.00*
6. It is nearly impossible to train individuals how to be better communicators	2.20 ± 1.17	2.04 ± 1.40	0.03*

SD Standard deviation, *T-TAQ* Team STEPPS™ teamwork attitudes questionnaire; * significant

2. The CBL session was effective, yet it needs some improvement in virtual technical detail; and
3. CBL can increase awareness of collaboration in achieving effective healthcare.

Theme 1: The roles of CBL in promoting cohesion and communication within the group

Most respondents stated that CBL promotes cohesion and communication among the group. Comments included:

> The case studies are given to be discussed by each group train students from different professions in communicating (expressing opinions) about the patient's handling in the case.

> (The most meaningful aspect is) the aspect of exchanging ideas on a given case, because it is undeniable that everyone has a different perspective that we don't think of ourselves.

> (The most meaningful aspect is) when discussing together in the breakout room, it can train communication between students.

The other respondents described that the discussion allowed them to share opinions within and with the other groups.

> In my opinion, the joint discussion taught me to share opinions and communicate with others, then during the presentation session it also made me know the views of other groups that had not been discussed in my group.

Theme 2: The CBL session was effective, yet it needs some improvement in virtual technical detail

The majority of the respondents described that the CBL session was very valuable. However, some respondents stated that several technical details need to be improved, such as time for discussion and breakout room technique.

> This learning has been good, both from lecturers and students. The existence of a general discussion forum from various groups makes insight more open and becomes a material for self-evaluation for the future to be more critical. It's been very good with the discussion and presentation so that you can understand more about what will be done in the future.

> The concept of learning is good enough which can encourage students to discuss and express opinions actively, but previously there were technical problems with Zoom, so the discussion time was slightly cut off. Technically, the division of the breakout room was still not smooth, so the discussion time was cut quite a bit. It is better to be prepared to be more fluent in group discussions.

Theme 3: CBL can increase awareness of sensitivity to the problem of patients and team, the need for reflection, and the importance of teamwork collaboration in achieving effective healthcare

Students recognized the effect of CBL in improving sensitivity to the problem of patients and team, awareness of the need for reflection, and understanding of the importance of teamwork.

> From this lesson, we can understand how important inter-professional collaboration is to be able to heal patients.
>
> Students better understand the importance of effective communication and interprofessional cooperation. The follow-up that needs to be done is that students need to learn more about how to communicate well and understand the role of each profession.
>
> (need to) learn to be more sensitive and to lower ego for mutual benefit. Self-introspection, self-reflection to find out if I am worthy of working in a team in handling cases and becoming a better communicator.

4 Discussions

This study sought to determine the impact of online interprofessional learning (IPL) using case-based discussion (CBD). The course needed students to collaboratively discuss with each health profession student and aimed to increase awareness and understanding of the need for communication and teamwork in healthcare. The use of a mixed-methods design may report the questions 'who' and 'how' of an IPE intervention and its results.

Interprofessional collaborative health services have been proven to increase patient safety and health outcomes. Effective IPL necessitates all students to learn with and from one another. The learning could be optimized by providing relevant context in which student will apply their knowledge [18]. In this study, academics from all schools actively designed and implemented the course to ensure the requirements of all disciplines were met. The scenario case study provided opportunities for collaborative healthcare practices, which exemplify where different professional backgrounds need to work together to conduct health services. Other studies also have shown that student collaborative working using CBD can help to promote positive attitudes toward interprofessional collaboration [19, 20].

Previous work showed that setting for learning is essential [18]. Ideally, the experience of interprofessional collaboration is conducted face-to-face either on campus, in a hospital, or a community setting. However, the COVID-19 pandemic forced the implementation of education to become virtual. Interprofessional competence must still be taught in all of its complexity. Therefore, it is necessary to modify learning so that communication skills and interprofessional cooperation are still achieved. Online learning provides an opportunity for educational programs that involve many students from various disciplines, with difficulties in scheduling and implementation, to be carried out properly. Although virtual education has been widely applied before COVID-19, e-learning in health professional education is still inconsistent [21]. A recent study suggested that the online method is well-accepted. In addition, Varvara also mentioned that, if appropriately applied, e-learning can improve the quality of education and teaching [21]. CBD topics are chosen to become part of the curriculum content of all study programs, namely child health and oral health, to make learning relevant to the entire study program. The topic was chosen based on the results of the IPE course development meeting by academics from the three disciplines.

From the survey, students have reported that online interprofessional learning encourages the achievement of learning goals. The CBD in this study involved more than 200 students from various health disciplines, and the online method successfully accommodated many participants. Feedback from respondents indicated that online CBD could facilitate interactivity and discussion. The discussion and division of small groups in breakout rooms can maximize engagement and interaction between students in the group. Previous studies reported that engagement and interaction are conditions for a successful interprofessional course [22, 23]. Furthermore, other works have reported that virtual interprofessional education has the same effect as face-to-face methods, increasing knowledge, skills, and attitudes related to teamwork [19, 24, 25]. The low response rate of midwifery respondents was because, during the post-test data collection, midwifery students had entered the midwifery practice stage at the hospital, so there was a possibility of difficulty in completing the questionnaire. However, even though the numbers were small, midwifery students' T-TAQ scores increased significantly from the pre-test to the post-test.

These T-TAQ quantitative results and the qualitative student responses provide the insight that IPE can be learned effectively online. This work is unique in that the learning was entirely online during a pandemic and involved a variety of health disciplines. The success of this study is probably because course participants only came from the three selected disciplines. Another study stated that the effectiveness of IPE could be hampered if it involves more than five health disciplines. It has been reported that reducing the number of disciplines would improve student engagement and collaborative experience [26, 27]. In addition, the success of IPE is also influenced by the relevance of the topics raised in this course. The results of the analysis showed that there was no significant increase in the T-TAQ score for pharmacy students. This is possible because there is minimal interaction with students of other professions during the learning process in the pharmacy curriculum. Although online CBD in IPE is considered beneficial, there are still challenges in the form of scheduling from multiple student disciplines to take part in the same IPE session.

Limitations

Although IPE plays a significant role in higher education, the development and implementation of its activities are resource-intensive and time-consuming. It is because IPE involves various disciplines, both academics, and students. Previous studies reported that IPE planning takes three times longer than traditional course learning planning. In addition, one of the obstacles to implementing online learning is the limited Internet connection, so a small number of students come in and out of the zoom session. This condition causes students to be frustrated and can disrupt the discussion process. The 62% of the students who completed the pre-and post-test survey are reasonable because there were no incentives given to students. Another weakness of this study is the inability to determine whether the positive effects of the implemented IPE program will be lasting. Although there were positive changes in attitudes and perceptions, it is still necessary to conduct longitudinal observations to examine whether this IPL affects interprofessional clinical practice.

5 Conclusions

Our findings suggested that IPE online using the CBD approach effectively enabled students from three disciplines to work together and learn from each other. There was a significant positive impact on attitudes and perceptions regarding communication and teamwork. Online interprofessional learning enables many students without being limited by room size and without the need for many parallel sessions. The online platform successfully facilitated the delivery of one scheduled session for many students, reducing the number of academics to facilitate learning, breakout groups, and discussion. Interactivity and engagement during CBD were evident, which facilitated achieving the learning outcomes.

Future works across universities are needed to explore student attitudes toward IPE. Additionally, longitudinal studies are needed to explore the impact of IPL in real work settings.

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Authors' Contribution *Bulan Kakanita Hermasari*—designed online CBL on IPE, developed the research proposal, collected data, data analysis, and preparation for publication manuscript.

Neoniza Eralusi Asrini—collected data, data analysis, and preparation for publication manuscript.

Ethics Approval and Consent to Participate The study commenced once approval to conduct the study was obtained from the Institutional Review Board of the Hospital of Dr. Moewardi No. 278/III/HREC/2022. The participants provided their written informed consent to participate in this study. Explanatory statements and consent were embedded within the online survey. Consent was required prior to accessing the questions.

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Character Development and Learning Activity in Medical Education: Lecturer Perception

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Abstract A person's character forms their psychological attitudes and behaviors that reflects their uniqueness in all conditions. One of the definitions of the doctor's character is taken from the core elements identified by the Delphi survey. This research only focused on the influence of learning activity in medical education methods on character building based on lecturer perceptions. This study aimed to see and compare whether learning activities in medical education methods impact character building. The study was conducted at Universitas Sebelas Maret with a cross-sectional descriptive design. The researchers used online forms to develop surveys with Likert scale questions. Participants were selected by random sampling method. Participants were asked to give approval or disagreement about various methods of learning activities in medical education which were then processed and compared between these learning methods regarding their impact on the character development of medical students. The results showed that each method of learning activities in medical education has a different impact on students' character. The average score of each learning method ranged from 3 to 4.7. Field labs, lab skills, and tutorials top the list in influencing students' character. They were followed by practicum and lecture activities. This research compared and showed how learning activity methods in medical education affect character. Several learning methods in medical education influence shaping the character of students. For research to be more diverse in the future, it is necessary to conduct research with different sources.

Keywords Character building · Medical education · Learning activity · Personal development

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1 Introduction

The discussion of character issues always continues in education circles [1–3]. Character is a critical component in assessing a person's personality, and it is an essential element in human beings that shapes a person's psychological attitude to make them behave accordingly under any and all conditions [4].

One of the ways to prevent negative behavior is to create a good school atmosphere that involves responsible student participation and is rooted in shared values. Across the country in Indonesia, parents, students, and civic leaders are helping to build students' characters through education to help create a strong and healthy learning environment. Based on the Ministry of National Education, character education aims to improve the quality of education delivery and produce the formation of the character or morals of students as a whole person, who is integrated and balanced. Through the implementation of character building, students are expected to become individuals who live in line with the Indonesian ideology, Pancasila or the Five Principles. Character education leads to the formation of academic culture, which underlines the attitudes, traditions, customs, and symbols practiced by all stakeholders of schools, colleges, universities, and the surrounding community [5].

Character education is an essential part of the learning process in medicine. One of the definitions of the doctor's character is taken from the core elements identified by the Delphi survey. The key words in defining Character are: "respect for human beings", "empathy", "consideration", "patience", "vocation", "honesty", "ethics", and "responsibility". Later in the study, it was modified into empathy and attention, honest and responsible; willing to sacrifice, patient and sincere; humble and respectful for others; communication, collaboration, leadership skills; and creativity and optimism. This process can involve many aspects and reflects the core content of medical education [6].

There are various medical education methods in Indonesia to support students' personalities as doctors, generally consisting of lectures, practicums, lab skills, field labs, tutorials, block exams, response exams, the Objective Structured Clinical Examination (OSCE), among others. The Department of Medicine of Universitas Sebelas Maret is one of the educational institutions available for prospective medical students. As mentioned earlier, various methods of medical education are found in the medical study program of Universitas Sebelas Maret [7]. In previous studies, it was mentioned that more improvement is needed in the education of doctors to imprint and build the character of a good doctor [6]. Based on and modifying the findings from previous research, the researchers were interested in conducting research that focuses on learning activity methods in medical education in influencing the character of the perceptions of Universitas Sebelas Maret lecturers. This study aimed to see and compare whether the learning activity in the medical education method has an impact on building student character.

2 Methods

A descriptive cross-sectional research design was adopted. A survey containing Likert scale questions was created by the researchers in a Google form, with 1 showing "strongly disagree", 2 "disagree", 3 "neutral", 4 "agree", and 5 indicating "strongly agree". The participants were selected through the use of random sampling. Medical lecturers at Universitas Sebelas Maret who were willing and able to complete the survey met the inclusion requirements. The exclusion criteria were: the potential respondents who did not fit the inclusion criteria. Participants were asked whether they agreed or disagree that the learning activity in medical education in medical study programs has an impact on character development such as empathy, care, honesty, responsibility, willingness to sacrifice, patience, sincerity, humility, respect, communication, collaboration, leadership, creativity, and optimism that have been modified from previous research [6].

Using SPSS 24 (IBM Corp., Armonk, NY, USA), validity and reliability tests were conducted. If a person consistently gave a stable response to the questions in the questionnaire, it is considered reliable. The reliability test with Cronbach's Alpha calculations yielded a finding of 0.924, indicating that the reliability of the data was high (>0.7). An item is considered valid if the count value r is more than the table value r (0.482) and the significance or error level is < 0.05. The validity test was performed using the Pearson correlation test. There were five invalid questions: questions about how lectures affect leadership development, collaboration, and communication; one about how skills labs, laboratory exams, and block exams affect the development of integrity and responsibility; and one on how the OSCE affects the development of originality and optimism. However, this study only discusses the learning activity methods in medical education.

This research was conducted in February and March 2022 and has received ethical approval from the Health Research Ethics Committee Dr. Moewardi General Hospital, Surakarta with the number 131/1/HRE/2022.

3 Results

In this section, the results of research related to lecturers' perceptions of learning activity in medical education in character development are presented. The research data were taken from the answers to the Google form questionnaire completed by respondents who met the inclusion and exclusion criteria. There were 11 respondents. The results of the study were analyzed using Microsoft Excel and each character was compared with one another. In detail the results of the study are as follows.

Table 1 shows the results of respondents' research from lecturers of the Medical Study Program of Universitas Sebelas Maret. The chart shows that the highest empathy and caring characters result from field lab learning (4, 6), followed by

the skills lab (4.27). Practicum and tutorial have equal value in the formation of empathy and caring characters (4.18), followed by lecture activities (3.72).

Honest character and responsibility have different values from the previous character. Field lab learning ranked highest in the formation of honest character and responsibility (4.54). Below that are the skills lab and tutorials with the same score (4.18). The third position was practicum (4.09) and the last was the lecture learning method (3.81).

The next character has a more varied value. The character of being willing to sacrifice, being patient, and sincere are also impacted by the learning activity learning methods. The lab field was still in the first place (4.63), followed in consecutive order by tutorial activities (4.18) and skills lab (4.09), then finally practicum (4) and the lecture learning method (3.72).

Humility and respect for others were also assessed in this character development research. Field labs ranked at the top in the formation of a character of humility and respect for others (4.63), followed by skills lab activities (4.45) and tutorials (4.36), then practicum (4) and the lecture learning method (3.9) with a fairly close difference of 0.1.

The characters of communication, collaboration, and leadership have different outcomes from previous characters. Field labs along with tutorials rank highest (4.63), followed by the skills lab (4.27) and the practicum (4.09). The last is the lecture learning method (3.9).

Creativity and optimism became the last characters assessed in this study. Matching the characters above, the field lab learning is in the first order in making an impact on this character (4.36) followed by the skills lab (4.27). The next was tutorial (4.18). Finally, the same value is owned by practicum and the lecture learning method (3.81).

Table 1 Lecturer perspective about character development and learning activity in medical education

Character	Lecture learning	Tutorial learning	Field lab learning	Skills lab	Practicum
Empathy and care	3.72	4.18	4.6	4.27	4.18
Honest and responsibility	3.81	4.18	4.54	4.18	4.09
Sacrifice, patient, and sincere	3.72	4.18	4.63	4.09	4
Humility and respect	3.9	4.36	4.63	4.45	4
Communication, collaboration, and leadership	3.9	4.63	4.63	4.27	4.09
Creativity and optimism	3.81	4.18	4.36	4.27	3.81

4 Discussions

In a general sense, the meaning of education is a conscious effort of humans to cultivate and develop the potential of both physical and spiritual dimensions in accordance with the values that exist in society and religion. Education is not only intended as a process of cultural transfer or transfer of knowledge but also as a process of transferring values or principles. To internalize values to learners, it is necessary to optimize education. Notably in Pancasila principles, the function of education is to develop altruistic and compassionate abilities in order to form a noble national character and civilization to educate the nation's life. This individual character in building aims to develop the potential of students to become complete human beings who have faith and devotion to God Almighty, have good character, healthy, knowledgeable, capable, creative, independent and become democratic and responsible citizens [8].

As a doctor, character education should not be considered with condescension or disdain. The character of a doctor is defined as someone who has the essential attitude, values, and mindset in conducting their duties, including respect for others, empathy for patients, a sense of vocation, honesty, ethics, and responsibility [6]. In this study, these characters were grouped into various attitudes, including empathy and caring; honesty and responsibility; willingness to sacrifice, patience and sincerity; being humble and respecting others; communication, collaboration, leading; creativity, and optimism. The development of character is then associated with the specific learning activity methods in medical education, namely lectures, practicums, tutorials, skills labs, and field labs.

Field lab is a learning method with the highest impact on character among other methods. Field or community attachment involves students in real situations in society. Students are allowed to live with the community for a certain period so that students feel and experience first-hand the real life in the community. Another goal is that students can overcome various problems independently in limited conditions, project the community's needs in the future, and, at the same time, grow into respectable humans with positive characters [9].

Lab skills are learning strategies that prepare clinical skills, communication, physical examination, or medical protocols and invasive procedures for general medical school students during undergraduate education and before entering professional education. Based on the research results above, lab skills are often second only to the field lab. Clinical skills (Skills lab) is an important part of a complex educational process and must be integrated with all programs that refer to a competence-based curriculum/CBC/KBK that serves as a gateway for the achievement of competencies for students. Services in the field of medicine will not be able to be done properly if they only rely on scientific understanding without adequate skills. The achievement of good clinical skills requires optimal practice both in terms of quality and quantity [10].

Tutorials are also excellent learning methods for shaping students' character. In the results above, tutorials are often third only to the field and skills labs. Lecturers generally conduct this activity by forming students into groups to solve problems.

Lecturers should design fun teaching and learning activities which are expected to improve learning outcomes. In addition, reflections can be conducted with lecturers as observers to have a more meaningful learning process. In addition, lecturers witness the learning practices in the classroom and can develop an understanding of effective learning with students. Finally, students can better understand, process new information, and can do well in their life pursuits. Character education means that students are not only directed to understand the lessons but also can apply them in actual actions [9].

Additionally, in the research results above, the practicum is in the fourth order above the lecture learning method. The practicum learning method is a process of solving problems through variable manipulation activities and variable observation. Practicum is one of the student-centered teachings that describes teaching strategies where the teacher facilitates more than engages in direct teaching. In the learner-centered teaching strategy, the teacher consciously focuses more on the learner's engagement, initiative, and social interaction. Through the practical sessions, students can also learn science and direct observation of the symptoms and processes of science, practice scientific thinking skills, instill and develop scientific attitudes, while finding and solving various new problems through the scientific method, and other iterative processes [11].

The last is the lecture learning method, which involves character education through teaching and learning activities in the classroom using an integrated approach in the course (embedded approach). Some of these courses include Pancasila Education, Civic Education, Entrepreneurship education, and Religious Education, as well as medical course education, which develops values/characters as an impact of learning (instructional effects) and also an accompaniment impact (nurturance effects). In an article by Wijaya, lecture learning techniques that still used the method of lectures and group discussions, and class presentations proved to be boring for some of the students. Wijaya concluded that students want a different learning atmosphere than the usual traditional approach. There needs to be a learning model that aims to instill character values in students in a more holistic paradigm combining cognitive, affective, and psychomotor dimensions [12].

From this study, each individual can have different perceptions of character education, especially the character of a doctor. Therefore, it is necessary to have deeper consideration when developing new decisions or setting goals in medical education [6].

5 Conclusions

Character is an important element in human development that shapes a person's psychological attitude. As a future doctor, the person's character is fundamental in shaping the personality of a good doctor in the future. There are various qualities necessary to be a good doctor, including respect for people, empathy, consideration, patience, vocation, honesty, ethics, and responsibility.

Learning methods play an essential role in character building. This research shows how learning methods in medical education affect students' character based on lecturer perceptions. From the research above, the field lab or community attachment is considered to be the best learning method for shaping the character of medical students. The lab skills/simulation and tutorials are also the best learning methods following the field lab. Indoor laboratory practical sessions can also help improve student character development, and the last is in the form of lecture learning methods.

In this study, only one source was used as a basis for conducting research. Therefore, in the future, there should be similar studies that use more reference sources for conducting research related to character development and learning activities in medical education so that the results can be better generalized and applied to a more diverse population.

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Correlation Between Self-Directed Learning Readiness and Structured Oral Case Analysis Test Scores

Catharina Widiartini and Fajar Wahyu Pribadi

Abstract Self-Directed Learning Readiness (SDLR) is critical in structured oral case analysis (SOCA). Accordingly, examining the correlation between students' SDLR and SOCA test scores is necessary to identify the required support for students learning in a problem-based learning environment. This cross-sectional study was conducted using a total sample of students in semester 1. It used the Indonesian language SDLR questionnaire. Univariate analysis was used to assess the SDLR scores. Bivariate analysis was conducted to identify the correlation between the SDLR and SOCA scores. A total of 122 students (response rate 96.82%) participated in the study. The mean for the SDLR score was 133.57 (95–168), which was regarded as a high SDL level. Most (55%) students had a high SDLR score. The mean for the SOCA test score was 42.79 (11.00–79.00). The correlation between SDLR and SOCA test scores reached a correlation coefficient (r) = 0.037, with a *p*-value of 0.686. In the desire to learn construct, most students could learn from mistakes in the learning process but were less able to evaluate new ideas critically. In the self-control construct, most students could realize their limitations and tended to lack confidence in their abilities. In the self-management construct, it can be concluded that most students could determine work priorities, but were less able to manage their time well. There was no significant correlation between SDLR and SOCA test scores of the semester 1 students. The institution should facilitate students to increase their self-efficacy and practice critical thinking and time management.

Keywords Student-directed learning readiness · Structured oral case analysis · Problem-based learning

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1 Introduction

The Structured Oral Case Analysis (SOCA) test is an oral assessment method in which the examinee must analyze a case to be able to answer related questions and the answers are recorded based on a structured marking grid [1]. The SOCA test can assess problem-solving skills, critical thinking, clinical reasoning and decision-making, professionalism and ethics, and academic communication skills. Like other oral tests, the SOCA test is considered to have a good educational impact, namely facilitating student learning (assessment for learning) [1–5].

Most of the time, the SOCA test is regarded as the most challenging assessment in the faculty of medicine. Relevantly, the score is frequently less satisfactory [4]. In evaluating the unsatisfactory SOCA test scores, we can use the presage-process–product (3P) model of teaching and learning developed by Biggs [6]. According to the model, the presage factors that exist in students and their learning environment interact with each other to produce or influence the process factor, namely the student learning process, which in turn will affect the product factor, namely student learning outcomes. Thus, it can be understood that the unsatisfactory scores on the SOCA test (product factor) can be caused by problems in the learning process (process factor) or students' characteristics and learning context factors (presage factor).

According to Thorndike's Law of Readiness [7], when a student is faced with a stimulus in the form of a learning environment that demands independence and proactivity, student readiness is necessary to respond to it to be able to perform well during the learning process and gain a satisfactory result. Therefore, one of the presage factors that can affect the SOCA test score is the level of student readiness in carrying out the self-directed learning (SDL) process, known as Self-Directed Learning Readiness (SDLR). Knowles in 1975 proposed that SDL itself is a process of individuals taking the initiative to analyze learning needs, formulate learning goals, identify the resources needed for learning, select and implement appropriate learning strategies and evaluate their learning outcomes with or without the help of others [8]. The Self-Directed Learning Readiness (SDLR) in Nursing Education (SDLRNE) [9] is the most frequently used instrument to assess SDLR and has three constructs, namely self-management, desire to learn, and self-control [10].

Examining the correlation between students' SDLR scores and assessment scores is necessary. After the positive correlation is confirmed, the institution can take steps to help students with low SDLR scores. However, if the SDLR score does not correlate with the SOCA test score or if the students' SDLR scores are already high, then the institution needs to test other presage factors and process factors. The competencies tested through the SOCA test are trained mainly through the problem-based learning (PBL) group discussion method during the learning process. Many studies on medical students show that PBL group discussions encourage students to apply SDL strategies through cognitive, metacognitive, and resource management strategies [11, 12]. Thus, problems in conducting PBL group discussions might explain why the high SDLR score as a presage factor is not followed by the suitable learning process that supports the achievement of good academic achievement.

1.1 Methods

The Faculty of Medicine in Indonesia, including the Faculty of Medicine, Universitas Jenderal Soedirman (FoM UJS) has implemented a competency-based curriculum. The curriculum is structured as a series of 3–6 weeks length blocks. The Introduction to The Human Body Systems Block (IHBS Block) is the third block of semester 1, which lasts for 3 weeks. In this block, students learn an overview of the human body, from chemical to organismal levels. The learning methods used were lectures, PBL group discussions, and hands-on laboratory practices. The summative assessment methods used were multiple choice questions (MCQs), Anatomy and Histology laboratory test, and SOCA tests. Students were excited because this was the first block for them to learn basic medical science materials, meaning that it had greater relevance to a career in medicine as compared to the previous two blocks. However, the test results were unsatisfactory. We hypothesized that the students' SDLR scores have influenced it. Thus, we aimed to study the correlation between SDLR scores with SOCA test scores.

Using total sampling, this cross-sectional study was conducted on 126 participants of IHBS in the 2021/2022 academic year. The Indonesian language SDLR questionnaire [13], an adaptation of the SDLRNE questionnaire developed by Fisher et al. [9] was used in this study. The questionnaire consists of 3 constructs spread over 36 valid and reliable statements related to SDL characteristics. The self-management construct consists of 13 statements, the desire to learn to the construct consists of 10 statements, and the self-control construct consists of 13 statements. For each of the statements, respondents were asked to choose their responses among a 5-point Likert scale, ranging from 1 (absolutely not agree) to 5 (absolutely agree). This was the most appropriate instrument since in testing the validity and reliability, the developer used the context of the medical faculty. In addition, the researcher did not find another SDLR measurement instrument in Indonesian in the literature. The SOCA test questions were reviewed by medical education experts and related lecturers and were declared valid. The SOCA test score before the remedial test was obtained from the block's administrator.

Univariate analysis for the SDLR scores was conducted to know the SDLR score's mean for overall statements and each construct, the mean to the maximum score in each construct to know the percentage toward the desired result, as well as the score's mean in each statement to identify the statements with the lowest and with the highest score in each construct. Univariate analysis for the SOCA test scores to know its distribution was based on the following grade categories: A ($\geq$80.00); B (66.00–79.99); C (56.00–65.99); D (46.00–55.99); E (<46.00).

The bivariate analysis presented a crosstabulation between SDLR scores that were categorized as low (36–83), moderate (84–131), and high (132–180) and SOCA test scores that were categorized based on grade. The correlation between the SDLR score and the SOCA test score was analyzed using the Pearson correlation test with a significance level of <0.05.

Table 1 Distribution of the SDLR score within each construct

SDLR construct	Maximum score	Mean	Mean to maximum (%)	Statement with the lowest average score	Statement with the highest average score
Self-management	65	45.10	69.38	*I can manage time well (2.75)*	*I can determine my work priorities (4.34)*
Desire to learn	50	38.65	77.2	*I can evaluate new ideas critically (3.25)*	*I can learn from mistakes in the learning process (4.25)*
Self-control	65	49.83	76.66	*I have high confidence in my abilities (3.11)*	*I am aware of my limitations (4.35)*

SDLR, self-directed learning readiness

2 Results

2.1 Univariate Analysis

Of the 126 IHBS Block participants, 122 people filled out the questionnaire (96.82% response rate). Most of the respondents (69.7%) were women. Both SOCA test scores and SDLR scores were normally distributed. The mean for the SDLR score was 133.57 (95–168). Based on Nyambe, Harsono, and Rahayu in 2016, it was regarded as a high SDL level ($\geq$132). The distribution of SDLR scores within each construct is shown in Table 1. When we compared the mean for the SDLR score in each construct to the maximum score for that construct, the biggest percentage was in the construct of desire to learn (77.2%), followed by the construct of self-control (76.66%), and the least was in the construct of self-management (45.10%). Table 1 shows the statements with the lowest and the highest average score in each construct.

The mean for the SOCA test score was 42.79 (11.00–79.00). Most of the students (61.5%) got an E grade. Students who passed (got grades B and C) were 23.8%, while 76.2% did not pass (got grades D, C, and E). No student achieved a grade of A.

2.2 Bivariate Analysis

The cross-tabulation between the SDLR and SOCA test scores is seen in Table 2. Table 2 shows that of all students, most (55%) had a high SDLR score, 45% had a moderate SDLR score and none had a low SDLR score. We can also see that most students with high and moderate SDLR levels had SOCA test scores of grade E.

Table 2 Crosstab between SDLR and SOCA test scores

SDLR level	SOCA test score					Total
	A	B	C	D	E	
High	0	5	11	5	46	67 (55%)
Moderate	0	5	8	13	29	55 (45%)
Low	0	0	0	0	0	0
Total	0	10 (8.2%)	19 (15.6%)	18 (14.8%)	75 (61.4%)	122 (100%)

The data normality test and data variance test on SDLR scores and SOCA test scores met the requirements for parametric tests. The Pearson correlation test for the correlation between SDLR and SOCA test scores got a correlation coefficient (r) = 0.037, which is a very weak correlation strength, with a *p*-value of 0.686. Thus, there was no significant correlation between SDLR and SOCA test scores.

3 Discussions

3.1 Most Students Had a High SDLR Level

The finding that most students had a high SDLR level and no student had a low SDLR level is different from the literature review regarding the SDLR level of medical students in Asia, which reported that the SDLR score at the beginning of university entry was still low but then increased when entering the third level [13]. The difference is probably due to the differences in the learning environment characteristics and learning methods used. The previous study used the SDLRNE questionnaire developed by Fisher, King, and Tague in 2001, which categorized SDLR scores as high (>150) and low (<150). However, we could not automatically interpret that our results were equal to the low SDLR level due to the difference in the two instruments used. Additionally, we are aware that the mean score of 133.57 was only slightly above the lower border of the high SDLR category, which is 132–180.

Dolmans et al. [14] found that SDLR was influenced by the amount of experience in implementing student-centered learning. This is supported by Fisher et al. [9] who explained for a person to be self-directed in a specific context, they must first have the relevant knowledge to a certain extent. In this study, most of the respondents had high SDLR levels. This may indicate that most of the 2021 batch of new students were accustomed to various student-centered learning methods. One of the contributing factors might be the implementation of the 2013 curriculum (K-13) in elementary to high school. The 2013 curriculum requires students to be more active, creative, and innovative in solving problems at school [15]. However, further studies are needed to test the assumption regarding the effect of the implementation of the K-13 on Indonesian students' SDLR.

3.2 There was No Correlation Between the SDLR Score and the SOCA Test Score

The positive correlation between SDLR and learning achievement is supported by Demak and Pasambo [16] who found a weak positive correlation and by Gayathridayawarsi et al. [17] in 2019 who found a moderate positive correlation. However, we found no significant correlation between the SDLR score and the SOCA test score.

Based on the 3P model of teaching and learning by Biggs et al. [18], SDLR as one of the presage factors generally has a direct effect on the process factor, and thus indirectly affects the test score, which is one of the product factors. This indirect relationship is supported by Zulharman et al. [19] who found that the effective contribution of SDLR in improving learning achievement was only 7.6%, indicating the average learning achievement of a group of students who had a high SDLR would be higher than those with moderate SDLR, although the difference was not statistically significant. Therefore, as mentioned above, if we found that the SDLR score does not correlate with the SOCA test score or if the students' SDLR scores are already high, then the institution needs to examine other presage factors. It is also important to look into the details of the SDLR statements, and whether there are some aspects in each SDLR construct with a low score that might affect the process factor.

3.3 The Problem with the Presage Factor

Another presage factor that moderates the relationship between SDLR and SOCA test scores is academic self-efficacy. Students with low academic self-efficacy will not automatically apply self-directed learning skills in their learning process, even though they have a high SDLR level [20]. Based on the average score on the construct of self-control, most students could realize their limitations and tended to lack confidence in their abilities. They were able to identify their limitations because, in the first block, namely Personality Development and Professionalism Block, students were taught self-potential analysis and self-evaluation. Based on the academic self-efficacy theory, e.g. students' personal belief in their capacity to achieve educational tasks to the expected level, students' lack of self-confidence could be caused by several reasons. They could have experienced failure before or have seen other people fail even though they had abilities and had tried hard. There might be a lack of persuasion or positive suggestions, advice, and guidance from people around. Being stressed, fearful, and anxious without abilities to manage them could reduce their self-efficacy [20]. FoM UJS might relate to those reasons. Similar to other oral tests, the SOCA test causes anxiety more than written tests. This was because of some factors, such as the extent of support from parents or people surrounding them, students' level of knowledge regarding the principles of the SOCA test as an assessment method,

students' level of preparation [21], failure or success experiences in the previous SOCA test, and the emotional status during SOCA test preparation [22]. In this study, the students had undergone the first 3 blocks or completed about the first 3 months of their journey as new medical students. They might still struggle to adapt to their new learning environments at the campus as well as at home, especially if they are from other towns, and now living apart from their parents and family. They might still search for the most suitable way to conduct learning methods and prepare for assessment methods that are different from those in high school. Especially knowing that the IHBS block is the first block in the medical faculty curriculum to have the SOCA test as an oral assessment, students have no previous experience in conducting SOCA tests. Those adaptation issues might influence their academic self-efficacy.

Another adaptation issue is time management. Based on the average value for each question in the self-management construct, it can be concluded that most students could determine work priorities, but were less able to manage their time well. Learning how to prioritize activities was taught as part of a student orientation program for the new students and in the previous block, namely, the Learning How to Learn Block. However, this block was much busier than the previous two blocks. They might experience difficulties in managing time for finishing many assignments, not only those related to the laboratory practicums but also the lengthy orientation program organized by their seniors. They might need longer time in fulfilling the assignments because of difficulties in understanding the content materials, problems related to the availability of learning resources, and lack of opportunities for clarifications that support understanding. A fully online learning environment nature could worsen the case, as described by Curelaru et al. [23] who found some disadvantages of online learning as perceived by university students during the COVID-19 pandemic. Those disadvantages are health and psychosocial problems (e.g., stress, anxiety, decreased motivation, isolation/loneliness, and apathy) and learning process problems (e.g., misunderstandings, a lack of feedback, additional academical requirements, a lack of challenge, and disengagement).

The time management problem might hinder the students to adapt learning habits that were suitable to their learning style. In other words, students might use unsuitable learning habits just because everybody used them, and then this may affect their SOCA test scores. As argued by Radha and Muthukumar [24], the suitability of learning styles with learning habits will improve the assessment of learning outcomes. Further studies are needed to study the students' learning style as part of their presage factor and study habits as part of their process factor, as well as the concordance between them.

Obstacles in the aforementioned adaptation issues might lower students' academic self-efficacy. Therefore, institutions could have supported new students with specific instruction concerning academic and life skills in managing those problems. This could be done during the campus orientation program right after students' enrollment. The importance of a well-organized campus orientation program in increasing students' SDLR is following Thorndike's Law of Readiness [7] that explained when a student is faced with a stimulus in a form of a learning environment that demands

independence and proactivity, student readiness is necessary to respond to it to be able to perform well during the learning process and gain a satisfactory result.

Another presage factor in the Biggs 3P model is the learning context factor. Leatemia et al. [25] found that the curriculum system, lecturer experience, student background, and cultural factors are factors that can affect SDL. In addition, presenting SOCA test answers requires good academic communication skills, since it is one of the skills assessed in the SOCA test. Students equipped with good public speaking as their prior skills will have an advantage. However, even though a student was not talented in public speaking or presenting, he/she could train him/herself through group discussion activities.

3.4 The Problem with the Process Factor

Problems in conducting PBL group discussions might explain why the high SDLR score as a presage factor is not followed by the suitable learning process that supports the achievement of good academic achievement.

We found that in the desire to learn construct, most students were less able to evaluate new ideas critically. Students could learn from their mistakes, probably partly because they have learned about reflective learning in the previous block, which was the Learning How to Learn Block, and were encouraged to apply it at the end of each PBL session. Students were asked to reflect on the PBL process that has been going on by analyzing the process that went well and what needs to be improved for the next PBL. The students tended not to be able to think critically about new ideas or knowledge even though critical thinking course material was taught in the Learning How to Learn Block. This is likely because this capability needs repeated practice and takes a longer time to be internalized. It could also be possible that critical thinking processes have not been practiced as part of their study habits because of poor time management or inappropriate learning management as mentioned earlier. The' time management problem could also hinder students to apply a deep learning approach, thus applying superficial learning by pursuing assignment submission without implementing critical thinking.

The unsatisfactory SOCA test score indicates a lack of students' ability to think critically. Solving SOCA test questions requires critical thinking skills in analyzing a case. This skill could be honed, especially through PBL discussions. Students could also practice answering comprehension or clinical application questions during individual learning. The importance of critical thinking practice is highlighted by Karatas and Barbay [26] who found that self-directed learning levels can be predicted by critical thinking disposition, academic achievement, and general self-efficacy in order of priority. Further research using qualitative methods is needed to explore students' learning strategies in conducting PBL group discussions as part of strategies in preparing for the SOCA test.

3.5 Implications of the Study

This study has several implications. First, the institution needs to examine other students' presage factors, such as students' background and cultural factors, new medical students' level of knowledge at the time of enrolment, and students' preference of learning style. Second, the institutional presage factors, such as the curriculum system, lecturer experience, and the SOCA administration need to be evaluated [25]. Intervening through modifying the institutional presage factors would be more manageable. We have ensured that the SOCA questions and answer rubrics were valid in terms of content and face validity. This consistency would be good to be maintained for every SOCA test. Third, the institution should consider having more than one SOCA examiner for each examinee and ensure that they reach an agreement on the scoring. Fourth, to increase the educational impact of the SOCA test as an oral test [1–5], we suggest that the faculty, especially persons in charge of the Block deliver a debriefing session, both for the students and the examiners. Although everyone involved in the SOCA test could put their thoughts in the Block evaluation form, direct and timely feedback should be better. Specific feedback should inform the students: what has been done well and what should be anticipated or avoided as well as how to do it to achieve good results in the next SOCA tests. Fifth, the institution should facilitate students' practice in time management as new medical students to increase their self-efficacy. This remedial approach can be done through training and mentoring by faculties or senior students. The tutors should also give examples, opportunities, and supports for critical thinking and presenting skills practices during PBL group discussions for the students to be more prepared for the SOCA test.

3.6 Limitations of the Study

The SDLR scores obtained in this study were limited to students' readiness in a particular block, so the results might be different from the SDLRs in other blocks or contexts. This study did not explore and could not control other student presage factors, learning context, and process factors that could mediate the relationship between SDLR scores and SOCA test scores.

4 Conclusions

Most students failed the SOCA tests, regardless of their high and moderate levels of SDLR. The statistical analysis confirms that there was no significant correlation between SDLR and SOCA test scores. We propose that the institution equips new students with adaptation management skills to increase their self-efficacy. Tutors might facilitate the students to make the most out of PBL tutorials, especially to

exercise presentation skills and critical thinking to prepare for the SOCA test. It is also important to have debriefing sessions to provide timely feedback, both for the students and the tutors. Further study is needed to clarify some assumptions mentioned. Although the study was conducted within one block only in FoM UJS, other institutions with a faculty of medicine with similar curricula may relate to our findings and suggestions.

Ethics Approval and Consent to Participate This study had been approved by commission of ethics from Universitas Jenderal Soedirman, No: 005/KEPK/I/2022 and we obtained consent form from the participants before the study was conducted.

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Developing Clinical Skill Videos as an Instrument to Assess the Objective Structured Clinical Examination (OSCE) Examiners' Effect

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Abstract Video-based assessment is a reliable method for testing clinical skills performance. Several published studies have different results because of various bias factors. This study aimed to describe the development and use of videos to assess the effect of the Objective Structured Clinical Examination (OSCE) examiners' backgrounds. Cardio-Pulmonary Resuscitation (CPR) was chosen for this study because it has a guideline from the American Heart Association. The development steps included: the assessment guidelines were rewritten by two cardiologists; two standardized simulated CPR procedure videos were made with their supervision. The CPR video showed performance following the guidelines and the other showed CPR not according to guidelines. The cardiologist gave feedback after watching the two videos. Finally, 51 OSCE examiners in the Medical Faculty, Duta Wacana Christian University assessed the CPR performance in the videos using standardized assessment guidelines. Examiners were categorized according to their backgrounds and the average results of the assessment based on their background characteristics were analyzed by the Kruskal–Wallis test. The results show that the two videos were developed and the assessment on those two videos did not significantly differ between examiners' background categories ($p > 0.05$). The clinical practice experience and educational background category had a significant score difference ($p = 0.04$; df = 3 and $p = 0.03$; df = 2, respectively). There were no score differences between examiners, except in clinical practice experience and educational background categories. Video-based assessment can foster the objectivity of OSCE hence it can be applied in OSCE scoring assessor training. However, there are still sources of biases that academics need to be aware of and consider.

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Keywords Video-based assessment · CPR · OSCE examiners · Background variability · Clinical skill performance

List of Abbreviation

OSCE Objective Structured Clinical Examination

1 Introduction

The Objective Structured Clinical Examination (OSCE) is a central component in assessing the clinical skills of medical students, and because the results provide information about the competencies of the students being assessed, the process must be ensured to be rigorous and accurate [1]. However, several factors interfere with the assessment in the OSCE, namely the inconsistency of the checklists and differences in the details of the assessment on each item, including the global rating scale [2], inequality in making checklists and their constructs [3], the level of difficulty of the material tested in the OSCE [4], and simulation patients which had a positive impact on student performance during OSCE compared to the use of student role-plays [5].

The OSCE blueprint plays an important role in the OSCE assessment, ensuring that exam candidates are comprehensively tested for competence [6]. However, a hidden pattern in examiners may influence them in conducting OSCE assessments [7]. Those hidden patterns are the perception of doctor-patient communication [8], various cultural factors of the examiner [9], the contrast effect of the previous student which becomes a benchmark for judging the next student [10], and the use of different assessment references in the OSCE [11]. Some of the factors for the inaccuracy of OSCE results can stem from the imprecision of the test, the variability of the examiner, and all of the other psychometric properties (simulated patients, assessment materials, scoring guides, etc.) [12].

Video-based assessment is considered a reliable method for testing clinical skills performance. Students can learn and prepare clinical skills with the help of video examinations, as a benchmark for clinical skills competency [13]. The use of video-based assessments of simulated examinations shows that these assessments can provide a valid and reliable method for testing the clinical performance of students [14]. The examiner's background, related to social and psychological processes, the examiner's clinical practice experience, the experience of assessing the OSCE, and the examiner's gender appropriateness, had a major role in the inaccuracy of the assessment even though the OSCE was administered under the most standard conditions [11, 12]. However, several studies that have been conducted on this aspect still found different results due to various bias factors. In this study, the considered OSCE examiners' backgrounds were gender, education, clinical practice experience and

duration, OSCE experience, and their OSCE training. This study aimed to describe the development of the videos and to analyze the developed video examination results from the OSCE examiners regarding their backgrounds. The findings of this study can add a reliable way to foster the objectivity of OSCE.

2 Methods

This study described how the process of making a video-based assessment is done (Fig. 1). First, Cardio-Pulmonary Resuscitation (CPR) skill assessment was chosen because it already has a specific guideline from the American Heart Association [15, 16]. To be usable by our OSCE examiners, it was rewritten by two cardiologists, adapted in Bahasa Indonesia, and they revised the assessment rubrics that already matched the OSCE requirement. The validity of the content in the rubric and assessment guide was achieved when the assessment instrument was reviewed by the cardiologists. Then, we developed standardized simulated CPR procedure videos with their supervision based on the guideline. Our students served as the actors in both videos; one video that portrayed CPR according to the guidelines and the other one that did not comply with the guidelines. The cardiologists gave feedback after watching the videos and revisions were completed where appropriate.

A total of 51 OSCE examiners from the Faculty of Medicine, Duta Wacana Christian University were enrolled in the study using total sampling, to assess the CPR performance in both videos using standardized assessment guidelines. These OSCE examiners were pre-clinical and clinical teaching lecturers from various scientific groups in the medical faculty. The Faculty of Medicine, Duta Wacana Christian University (UKDW) uses the OSCE as a regular clinical skills examination every semester for undergraduate medical education.

This study used a quantitative method, in the form of a cross-sectional study of the assessment of OSCE examiners on the Cardiopulmonary Resuscitation (CPR) competency video. In giving the assessment, the results of the OSCE examiner's assessment based on each background characteristic were analyzed by the Kruskal–Wallis test because the distribution of the data was not homogeneous. This study

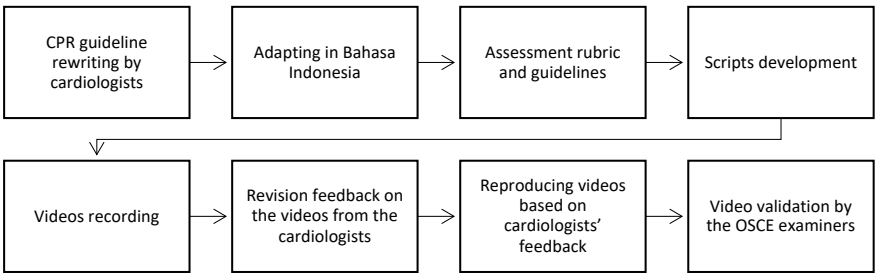

Fig. 1 The development of the clinical skill videos

was submitted to the Health Research Ethics Committee, Faculty of Medicine, Duta Wacana Christian University, while data collection was initiated after receiving approval (Reference No.1068/C.16/FK/2019).

3 Results

3.1 Script Development

Both video scripts were written and acted according to the American Heart Association's standardized rubrics and scoring guidelines. The scripts for these two videos were compiled by researchers, then reviewed and revised by two cardiologists. The two scripts were further developed into rubrics and assessment guides by the two cardiologists. Rubrics and assessment guides were prepared to evaluate student performance in CPR competencies. The validity of the content on the rubrics and assessment guides was achieved when the assessment instruments were reviewed by experts, who are cardiologists. This rubric and guideline for assessing CPR competencies coherently assessed three competencies, namely the primary survey, CPR procedures, and professional behavior that must be achieved on each value scale. The three competencies were defined in detail with specific explanations in the assessment guide. For CPR scripts that are not following the guidelines, standardized examinees performed <70% of clinical skills in the rubric, while for CPR scripts according to guidelines, standardized examinees performed >70% of clinical skills on the checklist.

3.2 Video Recording

The CPR video that showed performance following the guidelines and the other showed CPR not according to guidelines were recorded which contained the following: primary survey, CPR procedures, and professional behavior. All videos were recorded in the Skills Laboratory Faculty of Medicine, Duta Wacana Christian University with a digital Canon photographic camera. The sequence of video scripts was supervised by the researchers. The scripts were filmed by Medical Information Technology (IT) staff and were repeated several times to achieve the best situation that was written in the scripts. The cardiologists gave revision feedback on those two videos, then we reproduced the videos based on their feedback.

3.3 Video Validation

The validation of those two videos was conducted by the OSCE examiners as participants in this study. Participants in this study were 51 examiners described below in Table 1.

In giving the assessment, the median of two videos scoring results of the OSCE examiner's assessment based on each background characteristic and the significance from the Kruskal–Wallis analysis can be seen in the following Table 2.

The CPR videos that showed performance following the guidelines provided results that were not significantly different in the average value of the assessment results between each characteristic of OSCE examiners. Significant differences occurred in the two groups of examiners' characteristics, namely education and clinical experience when examiners assessed CPR competencies that were not following the guidelines. The median score for those groups was the same (33.33) with a p-value of 0.04; df 3 and p-value of 0.03; df 2, respectively.

Table 1 Study subjects' characteristics

Background		Number of participants ($N = 51$)
Gender	Male	22 (43%)
	Female	29 (57%)
Education	Bachelor undergraduate	19 (37%)
	Master's degree	16 (31%)
	Doctoral Degree	3 (6%)
	Specialist doctor	13 (25%)
Clinical practice experience	General practitioner	28 (55%)
	Specialist	14 (27%)
	No clinical practice	9 (18%)
Duration of clinical practice experience	<2 years	9 (18%)
	2–5 years	17 (33%)
	>5 years	25 (49%)
OSCE experience	<2 years	9 (18%)
	2–5 years	24 (47%)
	>5 years	18 (35%)
OSCE examiner training	<3 times	21 (41%)
	3–5 times	17 (33%)
	>5 times	13 (25%)

OSCE, Objective Structured Clinical Examination.

Table 2 Video assessment results

Video	Characteristics	Median		Max–Min score	*p*-value
According to guideline	Male	88.89		48.15–100.00	0.30
	Female	100.00		66.67–100.00	
	Bachelor undergraduate	100.00		66.67–100.00	0.17
	Master degree	88.89		48.15–100.00	
	Doctoral degree	100.00		100.00–100.00	
	Specialist doctor degree	88.89		59.26–100.00	
	General practitioner	88.89		48.15–100.00	0.50
	Specialist	94.44		59.26–100.00	
	No clinical practice	100.00		74.07–100.00	
	Clinical experience <3 years	88.89		66.67–100.00	0.90
	Clinical experience 3–5 years	100.00		48.15–100.00	
	Clinical experience >5 years	92.59		59.26–100.00	
	OSCE <2 years	100.00		66.67–100.00	0.83
	OSCE 2–5 years	94.44		59.26–100.00	
	OSCE >5 years	90.74		48.15–100.00	
	OSCE examiner training <3 times	100.00		66.67–100.00	0.83
	OSCE examiner training 3–5 times	100.00		48.15–100.00	
	OSCE examiner training >5 times	88.89		66.67–100.00	
Not according to the guideline	Male	40.74		11.11–74.07	0.08
	Female	33.33		0.00–59.26	
	Bachelor undergraduate	33.33		0.00–59.26	0.04*
	Master degree	37.04		0.00–55.56	
	Doctoral degree	33.33		29.62–44.44	
	Specialist doctor degree	44.44		33.33–74.07	
	General practitioner	33.33		0.00–59.26	0.12
	Specialist	42.59		29.63–74.07	
	No clinical practice	33.33		11.11–55.56	
	Clinical experience <3 years	33.33		11.11–40.74	0.03*
	Clinical experience 3–5 years	33.33		0.00–55.56	

(continued)

Table 2 (continued)

Video	Characteristics	Median		Max–Min score	*p*-value
	Clinical experience >5 years	40.74		0.00–74.07	
	OSCE <2 years	33.33		11.11–59.26	0.30
	OSCE 2–5 years	33.33		0.00–51.85	
	OSCE >5 years	40.74		0.00–74.07	
	OSCE examiner training <3 times	33.33		25.93–55.56	0.91
	OSCE examiner training 3–5 times	33.33		11.11–59.26	
	OSCE examiner training >5 times	33.33		0.00–74.07	

*$p < 0.05$ shows significant differences
Min–Max, minimum–maximum; OSCE, Objective Structured Clinical Examination

4 Discussions

This study showed that the several steps to create a video for assessment, which were also done in this study, were planning or pre-production, recording or production, and editing or post-production [17]. Planning is important to ensure that the next step of video development is as expected, and this study describes how to develop and validate a video script, for which one video describes CPR that is appropriate and one video reflecting CPR not done properly according to the guidelines [18]. The video recording step needs to be supervised by the scriptwriter and the shooting must be done by a professional, which was also done in this study. This step is important so that video recordings record all relevant and objective information, can be seen clearly, and prevent video viewers from losing important details [19]. Post-production steps are also important as a final filter before the video is watched by video viewers as we did in the development of this assessment video. Submission of a post-editing video to the expert as the first viewer is expected so that the expert can identify potential gaps that can affect the assessment of the video, and provide an opportunity to make adjustments before the video is implemented [18].

The validation analysis of the two CPR videos in this study showed that although there were variations in the examiner's background that allowed differences in cognitive processes and various examiners' behaviors that could affect the assessment results, they were still able to provide consistent decisions. This study could illustrate that the results of the assessment of the two videos in this study were only influenced by differences in the performance of the students themselves. These results were consistent with previous studies showing similar results [20, 21]. Examiners will tend to make judgments easier and will give good judgment with accuracy when judging excellent performance and failing low quality performances because the examiners base their assessment on quantitative checklists of clinical skill performance [22,

23]. The tendency to more easily give assessments to students who perform well following the assessment guidelines is because the examiners base their assessments on quantitative measurements of the student's performance, including counting the number of correct points, and the examiners do not place more attention on the global assessment of pass and fail, so the examiner judges based on the fulfillment of checklist components [23]. This tendency can also be explained by when the examiner assesses good performance, it is easier for the examiner to choose the highest checklist point [22]. A video-based assessment accompanied by specific assessment instruments based on the newest and the most detailed evidence can increase the assessment's reliability [24].

As a reflection in the future, it is easier for examiners to give an assessment of good performance and the reduction of assessment deviations can be done by using specific cases indicating that there is a learning process when they evaluate when they use specific cases [24]. A video-based assessment using specific cases will be more effective than using general cases.

To minimize or avoid examiner biases, this example of video-based assessment can foster achievement of the highest objectivity of OSCE by applying this project in OSCE role-play scoring training. Through this role-play scoring training, we hope there will be the same perception between examiners on using assessment tools, using references, and minimizing the effect of background variability. Examiners' knowledge regarding their assessment performance, including the availability of clear checklists, understanding of the scoring rubric, a clear global rating scale, and how to rate it, is understandable so that it can be targeted in the training of OSCE examiners to minimize bias [25, 26].

One of the limitations of this study was that the results of this study could not be applied to other cases such as communication skills and clinical reasoning that had more complicated cases because in both cases there were differences in the way of assessment compared to the procedural skill with more standardized cases such as CPR in this study. The generalization was also a drawback in this study because the examiners came from a single institution. However, the examiners have the same standardization and are comparable with examiners in other institutions, hence, this approach can be also applied in other institutions.

Future research may use other clinical skills such as communication skills and clinical reasoning skills. Both have different forms of assessment and are more complex than the procedural skills in this study so that they can be used to answer with more certainty the influence of the examiners' backgrounds in conducting clinical skills assessments.

5 Conclusions

There were no significant differences in scoring between OSCE examiners, except for clinical practice experience and educational background categories. Video-based assessment can foster the objectivity of OSCE, hence, it can be applied in OSCE

scoring assessor training. However, this study shows that there are still sources of examiner biases that academics need to be aware of and consider.

Ethics Approval and Consent to Participate This study was approved by the Health Research Ethics Committee Faculty of Medicine Universitas Kristen Duta Wacana (Reference No.1068/C.16/FK/2019).

Competing Interest The authors declare that there are no competing interests related to the study.

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Authors' Contribution *Oscar Gilang Purnajati*—conceived the research, reviewed the literature, designed the study, acquired funding, data analysis, and wrote the manuscript.

Rachmadya Nur Hidayah—developing study framework, data analysis the data, and reviewing the final manuscript.

Gandes Retno Rahayu—analyzed the data, reviewing the final manuscript.

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Differences in Perceptions of Values, Roles and Responsibilities, Communication, and Teamwork Regarding Interprofessional Education (IPE) Between Medical, Midwifery, and Psychology Students

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Abstract Developing characters of collaboration in health profession education through interprofessional education (IPE) is needed to improve health services. The implementation of IPE also still needs to be improved. This study analyzed differences in student perceptions of values, roles and responsibilities, communication, and teamwork between Medicine, Midwifery, and Psychology study programs. This analytic observational study was conducted with a cross-sectional approach at the Faculty of Medicine, Universitas Sebelas Maret, 2019. The research subjects were students of Medicine, Midwifery, and Psychology. The sampling technique was quota sampling. The measuring instrument used is an IPE learning experience questionnaire tested for validity and reliability, with a Cronbach alpha of 0.95 and a total item correlation of 0.47–0.72. Statistical analysis used the Kruskal–Wallis test because the data were not normally distributed. The results of the Kruskal–Wallis test showed a

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significant difference in students' perceptions of IPE values ($p = 0.003$) and communication ($p = 0.021$) between Medicine, Midwifery, and Psychology study programs. Meanwhile, there was no significant difference in students' perceptions of roles and responsibilities ($p = 0.256$) and teamwork ($p = 0.852$) between Medicine, Midwifery, and Psychology study programs. Mann–Whitney testing on the dimensions of IPE values showed a significant difference between Medical and Psychology students ($p = 0.001$), and between Midwifery and Psychology students ($p = 0.021$). There was a significant difference in communication between Medical and Midwifery students ($p = 0.022$) and between Midwifery and Psychology ($p = 0.006$). There is a significant difference in students' perceptions of IPE between the Medicine, Midwifery, and Psychology study programs on IPE values and communication. Health profession education institutions must consider the study program differences when developing the IPE curriculum.

Keywords Interprofessional education · Health professions · IPE values · Interprofessional communication

1 Introduction

Health systems around the world are currently experiencing a crisis, namely there is a shortage of health workers, while the distribution of health workers needs to be evenly distributed, causing fragmented health services and public health needs which are not met optimally [1]. In addition, as the world faces the increasing prevalence of chronic diseases, advances in health technology, and the growing complexity of healthcare delivery, the need for coordination and integration of clinical care through a multidisciplinary approach has become imperative [2]. The World Health Organization (WHO) recommends effective collaboration in health services, and this collaboration will be conducted well with the implementation of interprofessional education (IPE) in health education [3].

Unfortunately, implementing collaboration between professions has not yet been done effectively and consistently [2]. Differences in status between professions, stereotyping, feelings of superiority and inferiority, as well as many actions that are instructive from other professions, still affect the practice of collaboration. In this case, it can include the division of roles and responsibilities, communication of values, and cooperation between professions. In a qualitative study conducted on health workers involving 10 respondents, the results showed that most health workers did not have the same perception regarding collaboration between professions [4]. In a study conducted on 60 students [1], it was found that not all professions felt that they needed help or had a need to cooperate with other professions. Some also felt that they had limited discussions with other professionals. Conflicts between professions tend to be caused by the ego of each profession, hindering the collaborative learning process of healthcare workers [1]. The low need to cooperate with other professions and the perceived disapproval of relying on work done by other professions, excessive

self-confidence in their professional competence, and lack of interactions with other professions hinder collaboration between professions. The severity of this condition has contributed to the reduced quality of healthcare services for patients [5].

The American College of Clinical Pharmacy states that in collaborating, every important profession should understand their competencies in IPE, namely knowledge, attitudes, skills, and team abilities, which significantly differ in the perception component of the need to cooperate [2]. Students who participate in IPE introductory courses at the start of professional preparation maintain not only a positive attitude towards interprofessional learning but also enhance it. As a result, they are expected to be more involved in learning this important knowledge which will help them to become ready practitioners of interprofessional collaborative [6]. Collaborative practice can reduce complication rates, length of stay in the hospital, conflicts between health teams, and mortality rates [4]. One literature study stated that there are four indicators of competence in IPE, namely values/ethics, roles and responsibilities, interprofessional communication, team, and teamwork [7]. In general, the learning experience improves communication and collaboration skills between students, and as a result, it is hoped that with the IPE, students can be better prepared to carry out the next level of Interprofessional Collaboration.

Due to the importance of collaboration between professions in improving the quality of health services in the future and the possible obstacles in the implementation of IPE, the researchers aimed to analyze the differences in student perceptions of values, roles and responsibilities, communication and cooperation in Medicine, Midwifery and Psychology study programs, to see opportunities and potential that can be done in the IPE program.

2 Methods

This analytic observational study was conducted with a cross-sectional approach at the Faculty of Medicine, Universitas Sebelas Maret, in 2019. The research subjects were students of Medicine (n = 173), Midwifery (n = 70), and Psychology (n = 77). The sampling technique was quota sampling. The measuring instrument used is an IPE learning experience questionnaire tested for validity and reliability, with a Cronbach alpha of 0.95 and a total item correlation of 0.47–0.72. Statistical analysis used the Kruskal–Wallis test because the data were not normally distributed.

3 Results

3.1 Characteristics of Participants

Characteristics of the participants are summarized in Table 1. The results showed significant differences in values and communication between the Medical, Midwifery, and Psychology Study Programs (Tables 2 and 3). There were no significant differences in roles and responsibilities, and teamwork between the Medical, Midwifery, and Psychology Study Programs. For values and communication, statistical analysis was continued with Mann–Whitney tests. There were differences in the value of IPE between the Medical and Psychology study programs ($p = 0.001$) and in the value of IPE between the Midwifery and Psychology study programs ($p = 0.021$). But there were no significant differences in the value of IPE between the Medical and Midwifery study programs ($p = 0.846$). For communication, there were significant differences between the Medical and Midwifery study programs ($p = 0.022$) and between the Midwifery and Psychology study programs ($p = 0.006$), but no significant differences between the Medical and Psychology study programs ($p = 0.536$).

Table 1 Subject characteristics

	Study program					
	Medical		Midwifery		Psychology	
	N	%	N	%	N	%
Sex						
Male	65	36.7	0	0	14	18.2
Female	112	63.3	70	100	63	81.8
Total	177	100	70	100	77	100

Table 2 Differences in students' perception of values, roles and responsibilities, communication, and teamwork between students in the medical, midwifery, and psychology study program

Variable	Mean rank			*p*-value
	Medical	Midwifery	Psychology	
Values	168.25	164.57	127.65	0.003
Roles and responsibilities	167.52	157.91	147.08	0.256
Communication	155.86	186.64	147.08	0.021
Teamwork	163.06	158.75	153.34	0.852

Table 3 Differences in students' perception of values and communication between students in the medical, midwifery, and psychology study program

Variable	Study program		*p*-value
	1	2	
Values	Medical	Midwifery	0.846
	Medical	Psychology	0.001
	Midwifery	Psychology	0.021
Communication	Medical	Midwifery	0.022
	Medical	Psychology	0.536
	Midwifery	Psychology	0.006

4 Discussions

Our study found that there were significant differences in IPE scores between medical and psychology students, as well as between midwifery and psychology students. This finding matches the findings of previous research that revealed differences in the scores of health professional education students. The difference in the health professional education scores includes aspects of the educational process in health profession programs, IPE develops trust and respect between professions, and Implementation of IPE can improve healthcare quality, especially in terms of patient safety [8]. The main difference with previous research is that in this study, medical students had a higher perception of IPE in values, roles and responsibilities, and cooperation than in other study programs (Midwifery and Psychology). Meanwhile, a previous study found that medical students had fewer perceptions about IPE than students from other health professions. This occurs in the existing professional hierarchy where doctors occupy the highest position in a health team [8]. In the context of this study, the curriculum developed in the Medical study program places this IPE as a special course in the form of an IPE course. In contrast, in other study programs (Midwifery and Psychology), the IPE content becomes part of other courses because it is yet possible to revise the curriculum and it is offered as a special course. Research showed that IPE implemented as part of the curriculum will improve knowledge about roles, perspectives, confidence to collaborate, and motivation [9]. This is in accordance with previous studies that found the differences in the curriculum in various health professional study programs are challenging in developing IPE [10, 11]. The scheduling of various health-related study programs with different curricula can make it difficult to implement IPE [12]. Previous research stated that interventions in the form of implementing IPE with certain modules, for example, with simulation training, would improve communication and teamwork among students [13].

Regarding communication, the midwifery study program students have the highest perception compared to other study programs. Previous study found that at a communication skills training, more nurse and midwifery students stated that the communication skill was important and would be useful for patient than medical students [14]. Communication is an important competency in IPE. Several strategies can improve

this communication skill. One of them is through emphasis on openness to collaborate, openness to information, and openness to discussion [15]. Previous studies also found that IPE implementation would improve IPE communication skills in students [16]. In addition, IPE simulation, which is accompanied by appropriate assessments, will also improve communication in IPE [17]. Working together in a health team will improve students' soft skills, such as communication. A previous study stated that midwifery students felt insecure when collaborating with medical students and felt an inferior position, resulting in a gap in communication due to a lack of confidence [18].

The existence of a significant difference in student perceptions of IPE is one of the findings that underscores that the implementation of IPE in the curriculum needs to be stronger. Previous studies have stated that implementing IPE can change students' perceptions of IPE [19]. In addition to the curriculum, other challenges in IPE are leadership, resources, stereotypes and attitudes, student variations, IPE concepts, teaching, enthusiasm, professional jargon and accreditation, assessment, security, and logistics [20]. IPE can be implemented in various strategies depending on the subject, student readiness, and lecturer competence. IPE learning can also be implemented specifically on certain health issues [12], such as stunting or services for pregnant women. Our study also reveals that specific courses on IPE will improve students' perceptions of IPE compared with IPE substituted in other courses, for example, public health courses. The findings of this study imply a need to develop a specific IPE course in health professional institutions to ensure good collaboration skills among health workers. Hence, in light of the differences in values and communication in various health study programs, an IPE curriculum can be developed that accommodates these differences.

The limitations of this study are the different types of IPE curricula in the Medicine, Midwifery, and Psychology study programs, which will be an important consideration when the results of this study are generalized to other contexts. The strength of this study involves psychology study programs that relatively rarely implement the IPE curriculum, especially in Indonesia.

5 Conclusions

There is a significant difference in students' perceptions of IPE between the Medicine, Midwifery, and Psychology study programs concerning IPE values and communication. Health profession education institutions must consider the study program differences when developing the Interprofessional Education components of their curriculum.

Ethics Approval and Consent to Participate This research has been approved ethical clearance from the Ethical Board of Faculty Medicine Universitas Diponegoro No. 519/EC/FK/2020.

Competing Interest The authors declare that there are no competing interests related to the study.

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Authors' Contribution *Eti Poncorini Pamungkasari*—developing research proposal, collecting data, data analysis, and publication of the manuscript.
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Fatikhu Yatuni Asmara—developing research proposal and publication of the manuscript.
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Dysfunctional Coping Strategies by Medical Students with Stress in the COVID-19 Pandemic

Maftuchah Rochmanti, Dewi Ratna Sari, Sakina, Atika, and Tri Astuti Sugiyatmi

Abstract The Coronavirus Disease 2019 (COVID-19) pandemic affected not only physical but also mental health. There was an increasing stress prevalence among the population, including medical students. This study aimed to identify the medical students' stress levels and coping strategies during the COVID-19 pandemic. This cross-sectional study was conducted with 669 medical students from various semesters (female = 429, male = 240). The Depression Anxiety and Stress Scale-21 and Brief COPE questionnaires were distributed in August–November 2021, after Indonesia's second wave of the COVID-19 pandemic. Data were analyzed using Kruskal–Wallis and Chi-square tests with $p < 0.05$ considered significant. The results showed that female medical students (42.7%) experienced more stress than males (33.8%). The medical students in the third, fifth, and seventh semesters that experienced stress were 44.0%, 36.5%, and 36.4%, respectively. There was a significant difference in medical students' stress scores among semesters ($p = 0.019$). In order to cope with the stress, medical students with stress used problem-focused (79.9%), dysfunctional (13.3%), then emotional-focused strategies (6.8%). In comparison, the dysfunctional strategy (1.2%) was the least used among students who were in distress. Unlike normal students who used emotion-focused, medical students with distress used dysfunctional methods as an alternative coping strategy.

Keywords Coping strategy · Medical student · Stress · Mental health · Pandemic

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List of Abbreviations

COVID-19	Coronavirus Disease-2019
DASS-21	Depression Anxiety and Stress Scale-21

1 Introduction

The Coronavirus Disease-2019 (COVID-19) pandemic emerged in 2019 and widely impacted all sectors of life. Numerous evidences reported that COVID-19 severely affected physical health and resulted in mental health issues among general populations in different communities [1]. Stress became a common phenomenon during the pandemic, especially for medical students [2, 3]. One potential stressor in medical students during the COVID-19 pandemic involved academic concerns. The Abdulghani et al. study in 2020 showed that third-year medical students at King Saudi University, Riyadh, Saudi Arabia, perceived more stress during the COVID-19 pandemic [3]. Additionally, another study reported that the COVID-19 pandemic had brought significant psychological influence on the final year students of medical education in Pakistan [4]. Conversely, the study of Atta and Almilaibary in 2022 showed that medical students highly experienced stress at Albaha University, Saudi Arabia, during the early phase (preparatory phase) [5]. Similar results found high levels of mental burden in first-year medical students in the early period of the COVID-19 pandemic [6]. These inconsistencies indicated that medical students in different phases are susceptible to psychological distress, especially in pandemic situations.

However, diverse coping strategies become critical in discussing how medical students deal with stress, despite the stressor factor. Several previous studies reported there were correlations between the coping strategy and mental health, especially in medical students before and during pandemics [7–12].

A coping strategy can be described as an action taken by a person to handle unfavorable effects, both physiologically and psychologically, caused by stress [13]. Coping strategy refers to conscious volitional efforts to regulate emotion, cognition, behavior, physiology, and/or the environment in response to the stressful condition [14].

The selection of coping strategies is affected by personal backgrounds such as culture, previous experience dealing with problems, social-environmental factors, personality, and self-concept [13]. Coping is influenced by the person's coping resources, including psychological, spiritual, social, environmental, and material resources, and by the nature of the situation, especially whether its outcome is controllable or has to be accepted [15].

Coping strategies can be classified into problem-based, emotion-based, and dysfunctional-based coping strategies. Other classifications have also been used,

such as adaptive-based coping and maladaptive-based coping; positive and negative coping strategies; problem-based coping and emotion-based coping; appraisal-focused (adaptive cognitive), problem-focused (adaptive behavioral), emotion-focused, and occupation-focused coping; problem-focused coping, emotion-focused coping, social support, religious coping, and meaning-making; task-oriented, avoidant-oriented and emotion-oriented coping strategies; as well as approach and avoidant coping strategies [8, 12, 13, 16].

Coping mechanisms for stress can mainly be functional (problem-focused and emotion focused) and dysfunctional strategies. The functional strategy is a coping strategy that is done by facing and approaching the problem of a proactive strategy, while a dysfunctional strategy is a coping strategy involves avoiding situations that cause pressure reactive. Dysfunctional strategies tend to use habitual defensive strategies that try not to eliminate or attenuate stressors. Dysfunctional coping strategies temporarily reduce stressors, but stress inevitably returns because the underlying stressor is not addressed. The difference is that dysfunctional strategies have harmful effects over the long term for students [17].

Studies regarding stress and coping mechanisms for medical students existed long before the COVID-19 pandemic. However, due to its academic impact, the relationship between stress and coping strategies for medical students becomes an important issue. Therefore, this study aimed to identify medical students' stress levels and coping strategies during the COVID-19 pandemic.

2 Methods

This cross-sectional study was conducted on medical students from semesters 3, 5, and 7 in the Faculty of Medicine, Universitas Airlangga, using a total sampling technique from inclusion criteria of active medical students enrolled in 2020/2021. The students who disagreed to participate were excluded from the study. The Depression Anxiety and Stress Scale-21 (DASS-21) and Brief COPE questionnaires were distributed online via messenger applications after the second wave of the COVID-19 pandemic in Indonesia (August–November 2021). Both questionnaires were given with bilingual options. The stress level was assessed by 7 from 21 questions in the DASS-21 questionnaires [18–21]. The Brief COPE questionnaires were used to measure students' dominant coping strategies. This questionnaire consists of 28 questions divided into 14 coping mechanism subscales, each composed of two questions. The score of Brief COPE was calculated and classified into three types of coping strategies: problem-focused, emotion-focused, and dysfunctional coping strategies [16].

Data were presented descriptively and analyzed using Kruskal–Wallis and Chi-square tests. The significant level was statistically determined at $p < 0.05$.

3 Results

A total of 669 student participants (response rate 82.4%) completed the questionnaires consisting of 35.9% male and 64.1% female students with an average age of 19.8 ± 1.1 years. The distribution of medical students by gender in each semester is depicted in Table 1. Overall, there were more female medical students than males each semester.

The results showed that female medical students (42.7%) experienced more stress than males (33.8%). The medical students in the third, fifth, and seventh semesters that experienced stress were 44.0%, 36.5%, and 36.4%, respectively. Kruskal Wallis test results indicated there was a significant difference in medical students' stress scores among semesters ($p = 0.019$). The third semester differed significantly from the fifth ($p = 0.025$) and seventh semesters ($p = 0.011$). Based on the analysis of the Chi-Square tests, in order to overcome stress, medical students with stress significantly differed in coping strategies than the normal students ($p < 0.001$) from all respondents.

Table 2 indicates the distribution of stress and coping strategies in medical students. Problem-focused was the major coping strategy used by normal (85.2%) and stress (79.9%) medical students. The percentage of medical students with dysfunctional coping strategies suffered from stress was 87.5%. Meanwhile, the medical students who used problem-focused coping than emotion-focused were only 37.9% and 24.7%, respectively. As much as 13.3% of medical students with stress used dysfunctional methods, whereas 13.6% of normal students used an emotion-focused.

Table 1 Distribution of medical students based on stress and gender (n = 669)

Semester	Stress	Gender				Total	%
		Male (n)	%	Female (n)	%		
3	No	64	62.7	85	51.8	149	56.0
	Yes	38	37.3	79	48.2	117	44.0
Total semester 3		102	100.0	164	100.0	266	100.0
5	No	63	67.0	97	61.4	160	63.5
	Yes	31	33.0	61	38.6	92	36.5
Total semester 5		94	100.0	158	100.0	252	100.0
7	No	32	72.7	64	59.8	96	63.6
	Yes	12	27.3	43	40.2	55	36.4
Total semester 7		44	100.0	107	100.0	151	100.0

Table 2 Distribution of stress and coping strategies in medical students (n = 669)

Semester	n	Stress		Coping strategies		
				Emotion-focused	Problem-focused	Dysfunctional
3	266	No	149 (56%)	21 (14.1%)	126 (84.6%)	2 (1.3%)
		Yes	117 (44%)	7 (6%)	97 (82.9%)	13 (11.1%)
5	252	No	160 (63.5%)	19 (11.9%)	140 (87.5%)	1 (0.6%)
		Yes	92 (36.5%)	6 (6.5%)	73 (79.4%)	13 (14.1%)
7	151	No	96 (63.6%)	15 (15.6%)	79 (82.3%)	2 (2.1%)
		Yes	55 (36.4%)	5 (9.1)	41 (74.5%)	9 (16.4%)

4 Discussions

In the present study, about one-third of medical students, most of them female, suffered stress after the second wave of COVID-19. This finding strengthens the previous study, which reported that females are associated with higher stress levels [22]. Based on gender, Qamar in 2014 stated that stress scores were higher in female medical students. However, the difference was not significant. The basic personality of males, which tends to be easy going, is considered to be the relevant cause [23].

Most medical students showed normal stress levels due to their ability to adapt to changing environments and study conditions after the second wave of COVID-19. These findings match the previous study which indicated improved psychological well-being indicators and adaptive abilities in college students after the second wave [24]. This effect might be explained by the decreased cases of COVID-19 in Indonesia, relaxation of social restrictions, awareness about COVID-19, increased vaccination coverage, and effective health protocols for COVID-19.

Based on our study, the highest prevalence of stress was found in the third semester compared with fifth and seventh semesters. This condition could happen possibly because of the transition from high school to college during the pandemic. Students had to deal with altering the learning environment, despite COVID-19. Usually, studying in high school was conducted in small classes or groups. Typically, the teacher will organize the learning process in one course for the whole semester. Students need to study basic knowledge of each course, in order to reach expected competencies. In medical school, the content is mostly transferred in large class. Small groups are used in tutorials and practical sessions. Each topic in one course may be given by different lecturers with different styles in lecturing. Usually, one course will last for several months instead of one semester. In order to pass the course, students need to learn deeper than just basic skills and superficial understanding, and sometimes it requires combined knowledge from previous courses. This study used different tools for stress measurement, but still the results were in line with the previous study, that found students of the first year usually having more stress compared to senior students. Some conditions of our study were different to the previous one. This study was conducted during the COVID-19 pandemic situation

which needs further research to discover other stressors that may affect the outcome measurements. The participants in this study were mostly females which has been associated with experiencing higher stress levels [7, 23, 25–27].

Some personal changes occurred, together with the academic load, for example, being away from hometown and the obligation to have independent living for the first time, and making new connections with their new circle of friends and peers. Besides that, the students struggled with their new academic life, such as different learning processes and examinations, first time dissecting corpses, and seeing patients who suffered and/or died [25]. Other possible factors were less time to sleep, increased financial burden, and potentially experiencing student abuse [26]. The general personality of the students also plays a role in developing stress responses. Medical students tend to have neurotic and perfectionistic personalities, which induce anxiety and other types of stress when their self-set goals fail to be obtained [26].

An exciting trend observed by McKerrow in 2020 showed that medical students at the end of their first year had the lowest overall health compared to others. Overall health was highest at the entry point, but started to decrease to the lowest level at the end of year 1, and rose again although it never reached its previous highest level [27]. In their senior year, students usually managed to handle their personal problems and control their feelings of stress and burnout. They also tend to build social support among medical students and have the most prolonged sleep duration at night [26]. The flexibility of the curriculum at their end stage of study also helped students to maintain their overall health [27].

In addition, the third semester consists of basic medical science, while the fifth and seventh semesters consist of integrative courses and clinical science, respectively. Moreover, the credit hours in the third semester were highest among others. These findings were consistent with a previous study, which revealed that the highest prevalence of stress in medical students was observed during the early academic period and decreased as the academic level increased [5, 28]. The possible explanations could be due to gradual adaptation to the learning environment. Therefore, failure rate was higher in the early years.

The most common coping strategy used by medical students in our study was problem-focused. This strategy is commonly used by individuals with the resources to deal with the situation so that the conflict being faced is still considered under control [13]. In this case, all medical students, whether stressed or not, have relative resources, namely intellectual capacity in analyzing problems and social and information resources to solve various existing problems. In line with our study, Park et al. in 2022 found that problem-solving coping was widely used in university students [11].

In our study, the classification of coping strategies includes three main categories: problem-focused, emotion-focused, and avoidant/dysfunctional coping strategies [16, 29]. The problem-focused strategy encompasses active coping, instrument support, and planning. Emotion-focused coping strategies include acceptance, emotional support, humor, positive reframing, and religion. Meanwhile, dysfunctional coping strategies include behavioral disengagement, denial, self-distraction, self-blame, substance use, and venting [16, 30].

Most individuals use problem-focused and emotional coping methods when processing and tackling stressful situations [31, 32]. Although most stressors evoke both types of coping, problem-focused coping tends to predominate when people feel that something constructive can be done to alter the source of stress. In contrast, emotion-focused tends to predominate when people feel that stressor is something that must be restrained and they have made several efforts in order to modify emotional functions without trying to change the cause of stress [13, 31].

Our findings proved that the coping strategy of a medical student with stress significantly differed from the normal student. Park et al. in 2022 supported our finding, which showed the correlation between coping strategies and stress in Korean university students immediately after the second wave of COVID-19 [11]. In our study, medical students with stress tended to use dysfunctional coping strategies after the problem-focused. In addition, the highest percentage of stress was found in medical students who used dysfunctional coping mechanisms to deal with the stress. This result was in line with the previous study in other medical schools in Indonesia, which revealed that dysfunctional coping strategies were positively correlated with emotional exhaustion and cynicism [33] and served as predictors of depression and anxiety symptoms [34]. The previous study reported that dysfunctional coping strategies were also positively correlated with mental health impairment [35–37]. Dysfunctional coping/maladaptive coping refers to coping mechanisms that are associated with poor mental health outcomes and higher levels of psychopathological symptoms [38].

Different coping styles are related to serotonergic and dopaminergic input of the prefrontal cortex and nucleus accumbent. Vasopressin and oxytocin also have an important implication relative to coping style by modulating emotional, social-behavioral, and physiological responses within various brain areas [39, 40]. The brain regions responsible for coping and emotion regulation, especially regions of the prefrontal cortex, are the most vulnerable to deleterious effects of chronic stress. Therefore, exposure to chronic stressors impairs the ability to regulate emotions and cope with stress, eventually impeding adaptive coping [41].

Some possible causes for stress overload are excessive study load and academic pressures, such as learning material imbalanced with the provided time. In order to succeed in medical school, a personal approach, positive thinking, a support system from peer seniors and counselors, and extracurricular activities (e.g., musical and physical activities) could be used as emotionally focused coping strategies as well as following suit with the regular students [42].

In medical students, dysfunctional coping strategies are associated with a higher risk of burnout. Medical students indicated that exercise and relaxation techniques can significantly help stress management. Students who do not exercise or use relaxation techniques are more likely to experience burnout. Programs for stress prevention and management in student groups can significantly reduce stress [36]. Resilience training, having social support and emotional resilience, exercise, a healthy diet, and being involved in interpersonal relationships, as well as having the characteristics of joy, self-efficacy, and optimism, are all effective factors in dealing with stress in students [43].

The American Psychological Association (APA) describes the trait of resilience as the process and outcome of successful adaption during difficult or adverse life events that needs mental, emotional, and behavioral flexibility and adjustment in response to external and internal requisites [44].

In addition, personal approach, positive thinking, senior and counselor support system, extracurricular physical activities, and music can be used as coping strategies in medical school [42]. Institutional efforts must be recommended to anticipate students with stress and change dysfunctional strategies into adaptive coping strategies. In student groups, the university offers stress prevention and management programs. This program can include brief behavioral techniques such as stress awareness and stress management methods such as deep diaphragmatic breathing, relaxation, and walking meditation, reducing stress and preventing burnout [45]. Moreover, the university provides social support and a support system that can be obtained through mentoring or student groups with mentors from seniors and counselors. These efforts can include organizing extracurricular physical and musical activities or associations, such as lifting, cycling, forming favorite clubs, and utilizing the university's gym facilities. Resilience training should improve individual resilience through cognitive behavioral therapy-based interventions and mindfulness techniques [46].

The first year in college is the prime time to encourage awareness about mental health challenges, informing the students of the importance of strategies in preventing mental health issues and their potential negative academic effects, therefore the students can be prepared and adapt as issues occur. First year programs that can enhance student ability to implement adaptive coping strategies, familiarize and de-stigmatize accessing mental health services would be beneficial for students throughout their study [47]. Another supporting program for mental and emotional health of medical students by offering mental health visits, preferably free of charge, and maintaining the anonymity will encourage medical students to seek help and receive professional assistance to rally their resources against their negative emotions [48].

Nowadays, the use of digital platforms to provide online counseling services can assist in reaching much wider users, especially those who feel uncomfortable meeting in person for mental illness prevention. Hence, this online platform can be incorporated when developing student-centered support programs [49].

Perceived stress by medical students is related to academic, psychosocial and environmental stressors. Therefore, the academic curriculum and assessment patterns need to be reframed, and counselling unit services must be more introduced to medical students. In addition, leisure and sport activities must be incorporated into the medical curriculum to make medical education less rigorous, which can be achieved by providing additional time and resources [50]. According to Farres et al. in 2016 support programs by students might be helpful to reduce stress and burnout. Regular physical activity and adequate sleep can also be useful to promote personal health. It is also the duty of faculty to facilitate students so that they can pass through the preclinical years smoothly [42]. Facilitation from faculty can also build resiliency

among students. Additionally, the mentorship programs from senior to junior students will help them take advantage of and benefit from the senior experiences. On an individual level, students should develop trait mindfulness and rich social support networks [51].

This study has some limitations regarding stress level and coping strategy which were only measured once through self-assessment and represented only one situation. Thus, the measurement should be done more than once to monitor mental health in the students' development. This study was also conducted in only single institution but in the top three medical faculties in Indonesia which might reflect similar findings in other institutions. In further study, future researchers should explore more about risk factors and the impact of the COVID-19 pandemic on students' coping strategies.

5 Conclusions

The medical students in the early semesters perceived more stress compared with others during the pandemic. Furthermore, medical students with stress tended to use dysfunctional coping rather than emotion-focused strategies, despite the problem-focused preferences. Personal approaches from the seniors, counselor support system, and various extracurricular activities as supporting program need to be facilitated by the institution.

Ethics Approval and Consent to Participate This study was approved by the Health Research Ethics Committee, Faculty of Medicine, Universitas Airlangga (No. 152/EC/KEPK/FKUA/2021). All the respondents were informed about the study's objectives, including confidentiality of the data. Before completing the questionnaires, all respondents provided their written consent to participate in the study.

Competing Interest The authors declare that there are no competing interests related to the study.

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Authors' Contribution *Maftuchah Rochmanti*—developed the research proposal, carried out the study and published the manuscript.

Dewi Ratna Sari—developed the research proposal, carried out the study, collected data, analyzed data, and published the manuscript.

Sakina—carried out the study, collected data and published the manuscript.

Atika—developed data extraction, analyzed and interpreted data, and published the manuscript.

Tri Astuti Sugiyatmi—developed data extraction, analyzed and interpreted data, and published the manuscript.

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Exploration of Interprofessional Education Learning Methods in Achieving Collaborative Competencies During COVID-19 Pandemic

Kevlar Azri Ghurafa, Atik Maftuhah, and Bulan Kakanita Hermasari

Abstract The existence of Interprofessional Education (IPE) is crucial for healthcare students because it is a platform for them to learn how to interact and collaborate with each other. However, the emergence of the COVID-19 pandemic caused some major changes, including the shifting of IPE learning methods into online learning, which also changed how the students learn and interact with each other. This qualitative phenomenology study was conducted with content analysis technique and aimed to explore medical, pharmacy, and midwifery students' experiences in learning interprofessional collaboration skills through online learning for three months at Universitas Sebelas Maret. The data were collected using focus group discussions by dividing the respondents into six groups of 6–8 monoprofession students in each. The findings showed that the students learned all the four IPE's core competencies through community-based, case-based, and reflective learning used in the online IPE learning. They stated that each learning method has its own portion in helping them learn the competencies. Still, they felt the experience would have been better if the learning was conducted offline since they encountered many engagement difficulties through online learning. The study provides evidence that the online course can support the achievement of IPE competencies. Future studies are needed to explore strategies for improving student engagement in online IPE learning.

Keywords Interprofessional education · Online platform · Learning method · COVID-19 · Core competencies

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List of Abbreviations

B1	Group of Midwifery Students
CC	Interprofessional Communication
CHP	Community Health Project
COVID-19	Coronavirus Disease - 2019
F1	Group of Pharmacy Students
FGD	Focus Group Discussion
IPE	Interprofessional Education
K1-K4	Group 1–4 of Medical Students
RR	Roles and Responsibilities
SGD	Small Group Discussion
TT	Teams and Teamwork
UNS	Universitas Sebelas Maret
VE	Value and Ethics

1 Introduction

Interprofessional Education (IPE) is a learning process in which two or more students from different health professions study and interact with each other to learn interprofessional collaboration skills [1]. This learning is important because health workers who are able to collaborate can improve the quality of health services [2, 3], and this IPE is a place for them to learn and get used to the practice of collaboration.

To conceptualize the individual-level of interprofessional collaboration skills, The Interprofessional Education Collaboration (IPEC) in 2016 formulated the IPE core competencies [1], which consist of four core competencies: Values and Ethics (VE), Roles and Responsibilities (RR), Teams and Teamwork (TT), and Interprofessional Communication (CC). These core competencies can be used by institutions as the learning objectives of IPE.

Each educational institution has its own way of designing IPE learning to deliver the learning objectives by aligning the learning methods used with the expected learning outcomes [4, 5]. Learning methods that can be used by the institutions in IPE are varied, including case-based learning, problem-based learning, experiential learning, reflective learning, and community-based learning [4]. These various choices of learning methods can enable a wide variety of IPE learning designs. This versatility can be seen through the variety of IPE learning designs in foreign countries [5, 6].

However, the emergence of the Coronavirus Disease-2019 (COVID-19) and the declaration of a pandemic by the World Health Organization (WHO) on March 11, 2020, caused all activities, including education, to be unable to be conducted face-to-face to avoid the spread of this disease [7]. This was no exception for IPE learning.

This sudden change made institutions have to look for alternatives to still provide IPE training for their students, one of which is through online learning [3, 7].

The change of IPE learning methods that were originally offline to online certainly brought new challenges. One of these challenges is the limited interaction between interprofessional students [8, 9]. Another challenge found was to ensure that each profession can participate actively in the learning [10, 11]. These challenges can adversely affect how the students learn IPE's core competencies [8]. Online IPE learning also challenges facilitators to assess the practical practice of students' IPE core competencies because facilitators cannot observe the students directly [8].

This unique situation is what underlies the authors' interest in conducting these exploratory studies to explore:

(1) How are students' interprofessional collaboration abilities after participating in online IPE learning?
(2) How is the learning method that can support the achievement of interprofessional collaboration abilities in online IPE learning?

2 Methods

2.1 Setting

The setting of this study was the online IPE learning at Universitas Sebelas Maret (UNS), Surakarta, Central Java, Indonesia. The learning was conducted from September to December 2021 and involved 305 participants from medical, pharmacy, and midwifery students. This learning was the online modification of previous IPE learning, named course 5 (Community Health Project-Interprofessional Education) [5, 12]. The purpose of this online IPE learning was to provide students the experience of giving health interventions to the community with an interprofessional collaboration approach. This learning used community-based, case-based, experiential, and reflective learning methods.

This online IPE learning was divided into two phases. In the first phase, the students received the preparation materials including the basic knowledge of IPE, team building, and public health interventions through lectures, small group discussion (SGD), and learning circles. In the second phase, the students were sent virtually to the community to assess and overcome the community's health problems through promotive and preventive approaches (Community health project). This online IPE learning ended with self-reflection writing by the students.

2.2 Research Design

This study used a qualitative research design with a phenomenological approach to explore the perceptions and experiences of UNS medical, pharmacy, and midwifery students participating in online IPE learning from September to December 2021.

Before collecting the data, KAG compiled a guide for the focus group discussion (FGD) questions, and a coding scheme was adapted to the study's purpose to make it easier for authors to do coding. The coding theme related to interprofessional collaboration capabilities is referenced in the IPE core competency formulation according to IPEC 2016 [1]. The coding scheme was then jointly finalized by AM and BKH.

Data were collected using a FGD technique where 41 medical, pharmacy, and midwifery students were divided into mono-professional groups of 6–8 students [13]. This sample was taken using a purposive sampling technique and the number of the sample was adjusted to the proportion of the number of students participating in the online IPE learning by profession. In the FGD, documentation was done in generating recordings and notes.

The FGD data were then transcribed and analyzed using quantitative content analysis techniques. Information related to the purpose of this study was coded into codes, categories, and themes based on the coding scheme that was made previously. The coding results then were calculated based on the frequency to determine the dominance of the code or category of each theme. All the results of this coding were finalized by the three authors.

3 Results

3.1 Characteristics of Informants

A total of 41 informants spread into six mono-professional groups participated in the FGD of this study with the following characteristics (Table 1).

Based on the analysis results, the authors found two major themes: students' interprofessional collaboration abilities and supportive learning methods.

3.2 Students' Interprofessional Collaboration Ability

Table 2 shows the overall frequency of emergence of IPE core competencies in this study. Based on Table 2, it can be seen that all IPE core competencies have appeared in the FGD, with the dominant competence being Teams and Teamwork (TT). These results were then broken down based on the frequency of each sub-competence through Fig. 1.

Table 1 Characteristics of informants

Study program	FGD group	Gender		Total
		Male	Female	
Bachelor of medicine	K1	1	6	7
	K2	2	5	7
	K3	3	3	6
	K4	2	5	7
Bachelor of pharmacy	F1	1	7	8
Diploma of midwifery	B1	–	6	6
Total		9	32	41
		22%	78%	

Table 2 Frequency of Interprofessional Education (IPE) core competencies based on FGD

Interprofessional collaboration skills (Category)	FGD group						Total	Percentage (%)
	K1	K2	B1	F1	K3	K4		
VE	24	14	21	34	16	22	131	31
RR	12	14	13	14	13	8	74	17
TT	16	21	20	32	24	24	**137**	**32**
CC	12	13	17	26	6	12	86	20
Total							428	

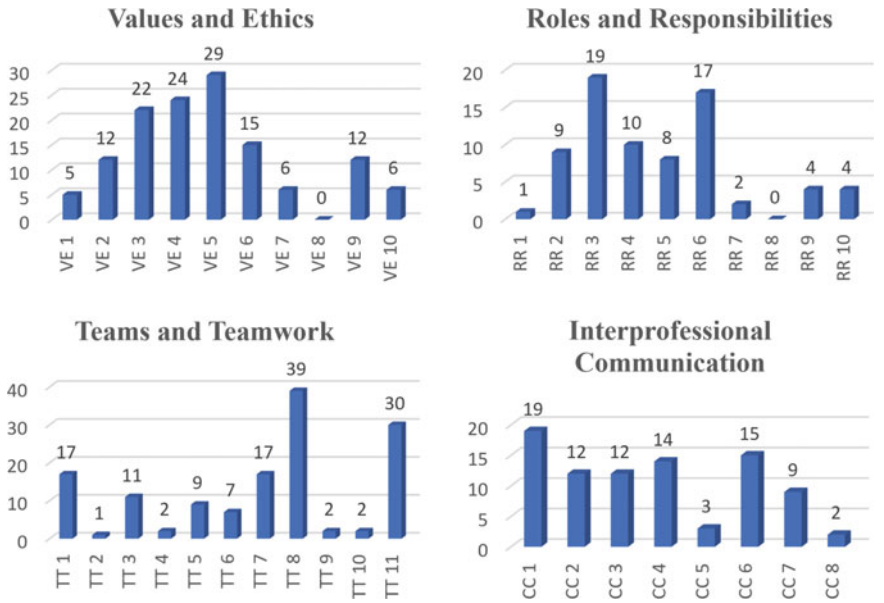

Fig. 1 Frequency of Interprofessional Education (IPE) core sub-competencies based on FGD

Figure 1 shows that all the core sub-competencies of Teams and Teamwork (TT) and Interprofessional Communication (CC) emerged in the FGD session. However, in the Values and Ethics (VE) and Roles and Responsibilities (RR) competencies, one competency did not appear, namely the VE8 and RR8 sub-competencies. Examples of quotations from each dominant sub-competency are described in Table 3.

Based on Fig. 1 and Table 3, there are characteristics of the collaboration abilities of students who take IPE learning online. In the Values and Ethics (VE) competency, the dominant character is being able to work together and understand other people. In the Roles and Responsibilities (RR) competence, the chief character is being able to share responsibilities and fill in the shortcomings of each health profession. In the Teams and Teamwork (TT) competency, the dominant character is being able to work effectively reflecting on team performance. In Interprofessional Communication (CC) competence, the chief character is being able to choose effective communication media and being able to use polite language.

3.3 Supportive Learning Methods

In this theme, the authors grouped the codes based on the learning methods and the core competencies of the supported IPE. The details of the grouping of these categories and codes, along with their frequency of occurrence in the FGDs, are described in Table 4.

Based on Table 4, it can be seen that online IPE learning methods in the form of Community Health Projects (CHP), Small Group Discussions (SGD), and lectures can support the achievement of all IPE core competencies where the learning method that has the highest frequency is CHP with a percentage of 74%. Meanwhile, learning circles and reflection learning methods can support one or two core competencies of IPE.

From Table 4, it can also be seen that the core competencies are supported by each learning method. For example, CHP and Learning Circles greatly support Values and Ethics (VE). On the other hand, SGD and lectures support the ability of Roles and Responsibilities (RR). This is different from reflection, which supports Teams and Teamwork (TT). The examples of quotations from each learning method are presented in Table 5.

Although the informants stated that these learning methods could support them in learning the IPE core competencies, they also mentioned that the learning experience was not maximal since they encountered many engagement difficulties throughout the learning.

Table 3 Analysis of dominant IPE core sub-competencies based on FGD results

Core sub-competencies (Code)	Code description	Informant quotation
VE 5	Work in cooperation with those who receive care, those who provide care, and others who contribute to or support the delivery of prevention and health services and programs	*"…we asked the head of Puskesmas if there is a phone number that can we access to contact the family…" (K2)*
VE 4	Respect the unique cultures, values, roles/responsibilities, and expertise of other health professions and the impact these factors can have on health outcomes	*"… in my opinion, it's more about understanding different professions. You see, so far, we've only studied midwifery. So, we can understand, 'Oh, this is how the medical doctor and pharmacy works…" (B1)*
RR 3	Engage diverse professionals who complement one's own professional expertise, as well as associated resources, to develop strategies to meet specific health and healthcare needs of patients and populations	*"Well, when we gather the materials or maybe when we compile reports, and so on, the division of tasks is more in line with each educational background." (K1)*
RR 6	Communicate with team members to clarify each member's responsibility in executing components of a treatment plan or public health intervention	*"Well, after we found the health problem, later we discussed the division of tasks…for example yesterday there was something like an educational poster… we decide who will make the poster" (B1)*
TT 8	Reflect on individual and team performance for individual, as well as team performance improvement	*"Well, I feel the communication between medical, midwifery, and pharmacy was often…yes…it wasn't effective. Sometimes the information is incomplete or something." (K2)*
TT 11	Perform effectively on teams and in different team roles in a variety of settings	*"…because this is a team. So, if, for example, it's his job and it turns out he can't do it. But this is also what the team's performance looks like, so maybe we can…back him up as much as possible." (K1)*

(continued)

Table 3 (continued)

Core sub-competencies (Code)	Code description	Informant quotation
CC 1	Choose effective communication tools and techniques, including information systems and communication technologies, to facilitate discussions and interactions that enhance team function	*"…For the discussion, we used chat…WhatsApp chat. Then sometimes we use zoom too. Because why is it better to use zoom? Because if we talk like this (in Zoom), the delivery is better than the WhatsApp chat because it will pile up like that." (B1)*
CC 6	Use respectful language appropriate for a given difficult situation, crucial conversation, or conflict	*"Well, maybe we can also learn about how to speak politely. As… politely in Javanese, namely the language of manners." (K3)*

Table 4 Frequency of the emergence of online IPE learning methods that support the achievement of interprofessional collaboration skills in FGD

Learning methods (category)	Interprofessional collaboration ability				Total	Percentage (%)
	VE	RR	TT	CC		
Community Health Project (CHP)	**71**	**32**	**51**	**48**	**202**	**74**
Small-Group Discussion (SGD)	2	24	3	9	38	14
Lectures (LCTR)	4	8	1	2	15	5
Learning Circles (LC)	12	–	–	–	12	4
Reflection (RL)	–	–	6	1	7	3

4 Discussions

4.1 Students' Interprofessional Collaboration Ability

Based on the study's results in the form of the frequency of emergence of IPE core competencies in FGDs, it is known that the informants stated that all IPE core competencies had been learned through online IPE learning. This result is in line with several previous studies which also involved online IPE learning [2, 14, 15]. This shows that online IPE learning can accommodate the achievement of interprofessional collaboration abilities.

The interprofessional collaboration ability of informants participating in online IPE learning has its own character. The character of being able to work together and understand other people can be because online IPE learning has many meetings and mentoring sessions. This is in line with the research of McElfish [16], where various activities in online IPE learning can provide opportunities for interprofessional teams to get to know other professions. Evans et al. [17] mentioned that mentoring sessions

Table 5 Analysis of learning methods that support the achievement of interprofessional collaboration skills based on the results of the FGD

Learning method-interprofessional collaboration ability (Code)	Code description	Informant quotation
CHP-VE	Community health project supports the collaboration capabilities of values and ethics	*"…Because we were directly sent to the field, we also get to know our friends better from there. So, it's like, for example, how does this person communicate…is there anything we need to back up when we are doing education." (F1)*
SGD-RR	Small-Group discussion supports the collaboration capabilities of roles and responsibilities	*"But at the SGD, because we discussed it together, we realized , 'Oh, this is the border of pharmacy. This border belongs to midwifery, and this one belongs to medical students' and so on. So, to better understand the roles and the classification of roles, SGD does fit for me." (K4)*
LCTR-RR	Lectures support the collaboration capabilities of roles and responsibilities	*"Well, yes, I feel that I have learned more things that other professions can do professionally through lectures." (K3)*
LC-VE	Learning circles support the collaboration capabilities of values and ethics	*"…but actually, it has been helped by the activities in the course (learning circles), such as getting to know each other… describe our family, continue to describe ourselves if I'm not mistaken. It could be bonding for the group. We know each other's background better." (K3)*
RL-TT	Reflection supports the collaboration capabilities of teams and teamwork	*"…for self-reflection, I feel that if I use reflection, I know what I'm lacking and then know what can I improve." (K1)*

could encourage discussion and coordination between interprofessional teams and facilitators.

The character of being able to share roles and responsibilities and fill the shortcomings of their respective professions can be caused because the interprofessional team is faced with many health problems, for example, in the CHP and SGD. This can encourage interprofessional teams to involve each other and share tasks to solve these health problems [3].

On the other hand, the character who can reflect on the team's performance can be triggered by problems or obstacles that arise in learning. Conflicts or issues in the team can trigger members' critical thinking processes to reflect, evaluate, and determine possible solutions [18, 19]. Meanwhile, the character of being able to work effectively can occur because of the harmony between good leadership and an increased sense of responsibility from its members [20, 21].

Characters who can choose effective communication media can be caused by the form of online learning. Raynault [14] explained in his research that online IPE learning could provide opportunities for students to choose communication media that help them discuss and communicate. Finally, the character who can use polite language can be caused by the setting where the learning is done, which was Surakarta, Central Java. The people of Central Java are famous for their polite language [22, 23]. This can be why informants use polite language to adapt to the local culture.

This study found that there were two sub-competencies not mentioned by the informants in the FGD session, namely VE8, "Able to manage specific ethical dilemmas in patient/community-centered care situations", and RR8, "Engage in professional and interprofessional development on an ongoing basis to improve performance and team collaboration".

There were no VE8 sub-competencies found, similar to several previous studies which also explored the achievements of students' sub-competencies [12, 20, 24]. Hermasari et al. [12] explained that the absence of these sub-competencies could be due to the lack of ethical dilemmas in IPE learning. Fell [24] then provided support and added other reasons although there is a possibility that ethical dilemmas actually occur. Still, students are unaware of it or hesitant to convey it. Thus, direct questions are needed to explore these sub-competencies.

The absence of RR8 sub-competence was similar to the findings of Hermasari, Rahayu, and Claramita and Rotz's research [12, 20]. Rotz explained that the RR 8 sub-competence is an advanced sub-competency, so its appearance in the FGD session is not something that can be expected from undergraduate student informants.

4.2 Supportive Learning Methods

The findings in this study indicate that the combination of learning methods used in online IPE learning (community health projects, small group discussions, learning circles, reflections, and lectures) support the achievement of interprofessional collaboration abilities. However, the learning method with the largest portion of achieving interprofessional collaboration skills is the Community-based education project. The author finds some supporting information that can be the basis for why community health projects can dominantly support the achievement of interprofessional collaboration capabilities.

The Community Health Project (CHP) is an example of community-based experiential learning (Community-based education). According to several studies, experiential learning can provide a superior learning experience because students get the experience of interacting directly with interprofessional teams and their learning environment. This direct interaction makes the learning process of students' interprofessional collaboration skills actively carried out [25, 26]. The authors also identified supporting research where community-based education could support the achievement of all interprofessional collaboration skills [12, 27].

Although CHP has the highest proportion of interprofessional collaboration capabilities achieved, in this study, the informants also said that other learning methods (lectures, learning circles, SGD, and reflection) and CHP complement each other. This finding is in line with Table 4, which shows that learning methods other than CHP have their respective roles in supporting interprofessional collaboration capabilities in online IPE learning. This finding also supports the statement that no IPE learning method can stand alone [4, 28].

In online IPE learning, lectures help organize study materials for students [29]. Learning circles help the VE competency learning process by encouraging students to get to know each other about the background of the interprofessional team to build intersubjectivity within the team [30]. SGD also helps in initiating communication and division of roles, according to previous research [31, 32]. Finally, reflection can help students to learn TT8 sub-competencies because reflection plays a role in encouraging students to evaluate team and individual performance [33, 34].

Even though IPE online learning methods support the achievement of interprofessional collaboration abilities, it is not denied that online learning still has some limitations, since this study's informants stated that they faced some difficulties in engaging with each other throughout the learning process. These limitations can be a trigger for further research to identify new strategies to increase engagement in IPE online. The development of online IPE is still necessary even after the COVID-19 pandemic since there is still the possibility of IPE being conducted online, for example, IPE which is done remotely by involving students who are geographically in different places [35].

4.3 Study Limitations

Limitations in this study include the time span of data collection with the last time the online IPE learning was conducted, which was about three months. This delay can cause the informants to have to remember their learning experience, and possibly the informant's memory is not as optimal as if the FGD was done closer to the last online IPE learning activity. However, the author also tried during the FGD to add a re-exposure session related to online IPE learning and include activity documentation to help informants remember their learning experiences.

5 Conclusions

Based on the results of this study, it can be concluded that the informants learned all the IPE core competencies through online IPE learning. The informants also stated that the learning method that best supports the achievement of all interprofessional collaboration abilities is the community health project (community-based learning). However, the other learning methods (small group discussions, learning circles, reflections, and lectures) can also support the achievement of interprofessional collaboration abilities according to their respective proportions. Although the informants stated that they have learned all the IPE core competencies through online IPE learning, they still felt that the learning experience would be better if it were done offline, considering they found many obstacles related to engagement. Future studies are needed to explore strategies to increase student engagement in online IPE learning since in the future even after the COVID-19 pandemic there is still possibility of IPE being conducted online.

Ethics Approval and Consent to Participate This study has been declared ethically feasible by the Health Research Ethics Commission of RSUD Dr. Moewardi (No. 278/III/HREC/2022). Informants who participated in this FGD have agreed to participate by filling out an informed consent form.

Competing Interest The authors declare that there are no competing interests related to the study.

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Atik Maftuhah—developing research proposal, data analysis, and publication of the manuscript.

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Feasibility of Peer Assessment in Evaluating Medical Students' Professional Behaviour in the Early Years of Their Medical Journey

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Abstract Peer evaluation/assessment is used by many programmes to assess medical students' professional behaviour. However, there are doubt about peers' ability and consistency to evaluate their peers. We conducted a pilot study to explore the method's reliability: a quantitative study, involving Phase I and II medical students from the National University of Singapore, was conducted utilising repeated peer assessments in a small group teaching programme, Collaborative Learning Cases (CLC). A 5-question online form on a 9-point Likert scale was used. Descriptive and Gwen's agreement coefficient analysis were done using SPSS. 52 Phase I and 54 Phase II students participated. Average scores for most questions for Phase I and II students were higher at the last session as compared to the first session. In terms of combined inter-reliability, more "perfect agreement" was observed by the mid and last sessions. Results suggest that peer assessment could be a reliable tool in assessing peers' professional behaviour. However, for this to be effective, the students must be given clear guidelines.

Keywords Pilot studies · Educational measurement · Program evaluation · Peer assessment · Professionalism

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1 Introduction

Background/rationale

Professionalism embodies a vital skill that medical practitioners are expected to emulate to the highest standards. The American Board of Medical Specialties (ABMS) defines medical professionalism as "a belief system about how best to organize and deliver health care, which calls on group members to jointly declare ("profess") what the public and individual patients can expect regarding shared competency standards and ethical values and to implement trustworthy means to ensure that all medical professionals live up to these promises" [1].

Many medical schools nurture their undergraduates with professionalism early by incorporating this in the curriculum and assessing students regularly. Many teaching modalities (e.g. role modeling, didactic lectures, reflection, interactive methods, etc.) and evaluation methods for professionalism exist [2]. Due to the complexity of professionalism, multiple assessment tools are usually used including multi-source feedback using 360-degree reviews, critical incident reports and patient feedback [2]. These assessment tools are incorporated during their clinical year instead of early year in their medical training. As professional behaviors are important since day one in medical school, peer assessment has emerged as a possible alternative method for providing formative peer feedback to students regarding their professional behaviour [3–6].

Peer assessment is commonly used to assess student professionalism as it is simple to use and also has some advantages [7]. For instance, it has been demonstrated that peer feedback during collaborative learning settings in undergraduate medical education denote dependable methods of assessment for professionalism, and serves to support the advancing of professional behaviour over time [7, 8]. Additionally, studies suggest that peer assessment offers advantages in terms of shedding light on non-cognitive qualities such as team contribution and personal attributes, and these are likely to be correlated with professional and interpersonal skills [9]. Use of peer assessment data may also create a culture of learning whereby students feel that their experiences and inputs are valued [9]. As peers are the closest person within a class that they collaborate with and are able to observe one another regularly over a wide range of circumstances, peer assessment may also provide information regarding student behaviour that is not measured by other traditional evaluation methods [3, 10–14].

Despite the benefits of peer assessment, some research studies have suggested that peer assessment represents a less reliable means of assessment. This is because the quality of peer assessment can be influenced by multiple factors, such as the reliability of the assessment, the interaction between peers, the stakes of the assessment and the assumption of equivalence between the evaluations of each (student) colleague or peer [15]. It has been observed that students are reluctant to take part in peer assessment especially in a face-saving and conflict avoidance culture among

Asian students [16, 17]. As a result, very few peer assessment systems have been implemented and published in Asian setting.

Given that active participation and accurate, appropriate and meaningful peer assessment may be constrained by fear of mistakes, politeness norms, and the belief that peer feedback lacks credibility compared with teacher feedback,, we conducted a pilot study to explore whether repeated peer assessment by preclinical students help in improving professionalism, and whether the method is realiable as a formative evaluation tool.

Objectives:

This pilot study seeked to explore whether utilising repeated peer assessment in a small group teaching programme is a reliable evaluation tool and if it helps in improving professionalism.

2 Methods

Ethics approval was obtained from the Institutional Review Board, National University of Singapore (Reference number: S19-342). Informed consent was taken from the student participants.

Study design

This was a quantitative cross-sectional pilot study involving a subset of students from each cohort.

Setting

NUS Medicine introduced Collaborative Learning Cases (CLCs) as a structured small group teaching program that is part of the Phase I and II curriculum. The programme occurs through a series of small group sessions, instructed by clinician/biomedical science educators paired tutors, that review prototypical clinical cases. There are around 8–10 sessions per academic year, spaced out over 5 months. Each session covers a different topic e.g. allergy, anaemia (thalassaemia), sudden breathlessness, Parkinson's, and joint pain.

The cohort, of around 300 students per phase, was separated into 100 groups, each comprising of 5–7 students. During the CLC group sessions, students are engaged individually in proposing and discussing different approaches through real time live interactions within a group [18].

Participants

Ten student groups within each cohort were randomly selected for the pilot and invited to participate which took place from August to December 2020. Participation was voluntary. Students who agreed to participate consented for data to be used for research.

Data sources/ measurement/Variables

Three sessions out of each academic year's 8 sessions were selected for the pilot study—first session, mid-session, and last session. Afer each session, the students rated each and every group mate using online evaluation forms hosted on a learning platform (Entrada).

The evaluation form provided clear criteria guidance and a level of standardisation of appropriate professional behaviour and attributes required of students. The form contained 5 questions on a 9-point Likert scale. The five questions covered these areas: Q1) integrity & honesty, Q2a) responsibility and participation (has good attendance; is punctual; participates appropriately; is a good team player) Q2b) responsibility & participation (accountable and committed to the successful completion of tasks assigned to you), Q3a) respect & sensitivity, Q4) compassion & empathy. The 9-point Likert scale used was also broadly grouped into the following: Scores 1–3 as "Below Expectations", 4–6 as "Meet Expectations", and 7–9 as "Above Expectations".

Study size

No sample side calculation was performed as this was a pilot study involving a small group of students. Also, only data from voluntarily participating students were analysed and reported.

Statistical methods:

Descriptive and inter/intra-rater reliability analysis were done using SPSS. Gwet's Agreement Coefficient (AC) was calculated and then categorized based on the Benchmark Scale - no agreement (<0.00), poor agreement (<0.20), fair agreement (0.21–0.40), moderate agreement (0.41–0.6), good agreement (0.61–0.8), very good agreement (0.81–0.99), perfect agreement (1). These were done first for each student group (by question and by session). The sum of the groups' agreement coefficients and categories were then calculated for each question, for Phase I and II separately and combined.

3 Results

Participants

Sixty six and eighty one Phase I and II medical students were invited to participate. Fifty-two (78.79% response rate) and 54 (66.67%) Phase I and II students volunteered to participate in the pilot study, of which, 21 (40.38%) and 24 (44.44%) are males for Phase I and II respectively. Their age range from 19 to 22 years old.

Main results

Data was collected over 3 sessions. Forty-seven students completed the forms for all 3 sessions.

As shown in Table 1, the average question scores among Phase I were generally higher than the Phase II students.

When looking at the student groups, in Phase I—3 groups and year II—2 groups respectively rated 9 for all their peers for some questions in few of the sessions. Within the same cohort, we looked at changes in the questions over time, comparing the start (first session) to the end (last session). For Phase I, Q1 had the biggest change over time. A similar trend was observed for Phase 2 with all the question scores showing an increase when comparing the start (first session) and end (last session), with the mid session recording the highest scores. However, the difference in score is relatively bigger (e.g. +1.2 for Q4 from 7.51 at the start to 7.63 at the last session).

In addition, we also looked at how the average question score changed over the 3 sessions at the individual group level within each cohort. We noticed several broad key patterns in how the average question scores changed over the sessions:

Table 1 Average score (based on a 9-point Likert Scale) for each Phase of study by question and session

Phase I	Q1	Q2a	Q2b	Q3a	Q4
First session	8.11	8.16	8.16	8.17	8.13
Mid session	8.21	8.06	8.26	8.27	8.15
Last session	8.19	8.06	8.18	8.23	8.20
Phase II	*Q1*	*Q2a*	*Q2b*	*Q3a*	*Q4*
First session	7.71	7.62	7.59	7.55	7.51
Mid session	7.85	7.88	7.87	7.90	7.89
Last session	7.78	7.71	7.69	7.65	7.63
Phase I and II combined	*Q1*	*Q2a*	*Q2b*	*Q3a*	*Q4*
First session	7.91	7.89	7.88	7.86	7.82
Mid session	8.03	7.97	8.07	8.09	8.02
Last session	7.98	7.88	7.94	7.94	7.92

- Declined from first session to the last session for most questions.
- Declined from the first session to the mid-session, then increased in the last session for most questions.
- Increased in score from first session to the mid-session, then stayed similar or increased at the last session for most questions.
- Inconsistent pattern for all the questions

With regards to reliability between students in the same group rating the same peer, overall (both Phase I and II), most student groups had Perfect Agreement (meaning higher reliability) at the first session, and all student groups had perfect agreements at the mid and last session (see Table 2). When separate analysis of Phase I and II were done, a different pattern was observed. Perfect agreement was observed for all questions in the first session and mid-session for Phase I, and for some questions in the last session. For Phase II, variable levels of agreement were seen in the first session, while perfect agreement was observed for all questions in the mid-session and final session. Phase I students were more consistent and stable in rating their peers as compared to Phase II. Questions that did not have strong relaibility ("poor agreement" or "no agreement") were Q1 and Q3a (for Phase I) as well as Q4 (for Phase II).

Table 2 Level of agreement for each question across 3 sessions for Phase I, Phase II and overall

Overall	Q1	Q2a	Q2b	Q3a	Q4
First session	Poor, very good, perfect agreement	Moderate, perfect agreement	Very good, perfect agreement	Perfect agreement	Perfect agreement
Mid-session	Perfect agreement	Perfect agreement	Perfect agreement	Perfect agreement	Perfect agreement
Last session	Perfect agreement	Perfect agreement	Perfect agreement	Perfect agreement	Perfect agreement
Phase I	*Q1*	*Q2a*	*Q2b*	*Q3a*	*Q4*
First session	Perfect agreement	Perfect agreement	Perfect agreement	Perfect agreement	Perfect agreement
Mid-session	Perfect agreement	Perfect agreement	Perfect agreement	Perfect agreement	Perfect agreement
Last session	No and perfect agreement	Perfect agreement	Perfect agreement	No & perfect agreement	Perfect agreement
Phase II	*Q1*	*Q2a*	*Q2b*	*Q3a*	*Q4*
First session	Moderate and very good agreement	Moderate agreement	Fair and very good agreement	Fair agreement	No agreement and poor agreement
Mid-session	Perfect agreement	Perfect agreement	Perfect agreement	Perfect agreement	Perfect agreement
Last session	Perfect agreement	Perfect agreement	Perfect agreement	Perfect agreement	Perfect agreement

4 Discussions

Across many disciplines, peer assessment has been found to be part of students' learning as a formative tool, as it assists in the progressive development of skills and contents [19]. The successful introduction of peer assessment is dependent on several factors, including the type of method adopted, receiving peer assessment information and how it is used, cultural influence, and issues surrounding the anonymity and confidentiality of the feedback [12, 21]. It is crucial to investigate whether the western approach to promote professionalism will work in a non-western context, especially taking into consideration the context and cultural diversity into before implementation. This was a pilot study to explore whether repeated peer assessment by preclinical students help in improving one's professionalism, and the method's reliability as an evaluation tool.

From the average question scores observed across the sessions, it seemed that the students' level of professsionalism had improved over time as a higher score was observed at the end of the CLC sessions. This may be because some of the professionalism domains evaluated in the questionnaire (e.g. empathy, integrity, sensitivity) had been taught to students during the same period as part of the other programmes within the curriculum. Secondly, this could be due to the effect of repeated evaluations where students become more conscious of being evaluated and hence change their behaviour.

Several groups were observed to have rated their peers a perfect score of 9 in all questions, especially towards the last session. This might be due to learner improvement as discussed above, but it could also be due to peer pressure. It has been noted that peer assessments tend to have the issues of over- marking, under-marking, or friendship-marking [20]. For instance, a student may be a close friend of the peer whom he or she was evaluating and will give a high rating to help their friend have better scores. Also, as the students in the same group attend other classes and work together closely outside of CLC, they might be reluctant to penalize their fellow groupmates as it might be awkward after that to work together [20].

We noticed several broad key patterns on how the average question scores changed over the sessions. A published review suggested that while the impact of an education approach is likely due to the approach itself and some methodological limitations, it might also be influenced by individual differences (student/teacher) and contextual variabilities [22]. In recent years, our school has expanded the diversity of its medical students, for instance through enrolling applicants with various backgrounds, accessing applicants based on other traits rather than focusing entirely on academic results. These could have resulted in students with more diverse learning approaches. Furthermore, in the study carried out by Curran et al., the authors discovered that their students expressed concerns regarding the functional lack of anonymity due to the small group size. Consequently, negative feedback and rating were avoided. As our students' group size was small, this may also have contributed to the variability in the rating [10]. As for the tutors, the sessions were usually taught by different educators, and this may have affected the peer discussions and hence peer behaviour.

Moving on to the level of agreement, overall, less agreement were seen in the first session, and more perfect agreement was observed in the mid-session and last session. This was not unexpected, since at the first session, students were not familiar with the scale, and had little experience in rating their peers. We noticed that one or two questions (Q1 and Q4) were more problematic. These questions evaluated traits (i.e., integrity, empathy) which tend to be multi-faceted and highly subjective, and hence could have contributed to the variability. This outcome contradicts with the study carried out by Nofziger et al. whereby they found that peers can provide reliable and stable ratings of both work habits (e.g., preparation, problem solving initiative) and interpersonal attributes (e.g., truthfulness, respect, integrity, empathy) [14].

We observed that Phase II students had perfect agreement for all questions in the last session and this was not observed for Phase I. In addition to the factors that can influence the realiability of peer assessment (including the number of relevant performances observed, the number of peers involved and the number of aspects of competence being evaluated), student maturity may affect the rating. It is possible that Phase II students being more mature, having had more professionalism training, thus have better ethos of the processes and know what was appropriate and inappropriate [4].

This pilot study had provided us with insights on areas to improve. Firstly, we need to improve and standardize the evaluation process. Briefings will be conducted to provide more information on the goals, rating scale, items, evaluation rubric, and what areas to look out for each traits. Secondly, we need to provide sufficient training on how to provide feedback so that we can improve the accuracy and effectiveness of the feedback [23]. Thirdly, we will need to optmise the environment by ensuring a transparent evaluation culture whereby students are well aware of all components of the process [23]. Lastly, we would emphasise to students that it is okay to give a lower rating if necessary, as this is part of the formative learning process and will help their peers to identify areas for improvement.

Limitations

There are several limitations with our study. First, the sample size was small as only a portion of each cohort was chosen for the study, and not all the students from the selected groups participated. Next, the students may not have completed the form immediately after the lesson, and might have done it several days later. This could result in the issue of recall bias. Thirdly, we only did 3 sessions, thus limiting the amount of data collected. However, considering that this is a pilot study, the issues above were not unexpected.

Generalizability

While this is only a pilot study, the results have been encouraging. The school is now considering incorporating peer assessment as a standard practice across the years of study. Other schools especially those from Asia could also consider implement peer assessment in their small group teaching.

Suggestions

Future studies could focus on comparing the students' peer assessment with that of the tutors' student assessment to see if there are concordance or discordance in the assessments.

5 Conclusion

In conclusion, our pilot study has suggested that longitudinal peer assessment has the potential to be a reliable tool for assessment over repeated measures and it can help to improve the professionalism of the students over time.

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Formative Objective Structured Clinical Examination (OSCE) as a Learning Tool and Predictor of High-Stakes OSCE

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Abstract High-stakes (national) objective structured clinical examination (OSCE) is a vital tool to assess clinical competence in medical students. Formative OSCE to the learner can narrow the gap between actual and desired performance. This study aimed to explore the outcome of simple formative OSCE before high-stakes OSCE. This quasi-experimental design study analyzed the passing status and the score of high-stakes OSCE (P2 OSCE) compared to local formative OSCE (P1 OSCE) after being given feedback on the P1 OSCE. Formative written feedback was given regarding the positive and negative performances of the students during the examination and the suggestion for improvement of high-stakes OSCE. This study was conducted on a total of 520 students. There were 98 students (18.8%) who failed at the P1 OSCE but passed the P2 OSCE. Only five students (1%) who failed at P1 OSCE failed at P2 OSCE. There were significant differences (P-value <0.001, Wilcoxon signed-rank test) between the P1 OSCE score and the P2 OSCE score. There was a significantly higher enrichment of the learning process for students to improve their performances and give them self-reflections apart from a pass/fail environment. Formative feedback in local formative OSCE before national high-stakes OSCE could increase the percentage of passing status and score in high-stakes OSCE.

Keywords Formative feedback · High-stakes examination objective structured clinical examination

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List of Abbreviations

IMDNCE	Indonesian Medical Doctor National Competency Examination
MCQs-CBT	Multiple-Choice Questions Using Computer-Based Testing Methods
OSCE	Objective Structured Clinical Examination
MD	Medical Doctor

1 Introduction

National medical competency examinations have been conducted to evaluate medical school education. The Indonesian Medical Doctor National Competency Examination (IMDNCE) is a national medical competency exit exam established in 2014 [1] The IMDNCE consists of multiple-choice questions using computer-based testing methods (MCQs-CBT) and an Objective Structured Clinical Examination (OSCE). This high-stakes OSCE is an essential tool for assessing clinical skill competency [1]. It is designed to evaluate students' history-taking skills, physical examination, communication, and professionalism. The OSCE has been used worldwide to teach and assess learners' competencies, particularly in healthcare [1, 2].

Formative OSCEs are assessments for learning, and it does not determine whether the students pass or fail. It is conducted to make the student familiar with the concept of OSCEs. They are unlike summative OSCEs, which are learning assessments that count toward a grade and formally assess clinical skills and knowledge required for graduation [3]. Formative OSCEs contribute positively to final summative examination performance [4]. During formative OSCEs, students are given the experience of interacting with standardized patients and their teachers at each station [5].

Although OSCE is well-established as an effective assessment tool for clinical competence, feedback after OSCE is vital in improving the student's clinical skills. This impact is not only for assessment but also can be used for learning purposes when it is accompanied by proper feedback. Feedback is an essential element of the educational process [6]. Feedback is a continual process between the teacher and student [7]. Good feedback practices may strengthen students' self-regulative ability [6]. Formative feedback gives information to the learner to improve their learning [8]. Formative feedback in OSCE to the learner can narrow the gap between actual and desired performance. Feedback is a fundamental learning tool in medical education, whereas excellent and effective feedback enhances student motivation and satisfaction [8].

Feedback forms can range from a simple judgment of correctness, identification of parts that could be improved, and also inviting ideas [9]. While formative feedback can be verbal or written, written feedback can take the form of comments, questions, corrections, and others to develop student understanding and provide a correction [9].

Due to the nature of the formative feedback, some students might see formative feedback as the only way to do better at summative assessment, thus not taking the formative assessment seriously without the thought that formative feedback is essential to help students reach the milestone of performance and narrowing the gap between actual and desired performances [10]. Although formative feedback is underutilized due to the complexity and minor variance, its benefit in highlighting the drawback of a curriculum or educational program is significant [10]. This study aimed to explore the outcome of simple feedback in national high-stakes OSCE by analyzing the passing status and the score of high-stakes OSCE (post-feedback; P2) compared to local formative OSCE (pre-feedback; P1) after being given the feedback in P1 OSCE.

2 Methods

This study was conducted with a quasi-experimental design on final-year medical doctor (MD) profession students of Atma Jaya Catholic University of Indonesia from 2017 until 2019 who undertook the P2 OSCE. Before the P2 OSCE was conducted, the P1 OSCE from the faculty was done to assess the readiness of the MD students. Both examinations were conducted with the same method. Each student was required to complete an entire cycle of 12 stations in a single session of both P1 and P2 OSCE. The topic of each station varied about a clinical case or procedure, and the examiner might not usually be an expert on the subject. The examiners were general practitioners with minimal qualifications of Master's degrees or specialists.

The examiner for each OSCE station had to follow the specific scoring sheet (actual mark) from the grading format checklist and observe the student's overall performance sheet (global rating) in the station for borderline regression purposes as a standard-setting procedure. The scoring sheet consists of three to eight criteria (history taking, physical examination, laboratory workup, differential and working diagnosis, pharmacotherapy plan, non-pharmacotherapy plan, communication, education, or professionalism) to assess specific clinical skills of each scenario. The global rating was scored as: (4) superior performance; (3) passing performance; (2) borderline performance; and (1) not-pass performance. Both P1 OSCE and P2 OSCE used the same grading format.

The borderline regression method is one of the latest methods to evaluate students' performances at each station by completing a checklist and a global rating scale. The checklist mark from examinees from each station is then regressed on the attributed global rating scores, providing a linear equation. The global score representing borderline performance (e.g., 2 on the global performance rating scale) is substituted to predict the pass-fail cut score for the checklist marks.

The formative written feedback was given in P1 OSCE regarding the positive and negative performances of the students during the examination and the suggestions for improvement for P2 OSCE. These written formative feedbacks were collected from each station and were sorted and put together based on the student's ID. It was

given to each student individually approximately two weeks before the P2 OSCE, and the students were given an optional practice period until one week before the P2 OSCE. The feedback was meant to give the students the self-reflections needed before the P2 OSCE to improve their performances.

Statistical analysis was performed using STATA version 14.1 (STATA Corp., College Station, TX, USA). The differences in the P2 passing rate between each batch were compared using Fisher's exact probability test. The passing status frequency of the P1 and P2 OSCE results were compared using Fisher's exact probability test. The score of P1 and P2 OSCE was compared using the Wilcoxon signed-rank test. A p-value <0.05 was appraised as statistically significant.

3 Results

This study was conducted on 520 MD students from 10 batches of P2 OSCE. There were no significant differences between each batch of the P2 OSCE (Table 1).

There were 98 students who failed the P1 OSCE but passed the P2 OSCE, while only five students who failed P1 OSCE also failed the P2 OSCE. Only one student passed the P1 OSCE but failed the P2 OSCE (Table 2).

There was a significantly higher median in the score of P2 OSCE (80.56 out of 100) than P1 OSCE (71.56 out of 100) (p-value < 0.001) (Fig. 1). The positive predictive value (PPV) of P1 OSCE as a predictor of passing P2 OSCE was 99.76%, and the negative predictive value (NPV) of P1 OSCE as a predictor of failing P2 OSCE was 4.85%.

Table 1 OSCE result of each batch

Batch	P2 OSCE Result, N (%)		p-value^
	Passed	Failed	
1	36 (94.74)	2 (5.26)	
2	78 (98.73)	1 (1.27)	
3	54 (100.00)	0 (0.00)	
4	19 (100.00)	0 (0.00)	
5	32 (96.97)	1 (3.03)	0.145*
6	73 (100.00)	0 (0.00)	
7	74 (100.00)	0 (0.00)	
8	19 (100.00)	0 (0.00)	
9	20 (95.24)	1 (4.76)	
10	109 (99.09)	1 (0.91)	

*Fisher's exact probability test; ^comparison of P2 OSCE results of each batch
OSCE, Objective Structured Clinical Examination

Table 2 P1 compared to P2 OSCE result

P1 OSCE Result, N (%)	P2 OSCE Result, N (%)		*p*-value value
	Passed	Failed	
Passed	416 (80.00)	1 (0.19)	0.001*
Failed	98 (18.85)	5 (0.96)	

* Fisher's exact probability test. OSCE, Objective Structured Clinical Examination

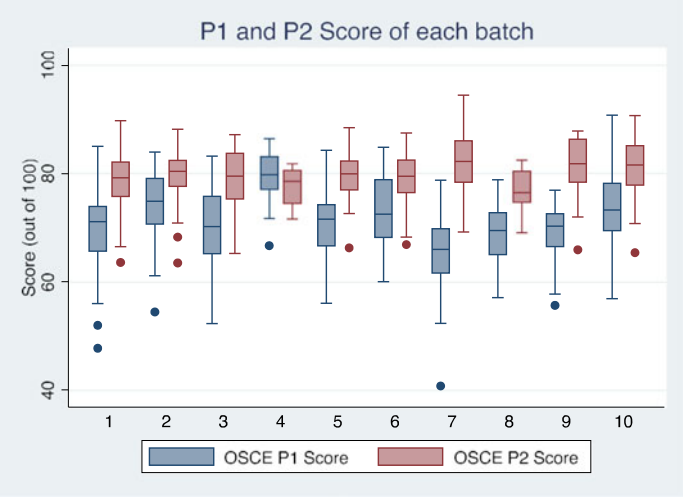

Fig. 1 P1 and P2 scores of each batch. There were significant differences (p-value < 0.001, Wilcoxon signed-rank test) between the P1 OSCE score and the P2 OSCE score

4 Discussions

The results of this study showed that the formative OSCE was beneficial for the student in their readiness to take the summative OSCE. Formative OSCE before the summative OSCE had a positive effect on increasing students' scores. Our findings may support the implementation of formative OSCEs to prepare students for high-stakes summative OSCEs. There were significant differences (p-value < 0.001, Wilcoxon signed-rank test) between the formative OSCE scores and high-stakes OSCE scores. Formative OSCE contributes positively to final summative examination performance [4]. During formative OSCE, students are given the experience of interacting with standardized patients and their teachers at each station [5].

This study analyzes MD students' improvement after written formative feedback from formative OSCE to high-stakes (summative national) OSCE. After giving written feedback about their weaknesses and strengths, the students had two weeks to prepare for the high-stakes OSCE. Formative feedback can enrich the learning process for students to improve their performances and give self-reflections apart

from a pass/fail environment. It is essential to give time for them to encourage their self-assessment and reflection on strengths and areas that need improvement [11]. Formative feedback in OSCE to the learner can narrow the gap between actual and desired performance. Feedback is a fundamental learning tool in medical education, whereas an excellent and effective feedback enhances student motivation and satisfaction [8].

Feedback effectiveness is influenced by many factors, such as the characteristic of feedback sources (stringency/leniency), the feedback recipient, and the message itself [12, 13]. Rebel and colleagues [14] stated that removing pass/fail results can give students specific input on their skill performances to narrow the gap between actual and desired performances. The formative feedback from a clinically experienced physician could help the students to improve their skills in history taking, physical examination, communication, and especially clinical reasoning [2]. A study by Alkhateeb and colleagues [15] found that a single P1 OSCE does not increase and change the pass rate of P2 OSCE. This finding is discordant with our findings that showed there was an increase in the passing rate and the score of P2 compared to P1 OSCE. The difference in results might be because of the selection bias in the study by Alkhateeb because the participation of formative-OSCE was voluntary. Our study has a similar result to the study by Chisnall [16], which showed an increase in pass rate and scores. A previous study by Bandiera [17] also showed the positive effect of feedback of past examination performances on future performances. This finding might be due to the potential of formative feedback, which provides the student with a rich and meaningful learning experience [10].

The good PPV but poor NPV can imply that the students who passed P1 OSCE were more likely to pass the P2 OSCE, while those who failed the P1 OSCE were less likely to fail the P2 OSCE. This finding showed that P1 OSCE improves performance and prevents failure in P2 OSCE. The students also perceived the P1 OSCE as a positive and valuable activity that could help their preparation for P2 OSCE [16].

This study did not analyze the effectiveness of the feedback to the students and assess each feedback given to improve the performance in P2 OSCE [12, 13]. This is a limitation of this study, although many publications support the finding of this study. The design of this study also does not control whether the examiners on P1 and P2 OSCE were generalists or specialists.

As a feedback provider, the teacher has an essential role in encouraging learners' self-assessment and reflection, so the examiner's background should be in accordance with the clinical topic of the examination station [4]. The study conducted by Perron [2] found that the quality of feedback during formative OSCEs depends on the tutor's profile. Specialists reported less training in providing feedback than generalists, whereas generalists are more learner-centered and pay more attention to communication and professionalism during feedback.

Medical students may receive feedback in various clinical and non-clinical contexts where opportunities for feedback on clinical competencies are valuable [18]. Many studies reported face-to-face feedback from the examiner immediately after the OSCE with additional time allocation, audio or video recordings of the examiner providing generic or personalized feedback, and written OSCE feedback

[19, 20]. Ngim [18] reported that medical students prefer written feedback compared to face-to-face feedback. In our study, the written feedback was unstructured or lacked guidelines to create high-quality feedback. It caused a wide variance between examiners [21], which becomes another limitation of this study. The excellent quality of feedback should be specific, balanced, and constructive and should describe the gap in student learning and observed behavioral actions in the exams [2].

The primary goal of formative low-stakes assessment is to support learners' progress. There are different perceptions about low-stakes assessment from the learner and teacher's points of view. Learners often do not appreciate the value of low-stakes assessments to guide their learning. If teachers do not fully understand the meaning and purpose of assessment, low-stakes assessments and their potential learning benefits are useless [22, 23] Van der Vleuten and Schuwirth proposed a programmatic assessment model to provide a holistic overview of students' competency development for formative feedback and summative decisions [24]. Multiple low-stakes assessments with constructive feedback can inform high-stakes performance decisions that have substantial consequences for learners [22]. Bok [24] found that the programmatic assessment is not easy to implement. It needs to train the students and supervisors to provide assessment and feedback. Hence, they both have the same perception about the function of low-stakes assessment and the feedback in the learning process and its contribution to high-stakes decisions. Enhancing feedback quality is also needed as the strategy for better implementation of programmatic assessment, such as using modern technology or scoring rubrics on the assessment form [24].

5 Conclusions

Assessment and feedback are essential components of medical education. Formative OSCE before the summative OSCE had a positive effect on increasing students' scores and passing status. Our study found that simple formative feedback in formative OSCE before summative OSCE could increase the percentage of passing rates and scores in summative OSCE. Structured written feedback is still needed to narrow variance feedback between examiners.

Ethic Approval This study obtained approval from the Commission of Ethics Faculty of Medicine Unika Atma Jaya Jakarta No.33/03/KEP-FKIKUAJ/2022.

Competing Interest The authors declare that there are no competing interests related to the study.

Authors' Contribution Komang Ardi Wahyuningsih—developing research proposal, collecting data, data analysis, and publication of the manuscript.

Nawanto Agung Prastowo—collecting data, and publication of the manuscript.

Veronica Dwi Jani Juliawati—collecting data, and publication manuscript.

Christian Ardianto—developing research proposal, collecting data, data analysis, and publication of the manuscript.

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From Burnout to Resilience During Online Learning in the Pandemic Era: A Qualitative Study on Medical Students

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Abstract During the pandemic, medical students worldwide faced an unexpected change in their life, including their shift to fully online learning. Personal factors and academic unreadiness often result in burnout in medical students. Hence, students need to develop their resilience and be well-adapted in their learning situations. We explored the influencing factors that cause burnout and how students achieve their resilience during online learning. This qualitative study was conducted a with phenomenology approach in the undergraduate programs in one of the Medical Faculties in Indonesia. Before the study began, we purposively screened the participants based on the Maslach Burnout Inventory-Student Survey (MBI-SS). In data collection, in-depth interviews were used for students in burnout categories. We performed member checking and multiple coders to interpret the themes. We screened 157 students with MBI-SS, and found 22 students in the burnout category, and 16 students agreed to have the in-depth interview. We found three central themes that emerged: (1) The academic stressor during pandemic learning caused the burnout symptoms; (2) The negative academic experience caused a higher academic stressor; and (3) The positive academic experience and supporting factors led students to resilience. According to the results, students' mental health is an important issue that needs to be considered in providing online learning for students during the pandemic. The

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implications of this study include the awareness of academic factors that influence burnout and resilience in students.

Keywords Burnout · Resilience · Online Learning · Qualitative study · Maslach Burnout Inventory

1 Introduction

The high demand for professionalism in medical doctors' performance during health services requires medical institutions to design a curriculum that facilitates all aspects of competence from the beginning of their program [1, 2]. The undergraduate program in the medical curriculum has the integrated goals of constructing knowledge, performing simulated clinical skills, and shaping professional behavior [1, 3].

In health professions education, the academic environment often causes stressful situations such as little tolerance for mistakes, competitiveness, and strict assessment regulations [4, 5]. The continuation of stressful situations can affect students' mental health or well-being, resulting in emotional and interpersonal responses called burnout. Students with burnout may experience a state of emotional exhaustion, avoidance of social interaction, and inefficacy in achieving their goals [4, 6]. Studies showed that burnout is relatively high among medical students and triggers drop-outs and other psychological disorders such as depression and suicidal tendencies [7, 8].

From a psychological perspective, a person can have the ability or resilience to 'survive' and 'rise up' from burnout. The power of resilience produces a stronger person after the burnout episode in their life [9, 10]. In the context of medical students, studies showed various influencing factors of resilience, such as their psychodynamic process and the supportive academic environment [9, 11]. Accordingly, the medical institution needs to facilitate the recovery of students with burnout, such as providing the students with a consultation to prevent further mental problems. Besides, medical institutions should explore the causes of burnout in their students related to the academic burdens [8, 12].

During the pandemic, many unexpected changes occurred. The heavy mental stress can be due to the uncertainty from personal experiences such as quarantine conditions, Coronavirus Disease-2019 (COVID-19) symptoms, or feeling the loss of a close person's death. During the COVID-19 pandemic, along with having a hard time, students are forced to adopt the fully online learning experience, including their assignments and assessment regulation [13, 14]. Recently, several studies have shown that the pandemic situation has increased the prevalence of burnout in medical students [12, 15].

With the increased potential for burnout in medical students during a pandemic, medical institutions should pay more attention to their student's mental health issues. However, the qualitative studies concerning the students' resilience ability in burnout situations are still very limited. Therefore, we focused on exploring the causes of

burnout and aimed to describe how students with burnout find their way to resilience in undergraduate medical education.

2 Methods

2.1 Context of Study

The study was conducted in an Indonesian Medical Faculty at the undergraduate level. Before the pandemic, students mostly engaged in learning with the face-to-face learning method, such as large class interactive lectures, small group learning and clinical skills laboratory activities. During the pandemic, all learning methods were converted to a synchronized online learning and asynchronized learning assignments.

2.2 Study Design

The qualitative inquiry method was used with the interpretive phenomenological approach to answer our research questions. This approach facilitates researchers to study the phenomenon in the respondents' life experiences [14, 16]. We aimed to explore a more profound understanding of the academic factors that contribute to burnout in students, as well as describe in-depth their burnout symptoms. Further, we explored the students' resilience experience.

2.3 Study Participants

Following the principles of qualitative inquiry, we collected the respondents purposively by the criteria of the burnout students. Before the study began, we screened the students using the Maslach Burnout Inventory-Student Survey (MBI-SS), which is a well-known instrument that is mostly used in detecting and monitoring burnout in health profession students [17, 18]. We screened 157 students in batch four of the undergraduate students with MBI-SS, and found 22 students in the burnout category. We provided the informed consent form to all of the students with burnout categories. Finally, consent was obtained from 16 students who agreed to participate in an in-depth interview about their burnout and resilience experiences.

2.4 Data Collection

We conducted the in-depth interviews with a recorded Zoom application facilitated by the first author (SMS) and two other authors (GPY and MFI). The duration of the in-depth interviews ranged from 40 to 80 min. Three authors coded the content individually, and discussed the themes of the transcripts to reach the consensus concerning the choice of codes after each of the interviews. To enhance triangulation of the data, the other authors discussed the coding and categories assigned to the development of emerging themes periodically. The guiding questions about burnout aspects and the resilience indicators were adapted from Findyartini et al. [19].

2.5 Data Analysis

Based on the phenomenological approach, we analyzed the respondents' life experiences and identified the common themes or phenomenon [14]. The analysis process started as we collected the interview data. The data were transcribed, coded, and categorized by three authors (SMS, GPY and MFI). All authors discussed the content regularly to interpret the themes. Finally, the authors constructed the central themes based on the content analysis of the burnout and resilience criteria. The trustworthiness of data collection and analysis was considered by all authors including: (1) Triangulate the data with multiple respondents and member checking (five voluntary respondents read and confirmed their interview transcripts); and (2) Triangulate with multiple coders and analyzers in performing data analysis.

3 Results

Our interview results from students with burnout showed three interrelated central themes: (1) The academic stressors during pandemic learning caused the burnout symptoms; (2) The negative academic experience caused a higher academic stressor; and (3) The positive academic experience and supporting factors led students to resilience. Figure 1 shows the framework of the identified themes.

Image information: The arrows represent the process from academic stressors to burnout symptoms and how supporting factors lead to students' resilience. The dashed line shows the inhibiting factors of resilience, such as negative academic experiences that possibly lead students back to the burnout cycle.

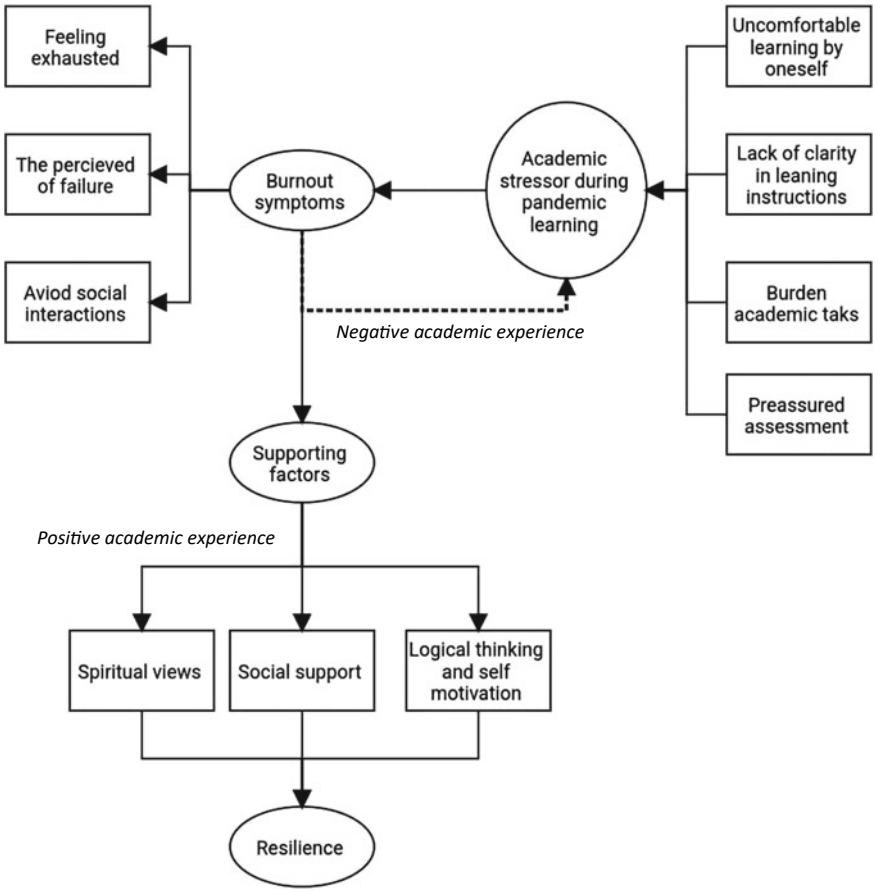

Fig. 1 The framework 'from burnout to resilience' of medical students during pandemic learning

3.1 Theme 1. The Academic Stressor During Pandemic Learning Caused the Burnout Symptoms

We interpreted these themes by identifying the categories of the academic stressors during pandemic learning and the burnout symptoms in students.

3.1.1 The Academic Stressor in Pandemic Learning

Students highlighted that academic stressors came from several aspects, including: (1) Uncomfortable feelings about learning by oneself; (2) Burden on academic tasks and lack of learning instruction, and (3) Pressured feelings during the online assessment. We interpreted these responses to indicate that the students were not ready to

be independent in their learning activities. It shows that the students had difficulties adapting to the changes in the academic situation during the pandemic, especially when they had to do their assignments all by themselves.

> I hate to be alone while studying, I don't have anyone to discuss or just asking 'how to deal with this assignment'.. (3rd year student_4)

Besides, the high load of learning tasks accompanied by the perceived challenges of its unclear instructions was one of the influencing factors that caused the academic stress. Some students also reflected that the lack of time management aggravated their burden from the learning tasks.

> Sometimes it feels impossible to run all tasks in one single time. (3rd year student_1).
>
> I am bad at managing time, and I think that makes things even worse. (3rd year student_7).

The heavy online learning tasks aligned with the gravity of its assessment activities. We found the online assessment preparation caused stress for some students. The findings represent students' responsibility to provide good Internet connections, the software specification for their gadgets, and other external factors besides the preparation of learning materials. Additionally, the oral assessment in the online version seems exceptionally challenging for students related to unexpected situations during assessment activities.

> Maybe some students will easily provide the internet connections and the gadgets.. but not for me, and I've been through a lot of effort.. (2nd year student_4)

> I have experienced the oral assessment.. maybe I lost connections, and I did not have any good marks, even though I had no sleep (3rd year student_5)

> I lost my father and all family members got infected by COVID-19, but somehow.. I have to struggle for him.. (3rd year student_1)

We found the academic overload on the online learning and assessment process initiated a stressful learning situation during the pandemic. This academic stress caused some of the students' burnout and their personal 'hard' conditions.

3.1.2 The Burnout Symptoms

As we reached more profound levels of the interview with burnout students, we interpreted their burnout symptoms such as feeling exhausted and perceived failure and avoiding social interactions. We found the stressful situation led some students to feel tired even though they had already rested and they often experienced an empty feeling in their daily life. These low affections influenced the student's behavior change, such as wanting to be left alone and avoiding social interactions. The quotations representing these findings are as follows:

Table 1 Guiding questions

Aspects to explore	Guiding Questions
Burnout symptoms	• Have you experienced emotional exhaustion or low energy during online learning during the pandemic? • Have you experienced a negative perception of yourself in academic achievement during online learning in the pandemic era? • Have you experienced the feeling of incompetence or lack of academic achievement during online learning in the pandemic era?
Academic Factors caused burnout	• What do you think are the academic aspects or factors that caused you in that situation (emotional exhaustion or negative self-perception)?
Resilience experience and the influenced factors	• How do you feel right now? Have you felt better than before? • Have you felt a more satisfying life, positive self-perception, or better social interactions? • What do you think is a powerful aspect of your resilience experience?

At that time.. I feel no one there for me, I am all alone in the dark corner.. (2nd year student_2).

I quit following the social media for sometimes, it is hard to answer the 'how are you' questions from friends. (3rd year student_6)

The burnout symptoms are also found in students as they perceive failure. This perception is often caused by the perception of unfinished tasks or worries about the upcoming lousy experience.

I failed.. and I will continue to fail somehow.. (3rd year student_4).

It just felt like I am not good at any tasks, my grades are failing down.. I don't know what to do (3rd year student_1)

We interpreted that these academic stressors in online learning during the pandemic resulted in burnout in students. Besides, some students have complex personal situations that influence their mental health.

3.2 Theme 2. The Negative Academic Experience Caused a Higher Academic Stressor

In the following description, we divided the second and third themes based on the impact on students' burnout situation. In this study, we found students (4 of 16) were still in the burnout situation during the interviews indicated by a lack of answering the resilience questions. Therefore, in this second theme, we interpreted the negative experiences that caused a higher academic stressor for students. We found several negative educational experiences such as the lack of peer support and failure judgment from teachers or parents.

The quotations from students represent this theme are as follows:

I don't think I could pass this, he (the teacher) also told me I won't be a good doctor if I fail that assessment. (3rd year student_2)

Since they all (peer group) started to avoid me, I feel worse. (3rd year student_3).

We identified that the negative experiences resulted in higher academic stressors in the students. In that way, we interpreted that this negative experience will inhibit the students from resilience and contribute to leading them back into burnout situations.

3.3 Theme 3. The Positive Academic Experience and Supporting Factors Led Students to Resilience

To get a deeper understanding of the resilience process in the students' interviews, we used guidance questions based on the aspect of resilience from Keyes, such as improved or positive emotions, psychological well-being, and better social interactions. We found most students (12 of 16) found their resilience after the burnout situation with supporting factors, such as: 1) External factors (positive academic experience, and social supports); and 2) Internal factors (spirituality, logical thinking, and personality). The quotations that represent these themes are as follows:

Yes, I do feel much better now, I am back to the strong version of me (3rd year student_9).

In one of the oral assessment sessions, the teacher told me to calm down and reduce my nervousness, and she listened carefully to my explanation and gave me an appreciation.. After that, I feel I can beat the other oral assessment with a better me.." (2nd year student_4)

When I fail or lose, I will give myself some space to cry, it is okay, my father (has passed away) told me so, but after that, there will always be a path to get through, don't ever doubt in God's plan, he told me.. (3rd year student_1)

We found most of the students have found their way to resilience from burnout episodes in their life. The supporting factors often come from students' perceptions of hope and inner strengths. These perceptions came from inside or personal beliefs and were supported by external factors, including the positive experiences during the academic learning process.

4 Discussions

During the pandemic, many unexpected experiences may cause stress or mental health impairment. In medical students, adapting to online learning and its consequences on learning strategies and assessment regulation may cause a higher potential for the stressful aspects [13, 20]. Our findings represent the phenomenon of burnout in medical students, while interpreting the academic factors that caused or contributed to their burnout situations, and describing their path to resilience.

The academic factors that cause burnout during online learning are the learning activities and the assessment regulations [4, 6]. Our results are in line with previous studies that stated online learning increases burnout, especially in cycles of emotional exhaustion and cynicism [13, 19]. We also found there were specific factors that influenced the students' well-being in online learning during the pandemic, such as feeling uncomfortable learning by oneself, lack of clarity in learning instructions and burdensome tasks, and strengthening of their experience with the online assessment regulations. These results are aligned with the perspective of the culture on burnout stated in previous studies [7, 8, 19]. The context of this study represents the collectivist culture with stronger group preference than the individualist culture [18, 21]. The lack of students' adaptation to learning by themselves and the need for clear learning instructions represent the collectivist culture. Despite being culturally related, burnout is also related to the educational regulations in the institutions [5, 6]. In that way, the burden of tasks and lack of learning instructions during online learning could be applied as the evaluation remarks for the institution to prevent burnout in students.

In this study, we found the burnout symptoms were similar to the Burnout dimension from Maslach [16], such as emotional exhaustion, which represents the tired feeling after rest. The Cynicism dimension was found as the negative perception about students' social interaction with fears that represent their avoidance of social interaction. The Personal Accomplishment dimension showed the perception of failure in students' academic achievement. These burnout situations will result in more severe mental problems such as depression, as stated by Cheng et al. [5]. Based on that understanding, the institution should pay more attention to the increased potential for burnout in their students.

Resilience is a process for individuals facing a challenging situation involving psychological difficulty such as burnout. Medical students should be resilient due to their future challenges in the medical profession [9, 21]. Unfortunately, we found not all burnout students can express their resilience experience. These findings supported our interpretations to divide the themes into a negative experience in the educational process that inhibits the resilience process; and the positive experience in the educational process together with supporting factors that lead to students' resilience. This finding was related to the coping reserve mechanism of individuals as the response to challenges in life that determined whether they will undergo burnout or resilience situations [10, 11]. Our findings of negative experiences from students with burnout represent the academic factors that strengthen the existing stressors during the pandemic. Aligned with these findings, several studies showed the work environment of medical students became a fundamental aspect that caused burnout [4, 6, 21]. Despite this, we also found that most of our students could find their way to resilience from burnout situations. We interpreted this cycle to indicate that the supporting factors from internal (personal beliefs and personality) and external (social support) were strengthened by the positive academic experience.

Our study has several implications for educational institutions in facilitating supportive learning environments, especially during online learning in pandemic situations. Health profession institutions should provide a more positive experience

for students, such as a conducive and supportive learning environment, facilitate students' engagement in online learning, and evaluate the load of learning assignments and assessment regulations. This research also provides the awareness for health profession institutions to prevent burnout in students with the effort to reduce the negative experience during online learning. However, we are aware of the limitations of our study's findings, especially in one single education context in undergraduate education of one medical Faculty, which will not be readily generalized to a larger more diverse population of students.

5 Conclusions

Student's mental health needs to be considered in providing online learning during the COVID-19 pandemic. Our study found the main factors causing or contributing to students' burnout during online learning are the uncomfortable feeling of being alone, the burden of online assignments and assessments, and the lack of clarity in learning instructions. From students' burnout experiences, we found that positive academic factors were essential to building students' resilience. However, the negative educational experiences were formidable obstacles to reaching their resilience. Therefore, the implications of this study underscore the awareness of academic factors that influence students' burnout and resilience ability. Further studies are recommended to explore a deeper understanding of the resilience mechanism in medical students in other contexts, such as clinical education.

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Arlisa Wulandari—developing research proposal, data analysis, and publication of the manuscript.

Ris Kristiana—developing research proposal, data analysis, and publication of the manuscript.

Luthfi Nurfuadi—developing research proposal, data analysis, and publication of the manuscript.

Gianita P Yuhana—developing the research proposal, collecting data, and data analysis.

Muhamad Fajar Ibrahim—developing a research proposal, collecting data, and data analysis.

Competing Interest The authors declare that there are no competing interests related to the study.

Ethics Approval and Consent to Participate The study was approved by Jenderal Achmad Yani University Institutional Review Board Number 002/M/KEPK/2022. The ethical consideration in the autonomy of respondents were provided by the informed consent and upholding the respondent's decision to give or not give the information—confidential aspect provided by the commitment of researchers to keep the data anonymous in publications.

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Health Professions Education Journal Club: Faculty-Led Initiative in Promoting Community of Practice

Siti Suriani Abd Razak, Vishna Devi Nadarajah, and Bhavani Veasuvalingam

Abstract Journal club has been a great tool in facilitating evidence-based practice. The health professions education -journal clubs serve its importance to health professional educators to better inform educational practice. The journal club organized by the International Medical University (IMU) is aimed to promote interprofessional learning and build its community of practice across the faculty. A survey questionnaire was administered to evaluate the content, delivery, organization, and usefulness with a 5-point Likert scale with open-ended free responses to gather feedback on its effectiveness. The descriptive statistical analysis reported a mean score of more than 4 for all four items in the questionnaire. The thematic analysis from the open-ended responses revealed four themes namely, insight and understanding, awareness of the importance and impact of a topic, putting into practice, and sharing of ideas and experiences. The mileage gained from health professions education journal club sessions is valuable to the faculty in supporting their roles and responsibility as health professional educators and in building the desired community of practice.

Keywords Journal club · Health professions education · Community of practice

1 Introduction

Journal clubs act as an axial point between research scholarship and workplace practice. Originally, journal clubs were created by Sir William Osler, from McGill University in Montreal, Canada in 1875 to support physicians who could not afford periodicals or books for personal use [1]. Journal clubs and reviews of existing literature continue to be necessary for promoting excellence in medical teaching [2].

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As Ramani stressed these journal club sessions are viewed to be crucial in elevating the scientific importance of educational literature within institutions.

Journal clubs have also been a great tool in supporting various teaching, learning and assessment strategies. Journal clubs have been identified as one of the ways to incorporate critical thinking among pre-clinical medical students [3]. Researchers at King Saud University reported their two-year experience in the medical education journal club, which improved the faculty's knowledge of the field and promoted high-quality healthcare teaching [4]. Interestingly, journal clubs are viewed as one of the earliest forms of flipped classroom, since the articles are provided as pre-reading before the face-to-face meeting to discuss and debate the content [5]. Although advancements in technology, have enabled online journal clubs to break geographical barriers, face-to-face small group sessions are much preferred as it allows active engagement [6, 7]. Additionally, active engagement can be further fostered through interactive journal club approaches as compared to traditional lecture-like sessions [8].

Various guidelines and steps have been introduced to guide medical educators in delivering a medical education journal club. The twelve tips for conducting such journal clubs presented by McLeod's team offer good clarity [9]. Attendance and participation are reported to be a significant marker of journal club success [10] with the type and quality of articles contributing significantly. Clear suggestions and tips on ways to prepare a journal club by Aronson is a useful guide to practice as well [11]. A six-step guide on organizing journal club offers good tips, by creating awareness on variations due to specific educational goals and training objectives [12].

Communities of Practice (CoP) are groups of people who have a shared concern, interest, competence, or passion and engage in joint activities and discussions to improve practices in the institution [13, 14]. CoP is redefined into three main areas: the domain of knowledge, the notion of community, and practice [14]. The domain of knowledge formed by shared interest or passion inspires the member to participate, inform and guide learning and action [13, 14]. Journal clubs are enablers to form and sustain CoP if practiced effectively.

1.1 The IMU- Health Professions Education Journal Club

The Health Professions Education Journal Club (HPE-JC) was first conducted at the IMU Center of Education (ICE) in July 2018 with the aim is to bring together a community of health professions practitioners to reflect, share ideas and bring about positive change in the IMU learning environment. IMU faculty members who had interest and passion in areas related to HPE proposed a topic to be discussed during the journal club. Unlike the usual practice of journal club, where participants only receive the article(s), at HPE-JC participants will be provided with a session guide that will consist of a list of articles or reading materials with guided questions for self-directed learning prior to the journal club session. This will provide the opportunity for the participants to reflect on issues that are relevant to their roles as faculty or

professional staff at IMU. Facilitators, persons who select the topics and prepare the guide, are responsible to ensure safe and open discussion during the session by treating the information, experiences or ideas shared with respect. Participants engage in the topics discussed by bringing in new ideas and perspectives into teaching and learning in IMU.

Like evidence-based practice within the clinical realm, the best evidence of medical education is the essence of health professional education, and the IMU HPE-JC was designed to promote and broaden professional network, collaborative learning, and lifelong learning and inspires new research [15].

The inter professional nature of the IMU HPE-JC fosters interactions by encouraging faculty members from diverse departments (i.e., medicine, pharmacy, nursing, health sciences, and dentistry) to share their experiences and ideas. Participants and facilitators have opportunities to critically share ideas and solutions on ways to address educational issues related to teaching and learning at IMU. Over the last 5 years, we have conducted 19 IMU HPE-JC, both in face-to-face and online mode and these sessions were attended by 98 faculty members at least once. Beginning in 2022, IMU HPE-JCs were scheduled once in every two months as an adjunct to IMU faculty development activities. The topics discussed in IMU HPE-JC cover many aspects of teaching and learning and support the many hats our HPE educators wear. The list of the topics discussed is mapped to the Harden's roles of educators [16] are shown in Table 1. An initial survey to gauge the effectiveness of journal club activities conducted in 2019 showed positive interest [17].

Table 1 The list of the IMU HPE-JC topics mapped to Harden's eight roles of educators

Topics	Roles
To change or not to change	Role 5: Curriculum developer & evaluator
Rethinking small group learning	Role 1: Information provider and guide Role 3: Facilitator & mentor
Open book assessments	Role 4: Assessor
Identification of "strugglers" and undertake remediation using educational theories	Role 3: Facilitator & mentor
What is your research paradigm?	Role 7: Scholar & researcher
Role of technology-enhanced learning (TEL) in health professions education	Role 6: Manager & change agent Role 8: Professional & enquirer into own competence
Exploring pattern thinking in health professions education	Role 1: Information provider and guide Role 2: Role model as teacher & practitioner
Rigour in educational research	Role 7: Scholar & researcher

(continued)

(continued)

Topics	Roles
Assessment of professionalism in health professions education	Role 2: Role model as teacher & practitioner Role 4: Assessor
Constructive alignment—What, Why and How!	Role 4: Assessor Role 5: Curriculum developer & evaluator
Integration of subject-discipline concepts in curriculum delivery	Role 5: Curriculum developer & evaluator
Medicine and medical education in the age of artificial intelligence	Role 6: Manager & change agent Role 8: Professional & enquirer into own competence
Addressing imposter phenomenon, professional Identity, and wellness in creating able humane professionals	Role 2: Role model as teacher & practitioner Role 6: Manager & change agent
Race and Racism: What strategies can we adopt to address this issue in health professions education?	Role 2: Role model as teacher & practitioner Role 6: Manager & change agent
Humanism in medical education	Role 2: Role model as teacher & practitioner
Facilitating Interprofessional Education (IPE) Online	Role 1: Information provider and guide: Role 3: Facilitator & mentor
Failure to fail	Role 3: Facilitator & mentor Role 4: Assessor
Supporting or thwarting learners through the lens of self-determination theory	Role 2: Role model as teacher & practitioner Role 3: Facilitator & mentor
The importance of remediation program in medical and other health professions education	Role 3: Facilitator & mentor Role 5: Curriculum developer & evaluator

2 Methodology to Evaluate the IMU HPE-JC

IMU HPE-JC sessions evaluation was conducted regularly beginning in July 2021 as part of continuous quality improvements of faculty development activities in IMU. This survey study is aimed to evaluate the effectiveness of the IMU HPE- JC delivery to the faculty members and to foster the community of practice and interprofessional learning. An evaluation questionnaire was designed by ICE faculty with the purpose to evaluate the IMU HPE-JC sessions.

2.1 Questionnaire

The evaluation questionnaire comprises ratings and open-ended questions. Participants are asked to rate the overall sessions based on the four criteria: content, organization, delivery, and usefulness. The rating is done using a 5-point Likert scale of 1: "Poor", 2: "Below average", 3: "Average", 4: "Good" and 5:"Excellent". The open-ended questions are on what participants gained by attending the sessions, how they are going to put the knowledge into practice, suggestions for future improvement, and their learning experience during the sessions. Participants were informed that the evaluation was for research and quality improvement of the journal club, whereby responses are voluntary, anonymous, and with consent. The evaluation form was distributed post-journal club session and did not interfere with participation in HPE-JC. Permission was sought and received from ICE Director to publish the findings of evaluation as part of the HPE scholarship of dissemination of knowledge.

2.2 Analysis

Descriptive statistical analysis was conducted using Statistical Package for the Social Sciences (SPSS) version 28.0 to calculate the mean and standard deviation (SD) for the content, organization, delivery, and the usefulness of the session. The open-ended responses were manually coded and thematically analyzed [18].

3 Results

A total of 98 faculty members from various schools (Fig. 1) attended the IMU HPE-JC at least once since July 2018. As the formal evaluation took place only since July 2021, there were only seven evaluations conducted with a response rate of 45%. The evaluation results and the feedback from the facilitators, aid in determining the effectiveness of the sessions and gathered ideas on how to assure the success of the future IMU HPE-JC. The mean scores of the evaluation results are as shown in Table 2.

3.1 Open-Ended Responses

The open-ended participant responses were evaluated, and four themes were identified to foster their roles as health professional educators. The themes resonated with participants' experiences which specifically benefited and facilitated their day-to-day work. The diverse range of journal topics provided a better insight, awareness, facilitating application into practice, and sharing of ideas and experience. The themes and quotes are presented in Table 3.

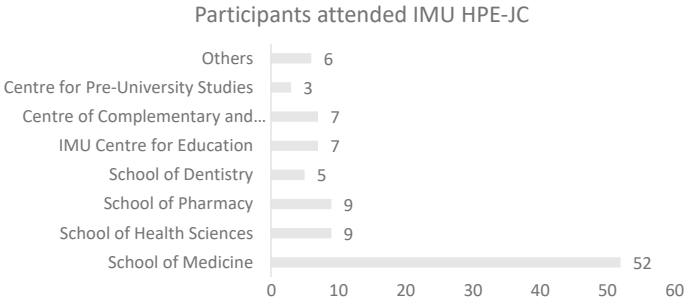

Fig. 1 Shows number of participants who attended IMU HPE-JC according to schools

Table 2 Shows mean score for the four items from the IMU-HPE JC evaluation questionnaire

Component	Mean score (SD)
Content	4.40 (0.497)
Organization	4.43 (0.547)
Delivery	4.48 (0.552)
Usefulness	4.45 (0.504)

4 Discussions

The IMU HPE-JC has been actively operating since 2018 with an increasing number of participations every year. Majority of the participants from the present study have rated the content, delivery, organization, and usefulness of the IMU HPE-JC sessions with the mean rate of more than 4. The findings from the open-ended responses further complemented the quantitative data with the four themes. The four themes that emerged, are insight and understanding, awareness of the importance and impact of a topic, putting into practice, and sharing of ideas and experiences. These four themes significantly suggest the value offered by journal clubs when it is well planned and organized with regard to the faculty's roles and responsibilities at work.

4.1 IMU HPE-JC Role in Community of Practice

Journal clubs are used as a method for continuous medical education or continuous professional development. Journal club has been declared to function as a CoP when planned effectively [19]. At our institution, we also aimed to evaluate the benefit of the IMU HPE-JC from a CoP perspective. For example, journal clubs also act as a platform for validation of new evidence prior to its application [19]. This means it can offer support and alignment to CoP, especially in decision-making. This is exemplified by a quote from one participant from the current study: "*Having provided sufficient justification with good assessment system like feedback, standard*

Table 3 Shows the themes with the narrative feedback from the journal club evaluation

Themes	Open-ended responses
Insight and understanding	"Insights into Humanism in Medical Education, opening new frontiers to consolidate soft skills in medical education"
	"More insight about the topic and also wider perspective"
	"A better knowledge regarding factors contributing to failure to fail, the failure to fail is not unique to certain program but happened throughout many programs"
	"Enhanced knowledge and application of SDT understanding of SDT in order to promote motivation in students"
Awareness of the importance and impact of a topic	"A great deal about the theory of SDT and how it plays an important role for educators and students alike"
	"Importance of IPE, challenges and the way forward"
	"Importance of being anti-racist. Understanding, acknowledging, and respecting diversity in relationship and communication not only at workplace but everywhere you go"
Putting into practice	"Having provided sufficient justification with good assessment system like feedback, standard settings, mentor–mentee will allow the educators to be at ease when failing the students"
	"Explore the place of AI in Family Medicine"
	"I will address more regarding professionalism when teaching medical students and create more eLearning materials in which students can do more interaction"
	"Will use the knowledge gained from attending the Journal club to tackle and solve similar problems arising at the school in future"
Sharing of experience and ideas	"The opportunity of sharing ideas and views of peer academics which gives me a better perspective of my own role here at IMU"
	"It was fantastic to observe the sharing of knowledge, experience and opinion"
	"Better understanding of self-determination theory and how to motivate our students" "The sharing session makes reading lots easier as we share experiences"
	"Sharing of common practice on SDT based on IMU practices"

settings, mentor–mentee systems will allow the educators to be at ease when failing the students". This suggests, the discussions facilitate the health professional educators to be comfortable in their academic decision-making process and aligns with the 3rd theme of putting into practice what is learned. Participants who joined the sessions related to the topics discussed, had opportunities to bring new ideas and seek others' perspectives for support and decision-making in teaching and learning at IMU.

While journal club discussion provides the general area of interest for the community, the demonstrated and actionable practice is the specific focus around which

the community develops, shares, and maintains its core knowledge [14]. Therefore, participants in the IMU HPE-JC sessions are highly encouraged to share ideas on ways to address any common issues related to teaching and learning at IMU. The first theme on insight and understanding reflects the specific focus around which the IMU community developed through the journal club involvement. The heightened insight and understanding of the principle of humanism, failing an assessment and self-determination theory are some of the core knowledge the IMU community of practice developed.

The CoP model of learning is a good catalyst for interdisciplinary learning where students and faculty with different levels of knowledge and discipline learn from one another [20]. IMU HPE-JC creates the social fabric for learning, fostering interactions and encouraging faculty members from different departments to share their experiences and ideas [17]. The second theme: awareness of the importance of specific topics is facilitated through the discussion and interaction during the journal club. The awareness of racial issues, student motivation, and interprofessional learning is viewed strongly via collaborative learning.

5 Conclusions

This study shows that IMU HPE-JC although not a new concept, can still add value when it is structured well for participant engagement. The current study reports its unique journal club structure which maps its session outcomes and educational articles to Harden's eight roles of educators and papers distributed a month prior to the IMU HPE-JC sessions, mimics the format of flipped journal club conducted by other groups [21]. Our innovative approach to the selection of articles based on Harden's eight roles of educators, with the utilization of small group discussion sessions, has been well accepted. Bounds reported the flipped journal club structure with the small group discussion method promoted active engagement and encouraged personal goals and educational objectives. The interprofessional approach, faculty-led topic selection, which is aligned to the role of a teacher, pre-reading that is also accompanied by guided questions and regularity of sessions creates a CoP. These features are valuable considerations for faculty developers when designing journal club sessions.

Ethics Approval and Consent to Participate The evaluation form was distributed post-journal club session as part of quality assurance activities for faculty development activities. The evaluation was anonymous and did not interfere with participation in HPE-JC. Permission was sought and received from ICE Director to publish the findings of the evaluation as part of the HPE scholarship of dissemination of knowledge.

Competing Interest The authors declare that there are no competing interests related to the study.

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"How Intense Should Be A Nurturing Program Physician Mindset?"

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Abstract The professional development of medical students starts with clinical reasoning growth. Facilitating the growth of clinical reasoning, from a single method to a program strategy could be used. An integrated program between knowledge and performance was applied within the curriculum in the third year students. The program consist of two tutorial meeting with multilevel type scenario, a single integrated performance training, and apply Objective Structured Clinical Examination (OSCE) at the end of the third year. This study aimed to evaluate a clinical reasoning course by using the OSCE score at the end of the program. A simple pair t-test analysis was conducted to compare OSCE scores before and after this program was implemented. There was a significant difference in OSCE scores between before and after the course was implemented on three stations from a total of seven stations, regardless of whether it was a procedural or non-procedural type of station. This clinical reasoning program could positively influence students' clinical reasoning growth. The course's length, and intensity given through tutorials and integrated training sessions influenced how the student can cognitively build critical thinking skills, especially the pattern of recognition and recall. However, more research is needed to better understand how much intensity is required in the sessions to build a firm tacit knowledge and pattern recognition.

Keywords Clinical reasoning · Students' professional development · Objective structured clinical examination · Program evaluation

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1 Introduction

Clinical reasoning (CR) is "an ability to integrate and apply different types of knowledge, to weigh evidence, critically think about arguments, and to reflect upon the process used to arrive at a diagnosis" [1]. CR depends on the cognitive process within a physician's mind, recognition of patients' problems, searching evidence related to a relevant diagnostic test, and decision-making based on certain examination results. How a physician thinks deliberately could be categorized into two processes: the short and long way, depending on the physician's expertise in the field [2]. The cognitive architecture theory, a combination of mathematical and psychological theories, explains what happens in a physician's cognition through their decision-making process [3, 4]. Some theorists have argued that the clinical reasoning process is not only part of the cognition process but reflects higher order thinking skills and actual experiences. However, the cognitive process still dominates the process.

Programs in facilitating clinical reasoning typically follow the SPIRAL curriculum, starting from simple to complex material. In contrast, training on clinical reasoning should follow closely after students demonstrate a full understanding of basic medical science [5]. In order to insert this pattern of thinking as a critical thinking skill in clinical reasoning, several phases should be managed through the program [6]. Before entering the program, the student should fully understand human physiology, anatomy, and pathophysiology. Basic medical knowledge should be structured in such a way that it will build students' tacit memory so they can easily retrieve accurate information when needed. After delivering the knowledge on basic medical science (anatomy, physiology, and pathophysiology), it is proposed by Cutrer, Sullivan, and Flemming that the clinical reasoning nurturing programs should facilitate the dual process of thought by inserting the pattern of the diagnostic process through a cycle of two systems [6].

In the first system, the student should have experience in the diagnostic process by facing clinical cases, either simulated or actual. Through this system, a cognitive framework will be developed throughout the process. The facilitator/teacher could address the student's performance from unconsciously competent to unconsciously incompetent by informing them of their failures during discussion for the diagnostic process (Fig. 1) [7]. In order to facilitate this, case-based clinical reasoning in the problem-based learning strategy is a specific type of discussion that uses specific clinical cases as a trigger point that could be used to facilitate immediate real-time feedback [8, 9]. In the beginning phase, a script concerning an illness should be started by adding students' knowledge of the disease. Integrating their knowledge of physiology, anatomy, and pathophysiology under the term diagnosis will help them "chunk their memory" when addressing similar patients' complaints. The discussion will follow just like in a diagnosis process, which involves the applied gathering of data from anamnesis until additional examination results confirm a definitive diagnosis, called a multilevel type scenario. This CR process should be followed by the scaffolding phase, where the students will receive immediate real-time feedback on their understanding of clinical presentation through an active process [9].

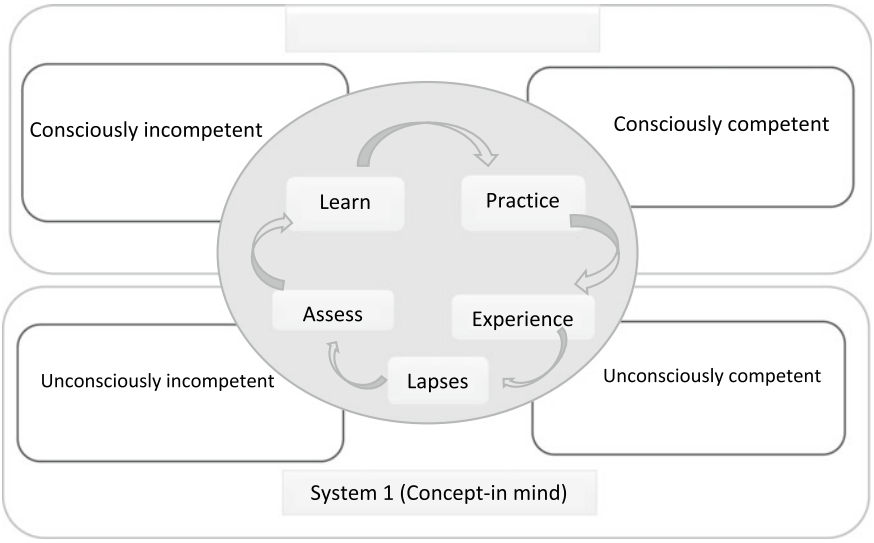

Fig. 1 An integrated program for improving clinical reasoning [5]

In the second system, as an active iterative process, the students should learn more specifically to enhance their cognition by understanding the illness script and 'chunking it' or relating it to basic medical science to confirm the content of their memory on a particular disease through actual performance. In this system, a cognitive framework is developed, and a skills or performance framework is further developed. The facilitator/teacher could facilitate the students' change from unconsciously incompetent to consciously competent by stimulating their critical thinking throughout the diagnosing process within their full performance [10]. Therefore, the facilitating of the CR process implies that the teachers should facilitate a complete package of direct feedback.

In the advanced phase, the students need help in data-gathering, which could be facilitated through encounters with simulated or real patients. Facilitators could use a strategy such as **S**ummarize the history and findings-**N**arrow differentials-**A**nalyze differentials-**P**robe preceptor about uncertainties-**P**lan management-**S**elect case-related issues for self-study (SNAPPS), and **R**eporter-**I**nterpreter-**M**anager-**E**ducator (RIME) in facilitating the process [8].

Additionally, there are also other strategies such as self-explanation, structured reflection prompts for differential diagnosis, illness script, and health and disease schema which could be encouraged throughout the educational program [10].

The most common applied strategy to facilitate the students' clinical reasoning is only focusing on the cognitive domain, by a discussion through a clinical case. As also proposed by Cutrer, Sullivan, and Flemming, we conducted an integrated CR training system between cognition and performance for medical students. The cognitive domain was developed by using case-based methods and the performance domain

was integrated into the patient management session for the third year curriculum [6]. In this study, we aimed to re-visit whether what we have done by using this specific course to train students' CR would increase students' performance measured through the Objective Structured Clinical Examination (OSCE).

2 Methods

2.1 Intervention

An integrated program between first and second systems was established by problem-based learning sessions using a case-based CR type of discussion, and also training the students' performance through an integrated patient management (IPM) session. A multilevel scenario, with two case-based CR forms were consistently applied for the third year students in each block. In between, the students had one IPM session in the skills laboratory in each block that aimed to train their performance step by step through a specific clinical scenario related to the blocks' theme as the trigger. In total, the student had 12 multilevel type scenarios for their problem-based learning strategy, and 6 sessions of IPM in one year.

Methods in assessing students' CR are varied from knowledge-based levels, including key performance or script concordance, to the OSCE, and one minute preceptor [11]. By the OSCE, we can observe students' ability in CR through gathering data, interpreting data, and selecting the diagnosis. Good CR ability will help the students in performing better clinical skills since they get used to thinking systematically through the dual process. This will lead to shorter decisive time during their actual performance: how they choose certain physical exams, decide the diagnosis, and propose the treatment. As a consequence, better CR ability either can result in both better scores and/or shorter performance. However, some factors affecting students' performance during OSCE were identified such as anxiety or depression, nervousness, previous knowledge, previous performance during training regarding feedback, and technical problems during doing the instruction [12–15]. Nevertheless, a study revealed that there is no significant relationship between students' CR ability with OSCE by assessing students' CR through patients' notes after the encounter [16].

At the end of the third year, we conducted a performance-based assessment; the OSCE with seven stations was used to assess the students' complex skill set by using clinical cases as a trigger. Stations 1–4 assess the students' complex ability in communication skills, conducting physical examination, asking for additional examination, diagnosing, and proposing the treatment. A presented clinical problem such as typhoid or acute otitis media was followed by students' instructions to deal with the problem, analyze the case through the diagnosis process, recommend conducting certain related physical examination, ask for any additional examination then conclude the problem and propose the solution. A simulated patient was assigned to present the clinical data by mimicking the real condition presentation.

Meanwhile, stations 5–7 assess the student's ability in certain procedural skills such as injection, IV line, and surgery while still assessing students' ability in simple communication such as patients' education, and delivering informed consent.

We conducted a comparison study on two consecutive years of third year OSCE scores before the implementation of the integrated program to two consecutive years of third year OSCE scores after the implementation of the integrated program. We used the students' scores regarding the absolute percentage from each of the stations and conducted a simple paired t-test analysis for further analysis.

3 Results

We compared two consecutive years before and after the course was implemented, i.e., student batch 2013, 2014, 2015, and 2016. The student batch 2013 and 2014 were the batches before the course was implemented, while the batches 2015 and 2016 were the batches after the course was implemented. By using borderline method of standard setting, each batch had different pass rates in the OSCE year 3. Table 1 shows the students' characteristics.

3.1 Descriptive

3.2 Analysis

From the analysis of seven stations, only three stations had different statistical significance: IPM2, IPM4, and IPM7 (Table 2). This pattern shows that there was a change in OSCE scores after the strategy was implemented. In further analysis, we could see whether this strategy made those scores better or not by comparing the t-value as twice of α value. Based on that assumption, we could see that the IPM 4 had exceeded the lower border confidence interval of the difference, which means that only the IPM 4 stations had better scores after the programs' implementation.

Table 1 Students' characteristics

Year	Pre	Post
Total N	593	554
Gender	303 (51.1%) 290 (48.9%)	201 (36.22%) 354 (63.78%)
Mean age	21.05	21.1
Mean GPA	3.49	3.455

Note GPA, grade point average

Table 2 Example cases in objective structure clinical examination (OSCE)

		Pre	Post	Sig	t-value
Integrated stations					
IPM 1	Mean	76.3142	76.4450	0.831	−0.214
	Std Dev	15.56957	16.01970	–	–
	Skewness	−0.424	−0.575	–	–
IPM 2	Mean	69.2770	75.8538	0.000	−7.203
	Std. Dev	16.53847	14.73252	–	–
	Skewness	−0.131	−0.625	–	–
IPM 3	Mean	68.5849	69.2758	0.146	−1.455
	Std. Dev	15.40540	14.89739	–	–
	Skewness	−0.263	−0.221	–	–
IPM 4	Mean	77.3801	73.4444	0.000	3.991
	Std. Dev	13.44112	13.49135	–	–
	Skewness	−0.781	−0.333	–	–
Procedural stations					
IPM 5	Mean	76.2380	75.0557	0.212	1.249
	Std. Dev	14.62530	14.34799		
	Skewness	−0.520	−0.498		
IPM 6	Mean	72.2705	70.650	0.776	0.284
	Std. Dev	18.94659	25.54401		
	Skewness	−0.808	−0.828		
IPM 7	Mean	64.5382	68.9576	0.000	−4.133
	Std. Dev	20.25391	19.70862		
	Skewness	−0.481	−0.384		

4 Discussions

Less than half stations from the total sevens stations of OSCE showed changes after the program, and only one station showed better score achievement after the program. Furthermore, only one integrated station skill was changed. This station assessed students' performance, including their ability in history taking, physical examination, diagnosing, and recommending certain treatments to the patient. Many factors were revealed in determining students' performance in OSCE, such as their nervousness, mental problems (anxiety or depression), previous knowledge, previous performance during training, and technical problems [12–15]. Research in test-taking has shown that nervousness or mental problems will disrupt students' thought processes by distracting their focus of attention, and perceiving instructions, until possibly freezing their minds.

As a consequence, this will cause the students to miss critical parts of the decision-making process. Nevertheless, how the levels of previous students' knowledge and performance affect their performance needs to be better understood. Further investigation by using the diagnosing time and correctness of the student' diagnosing ability will help to determine whether this integrated program will help the student have better CR skills.

In inserting the pattern of thought, the dual process system needs an abundance of effort, but much is still being determined concerning how much effort should be made. In this case, we already gave 12 times practice in cognitive domains and 6 times in real performance domains. The results showed that this could change the OSCE score, but it did not adequately increase all of the scores. There may be many other factors that influence the students' thinking patterns that shaped their behavior either during the case-based discussion or during their performance. For example, how feedback is delivered to the students will influence how they accept correction, triggering them to consider how they think and stimulating them to 'chunk it' with their previous understanding of basic medical science and learning during the process. From this research, it is still unknown how often the pattern of thought should be inserted to make the students have good systematical thought during their diagnosing performance. More research is still needed concerning how many training times with adequate feedback are necessary in establishing the pattern of thought.

Most factors involved in inserting the dual pattern of thought are solely cognitive-based. Using cognitive architecture theory, understanding how students' thought processes work can be developed much easier. Cognitive architecture, a combination of formal mathematical theories such as Bayesian and knowledge-level strategies theories such as the Heuristic-made decision-making process, permits a more precise picture [3]. In novice thought, a student will build their own "chunk" consisting of declarative knowledge with its base level of activation based upon its redundancy and frequency of occurrence. Retrieval of such knowledge will need an active process, such as adding focus or attention and building a causal association relationship. In the educational process, good case descriptions will make the student focused and trigger pattern recognition in a case-based discussion. The students will retrieve their memory, and regarding the heuristic model, they will value the memory after thinking and seeking the causal relation with the current condition. Accordingly, the case is essential in triggering the student's recall. In the process, facilitators are also essential in triggering the causal relation between students' declarative memory and the current case. At the end of the process, valuing the information process should happen through the facilitator's debriefing of key information regarding the case. Cutrer provides a good systematical way of training students' CR by giving a chance for interactions between cognitive and performance domains [6]. Nevertheless, there still needs to be more known on how often this encapsulation process should happen in building strong declarative memory for students to become an expert in the medical field. Our research also emphasizes that this process was not done correctly, underscoring the importance of a faculty development program specifically for feedback on inserting a systematical thought of the students in thinking and deciding the diagnosis for their patients.

Regarding the process, the students' minds and psychological states have significant implications. Consequently, any negative aspects related to students' minds and psychological states could hamper the process. For example, in the OSCE, students' minds and, thereby, their performance will be influenced by their nervousness or anxiety. Once the students can overcome their nervousness or anxiety, they could retrieve their declarative memory or think over the case. While in the process, if the student is not comfortable with the situation or the educational process cannot reveal a causal relationship between students' thoughts with current cases, the encapsulating process of the proposed 'chunking' will not happen. This gap in recall implies that either the educational or assessment process will need to maintain the students' focus of attention, stimulate active memory, and create a stable, safe psychological environment.

5 Conclusions

Helping students in medical schools build their minds' encapsulating process to become an expert needs an abundance of effort. In this study, by using Cutrer's model, an integration between cognitive and performance systems in CR training could improve students' ability in clinical reasoning. Nevertheless, based on this study, the number of sessions with 12 times the cognitive domain process and 6 times the performance domain process was not adequate enough to support the development of a stable and good students' 'chunking' process. This essential cognitive development might need more intense and more frequent sessions of training with adequate feedback from the teachers.

Ethical Clearance This research was already reviewed and gained the ethical approval from the institutional ethical review board with letter number KE/FK/0915/EC/2020.

Conflict of Interest All of the authors have no conflict of interest with the publication of the research. We do hope that this research will enrich the science of evaluation in term of assessment for learning paradigm.

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Authors' Contribution HNR is the junior (main) researcher and the first author of this manuscript, PU is HNR colleague who worked together with HNR in analyzing the scores. TSH is HNR's supervisor in terms of curriculum and consultant in publishing this manuscript.

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Implementation of Design Principles for Virtual Patient Simulation in Interprofessional Education

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Abstract The use of Virtual Patient (VP) across various settings in medical education incorporates interactive activities to promote interactive learning. Instructional interventions provided by VP emphasize students' understanding and knowledge integration. Case-based learning in the form of VP simulations is considered to be an appropriate teaching modality for clinical reasoning skills. Despite VP having been widely adopted in medical and health profession education, its potential to enhance students' collaborative and reflective skills in supporting interprofessional education (IPE) is poorly maximized. VP development to facilitate IPE in medical and health professions education remains limited. This study aimed to develop design principles for a web-based VP simulation for interprofessional learning. We conducted a literature review to discover essential aspects to consider during the VP development. Characteristics from existing VP simulations were included in the design process combined with the Four Core Competencies for Interprofessional Collaborative Practice. In this study, we present two design principles associated with VP in IPE: (1) general user interface recommendations; and (2) features to stimulate IPE. The simple and intuitive interface presented by the VP was devoted to the students in achieving IPE competencies, including value/ethics, roles/responsibilities, interprofessional communication, and teams and teamwork. Suggested combinations of learning resources and technical requirements provided in this paper motivate educational organizations to implement a tailored approach based on institutional characteristics and student profiles.

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Keywords Design principles · Interprofessional education · Virtual patient · Web-based simulation

List of Abbreviations

IPC : Interprofessional Collaboration
IPE : Interprofessional Education
UI : User Interface
VP : Virtual Patients

1 Introduction

Virtual patients (VP) have been utilized for decades in a variety of settings: clinical research [1], electronic patient records [2], and medical and health professions education [3, 4]. Different perspectives have merged to develop the definition of VP and how this learning modality can be employed to enhance students' experience. The use of VP has been identified from a variety of educational techniques, particularly in the academic settings [5, 6]. In the context of medical education, VP generally refers to any software that facilitates case-based training [7]. Ellaway in 2014 proposed the following definition of VP: "an interactive computer simulation of real-life clinical events for the purpose of healthcare and medical training, teaching, or assessment" [8]. A broader definition of VP was introduced by Candler, as a particular kind of computer program that mimics real-world clinical scenarios [through which] learners emulate the responsibilities of healthcare providers to gather a history, conduct a physical exam, make diagnostic and treatment decisions" [9]. Additional definitions of VP focused on a trained-realistic software that represents patient's clinical profile [10].

Medical educators employ VP to accomplish a wide range of learning objectives, such as acquisition of fundamental knowledge, practicing clinical reasoning and communication skills, as well as monitoring student progress. A nationwide initiative of VP was introduced to enhance the mastery of clinical skills in blended simulation settings based on standardized curricula [6, 11]. Shoemaker et al. in 2015 initiated collaborative work in VP development by involving multiple institutions. The project demonstrated adequate coverage of curricular objectives by utilizing the ability of VP to deliver customized learning experiences [12].

The demand to continuously improve the quality of patient care and health outcomes in an increasingly complex healthcare system has stipulated the promotion of interprofessional education (IPE) and interprofessional collaboration. Accomplishing this common goal is designed to foster the health and well-being of patients, families and clients. IPE is defined as "a learning episode in which members of more

than one health or social care profession are actively engaged" [13]. The World Health Organization (WHO) and other international or regional bodies have endorsed IPE as a key component for achieving the triple aims of better health, quality healthcare, and lower costs. Successful implementation of IPE was associated with better results for diabetic care, lower clinical error rates in surgical procedures, and decreased patient mortality [14, 15].

Despite its significance for learning, major barriers to IPE adoption have emerged. Difficulties in synchronizing students' schedules and a lack of educators with expertise are among the bewildering factors acting as barriers for effective IPE [16, 17]. Essential aspects to maintain IPE include: systematic approach (available to all students as part of compulsory curricula), sustainability (permanent notwithstanding faculty management changes), and scalable (easily distributed to a large number of students without significant resource challenges in program delivery). As previously mentioned, these limitations can be mitigated with the help of electronic learning (e-learning) platforms and VP. The versatility and effectiveness of e-learning [18] and VP [19] for IPE have been demonstrated, especially for medical and health professions education students achieving a broad range of clinical knowledge, skills, and attitudes.

2 Methods

This is a case study about the development of VP design principles for IPE. An approach based on the study conducted by Crowe et al. in 2011 with the following procedure was selected: defining the case; selecting the cases; collecting and analyzing the data; and interpreting data [20]. The study aimed to generate an in-depth and multifaceted understanding of the complex issues in building the VP design principles.

The included VP modalities in this study were retrieved from published articles and open-source software. A total of six VP modalities were collected, retrieved for their characteristics, and synthesized as the guiding principles for future design developments. Inclusion criteria for the VP were: launched within the past 10 years and focused on medical and health professions education.

In defining the principles, this study employed a design-based research (DBR) approach as a systematic attempt through an iterative process. This approach leads to a workable educational intervention that adds to the body of knowledge or advances educators in developing complex learning episodes. A reflective process took place in the creation and reporting of reusable design concepts. With this distinction, the study offered a framework for the processes of developing VP modalities which enhance interprofessional competencies.

The current study was exempted from ethical review based on the KI ethics rules and guidelines from Swedish Research Council [21]. This study was categorized as low risk for ethical violation due to the nature that no human related information was being collected. However, the study consistently conforms to the recommendations

for ethical research from ethics unit at LIME, Karolinska Institutet. Exemptions also applied from the Basic HHS Policy for Protection of Human Research Subjects, which specifies requirements for ethical clearance [22]. The current research did not involve practice that is likely to adversely impact student learning. No educational assessments, surveys, interviews, or observations of public behaviors were conducted in this study.

3 Results

The basic ideas behind the construction of VP design principles for IPE were to deliver realistic challenges in an academic environment, guided by the principles of authentic learning and the four core components of IPE (Fig. 1). VP as a digital simulation modality offers a unique and different, yet authentic approach to learning patient care and management plans, which can allow an extension of traditional learning and clinical practices and facilitate team members with opportunities to interact with each other [23].

Simulated clinical activity was programmed to be self-directed, learner-driven, and helpful for independent study. Beyond the facilitation of the lecturer as a tutor, this modality ensured affordability, accessibility, and relevance in interprofessional learning. Additionally, it did not require learners to go through a phase of acclimatization before the learning activity could start. This approach was considered crucial for giving students the freedom to complete the simulation activity whenever and wherever they pleased.

Two major principles were identified from this study: general user interface (UI) standards and features for IPE. The UI is a computer, website, or application's UI that is the point at which users interact with it. An effective UI should be simple and intuitive to use, requiring little effort from the user to achieve the desired results. UI is developed in levels of interaction that engage the senses of the user (sight, touch, auditory and more). The goal of a UI is to give a user effective control over the computer or other machines they are working with and to allow feedback to be

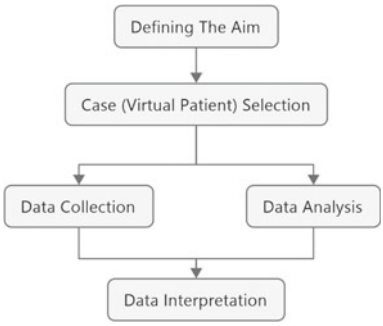

Fig. 1 The design principles development process

received to convey when activities have been completed successfully. An effective UI should be simple to use (without requiring special training), effective (not adding extra or needless friction), and user-friendly (be enjoyable to use).

In VP learning, features hold a significant role to stimulate the achievement of desired outcomes. This study highlighted five main features of VP systems to enhance students' learning. The features should be accessible at the time learning occurs, or after the session expired. Continuous engagement between students and educational materials may foster better learning experiences and greater satisfaction. Ultimately, students will be more supported to attain higher learning outcomes.

4 Discussions

The use of simulation training in medical and health professions education has rapidly risen in the past decades. The improvement of a student's competencies has been conclusively demonstrated through simulation training, and it can be expedited so that the development of expertise through teamwork and leadership can be efficiently facilitated. Learning in a simulated setting allows students to advance their expertise in a controlled environment where deliberate practice is encouraged while individual errors do not lead to adverse effects on the actual patients [24].

The simulation's design is highly dependent on the type of system installed and the design thinking which have various levels of effectiveness. High-fidelity mannequins, for instance, are very beneficial for authentic learning [25], but their scalability is severely limited by logistical and financial constraints. Advanced simulation technology, including virtual reality (VR), is expensive. In addition, VR is subject to space and hardware limitations [26]. Here, basic computer-based VPs serve as an effective foundation for realistic learning scenarios.

In 2010, an expert panel of educators defined the generic statements that correspond to the four interprofessional core competencies [27]. The IPE core competencies are: (1) Values/ethics for interprofessional practice, defined as a work with people from various professions to promote a culture of respect and shared values; (2) Roles/responsibilities, to utilize an understanding of own and other professions' duties to respond patients' and populations' demands; (3). Interprofessional communication, engage in responsive and accountable communication with patients, families, communities, and other health professionals; and (4) Teams and teamwork, perform well in various team positions and deliver safe, timely, efficient, effective, and equitable patient/population-centered care.

Health professionals will acquire the knowledge and skills they need to work together in environments based on mutual respect and shared values, understanding of each other's roles and responsibilities, and effective communication and teamwork processes through purposeful learning guided by the interprofessional collaborative practice. The VP modality facilitates groups of students from various professions to

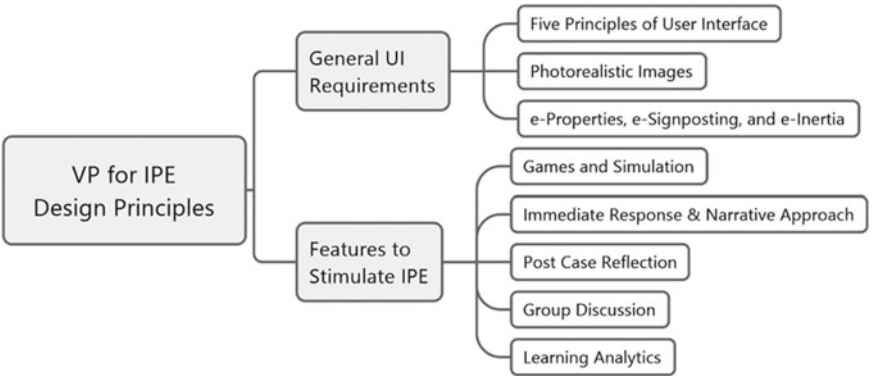

Fig. 2 Design principles of the virtual patient for interprofessional education

learn together. Students were able to better acknowledge their own and other professions' roles and responsibilities through VP learning. Interprofessional collaboration which is required in clinical setting was similarly promoted in this educational episode. The combination of text and multimedia in simulated environments added to the value of VP as an authentic experience as well as stimulating group discussions [28].

VP may be expanded affordably to larger student cohorts and made accessible from a variety of devices without time and space boundaries [29]. VPs offer significant advantages compared to high-fidelity simulation. Recent studies validated VP as an efficient tool to teach a variety of clinical practice, decision-making, teamwork, and communication skills [24, 29, 30]. An authentic learner experience presented by the VP in a simulated setting emphasizes meaningful interaction as a crucial component of learning [26]. In a curricular context, the use of VPs promotes greater consistency of educational instruction and equips lecturers with an ability to adapt their delivery methods corresponding to the learning outcomes [31]. Figures 2 and 3 describe the VP function in this study.

5 Conclusions

There is great potential for VP to leverage IPE learning experiences for faculty and students in medical and health professions education. Relevant design thinking and a meticulous development process should be conducted to ensure the learning materials contained are appropriate. Consistent practice to meet the standards of educational contents, supplemented with satisfactory crafted technical requirements allow educators to tailor the students' educational experience. During the development,

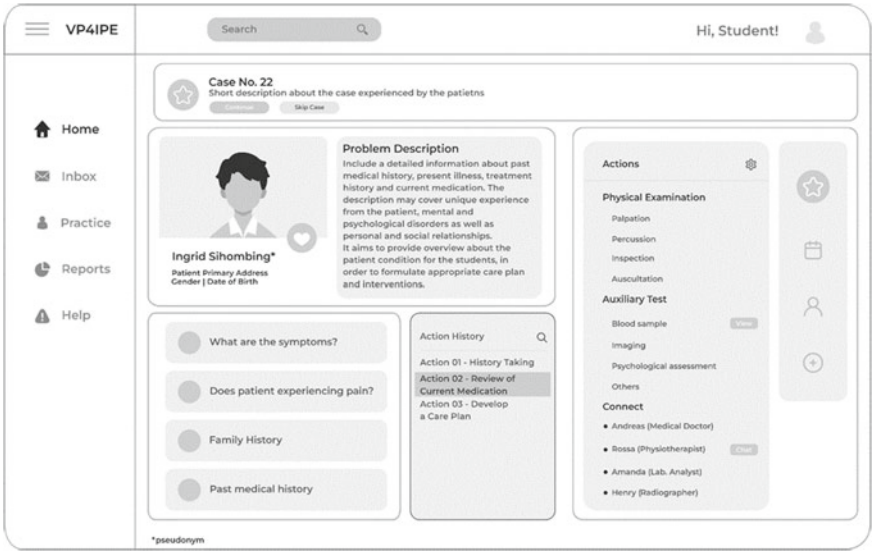

Fig. 3 Proposed design of virtual patient in IPE[32]. This figure was taken from the Intellectual Property Rights Min. of Law Rep. of Indonesia by Utomo et al. 2022 No. EC00202267866; in which the first author of this chapter was one of the co-founders

institutional characteristics and resource availability need to be taken into consideration. Future studies are expected to validate the design principles as proposed in this research in a real environment.

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Authors' Contribution *Dimas Sumunar*—developing research proposal, collecting data, data analysis, and publication of the manuscript.

Natalia Stathakarou—developing research proposal, data analysis, and publication of the manuscript.

Andrzej A Kononowicz—data analysis and publication of the manuscript.

Klas Karlgren—data analysis and publication of the manuscript.

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Medical Student Organization Activities and Self-directed Learning Readiness (SDLR): A Cross Sectional Study

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Abstract Self-directed learning readiness (SDLR) is an individual readiness to learn independently. SDLR is needed to support the long-life learning process of medical students. Medical students participate in academic activities and non-academic activities such as student organizations. Students' activities in organizations have a positive and negative impact on the time and priorities of their learning. The existence of this impact influences the student SDLR process. This study aimed to determine the effect of organizational activity on the level of SDLR of second-year medical students at the Sebelas Maret University. Data were collected through a student activity questionnaire and the Self-Directed Learning Readiness Scale-Nurse Education (SDLRS-NE). This study involved 72 s-year medical students as respondents who were selected based on a simple random sampling technique. Data were analyzed using the Spearman correlation test. The results showed that the correlation coefficient (r) = 0.298 and the significance value $p = 0.011$ ($p < 0.05$) on the effect of organizational activity on the SDLR level. The effect of organizational activity on SDLR components sequentially includes the desire to learn (r) = 0.475, self-control (r) = 0.388 and self-management (r) = 0.330. The positive correlation between organizational activity and SDLR components showed significant results between organizational activity and students' SDLR scores. This study indicates that there is a significant effect of organizational activity on the SDLR level of second-year medical students at Sebelas Maret University.

Keywords Medical students · Organizational activeness · Self-directed learning readiness

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List of Abbreviations

SDL	Self-Directed Learning
SDLR	Self-Directed Learning Readiness
SDLRS-NE	Self-Directed Learning Readiness Scale-Nurse Education

1 Introduction

Students are adult individuals who study at the university level. The students' lives are not only about academic activities but also non-academic activities. This non-academic (organization) activity is expected to be able to increase students' soft skills. Students who participate in organizational activities tend to have higher academic achievement abilities [1] and higher average score [2], more motivation to learn [3–5], as well as showing a balance in managing daily activities, better academic self-efficacy [6], improvement of soft skills [7], time management skills, leadership skills, collaboration, and involvement in community activities [8]. However, excessive involvement in organizational activities can also have a negative impact on reducing student learning time [9].

The existence of positive and negative impacts of organizational activities can affect the ability of students in the learning process; some of them are the self-directed learning ability and learning priorities, especially in Problem-Based Learning (PBL) systems. These aspects will have an impact on the student achievement index in general [10].

Self-Directed Learning (SDL) is a desire for independent learning that comes from within the students themselves. SDL abilities must be possessed by students, especially medical students in order to grow and develop the long-life learning skills needed for medical professionals [11]. In assessing the ability of SDL, students need an understanding of Self-Directed Learning Readiness (SDLR) and the factors that influence it. SDLR is a person's readiness and willingness to learn independently, which consists of components of attitudes, abilities, and personal characteristics. An understanding of SDLR is very necessary for a learning environment that demands student activity and independence [9]. SDLR students are influenced by self-management, motivation, educational experience, and culture. Generally, the students have a responsibility in the learning process to be more active so that they can evaluate their learning goals [12].

Research on SDLR conducted among medical students in India showed that the average SDLR in the second-year onwards decreased from the previous year [13]. Meanwhile, a study by Meity et al. in 2017 stated that older and more experienced students have higher SDLR [14]. However, the study conducted by Nyambe et al. in 2016 showed that the second-year students actually have the highest average SDLR score and the third-year students had a lower average than the previous year due to spending excessive time in organizational activities [9]. This study aimed to

investigate the influence of student activity in organizations on the SDLR level of students.

2 Methods

This analytic observational study was conducted with a cross sectional approach during November–December 2021. The population in this study were second-year medical students of the Faculty of Medicine, Sebelas Maret University. Simple random sampling was used in this study to enroll as many as 72 students.

Data collection used an online questionnaire given via Google Forms but to increase the response rate of completing the questionnaire, direct data collection was also done. The instruments used in this study included the Self-Directed Learning Readiness Scale-Nurse Education (SDLRS-NE) and the students' activity questionnaire. The SDLRS-NE questionnaire used was developed by Fisher et al. in 2010 which has been adapted and validated in Indonesia by Syah in 2014 [15, 16]. Meanwhile, the student activity questionnaire used a questionnaire developed by Pratiwi in 2016 [17]. The analysis used Spearman correlation tests with SPSS version 22 for Windows (IBM Corp., Armonk, NY, USA).

3 Results

This study involved 72 respondents, most of whom are women. Most of the respondents lived in boarding houses and the majority of respondents joined two organizations. Characteristics of respondents can be seen in Table 1.

Table 1 Characteristics of study respondents.

Characteristic	Frequency (n)	Presentation (%)
Gender		
Male	29	40.3
Female	43	59.7
Residence		
Dorm	48	66.7
House	24	33.3
Number of organization		
One	15	20.8
Two	41	56.9
Three	13	18.1
Four	3	4.2

Source Primary Data 2021

Table 2 shows the results of organizational activeness and SDLR of the respondents based on the number of organizations followed. The number of organizations that are followed did not differ much in their means from the level of student activities in organizations. Meanwhile, the number of organizations that were followed did show different means in SDLR results and the highest mean was found in students who follow four organizations. The distribution of each student's activity score and SDLR can be seen in Fig. 1.

The SDLR questionnaire consisted of three components that were assessed, namely, self-management, desire to learn, and self-control. Table 3 shows the average value of the SDLR component with the self-control component having the highest average value, which was 61.0.

The results of the Spearman correlation test between student activity and SDLR obtained the value of sig. 0.011 which indicates that the correlation between student

Table 2 Student activities in organization and SDLR based on the number of organizations

Characteristic number of Organization	Student activities in organization			SDLR		
	Mean	Med	SD	Mean	Med	SD
One	41.8	42	7.2	160.8	158	13.4
Two	44.7	44	5	155.2	154	13.8
Three	44.5	46	6.7	164.5	158	17
Four	43.3	42	3.4	166.7	158	18.2

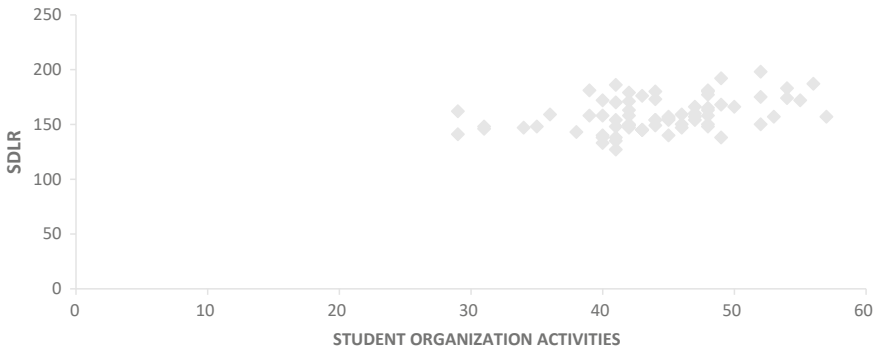

Fig. 1 Distribution value of student organization activities and SDLR

Table 3 Distribution of the mean value of SDLR components

SDLR	Mean
Self-management	49.4
Desire to learn	48.1
Self-control	61.0

Table 4 The Results of the Spearman Correlation Test Student Activity and SDLR Components

Student activity towards SDLR Component	Coefficient correlation	P
Self-management	0.330	0.005
Desire to learn	0.475	0.000
Self-control	0.388	0.001

activity in organizations and SDLR is significant. Spearman correlation value of 0.298 indicates a positive correlation with low correlation strength.

In Table 4, the results of the Spearman correlation test on student activity and the 3 SDLR components are significant. The correlation coefficient of each SDLR component has a low correlation on self-management and self-control, but there was a strong correlation for the desire to learn with a positive correlation.

4 Discussions

The results showed that there was a significant positive correlation between the level of activity and SDLR. These results indicate that the more active a student is in the organization, the higher the student's SDLR score will be. The correlation coefficient of 0.298 indicated the level of moderate correlation. It was possible that this could happen because the SDLR components of self-management, desire to learn and self-control also have a significant and positive correlation coefficient. The positive influence between student activity and SDLR is in line with the study conducted by Bakoban and Ajarallah in 2015 and by Chan in 2016 which found this can occur because students who take part in organizational activities are accustomed to managing their time well so that organizational activities do not interfere with their study time [18]. Students with active involvement in organizational activities are more likely to use an in-depth approach when learning, making it easier for them to focus more on learning with better results [19].

The results of the correlation test of the level of student activity in organizations with the self-management component of the SDLR showed significant results with a positive correlation ($p = 0.005$; $r = 0.330$). Generally, the more active students are, the more they have the ability to manage themselves and all the activities they will do well. This pattern is in line with the study results of Deyo et al. in 2011 which showed that students who take part in organizational activities tend to complete assignments early before the laboratory, meet in study groups, and can report post-campus plans to enter the general community [20]. These achievements show that the self-management and time management skills obtained by activist students are exceptionally good. Christison's 2013 study also showed that students who participate in organizational activities have greater academic success, greater character development, especially in the areas of time management and leadership skills, more positive social development, and a greater interest in community involvement [8].

The correlation test of the level of student activity in organizations with the component of desire to learn in the SDLR showed significant results with a positive correlation ($p = 0.000$ (<0.001); $r = 0.475$). These results are in line with the study conducted by Sohilait in 2019 on 2016 students of University Sam Ratulangi ($r = 0.525$) where there was a positive correlation between organizational activity and student learning motivation. [21]. Zubaidi et al. in their 2018 study also reported that there was a statistically significant positive correlation between organizational activity and student learning motivation [22]. This can be caused because students who participate in organizations are accustomed to being given the responsibility to complete assignments so that they have more experience and knowledge to achieve their goals, one of which is growing the necessary motivation to learn [21].

The final component of the SDLR is self-control. The correlation test of the level of student activity in organizations with the self-control component of the SDLR showed significant results with a positive correlation ($p = 0.001$); $r = 0.388$). These results indicate that the higher the level of student activity in the organization, the higher the self-control ability of the student. This is in accordance with a previous study conducted by Attarwala in 2015, which reported that students who participated in organizational activities scored significantly higher on overall academic self-efficacy when compared to students who did not participate in organizational activities [6]. In addition, the results of a study by Christison in 2013 also explained that organizational activities are associated with better self-efficacy and self-restraint in students [8]. Another study conducted by Griffiths et al. in 2021 explained that there is a positive correlation between involvement in certain organizational activities and self-efficacy in university students [1]. This conclusion is reinforced by Putri's 2016 study in which self-efficacy is significantly correlated to the level of SDLR [23].

One of the limitations of this study is that the data were taken during the COVID-19 pandemic when most students study online. Likewise, student activities including the majority of organizations were done online such as meetings, seminars, committees, and others. As a result, these organizational activities did not actually affect the "free time" for student learning.

5 Conclusions

From the results of the study, it was found that there was a positive effect between the organizational activity and the level of Self-Directed Learning Readiness (SDLR) of medical students. There is also a positive effect between organizational activity on the three components of SDLR, namely self-management, desire to learn, and self-control. Accordingly, it can be concluded that the more active students are in organizations, the higher the SDLR level they will have in their academics.

Institutions can encourage students to participate in organizations by appreciating and supporting those students who are actively involved in an organization. As a result, the students' self-management and self-control will be balanced on academic efforts and organizational activities with reduced free time.

Ethics Approval and Consent to Participate All respondents participated voluntarily and informed consent was obtained from the participants. Ethical approval of research was obtained from the Health Study Ethics Committee of Dr. Moewardi General Hospital (register number: 967/XI/HREC/2021).

Competing Interest The authors declare that there are no competing interests related to the study.

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Authors' Contribution *Siti Maryam*—developing study proposal, collecting data, data analysis, and publication manuscript.
Atik Maftuhah—developing study proposal, data analysis and publication of the manuscript.
Siti Munawaroh—developing study proposal, data analysis and publication of the manuscript.
Dian Nugroho—data analysis and publication of the manuscript.
Rachmadya Nur Hidayah—developing and publication of the manuscript.

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Perception of Interprofessional Education (IPE) of Healthcare Workers from Public Health Facilities

Siti Munawaroh and Hedva Rayna Hitipeuw

Abstract Interprofessional education (IPE) is important for health profession students' character development. More studies are still needed to measure the perception of the facilitators, especially those who are not faculty members and are less familiar with academia. This study aimed to determine the IPE perception of healthcare professionals working in Surakarta public health facilities who are preparing to facilitate IPE. This was a pilot study where data were obtained through an online survey containing the revised version of the Interdisciplinary Education Perception Scale. The Mann–Whitney U test was used to compare the difference between each variable, and the results were categorized by the participants' gender, profession, and workplace. A total of 38 healthcare workers participated from a regional general hospital and several community health centers in Surakarta. They consisted of 60.5% female, and the doctor profession as the highest proportion. They generally have a positive perception of IPE, with an overall mean score of 66.07 (SD = 4.97). Furthermore, there was no significant difference between the compared mean scores included in each subscale except between male and female participants in the Perceived Need for Cooperation subscale ($p = 0.02$). The participants generally have a positive perception of IPE.

Keywords Interprofessional education · Interprofessional collaboration · Health professions · Interdisciplinary education perception scale

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List of Abbreviations

IPE Interprofessional education
IEPS Interdisciplinary Education Perception Scale
IPFS The Interprofessional Facilitation Scale
SD Standard deviation

1 Introduction

Interprofessional education (IPE) is a process in which students from more than one profession jointly learn to improve patients' outcomes [1, 2]. It prepares the students for the interprofessional collaboration they will encounter in work [3, 4]. IPE's potential to enhance students' character and competencies regarding knowledge, behavior, and communication can improve clinical outcomes and patient satisfaction [2, 5]. The continuing efforts for improvements and innovations reflect its importance in shaping future healthcare workers [1, 6].

Facilitators play a significant role in IPE, in which their perceptions of it are crucial towards the process and outcome. However, only a few studies measured the facilitators' perception and readiness of IPE among the currently available research. The participants were mainly lecturers in universities, colleges, or polytechnic institutions [7–11].

Outside of faculty members, facilitators of IPE could also consist of clinicians and healthcare who are not directly involved in academia. These professionals who are experienced in the interprofessional collaboration were observed in previous studies [4, 12]. In collaborating, the healthcare professionals are well-versed in how to communicate perspectives and divide tasks between professions to avoid overlaps between roles and responsibilities [4]. This aspect reflects on their competence as a contributor in an interprofessional collaboration. These professionals also are practiced in handling barriers, such as domain thinking, that can hinder cooperation between different domains in a team. Another substantive aspect they could share, as an IPE facilitator, is the motivation to participate and continue in the interprofessional collaboration, despite its challenges [12].

However, the facilitators' perception of IPE itself is crucial because it affects the commitment and motivation in their participation. A positive perception could affect their readiness and preparation before facilitating IPE, which could increase the facilitators' competence [1, 13]. Compared to the facilitators who are faculty members, these healthcare professionals may have different perceptions regarding education due to the familiarity difference towards academia. Therefore, this study aimed to determine the IPE perception of healthcare professionals who work in Surakarta public health facilities and are preparing to facilitate IPE.

2 Methods

This study was conducted from February to March 2022 as a pilot study. Ethical clearance was issued in January 2022 by the Health Research Ethics Committee in Dr. Moewardi General Hospital, Surakarta, with the number 131/I/HREC/2022.

The study adopted a cross-sectional design using a survey to obtain quantitative data. The survey was distributed through an online form containing the remodeled version of the Interdisciplinary Education Perception Scale (IEPS), initially developed by Luecht et al. in 1990 and revised into a 12-item scale in 2007 by McFadyen. The subscales of the instrument are Competency and Autonomy, Perceived Need for Cooperation, and Perception of Actual Cooperation [14]. Among the several IPE instruments currently available, this study uses IEPS due to its suitability in measuring the perception of IPE of participants who are already well acquainted with their profession's work environment, such as the healthcare workers who participated here [15]. The Interprofessional Facilitation Scale (IPFS), an instrument developed and previously tested on IPE facilitators, is not being used in this study due to the difference in purpose. The IPFS is already focused on measuring facilitation skills rather than perception [16]. With IEPS, this study aimed to see the healthcare professionals' perception of IPE, which is still a novel concept for those unfamiliar with academia and its learning methods.

This study used convenience sampling. The participants were healthcare professionals invited to a workshop to train and prepare upcoming IPE facilitators. The professionals included those who work in a regional general hospital and several community health centers in Surakarta. This study compared the data based on gender, profession (doctor and non-doctor/paramedic), and workplace. Furthermore, the Mann–Whitney U test was used to compare the difference between variables in each category using the SPSS software (IBM Corp., Armonk, NY, USA).

3 Results

A total of 38 healthcare workers who will serve as IPE facilitators participated in the survey and completed all of the questions (Table 1). They were comprised of 60.5% females, while the doctor profession had the highest proportion (42.1%), followed by nurse (21.1%) and midwife (13.2%), and 81.4% of the participants work in a community health center, while the rest work in a regional general hospital. Table 1 shows the detailed characteristics of the sample population.

The overall mean score of the IEPS was 66.07 from the possible range of 1 to 72, with a standard deviation (SD) of 4.97. The mean score for each item ranged from 5.42 to 5.84, except for the sixth, which was 4.32. The highest SD was 1.54. The minimum and maximum scores for the sixth item are 1 and 6, respectively. The sixth item contains "individuals in my profession must depend on the work of other people from other professions." The overall mean scores of the female and male

Table 1 Characteristics of the sample (n = 38)

Characteristics	Mean (SD)	N (%)
Age	41.55 (7.49)	
Gender		
Female		23 (60.5)
Male		15 (39.5)
Profession		
Doctor		16 (42.1)
Nurse		8 (21.1)
Midwife		5 (13.2)
Pharmacist		2 (5.3)
Epidemiologist		2 (5.3)
Dentist		1 (2.6)
Physical therapist		1 (2.6)
Health analyst		1 (2.6)
Nutritionist		1 (2.6)
Pharmaceutical & food analyst		1 (2.6)
Workplace		
Community health center		31 (81.4)
Regional general hospital		7 (18.4)

SD: standard deviation

participants showed no significant difference ($p = 0.26$). This result is also found in the participants' profession ($p = 0.699$) and workplace ($p = 0.404$) categories. Table 2 shows the detailed results**.**

Table 2 Comparison between stratifications

Stratification	N	Mean (SD)	*p*
Gender			
Male	15	65.33 (4.48)	0.26
Female	23	66.56(5.32)	
Profession			
Doctor	16	66 (4.27)	0.699
Paramedic	22	66.13 (5.52)	
Workplace			
Regional general hospital	7	67.42 (5.45)	0.404
Community health center	31	65.77 (4.99)	

SD: standard deviation

Mean scores of each subscale were compared between the participants' genders, professions, and workplaces and showed no significant difference. The only exception is the Perceived Need for Cooperation subscale between the male and female participants ($p = 0.02$). Table 3 shows the detailed results for each subscale.

4 Discussions

The participants in this study generally have a positive perception of IPE. The overall mean of the subscales also shows positive results, with Competency & Autonomy having a mean score of 27.44 from the possible range of 5 to 30. Also, Perceived Need for Cooperation and Perception of Actual Cooperation has a mean score of 10.15 and 28.47, from the possible range of 2 to 12 and 5 to 30, respectively. These results are consistent with the reports of previous studies on the facilitators of IPE [7–10, 17–19].

This study is the first to measure the IPE perception of facilitators who are not faculty members of a university but healthcare professionals working in public health facilities, such as regional general hospitals and community health centers, partnering with the faculty of medicine. Therefore, the participants have diverse professions. Previous investigations mainly involved faculty members, with the diversity of professions varying across studies [7–10, 17–19].

Direct comparison with other studies on IPE facilitators is limited because of the difference in the IEPS version and the analyzes. Studies mostly use the unrevised and 18-item versions of IEPS to measure perception, except for Bashatah et al. in 2020, Yuniawan et al. in 2015, and Christiyawati and Suminar in 2017 [7–10, 17–19].

Categorization in analyzing the results also differs across studies. Most compared between gender, health profession, or the health major the participants teach [7, 9, 10, 19]. Some are categorized by educational background and experience, particularly years of teaching experience [9, 19]. Others are by IPE experience, previous IPE training experience, or interprofessional collaboration [9, 10, 19]. No previous study reportedly compared results based on the participants' workplaces.

The overall mean scores between male and female participants in this study showed no significant difference. This result is consistent with two other studies on lecturers' perceptions in health majors regarding IPE [10, 19]. Furthermore, the results compared between genders for each subscale showed no significant difference, except for the Perceived Need for Cooperation. This result contradicts the reports of Khajehghyasi et al. that showed no significant difference on every subscale, using the unrevised IEPS [19]. Those that compared perceptions based on gender did not specify the results in each subscale. However, a cross-sectional study conducted by Patricia et al. in 2019 used the unrevised version of IEPS and found a higher percentage of positive results in the female participants [9, 10].

The significant difference found between the mean scores for the Perceived Need for Cooperation subscale when compared between the male and female participants might be attributed to the gender differences in behavior reported in earlier studies.

Table 3 Comparison between stratifications in each subscale

Subscale	Mean (SD)	Gender			Profession			Workplace		
		Male	Female	*p*	Doctor	Paramedic	*p*	Regional general hospital	Community health center	*p*
Competency & Autonomy	27.44 (2.6)	27.66 (2.44)	27.30 (2.73)	0.889	27.43 (2.31)	27.45 (2.84)	0.854	28.71 (2.21)	27.16 (2.62)	0.123
Perceived Need for Cooperation	10.15 (1.62)	9.4 (1.7)	10.65 (1.4)	0.02	10.37 (1.36)	10 (1.79)	0.574	9.86 (1.95)	10.22 (1.56)	0.699
Perception of Actual Cooperation	28.47 (1.95)	28.26 (2.01)	28.61 (1.94)	0.581	28.18 (1.9)	28.68 (2.01)	0.404	28.85 (2.03)	28.38 (1.96)	0.414

Early reports showed that women tend to compromise and cooperate better than men, who are generally more independent and assertive [20]. The independence attribute in men may affect their response to one of the items in this subscale which state, "individuals in my profession must depend upon the work of people in other professions" [14]. A study was previously done to see the difference in cooperation between male and female high school students and also reported a negative association between the male participants with cooperation level, where the gender gap favors more toward the female participants [21]. Overall, women are found to be more prosocial than men, although this does not directly reflect higher cooperation. The level of cooperation in women is strongly related to their trust in collaboration partners. The results in this study may be affected by the trust level in the female participants to cooperate with other professions [22]. Another factor that could affect this result is the gender composition in the participants' workplace. Peshkovskaya et al. in 2019 found the participants in their study cooperate positively in a mixed-gender environment, while the female participants showed negative results in a same-gender group.

The results were compared based on profession and showed no significant difference. This result contradicts the findings of Khajehghyasi et al. on lecturers categorized according to the health major they teach in, which reflects their profession or specialty [19]. Other studies which compared based on health majors showed various results with no calculation for a statistically significant difference [7, 9]. The results on each subscale also showed no significant difference. Furthermore, no previous study on IPE facilitators calculated a statistically significant difference between professions for each subscale, except for Khajehghyasi et al., which used the original version of IEPS [19].

There is no significant difference in the comparison based on the participant's workplace. Due to the lack of previous studies regarding IPE facilitators' perception of using their workplace for comparison, these results provide an opening for further investigation into the relation between health professionals' workplace and their perception of IPE.

IPE is a way of educating attributes and characters essential for future healthcare workers [23]. Facilitators are crucial to the process of IPE since the students rely on their skills, knowledge, and experience in interprofessional collaboration in the working environment after university. IPE requires the same level of commitment from the facilitators and the participants to be successful [13]. Therefore, it is important to assess the facilitators' perception of IPE, especially before the interprofessional programs, to identify and prepare for the area that needs improvement before mentoring the participants. Properly-prepared facilitators may improve the process and outcome of the IPE and participants' characters.

Despite the difference in familiarity towards academia compared to faculty members, the healthcare professionals who participated in this study have a positive perception towards IPE. This result is significant because it would affect their commitment, behavior and competence while facilitating the students. The results suggested that the healthcare workers in this study would do their role as IPE facilitators positively just as those who are part of a faculty.

The limitation of this study includes the small number of samples who participated in the survey. Furthermore, due to the small number of participants from some professions and workplaces, the interpretation and representation of those categories are limited. Future studies could benefit from using more samples and extending more into the relationship between facilitators' perception of IPE with their competence in facilitating, especially the non-faculty members. Future studies could also search into the relationship between gender, profession, and workplace environment with facilitators' perception of IPE.

5 Conclusions

The perception of the healthcare professionals in this study is positive towards IPE, with an overall IEPS mean score of 66.07. The results are consistent with previous studies and positive despite the initial assumption that these participants have less familiarity towards academia and education, compared to facilitators who are faculty members.

There was no significant difference in each stratification, both on the overall mean scores and for each subscale. However, there is an exception in the mean score between male and female participants in the Perceived Need for Cooperation subscale. Based on these results, future studies are recommended to discuss more about gender and their effects on IPE perception, especially relating to the Perceived Need for Cooperation subscale, with larger sample populations.

Ethics Approval and Consent to Participate Ethical clearance for this study was issued in January 2022 by the Health Research Ethics Committee in Dr. Moewardi General Hospital, Surakarta, with 131/I/HREC/2022 as the reference number.

Competing Interest The authors declare that there are no competing interests related to the study.

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Authors' Contribution *Siti Munawaroh*—developing research proposal, collecting data, data analysis, and publication of the manuscript.

Hedva Rayna Hitipeuw—collecting data, data analysis and publication of the manuscript.

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Teaching in Limited Time Training Using a 'Champion' Approach

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Abstract Time constraints are the most significant obstacle experienced by clinical teachers when they want to provide high-quality learning experiences or attend faculty development training. The faculty development program will be effective if it involves 'champions' or a small number of people committed to change. This study aimed to explain the application of one-minute preceptor (OMP) training with a flexible design through the champions. This study was qualitative descriptive research conducted at the UKDW Faculty of Medicine Teaching Hospital. The champions were chosen from Internal Medicine, Surgery, Pediatrics, and Obstetrics and Gynecology Department. Four champions participated in OMP training individually and adjusted to their schedule. The training was conducted in three phases; initiation, development, and implementation, accompanied by observation, giving feedback, reflection, and interviews by the facilitator. The results were analyzed using content analysis. The feedback delivery in OMP training still focused on the preceptors instead of the learners. The preceptors tended to correct the mistakes and give explanations to the learners. The flexible training format could accommodate all participants attending all the training phases. A flexible training strategy using a champion approach is needed to initiate teaching innovation among busy clinical teachers. This method demonstrates that lecturers can provide quality teaching even in a limited time. However, the training strategy should be evaluated to provide a suitable feedback delivery method focused on the learners.

Keywords Time constraint · One-minute preceptor training · Champion · Feedback · Clinical teacher

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List of Abbreviation

OMP One-minute preceptor

1 Introduction

According to clinical teachers, time constraints are a significant obstacle in the planning and providing of quality clinical teaching [1, 2]. Generally, being an effective clinical teacher is more challenging than being a busy doctor in clinical practice [1]. Clinicians tend to want to provide quality learning experiences for learners without disrupting their clinical work [3].

There are several tips for teaching in a limited time, namely identifying the needs of learners, choosing a model for teaching in a limited time that can be integrated into daily routines, and providing feedback [4]. The method of teaching "micro-skills," or one-minute preceptor (OMP), is a short method for teaching in a clinical environment and provides a simple framework for daily teaching during patient care. The original OMP model uses a five-step approach: (1) getting commitment, (2) probing for supporting evidence by encouraging students to think critically and conduct clinical reasoning, (3) teaching general rules, (4) reinforcing what has been done well, and (5) correcting mistakes. The strengths of this teaching method are increasing involvement with patients, increasing clinical reasoning by students, brief student admissions, and high-quality feedback from mentors [5, 6].

From various studies, OMP is proven as an effective and efficient teaching method. An experimental study showed that students who were guided using the OMP model had comparable abilities, was even better at diagnosing patients, had higher self-confidence, and assessed OMP methods to be more effective and efficient than traditional methods [7]. Other research in the United States of America (USA) through qualitative assessments and workshop evaluations showed increasing role-play participation and training material satisfaction [8]. Short clinical teaching, such as OMP, that could be done more often than traditional teaching, increased student satisfaction [9]. A study in Hong Kong demonstrated that the new lecturers became more committed to students in reinforcing what had been done correctly by students [10]. OMP also had an impact in encouraging concept teaching at a higher level, facilitating the assessment of student knowledge, encouraging the provision of feedback, and increasing student satisfaction with clinical case-based teaching methods in the emergency department [11].

Leading or implementing change in educational programs and using scholarly teaching techniques in clinical environments effectively is a competency that must be possessed by clinical teachers [12]. In order to have skillful clinical teachers, a faculty needs to organize teaching training activities to facilitate clinical learning. The faculty needs to provide the necessary training for their clinical teachers to give them a conceptual framework for teaching and help them adopt and adapt specific

teaching behaviors to actual clinical settings. One of the teaching behaviors about teaching in a short time is the OMP approach [1].

Damp et al. [13] stated that two aspects that became a challenge in faculty development were incorporating training material into daily activities and limited time to allow participation in faculty development programs. In that study, the researchers found that effective faculty development programs can be implemented in flexible formats and overcome common barriers to participation [13].

In order to improve the effectiveness of faculty development program implementation, "champions" are needed to achieve these goals [14]. Based on Miech et al. [14], the meaning of "champion" as a role is related to implementation with the characteristics of people who (1) are internal to the organization; (2) generally have an intrinsic interest and commitment to implement change; (3) work diligently and endlessly to encourage future implementation, even if the efforts do not receive formal recognition or compensation; (4) are enthusiastic, dynamic, energetic, personal, and persistent; and (5) have the power to convince others of the efficacy of an effort or approach. In an organization, the role of champions can focus on particular project-based innovation or focus on individual changes in transformative practices.

The "champion" is vital in introducing new ideas, including clinical teaching methods. An ideal "champion" is someone who is an expert in his field, is involved in medical school activities, and becomes an educator who understands the importance of integrating topics into the organization. "Champions" can support the premise, that it is essential to recruit other colleagues to support the development of curriculum content and plans, as well as to provide ongoing training for the program's sustainability [15]. Thus, this study aimed to explain the application of one-minute preceptor (OMP) training with a flexible design for the busy schedule of clinical teachers using "the champion approach."

2 Methods

This study was a qualitative descriptive research conducted at the UKDW Faculty of Medicine Teaching Hospital. The champions were chosen from Internal Medicine, Surgery, Pediatrics, and Obstetrics and Gynecology Departments using students' evaluations and consideration from the faculty. The four champions who participated in OMP training individually adjusted with their schedule. After that, the facilitator pre-initiated the champions with regard to adjusting the training design to the champions' schedule. All champions had non-uniform schedules. Three of the four champions recommended individual training so that they did not have to spend the time determined by the facilitator to be present in groups. With these considerations, medical education experts delivered the OMP material via video, while the training was packaged individually with a schedule to adjust to the champions' requests. The training was conducted in three phases; initiation, development and implementation [16].

In the initiation phase, the champions were interviewed about the experience of conducting daily clinical teaching, the challenges and obstacles of clinical teaching, teaching clinical reasoning, and providing feedback. After that, the facilitator displayed the OMP material video.

In the development phase, the champions tried to apply the OMP in clinical teaching for one week with direct observation by the facilitator. After one week of trial implementation, the facilitator guided the reflection of experience in the implementation using the Gibbs reflective cycle. Participants were asked to describe the process of clinical teaching using the OMP method (description), share their thoughts and feelings about the implementation (feeling), experiences that have been good and bad regarding the implementation (evaluation), what can be learned from the implementation (analysis), the suitability of the implementation with the theory (conclusion), and any follow-up to improve the subsequent implementation process (action plan) [17].

In the implementation phase, participants were asked to apply OMP again for four weeks. During the implementation process, the facilitator acted as an observer and provided feedback. As a result of the evaluation, clinical teachers were interviewed about their experience of implementing the OMP in daily clinical teaching and answered the questions related to the OMP training design.

3 Results

3.1 Champion Selection Process

Considerations on the selection of the champions in each department were different. The Champion from the Obstetrics and Gynecology Department was chosen with consideration as the head of the department, who was assessed both by students in the clinical teaching process and actively participating in faculty activities both teaching, meetings, and training, and enthusiastic about medical education, while the Champion from Surgery Department was chosen with consideration as the head of the department as well as the head of the program study and actively participating in faculty activities both teaching, meetings, training, and informal activities, and supporting the development of medical education. The Champion of Internal Medicine Department was chosen with the consideration of always guiding students in the hospital, being assertive and dynamic, and actively participating in the faculty activities teaching, meeting, and training. The Champion of Pediatrics Department was chosen because they were considered the best choice among two clinical teachers in the department. According to students, compared to other clinical teachers in the department, he was younger and more open-minded and often guides students in hospitals, is energetic and persistent. Three of the four champions had previously participated in clinical teaching workshops where one of the topics was OMP.

3.2 Observations

OMP was most often applied in the wards and outpatient settings after bedside teaching or after visitation. Clinical teachers from the Pediatric and Surgical Department did not apply OMP in outpatient settings due to time constraints so they preferred the ward or operating room settings. When a patient was examined, the clinical teacher provided guidance on bedside teaching and after the patient was discharged, the clinical teacher provided guidance with the OMP method. At the visitations, clinical teachers conducted bedside teaching more than after being in a nurse station, and the clinical teachers implemented the OMP while completing the patient's medical records. In general, the clinical teachers conducted clinical teaching with the OMP method which consisted of getting a commitment, probes for supporting evidence, reinforcing what was done right, correcting mistakes, and teaching general rules.

- Get a commitment. The commitment that was built comes from clinical teachers and most of it was about physical examination, diagnosis, and therapy according to the cases found in the outpatient or ward.
- Probe for supporting evidence. If students had not mastered it, then clinical teachers would provide more triggers to guide students' answers.
- Was done right. Clinical teachers gave a positive comment by responding "yes" then repeating the correct answer of the student. Positive feedback given to students was still very general and less specific.
- Correcting mistake. Clinical teachers asked other contradictory aspects to make students think critically, then clinical teachers would give their correction. The focus of correction was to convey what was wrong and provide additional information to justify the student's answer. Corrections also took the form of physical examinations that had been conducted by the students during bedside teaching.
- Teaching general rules. Clinical teachers did not always apply the step if the learning was clear. If the clinical teachers felt that students had to study again, they usually provided homework to discuss at the next meeting.

Three of the four clinical teachers could apply OMP in the daily clinical teaching–learning process, outside the formal schedule such as through clinical tutorials, case referrals, or case reflections. A clinical teacher experienced difficulties in implementing OMP due to time constraints. He considered that by reducing the duration of teaching and increasing its frequency, the material discussed was lacking in depth. When observations were made on this clinical teacher, he tended to ask about all theories about the cases encountered so that the teaching duration was longer than it should be.

All clinical teachers guided students to think critically and were not just providing the right answers directly and in the process, they encouraged students to actively learn. The learning atmosphere presented was very challenging because students must be prepared with the cases without making the atmosphere threatening for students. It makes students stay comfortable and able to study more diligently. Two

clinical teachers provided material about diseases according to the competence of general practitioners at the beginning of the week to increase student readiness.

3.3 Interviews

Experience implementing OMP in clinical teaching

Although OMP is designed to be used for a limited time, it turned out that the biggest obstacle in implementing OMP was the availability of time when serving patients. OMP could be implemented if there were not many patients.

> The OMP method is applied for clinical teaching depending on the time, the situation... whether the patient is overloaded or not. It all depends on the time, limited or not. (RI)
>
> There are no difficulties, it's just a matter of time constraints. If there are a lot of patients, yes, we really feel more burdened, (RII)

When OMP could be conducted, the clinical teachers felt that this method was more efficient because they could provide guidance in a short time. With OMP, clinical teachers could also find out the readiness of students in clinical setting.

> I can teach clearly, I don't lose much time to teach, and I am more suited to this kind of method than if I have to set aside special time for them [students], for example talking about dengue cases. If we are looking for a certain time it is wasting time and in my opinion, it is less effective. (RIII)

In addition to providing benefits for clinical teachers, in their opinion, OMP also provides benefits for students, including encouraging students to study, students can be exposed to many cases, and instructors could provide more focused and efficient learning.

> [OMP] should be useful because [students] are encouraged to learn. Apart from that [students] get a lot of cases, so what is learned is not only one or two but during the clerkship but can be around 10 to 15. (RII)
>
> The perceived benefit is that learning is more focused on one topic and the time is not too long. (RIV)

The opinion of the champions on training design

Participants had a good impression of the training design. Regarding the influence of the training design on the participants' business, some participants did not feel busier because of this training because its phase was integrated into daily clinical teaching–learning activities that were routinely conducted by participants as clinical teachers. They did not feel disturbed by the training schedule because they adjusted to the participants' time.

> For me [the design] is suitable because the facilitator adjusts my time for student guidance so that I don't feel disturbed. This was not annoying because the facilitator adjusted my time guiding students on a regular basis so that no extra time was required for me. (RII)

However, there was one participant who felt increasingly busy because the brief guidance made him have to guide students more often. He preferred to teach in lectures at one time with a long duration.

> The thing that bothers me is the timing. I end up having to often guide students in brief. It interferes with my time. It can't just be one long time like a lecture. (RIV)

Benefits that could be gained from the training design include that participants do not need to leave their daily work, participants got teaching guidelines that make clinical teaching more directed, and they are reminded about the OMP.

> The teaching can be more focused because there are guidelines that we can use from this training. (RII)

Regarding the sustainability of training results in daily clinical teaching activities, participants who had a habit of teaching the students outside the referral schedule or clinical tutorials still routinely implemented the OMP method. OMP made the guidance process now more directed and systematic. However, participants who did not have this habit rarely applied OMP.

> From the beginning, I have often given cases directly to students, in front of patients, so going forward, I will continue to apply it. (RI)
>
> [applied continuously] Yes depending on whether I bother or not. If not busy, I can guide. (RIV)

4 Discussions

Before the training phase was conducted, we approached prospective participants to convey their objectives, inform the design of the training and ask for their willingness to participate. This was done because the clinical teachers are busy and had unpredictable schedules. Therefore, the training schedule must be in accordance with the participant's schedule. Faculty development was certain to be more effective if based on the real or perceived needs of the faculty [18]. During this time, the need assessment was related to the training topic needed by the faculty, but actually, the needs assessment related to the schedule of prospective participants also needed to be done. The flexible training format could accommodate all participants attending all of the training phases. Three of the four champions could provide clinical teaching in a short time.

The training domain contained knowledge, skills, and attitude packed through three training phases. Participants understood the concept of OMP through the initiation phase and then practiced the teaching methods through the development and implementation phases. The application of teaching methods in daily clinical teaching activities was accompanied by reflection and feedback in the development phase and the implementation forms an attitude to integrate OMP among the busy activity of clinical teachers.

Participants get priority in the faculty development program when they can participate without having to perform additional tasks that can interfere with their routine tasks, especially if the training can have an impact on their clinical practice [19]. The OMP training was delivered in a flexible format so that the champions can still take part in the training while doing daily tasks without making them leave the workplace. The training material also makes them able to teach during a busy schedule.

Through OMP, students interacted directly with clinical teachers and got feedback from them. These two aspects fall into effective supervision criteria [20]. For feedback to be effective, clinical teachers must observe students through direct interaction with patients [1]. OMP facilitates the occurrence of these interactions while facilitating the provision of feedback for students.

The feedback given by clinical teachers was more likely about corrections, not the good efforts that have been done by students. Students also perceived feedback from clinical teachers as an affirmation of ideas that are right or wrong and a means to get true information from experts directly. The positive feedback given by clinical teachers was not specific, for example, "You're good," which was not beneficial for students [1]. Therefore, students tended to benefit only from error correction.

Two of the four departments had difficulty implementing OMP in outpatient settings due to time constraints with patients. This is similar to the challenges mentioned by Ramani et al. [1] that busy clinical settings, teaching time that is often short and no time for elaborate teaching are some of the challenges of outpatient teaching. Even though it has been taught to use the OMP framework that should be done in a short time, it remains an obstacle for clinical teachers.

The success of this training was that clinical teachers who were selected as champions could take part in all stages of the training without having to give up their busy lives in maintaining their clinical work. Even so, it turned out that the essence of clinical teaching in a short time that is packaged in OMP has not been fully understood by clinical teachers. There were still clinical teachers who take longer to explain learning material to students and feel OMP is not enough. What should be understood is that OMP focuses on increasing the frequency of teaching, not the duration of teaching. From the results of observations and interviews, clinical teachers felt that all materials must be taught directly to students because clinical teachers are the main source of information. This is presumably due to the cultural context of large power distance which is still strong [22].

In addition, in providing feedback through OMP, clinical teachers were still focused on error correction. The step to reinforce what was done well was usually just a short change of "right" or "already good" statements, which tend to be not specific and sometimes even skipped. The culture of large power distance is also reflected in these results, where clinical teachers as experts tend to see mistakes so that the focus of feedback is on error correction [22–24].

The findings above are different from a study conducted by Pribadi [25] which found a change in the model for providing feedback after training was conducted for field supervisors by implementing intensive supervision. Field supervisors can apply reflective feedback in facilitating community-based learning, not just providing corrections. According to the field supervisor, this change can occur due to intensive

supervision modules, training, and real experience in facilitating students. This OMP training is also based on the actual experience of clinical teachers in guiding students, but the possibility of clarity on the modules and design of the training still needs to be evaluated further.

5 Conclusion

A flexible training strategy using a champion approach is needed to initiate teaching innovation among busy clinical teachers and gives evidence that lecturers can provide quality teaching even in a limited time. Faculty development, whose target is clinical teachers, can consider a training design that schedules according to the participants' time so that all participants can attend the training. Although the OMP training provided many benefits, the training design needs to be reviewed because it has yet to change the behavior of clinical teachers, especially in understanding the essence of OMP and providing feedback in an appropriate method.

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Yoyo Suhoyo—developing research proposal and collecting data.
Ova Emilia—developing research proposal and collecting data.

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The Effect of Self-regulation and the Unified Theory of Acceptance and Use of Technology (UTAUT) Factors on Medical Students' Mental Well-Being

Sha Lisa Indriyani, Bulan Kakanita Hermasari, and Dian Nugroho

Abstract During the COVID-19 pandemic, changing the learning system from offline learning to online learning may have harmed the mental well-being of medical students who have a low level of acceptance and use of online learning. This study aimed to determine the relationship between students' self-regulation learning strategies and acceptance and use of online learning toward the mental well-being of medical students. This research, analytical observational research with a cross-sectional approach was employed. A total of 230 medical students participated in the study. Data were collected using Google Forms containing the individual data, the Online Self-Regulated Learning Questionnaire (OSLQ), the Unified Theory of Acceptance and Use of Technology (UTAUT) questionnaire, and the Mental Health Continuum-Short Form (MHC-SF). Data gathered were analyzed by the Spearman correlation test using SPSS. The results showed a significant correlation ($\rho = 0.252, p = 0.000$) between self-regulated learning and medical students' mental well-being. There was also a significant correlation ($\rho = 0.131$, $p = 0.047$) between acceptance and use of online learning with medical students' mental well-being. The help-seeking behavior ($\rho = 0.318, p = 0.000$) and performance expectancy ($\rho = 0.170, p = 0.010$) had a positive role in the prediction of the mental well-being of the students. According to the results, self-regulation learning strategies, as well as acceptance and use of online learning, had a positive effect on mental health conditions. Thus, teaching self-regulated learning strategies to students is recommended as a promotive strategy in mental health. Furthermore, it may suggest that medical education institutions should focus on facilitating the development of strategic planning of online learning courses to increase the recruitment and retention of future students. In terms of pedagogical practice, a user-friendly learning management system may be recommended so students can access online learning courses without difficulties.

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Keywords Self-regulated learning · Unified theory of acceptance and use of technology · Mental well-being · Medical student · Mental health continuum-short form

List of Abbreviations

OSLQ	Online Self-Regulated Learning Questionnaire
UTAUT	Unified Theory of Acceptance and Use of Technology
MHC-SF	Mental Health Continuum-Short Form

1 Introduction

The Coronavirus Disease-2019 (COVID-19) pandemic caused all schools and colleges to be closed to implement physical distancing. The closure of schools and colleges forced teaching and learning activities to be shifted from face-to-face activities to online learning activities. Medical education institutions considered online learning as a solution to minimize the time lost in the teaching and learning process caused by the COVID-19 pandemic [1].

The application of online learning to facilitate learning activities has measurable indicators. One indicator that can be measured is students' level of acceptance and use of online learning. Online learning methods give students more flexibility, but online learning can also create new problems [2–5].

The sudden change in teaching methods from face-to-face meetings to online learning can harm the mental well-being of medical students. Mental well-being is a condition in which a person feels happy in life, has good social relationships, and has satisfaction with themselves [6–8]. Poor mental well-being can hurt various aspects of medical student life, such as poor physical health conditions, low academic performance, and poor ethics and professional attitudes [9, 10].

In addition to acceptance of the use of online learning, online learning also requires self-regulated learning skills from students because online learning places students as central figures in the learning process [11]. Self-regulated learning is an activity where students set goals in the learning process and then try to monitor and regulate cognition, motivation, and behavior to match the goals and available resources [12]. Self-regulated learning has three phases: the forethought phase, the performance phase, and the self-reflection phase.

Regularly conducting self-regulated learning is expected to help students to control their thoughts related to the learning process so that students can adapt better to changes in the learning environment. Students who can do self-regulated learning optimally will be able to adjust their learning strategies when learning methods change so that learning activities remain enjoyable. The ability to regulate the quality

of the learning experience possessed by a student enables an increase in the mental well-being of the student concerned.

There has been a lack of studies that explored the relationship between the acceptance and use of online learning, self-regulated learning, and mental well-being in the medical education context. Accordingly, this study aimed to determine whether there is a relationship between self-regulated learning, acceptance, and the use of online learning on medical students' mental well-being.

2 Methods

The authors conducted this study at Sebelas Maret University, Faculty of Medicine, Surakarta in February–July 2021. This cross-sectional study was conducted with proportional stratified random sampling. There were 230 undergraduate students from 2018, 2019, and 2020 who participated in this study. All of them have participated in online classes using video conference technology for the past month This study used several questionnaires that incorporated an informed consent form, demographic questions, the Unified Theory of Acceptance and Use of Technology (UTAUT) questionnaire, Online Self-Regulated Learning Questionnaire (OSLQ), and the Mental Health Continuum-Short Form (MHC-SF). The authors adapted the questionnaires from the original versions to suit this research and these can be obtained by contacting the authors.

The level of acceptance and use of online learning facilitated by video conferencing technology (Zoom, Google Meet, WhatsApp, etc.) was measured through the UTAUT questionnaire. The acceptance and use of online learning in medical students were measured through six constructs: performance expectancy, effort expectancy, social influences, facilitating conditions, and behavioral intentions. The level of self-regulated learning was measured through the OSLQ, which also consists of six constructs: goal setting, environmental structuring, task strategies, time management, help-seeking, and self-evaluation. The MHC-SF was used to measure the level of mental well-being consisting of hedonic and eudaimonic well-being. Hedonic well-being includes happiness, life satisfaction, and interest in life, while eudaimonic well-being includes optimal psychological functioning, positive relationships with others, and self-development.

The authors distributed the questionnaires to each student by using a Google form. The students gave informed consent after reading relevant information in the informed consent form by clicking a button to continue the questionnaires. The authors then sorted the eligible data after the data were deemed enough and closed the form for further participation.

Statistical analysis was done using the Statistical Product and Service Solution (SPSS) 22.0 For Windows (IBM Corp., Armonk, NY, USA). The Spearman correlation test was used to identify any correlations between variables with $p < 0.05$ considered as significant.

3 Results

The sample size for this research was calculated using OpenEpi. The total population of students was 689 people, with an error rate of 5%, so a minimum sample size of 249 people was obtained. The number of samples returned to the researchers were 237 samples so it can be concluded that this study had a response rate of 95.18%. Out of the 237 obtained samples, there were as many as 7 samples that could not be used. The spread of respondents based on their characteristics is shown in Table 1.

Table 1 shows that the percentage of respondents in each batch was about 30%. The respondents in this research are predominately female. There were 71 male respondents (30.9% of total respondents), while female respondents comprised 159 people (69.1% of total respondents).

Table 2 shows a pattern in which the higher the level of education, the lower the student's level of self-regulated learning and the acceptance and use of online learning. This result is evident from how the mean scores of self-regulated learning and mean scores of acceptance and use of online learning diminish as the education level progresses. It can be concluded that medical students from batch 2020 have the best level of self-regulated learning and level of acceptance and use of online learning compared to students from batch 2019 and 2018. Table 2 also shows that the level of mental well-being is relatively stable along with the increase in the education level of students. It is evidenced by the similarity of the mean scores from every batch.

The frequency of scores for each questionnaire is shown in Table 3. Interpretation of scores was calculated using mean ± SD. The majority of respondents scored in the moderate category (64–91) for self-regulated learning, the moderate category (51–66) for acceptance and use of online learning, and the moderate category (25–44) for mental well-being. This pattern proves that the majority of respondents have moderate self-regulated learning skills, moderate levels of acceptance and use of online learning, and moderate mental well-being conditions.

Table 4 shows that self-regulated learning and mental well-being have a significant relationship with $p = 0.000$ ($p < 0.05$), and the correlation coefficient value (ρ) is 0.252. It can be concluded that the higher the level of self-regulated learning is, the better will be the mental well-being of medical students. Table 3 also shows that the acceptance and use of online learning significantly correlate with mental well-being

Table 1 Respondents' characteristics

Characteristic	Frequency	Percentage (%)
Batch		
2018	67	29.1
2019	74	32.2
2020	89	38.7
Gender		
Male	71	30.9
Female	159	69.1

Table 2 Results summary

Batch	Variables	N	Min	Max	Mean	Median	SD
2018	OSLQ	67	40	110	74.93	74.00	16.04
	UTAUT	67	28	75	57.34	57	9.50
	MHCSF	67	8	55	35.81	37	11.09
2019	OSLQ	74	46	99	76.47	75.00	11.97
	UTAUT	74	39	74	57.57	58.00	6.85
	MHCSF	74	7	55	34.73	37.00	10.54
2020	OSLQ	89	49	103	81.80	82.00	12.22
	UTAUT	89	42	75	60.62	61.00	7.34
	MHCSF	89	5	52	35.09	37.00	9.55
Total	OSLQ	230	40	110	78.08	78.50	13.65
	UTAUT	230	28	75	58.68	59.00	8.00
	MHCSF	230	5	55	35.18	37.00	10.30

OSLQ: Online Self-Regulated Learning Questionnaire; UTAUT, Unified Theory of Acceptance and Use of Technology questionnaire; MHC-SF, Mental Health Continuum-Short Form; Min–Max, minimum–maximum; SD, standard deviation

Table 3 Respondents' scores

Questionnaire	Category	Score	Frequency (Percentage)
OSLQ	Good	92–110	45 (19.6%)
	Moderate	64–91	155 (67.4%)
UTAUT	Bad	40–63	30 (13%)
	High	67–75	39 (17%)
	Moderate	51–66	158 (68.7%)
MHC-SF	Low	28–50	33 (14.3%)
	Good	45–55	38 (16.5%)
	Moderate	25–44	158 (68.7%)
	Bad	5–24	34 (16.5%)

OSLQ: Online Self-Regulated Learning Questionnaire; UTAUT, Unified Theory of Acceptance and Use of Technology questionnaire; MHC-SF, Mental Health Continuum-Short Form

with $p = 0.047$ ($p < 0.05$), and the correlation coefficient (ρ) is 0.131. It proves that the higher the level of acceptance and use of online learning is, the better will be the mental well-being of medical students.

Table 5 shows that all constructs in self-regulated learning have a significant relationship with a positive correlation with mental well-being. The construct that has the strongest correlation with mental well-being is help-seeking.

OSLQ, Online Self-Regulated Learning Questionnaire.

Table 4 Spearman correlation test results

Variable	ρ	*Sig*	Correlation direction
Self-regulated learning	0.252	0.000	Positive
Acceptance and use of online learning	0.131	0.047	Positive

OSLQ: Online Self-Regulated Learning Questionnaire

Table 5 Correlations between OSLQ constructs and mental well-being

Construct	ρ	*Sig*	Correlation Direction
Goal setting	0.192	0.004	Positive
Environment structuring	0.191	0.004	Positive
Task strategies	0.180	0.006	Positive
Time management	0.178	0.007	Positive
Help-seeking	0.318	0.000	Positive
Self-evaluation	0.219	0.001	Positive

Table 6 Correlations between UTAUT questionnaire constructs and mental well-being

Construct	ρ	*Sig*	Explanation
Performance expectancy	0.170	0.010	Positive correlation
Effort expectancy	0.009	0.897	Insignificant
Social influence	0.119	0.073	Insignificant
Facilitating condition	0.036	0.586	Insignificant
Behavioral intention	0.121	0.067	Insignificant

UTAUT, Unified Theory of Acceptance and Use of Technology questionnaire

Table 6 shows that only the performance expectancy construct significantly relates to mental well-being. Performance expectancy and mental well-being have a positive correlation.

4 Discussions

Based on the Spearman correlation test, it is proven that there is a significant relationship ($p < 0.05$) with a positive correlation between self-regulated learning and mental well-being. It was also found that the higher the education level of students is, the lower is the level of their self-regulated learning skills. This result was evidenced by the group of medical students from batch 2020 who achieved the highest self-regulated learning scores, while the batch of 2018 had the lowest self-regulated learning scores. Decline and differences in the level of self-regulated

learning between students could be caused by differences in motivation, resources, social environment.

Out of all of the constructs in OSLQ, help-seeking proved to be the construct that correlates the strongest with mental well-being. In this study, help-seeking was measured through seeking help from those who are considered experts, classmates, and lecturers [13, 14].

Effective self-regulated learning requires people to regulate themselves, their behavior, and environment. The triadic model of self-regulated learning stated that person, behavior, and environment have an interdependent relationship. Changes caused by a person's cognitive and emotional state affect a person's behavior, which in turn affects the physical and social environment. Finally, the environment will provide feedback that will affect the person's cognitive and affective state. In triadic analysis, help-seeking acts as a way for a person to regulate their social environment [15, 16].

Guidance from the social environment plays an important role in developing self-regulated learning skills. The multi-level model proposed by Zimmerman explains that the development of self-regulated learning skills consists of four stages: observation, emulation, self-control, and self-regulation. The impact of the social environment is most prominent in the observation stage and will diminish in later stages [15, 17, 18].

This research also found a significant relationship ($p < 0.05$) with a positive correlation between the acceptance and use of online learning and mental well-being. Theoretically, discrepancies in the level of acceptance and use of online learning among respondents contribute to differences in age, experience, gender, and voluntariness [19–22]. The students with experience with online learning will be inclined to think that there are sufficient resources and infrastructures to use online learning compared to students without previous experience. Experienced students will also find online learning technologies easier to use [21].

Differences in gender roles between men and women affect performance expectancy and effort expectancy. Women are usually more sensitive to social influences; as a result, female students will be easier to persuade to accept and use new learning technologies [21, 22]. The mandatory use of online learning can encourage people around students to motivate these students to take online learning [21].

This study did not examine to what extent age, experience, gender, and voluntariness influence the level of acceptance and use of online learning. Further research is necessary to examine the strength of the influence age, gender, experience, and voluntariness on the acceptance and the use of online learning in medical students.

Out of all the constructs in the UTAUT questionnaire, performance expectancy has the strongest relationship with mental well-being. It can be concluded that despite the varying views of online learning among respondents due to their different characteristics, almost all respondents agreed that online learning was beneficial.

Concerning the findings of this study, this study recommends that medical education institutions teach and facilitate self-regulated learning strategies for students to promote mental health. It is also advisable that medical education institutions focus on facilitating the development of strategic planning of online learning courses to

increase the recruitment and retention of future students. In terms of pedagogical practice, a user-friendly learning management system may be suggested so students can access online courses without difficulties.

5 Conclusions

This study found a significant relationship between self-regulated learning and the mental well-being of medical students and a significant relationship between acceptance and use of online learning with the mental well-being of medical students.

Ethics Approval and Consent to Participate All respondents participated voluntarily and informed consent was obtained from the participants. Ethical approval of research was obtained from Dr. Moewardi General Hospital (register number: 458/IC/HREC/2021).

Competing Interest The authors declare that there are no competing interests related to the study.

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Dian Nugroho—developing research proposal, collecting data and preparing for publication of the manuscript.

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The Use of Online Flipped Classroom in Medical Student Clinical Skills Training During COVID-19 Pandemic: Students' Perception

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Abstract Throughout the COVID-19 pandemic, all learning activities were held through online meetings to minimize face-to-face contact, including clinical skill training. Online clinical learning skills training has limitations and obstacles, including the requirement that students demonstrate their abilities and the high cost of synchronous learning. On the other hand, the flipped classroom has the benefit of practicability since it reduces the cost of full synchronous training. During the COVID-19 pandemic, the Faculty of Medicine UNS implemented an online flipped classroom model for clinical skills training. However, this model required students and teachers to be committed and motivated. Therefore, it is necessary to ascertain students' perspectives on the feasibility and benefits of online flipped classrooms in clinical skills education. A qualitative study was conducted in April 2021 and assessed the student perceptions using a Google form with three open-ended questions. Data collected were then analyzed using the content analysis technique. A total of 39 responses were collected during the study. The content analysis identified five themes: choosing a suitable topic, needing effective feedback, needing good preparation, burdening student, and effective learning. Learning clinical skills using the flipped classroom method can effectively achieve learning objectives when the topics chosen are appropriate and there is appropriate feedback from clinical

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instructors. All learning-related needs can be properly prepared. Student perceptions of the flipped classroom implementation in clinical skills training are divided into five themes: choosing suitable topics, needing effective feedback, needing good preparation, burdening students, and effective learning.

Keywords Flipped classroom · Online · Clinical skills training · Feedback · Effective learning

1 Introduction

The Coronavirus-2019 (COVID-19) pandemic has profoundly affected many areas of society worldwide. This pandemic has also profoundly affected medical education [1, 2]. Since COVID-19 pandemic has spread worldwide, it necessitates that medical education institutions prevent against further transmission. According to the World Health Organization (WHO), during the pandemic, all students should receive their education remotely via online learning. Through this online education, students remained at home and learned using their gadgets and the Internet [3].

The primary goal of medical education is to provide students with the required information, abilities, and attitudes for future practice [4]. Knowledge acquisition can occur through face-to-face lectures in class or tutorial conversations. At the same time, clinical skills are typically taught in the skills laboratory.

Even during the COVID-19 pandemic, the development of these clinical skills must continue to be done online. This requires the creativity of the teachers. Because teaching clinical skills online is not easy. It usually requires physical contact when teaching and also correcting mistakes made by students when trying clinical skills. Learning clinical skills requires adequate facilities and learning media to be able to meet good quality learning [5].

Clinical learning is implemented online in the clinical skills training, using the flipped learning or reverse learning method. There are numerous approaches to flipped learning, including video tools [6]. In this method, the students are first shown an example of a clinical skills video and then assigned a module to study independently during this lesson. Additionally, students must record themselves performing specific clinical examinations or skills and email the recording to the lecturer. An online meeting with the lecturer is scheduled to discuss student video assignments and provide feedback.

Numerous references discuss the benefits of this flipped learning model; however, some also discuss its drawbacks. According to prior research, flipped learning conducted in a hybrid online/offline mode has many benefits for both students and lecturers [11–13]. However, few studies demonstrate the effectiveness of entirely online flipped learning in clinical skills. Uchida in 2022 examined the use of the flipped classroom method in teaching deep tendon reflexes, and the results show that flipped classrooms can develop self-confidence in doing the technique at an early stage before procedural teaching, which enhances readiness for learning [7]. Research

conducted by Zhang in 2022 also showed good results in clinical skill training using the flipped classroom model [8]. Research on student perceptions regarding the use of flipped classrooms was also done by Ramnanan et al. in 2017. However, their study did not focus on clinical skills training, but pre-clinical and clinic education in general [9]. Few studies related to student perceptions of flipped classrooms on clinical skills training have been conducted. The purpose of this research was to explore the factors that influence the success of the flipped classroom from a student's perspective.

2 Methods

The study was conducted using qualitative design to elucidate a central phenomenon and interpret the meaning of the participants' experiences or personal reflections. This study used primary data gathered through an online survey method with a long essay question format via a Google Form with a minimum number of words in the answer. A total of three questions were delivered to the students to assess their perceptions concerning the flipped class method during online clinical skills training. The questions were developed by the medical education experts and then confirmed to the clinical skills lab educational staff to ensure the content validity. These three prompts included the following: respondents' views about online flipped learning, respondents' opinions about whether reverse learning makes it easier for students, and respondents' opinions if reverse learning is applied to clinical skills training topics other than integration.

Based on the three questions, the raw data were obtained from respondents' opinions for each question. Data were analyzed qualitatively using content analysis techniques, which are used for analyzing narrative text to derive conclusions from the data by methodically identifying the data's characteristics [10, 11]. The analysis of this research was conducted using open coding by two coders. Each stage and decision were meticulously documented. There were three stages of coding, with the first and second stages conducted independently by two coders. The first and second stages of coding generated the codes and categories. After each coding phase, a meeting was held to discuss the coding results until themes were produced based on consensus among the coders.

Consecutive sampling was used in this study. The inclusion criteria for this study were medical students currently enrolled in clinical skills program from years: 2018, 2019, 2020, and 2021, and during the odd semester of 2021. The Health Research Ethics Committee of the DR. Moewardi General Hospital approved this study with the reference number 421/IV/HREC/2021.

3 Results

The primary data obtained directly in the period September–October 2021 were analyzed. A total of 39 respondents were included in this study. The baseline characteristics of the participants in this study are summarized in Table 1. The students were classified by gender, age, and student batches. The age range for this study was between 17 and 22 years old, and the batches of the study are students from 2018 to 2021.

The results of content analysis from the Google Form answers that were coded can be seen in Table 2. The content analysis identified five themes: choosing a suitable topic, need effective feedback, need good preparation, burdening student, and effective learning.

The first theme is choosing a suitable topic. One of the quotes that support this theme is:

> Because in this seventh semester the material is quite advanced which requires skills and accuracy as well as mannequins that can help learning the skills lab (Respondent 27)

The use of the flipped classroom method is not suitable for topics that require special mannequins such as inserting infusions, taking venous blood, circumcision, etc. Actually, mannequins are available on campus, but because of the pandemic, the learning is conducted online, so students cannot access the facility. This makes it difficult for students to make videos of these clinical skills.

The second theme is need effective feedback. Some of the respondents' statements that support this theme are:

Table 1 The baseline characteristics of participants

Total participants	N 39	Percentage 100
Gender		
Male	13	33.3
Female	26	66.7
17	2	5.1
18	4	10.3
19	6	15.4
20	8	20.5
21	16	41
22	3	7.7
Student Batches		
Year 2018	8	20.5
Year 2019	1	2.6
Year 2020	14	35.9
Year 2021	16	41

Table 2 Theme and representative quotes

Theme	Representative quotes
Choosing a suitable topic	"It is not suitable for skills that students have just acquired." "The reverse method made many mistakes in the skills that students practiced in the video because they did not understand."
Need effective feedback	"It makes it easier for students because students learn from mistakes and get appropriate feedback." "Students remember more about input for further improvement." "We know better where our weaknesses are; we get the right feedback." "Not all of the students get feedback."
Need good preparation	"It is necessary to have a common perception through discussion first after seeing the video and manual before students are asked to make a video." "Confused because there is no related topic description." "We recommend that you provide a supporting example video."
Burdening students	"It takes hard work to get the appropriate probands" "This flipped was burdening students because of tight deadlines." "It makes the burden on students even heavier because they make too many videos." "There are special equipments that students may not be able to get, so students are confused for making the visualization"
Effective learning	"Make learning better." "Student knowledge will be further increased" "Forcing students to learn early." "Make student active to study independently." "Among students share information (collaborative learning)." "Students learn independently, encourage collaborative and cooperative learning."

> Students can get feedback that can help to correct previous mistakes (Respondent 17)
>
> Input in the form of criticism, suggestions, or some things that are noted by the lecturer giving feedback can be more firmly embedded in the student's memory so that in the future the mistakes that have been made can be corrected (Respondent 38)

The third theme is need good preparation. This theme emerged from several student statements that complained about the flipped classroom, including:

> Because there are many perceptions here, sometimes each instructor also has a different opinion (Respondent 24)
>
> Learning like this requires students to be able to study independently first (Respondent 39).

Some of these statements indicate that good preparation is needed to support the achievement of clinical skills learning objectives. Among the preparations needed are the preparation of lecturers by balancing the equation of perception between lecturers regarding the clinical skills being taught and also the procedure for implementing learning with the flipped classroom. In addition, it also requires good preparation from the students. Because a learner can access earlier learning materials at any time or location, readiness for learning is increased in the flipped classroom.

The fourth theme is burdening student. Here are student answers that support this theme:

> To be honest, it is a bit burdensome for students, because making videos tends to require energy, time, and friends around to become probands and video takers (Respondent 3)

The flipped classroom method forces students to make videos according to the topic of clinical skills, while actually making the videos requires extra effort. Students need human probands for clinical skills involving simulated patients. In addition, equipment is also needed to engage in these clinical skills. The probands are needed because this learning method requires student activity.

The fifth theme is effective learning. Student perceptions give a positive appreciation of the flipped classroom method. This method helps them prepare material better.

> It's quite effective because by making a video first students automatically read the module and have questions to ask during meetings with lecturers alias not with an empty glass. (Respondent 1)
>
> In my opinion, the reverse method is very effective in supporting each student's prior knowledge (Respondent 29)
>
> students can explore more broadly, the knowledge gained is not limited to what is exemplified by the lecturer so that it broadens horizons (Respondent 27)

4 Discussions

The purpose of this research was to explore the factors that influence the success of the flipped classroom from a student's perspective. The results of this study indicate that the use of flipped classrooms is effective in achieving clinical skills training learning objectives. However, it needs to be supported by good preparation, constructive feedback, and selecting appropriate topics. Although on the other hand, the flipped classroom learning model during the pandemic was considered burdensome for some of the students.

Constructive feedback is needed by students to achieve effective learning. The study conducted by Abraham and Singaram in 2018 conveyed that feedback on clinical skill competency is crucial for effective student learning since it has a significant impact on the development and advancement of learners [12]. Students confirmed their appreciation for the feedback they received during clinical skills sessions, where frequent and clear feedback were linked to specific learning outcomes as a means of assessing their knowledge relevant to their goals and using it to "feed-forward" into subsequent assessments. They prefer feedback that includes an assessment of their strengths and weaknesses since it is critical for their academic advancement, helps them build self-confidence and self-esteem, and boosts their enthusiasm to learn. This dynamic process illustrates the crucial aspects of lecturer feedback given to undergraduate medical students as a means of establishing core clinical competence early in medical school and preparing students to adopt appropriate actions when faced with the real patients throughout their clerkship years [12, 13].

Careful preparation regarding schedules, common perceptions between instructors, clear learning modules and videos, as well as detailed explanations to students are needed to support the success of learning with flipped classrooms. Having well-prepared learning modules and videos will really help students. Because a learner can access earlier learning materials at any time or location, readiness for learning is increased in the flipped classroom. As a result, there is more time for active learning in the classroom, and the learner's understanding is enhanced [14]. Readiness for learning is one of the prerequisites for self-directed learning and has a substantial impact on learning motivation [7].

On the other hand, previous research has indicated that there was actually no positive effects of using flipped learning, especially on increasing the final examination score [15, 16]. The study's findings discovered the need to review the preparation process for implementing online clinical skills training classes using the flipped learning method. This is because the discrepancy between the clinical skills material and the video collection schedule for the clinical skills training will affect students' comprehension, causing them to feel confused and unable to grasp these skills optimally.

The implementation of an active learning teaching system, particularly one based on simulation, necessitates more human and financial resources than traditional methods [17]. Some students complained about the short video assignment time so that students were not able to properly prepare the video. One of the purported negatives of the flipped classroom technique is that it necessitates greater study time [18].

This perception is supported by previous studies of the flipped classroom, which was implemented using a hybrid approach (online format combined with face-to-face instruction), and the results showed it was more effective than the traditional classroom. This can be seen in the students' performance on the examination, which showed an increase in final scores compared to traditional learning (teacher-centered) [19, 20]. This is also corroborated by students' satisfaction levels and positive responses to the flipped classroom program. Students benefit from complimentary book services and pre-class lecture videos accessible online from anywhere and anytime, allowing them to arrange their study plans in their own location, regardless of time or place. Students may broadcast knowledge points that were not properly mastered several times based on the actual situation, which would not only improve their happiness with instruction but also allow them to have flexible rest based on their needs [8]. Additionally, students value small group discussions during face-to-face flipped classroom sessions. Through these small group discussions, students' motivation to learn and participate actively can be increased [9].

Additionally, the meta-analysis revealed that the flipped classroom approach in medical lectures could significantly improve the quality of student learning compared to traditional learning methods [14]. The flipped classroom is considered more beneficial for students and lecturers because it allows for more interactive discussions [21].

Learning clinical skills using the flipped classroom model according to students is very effective in achieving competency. Dooley et al. in 2018 found that a

flipped classroom model with online learning materials increased the aspects of student academic performance, contentment, and engagement in a pre-clinical sciences course [17]. Flipped classrooms may increase clinical skills performance by allowing students to participate in higher order cognitive tasks such as knowledge analysis, assessment, and synthesis, which lead to improvements in higher order problem-solving and clinical reasoning [8].

The implementation of lectures delivered via the flipped classroom method, which was entirely online, also demonstrated positive results in medical education. Although the results of previous studies indicated that there were no significant changes in students' test scores, students reported that their learning experience was more optimistic, accompanied by an increase in knowledge [22]. Delivering clinical skills to students in flipped classrooms boosts their readiness for learning and self-confidence in executing the process prior to procedural teaching [7]. The flipped classrooms model appears to fit the requirements of prelicensure medical courses, in which students become motivated, self-directed learners with confidence in critical thinking and clinical decision-making [23].

Additionally, in terms of clinical skills, the flipped classroom approach increases students' comprehension of related stations [24]. This indicator of effectiveness can be seen in the Objective Structured Clinical Examination (OSCE), which is the gold standard and universal format for comprehensively, reliably, and validly assessing the clinical competence of medical students [8, 25]. Students who used a flipped classroom with face-to-face skills training saw a significant increase in OSCE scores. This improvement is because learning is student-centered, allowing students to explore concepts they still do not entirely understand. This way, students will have an easier time comprehending and remembering the skills they learn [24].

Also, the results of another study indicate that implementing the flipped classroom, which begins with a video demonstration of clinical skills before the start of the offline skill teaching class, has a positive effect on students' self-confidence and stress reduction before facing the clinical skills assessment [26]. This results in a noticeable improvement in their OSCE scores.

In 2021, a study evaluated flipped classroom implementation in clinical skills training. A hybrid approach was used to implement the flipped classroom in this study (online learning through videos; course and skills teaching through face-to-face classroom). The study's findings indicated that cardiac, lung, and abdominal physical examination performance improved [8]. Consistent results were obtained for radiological examination [27], osteopathic examination [28], laparoscopic suturing skills [29], and surgical competence [30]. Meanwhile, the neurological examination results were only slightly improved. This is because neurological examinations are frequently complicated, as is neuroanatomy [8].

Based on the findings of this study, it can be concluded that flipped learning is an effective method of promoting the activeness and success of medical students, particularly in the area of clinical skills [8]. Through flipped learning, students can be more self-directed in their learning and explore the material or clinical skills videos provided before the start of class [31]. Furthermore, flipped learning cultivates

students' critical, analytical, evaluative, effective, and efficient mindset and is always guided by clinical reasoning.

Besides that, to improve the effectiveness of flipped learning and students' knowledge of this abilities competency, it can employ learning approaches that focus on students such as Student-Centered Learning (SCL) and also Problem-Based Learning (PBL) [32]. The SCL method can be utilized by peer learning among the students to discuss their clinical skills videos that have been collected. By employing SCL and PBL approaches, students will be encouraged to be independent, analytical learners and actively participate in that learning [13, 32].

In addition, to support the continuity of effective flipped learning in clinical skills training, it is necessary to collaborate with face-to-face skills teaching and learning when implementing flipped learning, particularly in clinical skills, which is frequently complicated and is only being introduced [8]. This ensures that errors, lack of comprehension, and confusion do not occur when performing these clinical skills.

To bolster the findings of this study, it is hoped that future research will compare the effectiveness of flipped classrooms in entirely online clinical skills learning to the point of flipped classrooms in online and face-to-face clinical learning. This effectiveness can be quantified by examining the output, represented by the OSCE values obtained from each treatment group.

There are limitations to this study in that the research respondents are restricted to students. The lecturers' perceptions also need to be explored regarding teaching and learning clinical skills using the flipped classroom method.

5 Conclusion

The findings of this study indicate that there are five main themes about flipped classrooms, which are choosing suitable topics, need effective feedback, need good preparation, burden students, and effective learning. Learning clinical skills using the flipped classroom method can effectively achieve learning objectives when the topics chosen are appropriate and there is appropriate feedback from clinical instructors, and all learning-related needs can be properly prepared. Although there are some students who feel burdened. Evaluation is required in the form of a review of the schedule for collecting video responses and feedback to all students.

Ethics Approval and Consent to Participate All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards (Reference number 421/IV/HREC/2021).

Competing Interest The authors declare that there are no competing interests related to the study.

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Authors' Contribution *Siti Munawaroh*—developing research proposal, collecting data, data analysis, and publication manuscript.

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Strengthening the Implementation of Programmatic Assessment: Shifting the Paradigm to Assessment for Learning as the First Step

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Abstract The assessment system in Indonesian medical schools mainly relies on summative assessment, where the "assessment of learning" is more prominent. Previous research revealed that the current system led to limited opportunities for feedback to support students' learning. Focusing on the outcomes of assessment without overseeing learning progress would not be helpful for competence acquisition. Based on our previous work in empowering medical teachers with twenty-first Century Learning Skills through serial training in 2020–2022, this research aimed to lay the groundwork for implementing programmatic assessment by changing the paradigm of educators in medical schools in Indonesia. This study is a part of an ongoing participatory action research project funded by the Education and Culture Ministry of Indonesia. This study focused on the first part of the project, where we conducted faculty development across medical schools in Indonesia. The first workshop emphasized the paradigm of "assessment for learning". We conducted an online workshop inviting 319 participants from 92 medical schools in Indonesia. Participants were deans/vice deans, medical education units, and teachers. An online questionnaire exploring participants' experiences and changes in their perception of assessment was used to evaluate the workshop results. Results showed changes in: (1) comprehension of programmatic assessment and its role in the outcome-based curriculum; (2) perception of the roles of summative and formative assessment; (3) perception of assessment methods in programmatic assessment; and (4) perception

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of progress test. We found that the assessment practice in Indonesia's diverse, multicultural context posed another challenge to implementing the programmatic assessment. The shifting paradigm from assessment of learning to assessment for learning is needed for institutions to be engaged in the changes. Programmatic assessment can strengthen student learning support where decisions are made based on multiple data points to capture students' progress and achievement; changing the paradigm of educators is the first step toward a more significant change. Educators can raise awareness of their roles through mentorship and use programmatic assessment results to support students' learning.

Keywords Programmatic assessment · Assessment paradigm · Mentorship · Assessment for learning · Progress test

1 Introduction

The role of assessment in medical education has moved past the concept of "assessment drives learning" [1]. However, delivering assessments as part of a learning process remains challenging [2, 3]. The assessment system in Indonesian medical schools consists of summative and formative assessments aligned with the principle of an outcome-based curriculum. However, a previous study revealed that the current assessment system mainly relies on summative assessment with the minimal function of formative assessment [1, 4]. Thus, it led to limited opportunities for feedback to support students' learning. In a broader sense, the "assessment of learning" is more prominent than the "assessment for learning".

The concept of assessment for learning does not necessarily diminish the role of summative assessment; instead, it highlights how the assessment can become a strong pillar for learning. Providing feedback for learners from assessment results, increasing the active roles of students and teachers in assessment, and supporting the learning progress are features sought by educators in assessment.

The programmatic assessment was introduced over a decade ago as a system designed to achieve "assessment for learning" with features to make the system work effectively [5–8]. The ideal programmatic assessment would need mentorship, progress monitoring, and robust documentation to support learning, assessment, and supporting activities.

Previous studies have shown that programmatic assessment might succeed in the Northern Hemisphere, citing a more positive impact on students' learning and education outcomes in various settings [3, 9, 10]. Nevertheless, it remains a challenge to implement programmatic assessment in the Asian context. The complexities of the culture, society, and health care system affect how medical education is delivered in Indonesia. The current national examination system, just like in other Southeast Asian countries, might offer a temporary solution to ensuring the quality of education [11]. Based on previous findings, we believe that aiming to improve curriculum, teaching and learning practice, assessment, and, to a further extent, medical schools'

capacity is a better option for the sustainability of medical education quality [4, 11, 12]. Our research group proposed a nationwide project to improve the quality of the assessment system in Indonesian medical schools. Accordingly, as the first step, this study aimed to change the paradigm of Indonesian medical educators from "assessment of learning" to "assessment for learning".

2 Methods

This study was part of a participatory action research project funded by the Education and Culture Ministry of Indonesia in developing and implementing programmatic assessment in medical education institutions. The project introduced several workshops as an intervention, as well as the development of a portfolio system and national progress test. This study evaluated the first workshop: Changing the paradigm to support the implementation of continuous programmatic assessment.

The workshop was conducted online in June 2022, and we invited representatives of medical schools to participate. There were 92 medical schools that participated; they were represented by deans/vice deans, heads of study programs, and teachers.

The online workshop consisted of interactive lectures, group discussions, and reflection. The content of the lectures included: (1) The future challenges of health care profession and competence (outcome) based curriculum; (2) The implementation of programmatic assessment in come-based education; and (3) The roles of progress tests. Experts delivered lectures in medical education in Indonesia. Participants could ask questions and discuss their concerns at the end of the lectures. During the discussion, participants were encouraged to share their thoughts on the commitment to change in their institutions and their participation in the portfolio and progress test system introduced in this project. The workshop ended with a reflection session where participants shared their views on assessment.

We conducted the evaluation using pre- and post-workshop questionnaires. The questionnaire consists of 14 questions covering the workshop's content: (1) Perceptions on programmatic assessment, (2) The roles of programmatic assessment in outcome-based education, (3) Assessment methods, and (4) Progress tests. We analyzed the evaluation results descriptively to compare the means of agreement on each statement.

3 Results

The online workshop gathered 319 participants from 92 medical schools in Indonesia. The participants were deans/vice deans, heads of the study program, medical education unit (MEU) managers, and educators/teachers. The descriptive results are presented in Table 1.

Table 1 Results of the pre- and post-workshop questionnaire

Statements	Agreement rate (%)	Agreement rate (%)	*P* (*Sig: $p < 0.05$)
Assessment can support the continuous learning process by maximizing learning impact, feedback, and mentorship	97.76	97.76	0.182
The final examination determining graduation is the most essential in programmatic assessment	35.25	19.78	0.000*
Students can plan their learning based on assessment results	96.79	97.02	0.002*
The role of the teacher in programmatic assessment is only to provide judgment on students' learning achievement	25.56	57.09	0.000*
Programmatic assessment can ensure learning outcomes acquisition	98.07	98.13	0.104
Assessment in an outcome-based curriculum provides feedback for students to plan their learning	97.76	98.88	0.008*
Formative assessment in the form of discussion and continuous feedback has equally significant roles and importance as a summative assessment	78.28	83.9	0.011*
The single, most important, summative assessment is the high reliability and validity final examination	37.38	19.78	0.000*
A sound assessment system uses a variety of assessment methods suitable to evaluate learning outcomes	98.84	100	0.001*
Not all assessment methods need to provide feedback for students	38.15	31.72	0.184
The variety of assessment methods can be aligned with an intermediate and final assessment	97.43	96.64	0.006*
Assessment methods in the programmatic assessment must be specific and separately assess knowledge, skills, and professional behavior	70.74	64.93	0.441
Progress tests can describe learning outcomes acquired at each phase of the study	98.05	98.51	0.002*
Progress tests can only offer scores as input for learning outcomes acquisition	24.51	17.23	0.000*

Results showed changes in: (1) Comprehension of programmatic assessment and its role in the outcome-based curriculum; (2) Perception of the roles of summative and formative assessment; (3) Perception of assessment methods in programmatic assessment; and (4) Perception of progress tests. Almost all of the participants perceived that a sound assessment system could support the learning process and learning outcomes acquisition. However, the expected outcomes of this workshop were the changes in paradigm on how summative assessment should not be the most critical assessment and how educators' roles should not be limited as evaluators. Views on educators' roles as facilitators and mentors and how feedback from the assessment can support learning were also affirmed during the reflection session. The results also provide insight into how participants perceived the progress test's role in providing continuous feedback for students and institutions.

4 Discussions

The findings of this study involving national institutions revealed a significant description of how medical education is delivered in Indonesia. Insights into how leaders and educators viewed assessment were invaluable as a foundation for improving assessment practice through implementing the programmatic assessment. Several key issues should be brought forward in the discourse.

4.1 The Challenge of Assessment Practice in Indonesia

The assessment system has been part of the accreditation requirement for a long time; therefore, the roles of assessment in outcome-based curriculum and its features can be found in most medical schools in Indonesia. The general understanding of how assessment roles should benefit learning was shown in this study. However, as a country with cultural diversity and a complex healthcare system [4], the challenge of assessment practice was very prominent. A discourse on assessment practice that faces challenges in cultural diversity has been proposed [4], and this study affirms it. Assessment practice relies heavily on summative assessment, and it is mostly believed this summative assessment drives learning. The policy of national examination in the last 15 years, which aimed at capacity building of medical schools and establishing the standards for graduate outcomes, was perceived as the single most important assessment, detached from the schools' assessment system [12]. To some schools, this policy led to rapid improvement and innovation in their education system. However, to some schools, the term "assessment drives learning" referred to only summative assessment and limits the use of formative assessment. A less formative assessment would mean less student feedback, teacher discussion, and mentorship.

Furthermore, as this study highlighted, the role of assessment would diminish to producing scores or pass/fail decisions. Although many studies before similarly revealed the challenge of "assessment for learning" [2, 3], what we found in Indonesia is somewhat more complicated. The complexity of cultural context affecting educational practice in Indonesia, and our findings affirmed our decision to actively involve medical schools in changing the assessment practice through implementing the programmatic assessment.

4.1.1 The Shifting Paradigm and the Groundwork for Programmatic Assessment

As this study found, the significant paradigm shifts from "assessment of learning" to "assessment for learning" are crucial for a more integrated and meaningful assessment as a system. As initially proposed by van der Vleuten and Schuwirth [13], the programmatic assessment needs changes in the conceptual framework of viewing assessment. Elements of the educational system contribute to the credibility of assessment to support the learning process [8, 14]. Teachers need to be engaged in assessment, not only as evaluators but as facilitators. Whether it is a low-stakes formative or high-stakes summative assessment, teachers need to be empowered to take the roles [15]. Students must be provided opportunities to reflect, discuss, and plan their learning using the assessment results [9]. Managers, leaders, and decision-makers need to view the assessment in a broader sense to meticulously design, deliver, and evaluate assessment as part of the learning process.

Simply put, the success of implementing programmatic assessment needs to have the stakeholders on board. Therefore, we saw that the shifting paradigm could be our cornerstone to lay the foundation of an impactful, nationwide "assessment for learning" project. Our sequential workshops in the first year of the project were aimed to strengthen the capability of medical schools to attain their programmatic assessment.

We understand that more data are needed to evaluate this project's intermediate and long-term impact. Further research will be required to know how this project affects medical schools individually and internally. This study's efforts to include medical schools across a country with complex cultural diversity enabled us to not only explore the need for changes in medical education nationally but also provide a start for the active participation of medical schools in preparing for the changes.

5 Conclusions

Changing the paradigm of medical educators nationwide is the first significant move toward establishing and implementing the programmatic assessment. This study showed that even though educators and leaders widely knew the comprehension of good assessment of medical schools, the practice of assessment for learning posed

another challenge. Educators' role in assessment as mentors, opportunities for student feedback, and continuous progress monitoring based on assessment results should become a priority to ensure the foundation of programmatic assessment practice in Indonesia.

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Ethics Approval The project has been approved by the Medical and Health Research Committee (MHREC) Faculty of Medicine, Public Health and Nursing Universitas Gadjah Mada No: KE/FK/0833/EC/2022.

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Student Perception of Integrated Clerkship in Primary Care

Siti Munawaroh, Bulan Kakanita Hermasari, and Aldira Ayu Nastiti Nur Hanifah

Abstract Clinical clerkship is a component of the learning stages that students of the medical profession must complete. Students who have completed undergraduate education must participate in the clerkship program to become a doctor. Currently, the referral system in Indonesia makes hospitals limited in treating diseases with a level of competency that must be mastered by general practitioners (level IV in SKDI/Indonesian Physician national competence standard). Since 2020, the Faculty of Medicine at Sebelas Maret University has begun developing and implementing new methods for professional medical education. Starting in 2020, the clerkship program, which was initially conducted in a limited departmental stage, will also be executed directly using the principles of comprehensive patient care. Students undertake this program after students have completed the departmental stages. Based on the description of the application of the new method in this medical professional education program, it is necessary to evaluate the implementation of the integrated clerkship in the primary care program. This study aimed to explore student perceptions of the learning and evaluation process in the integrated clerkship in primary care. The study used quantitative methods. The data were collected from 43 respondents through an evaluation form with a Likert scale via Google Forms. The results showed that the online questionnaire received 43 responses. Based on the findings of the study, the average was more significant than 3.5 in each aspect studied. The efficiency point of the integrated clerkship in primary care program for future general practitioners has the highest mean, which was 4.49. Meanwhile, the effectiveness of longitudinal learning during integrated clerkship in primary care has the lowest mean, which was 3.98. According to research findings, integrated clerkships focused

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on clinical patient care in primary care (*Puskesmas*) could effectively increase clerks' knowledge and skills.

Keywords Clinical clerkship · Integrated clerkship · Primary care · Medical education

1 Introduction

The clinical clerkship program is a series of education for the medical doctor profession. The clinical clerkship program includes promotive, preventive, curative, and rehabilitative actions under the doctor's guidance as supervisors [1, 2]. The clinical clerkship program is an essential component of a medical education system because it allows students to gain knowledge, skills, and attitudes/behaviors while working directly with patients under supervision. In other words, medical doctor undergraduates must complete a professional medical education to become general practitioners [1, 3].

As part of a series of medical education programs, the clinical clerkship program is guided by the Indonesian Doctor's Professional Education Standards approved by the Indonesian Medical Council [4]. In addition, the medical education process must be geared toward community needs [5][5]. Initially, the clinical clerkship program in Indonesia, including at the Faculty of Medicine of Universitas Sebelas Maret, focused on the departmental stages in the hospital. Students focus on clinical patient care from one ward to another, except for the public health station, which is done directly in primary care (*Puskesmas*). However, due to the current referral system in Indonesia, hospitals cannot treat diseases with the level of proficiency required of general practitioners (level IV in SKDI/Indonesian Physician national competence standard)[3]. The cases of diseases with a competency level of IV are frequently encountered in primary care settings. In order to attain this level IV competency, educational institutions other than hospitals are required.

In Indonesia, primary care as a vehicle for professional medical education emphasizing individual health services is not yet widespread. Most medical school institutes in Indonesia use primary care to teach community health sciences, even though primary care has enormous potential as a vehicle for teaching complete patient care.

Since 2020, the Faculty of Medicine at Sebelas Maret University has started designing and implementing new methods for professional medical education. Beginning in 2020, the clerkship program, which was initially conducted in a limited departmental stage, also began to execute the clerkship program directly using the principles of comprehensive patient care. The name of this program is Integrated Clerkship in Primary Care. Students pursue this program after they have completed departmental requirements. Integrated clerkship learning activities in primary care are conducted for six weeks in primary care (Puskesmas).

Based on the description of the application of the new method in this medical professional education program, it is necessary to evaluate the implementation of the

integrated clerkship in the primary care program. This approach is to determine the performance effectiveness of the integrated clerkship program in primary care based on students' perceptions. This study aimed to investigate students' perceptions of the learning and assessment process in the integrated clerkship program in primary care.

2 Methods

The design of this research is quantitative. This study used a consecutive sampling technique. The sample requirements for this research are students of the medical professional education program at the Faculty of Medicine, Universitas Sebelas Maret, who are registered and have completed clinical clerkship, including departmental stages in hospital and integrated clerkship in primary care. Forty-three students were involved as respondents in this study, with details of 13 students who completed clinical clerkship (before the pandemic period) and 30 students who completed a clinical clerkship in the November 2022 period.

This study used primary data collected through online questions via Google Form, which students filled in at the Faculty of Medicine, Universitas Sebelas Maret, who were registered and had completed clinical clerkship, which included departmental stages in hospital and integrated clerkship in primary care. These data were collected from February to March 2020 and November 2022.

The six questions included respondents' opinions regarding whether the integrated clerkship in primary care programs is helpful for general practitioners, the effectiveness of conducting case discussions/presentations, longitudinal learning for integrated clerkship, the effectiveness of bedside teaching or mini CEX or mini DOPS, the guidance and supervision system for integrated clerkship, learning achievement assessment system, and the general opinion of respondents regarding integrated clerkship in primary care.

3 Results

In this study, primary data were used. Preliminary data in this study were obtained directly on February–March 2020 and November 2022. This study was followed by 43 clerks who were enrolled in and completing department stations and integrated clerkship in primary care (*Puskesmas*) as respondents. The characteristics of the participants in this study are summarized in Table 1, which were predominately female clerks.

In the Google Form, six questions were given to explore respondents' opinions and perspectives regarding the integrated clerkship held in primary care (Puskesmas). The six questions included: respondents' views about the integrated station's usefulness for general practitioners, the effectiveness of carrying out case discussions/

Table 1 The baseline characteristics of participants

Characteristic	Respondent	
	Person	Percentage
Total participant	43	100%
Gender		
Male	13	33.3%
Female	29	66.7%

presentations, longitudinal learning, bedside teaching or mini CEX or mini-DOPS, the system of guidance and supervision, and the learning outcomes assessment system.

In this study, as shown in Table 2, a threshold of 3.5 was established for each aspect. A score below 3.50 indicates that further observation and evaluation are required. Based on the findings of the study, the average was more significant than 3.5 in each aspect studied. The efficiency point of the integrated clerkship in primary care program for future general practitioners has the highest mean, which was 4.49. Meanwhile, the effectiveness of longitudinal learning during integrated clerkship in primary care has the lowest mean, which was 3.98.

4 Discussions

The results of this study revealed that the average score for the six questions exceeded 3.5 (the threshold set by the joint agreement of the researchers). This demonstrates that, from the student's perspective, the integrated clerkship program in primary care is considered effective. As future general practitioner candidates, the integrated clerkship program in primary care is believed to benefit students by enhancing their sense of responsibility. This is consistent with the referral system in Indonesia, which limits hospitals' ability to treat diseases requiring a level of competence possessed by general practitioners (level IV of the SKDI/Indonesian Physician national competence standard) [3].

The presence of an integrated clerkship program that focuses on clinical patient care in primary care gives students the ability to respond to the commonly encountered level IV health issues in society. Through the implementation of the integrated clerkship program in primary care, students will be trained to provide community-centered health services directly [5–7]. By involving students in direct patient care under remote supervision, students can develop a deeper sense of responsibility [8, 9]. In addition, the involvement of students in dealing with health problems that arise in primary care enables students to master level IV competency, which general practitioners must achieve.

In addition, applying clinical case presentations during the clinical clerkship period is essential. Through this case presentation, students are trained to learn presentation skills and diagnostic thinking [10, 11] related to diseases with a level of

Table 2 Student's Perception of Integrated Clerkship Program in Primary Care

Question	Scale					
	1 (Strongly Disagree)	2 (Disagree)	3 (Neither Agree nor Disagree)	4 (Agree)	5 (Strongly Agree)	Mean
The integrated clerkship in primary care is helpful for clerks as future general practitioners	0	2	1	14	26	4.49
The effectiveness of carrying out clinical case discussions/presentations during integrated clerkship in primary care	2	1	8	10	22	4.14
The effectiveness of longitudinal learning during integrated clerkship in primary care	3	1	11	7	21	3.98
The effectiveness of bedside teaching or Mini CEX or Mini DOPS during integrated clerkship in primary care	2	2	2	13	24	4.28
The effectiveness of guidance and supervision during integrated clerkship in primary care	1	2	3	9	28	4.41
Learning outcomes assessment system during integrated clerkship in primary care	3	2	5	11	22	4.09

competence that medical doctors must be mastered (level IV in the SKDI/Indonesian Physician national competence standard)[3]. This is in line with the findings of this study. Most respondents felt that the application of oral clinical presentations in the integrated clinical clerkship program in primary care was very effective in developing their clinical reasoning.

The longitudinal education system between students and doctors as supervisors contributes significantly to the maturation of students into competent, independent doctors [12]. This is consistent with our research findings, which indicate that applying supervisors in the integrated clerkship program in primary care is essential for assisting students in recognizing what is wrong and what to focus on. Additionally, it has been discovered that in a longitudinal clerkship, the continuity of contact with the supervisor allows students to report learning about chronic illness and communication skills and receive assistance in developing their clinical skills [13]. Previous

research shows applicants for community-based longitudinal integrated clerkships reported higher matched rates in primary care than students in conventional block clerkships [14].

Based on the results of this study, bedside teaching was considered very effective for students to improve their clinical skills [15, 16]. This is in line with previous research, which stated that students' agreement with the bedside teaching method would improve their clinical abilities. In addition, previous research indicates that the mini-CEX and DOPS influence the learning process [17]. Mini-CEX is a valuable assessment tool that positively impacts the learning process [18]. DOPS is a criterion-referenced evaluation that evaluates cognitive, psychomotor, and affective domains of procedure performance [17, 19]. Mini-CEX and DOPS will also aid in identifying student performance gaps [18]. It provides a focal point for learning by highlighting areas of strength and weakness. Students are most likely to receive feedback whose content is geared toward the achievement of competence and eliminating any performance gap by providing information on the student's performance. Feedback is significantly more effective when it includes specific suggestions on improving performance instead of simply indicating whether a student's performance is good or not [18, 20].

Based on this research, the highest satisfaction with implementing integrated clerkship in primary care is seen in the guidance and supervision system for the integrated clerkship. This follows previous research, which stated that a good relationship between supervisors and students is also essential. Referring to previous research, developing this relationship requires ongoing collaboration between students and supervisors, where they know each other professionally and personally and trust and respect each other [21]. Collaboration between students and their supervisors positively affects feedback and assessment because it is based on students' continuous development in all aspects of medical services [22], which is very important for developing student competencies [23].

From the description above, it can be seen that an evaluation is needed in developing a learning method, including applying for the integrated clerkship program in primary care. Of course, as an evaluation material in implementing the clerkship program, it cannot be based only on one point of view. There needs to be a perspective from other parties, such as the perspective of a doctor who stands as a supervisor for clerkship students. This is a limitation of our research. Therefore, further study and more in-depth analysis of the implementation of the clerkship program are needed from the doctor's point of view as the supervisor as a follow-up in developing the integrated clerkship in the primary care program in the future.

5 Conclusion

According to research findings, integrated clerkships focused on clinical patient care in primary care (*Puskesmas*) could effectively increase clerks' knowledge and skills. The average was more significant than 3.5 in each aspect studied, which

included: the benefits of integrated clerkship in primary care for clerks as future general practitioners, the effectiveness of carrying out clinical case presentations, the effectiveness of longitudinal learning, the effectiveness of bedside teaching or Mini CEX or Mini DOPS, the significance of guidance and supervision, and learning outcomes assessment system during integrated clerkship in primary care.

Ethics Approval and Consent to Participate All procedures performed in studies involving human participants followed the ethical standards of the institutional or national research committee number: 421/IV/HREC/2021.

Competing Interest The authors declare that there are no competing interests related to the study.

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Authors' Contribution *Siti Munawaroh*—developing a research proposal, collecting data, data analysis, and publishing the manuscript.

Bulan Kakanita Hermasari—developing the research proposal, collecting data, and publishing the manuscript.

Aldira Ayu Nastiti Nur Hanifah—data analysis and publication of the manuscript.

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‘We Want to Practice and Be Safe’: Students’ Perception on Clinical Learning Methods During the First Wave of the COVID-19 Pandemic

Desy Puspa Putri, Nurhasan Agung Prabowo, Pepi Budianto, and Siti Munawaroh

Abstract Medical education is a form of education that combines the theoretical and direct practice of interaction with patients. The COVID-19 pandemic required strict crowd restrictions to reduce the viral spread, and this situation limited interactions between students and patients. It certainly impacted the clinical practice experience. This study aimed to review medical students’ perceptions of learning methods chosen during a clinical rotation in the first wave of the COVID-19 pandemic. We collected information from 193 medical students who underwent clinical rotation during the first wave COVID-19 pandemic using surveys and 14 in-depth interviews about the students’ perceptions related to the learning methods of each clinical department. Most departments have 10–20 active days per department for students, with case discussions and academic help being the most popular techniques. According to students’ perceptions, most departments can achieve the level of competency 3–4, and 6 out of 10 were assigned to the capacity to conduct anamnesis and physical examination. A thorough investigation revealed that students hardly ever interacted directly with patients. They also wanted to emphasize they were following the safety regulations while attending to patient care and the emergency room, which were inaccessible during the pandemic. Conclusively, the practical experience during clinical rotations during the COVID-19 pandemic still needed improvements, especially in history taking and physical examination. Students wanted to practice and be protected. During a pandemic, it is necessary to find better clinical teaching methods that allow students to have direct patient care with adequate supervision, prioritizing patients’ and providers’ safety.

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1 Introduction

The World Health Organization (WHO) declared the Coronavirus Disease-2019 (COVID-19) a global pandemic on March 11, 2020. Since then, many countries have implemented policies to reduce the spread of the coronavirus, including wearing masks, washing hands with soap, and social distancing. In addition, crowd restrictions were enforced in various places to reduce the risk of spreading the virus. The Indonesian government has also applied the same approach. This pandemic condition has also affected the mental health of health workers [1]. The government's policy of restricting crowds severely impacted the education system in Indonesia. Almost simultaneously, various education centers eliminated face-to-face teaching and learning activities and shifted them to an online system, including the Faculty of Medicine, Universitas Sebelas Maret.

As listed in Medical Education Law No. 20 of 2013, medical education is a conscious and planned effort in formal education. It consists of academic and professional education at the higher education level. The government has evaluated the study programs regularly to produce competent medical or dentistry graduates. The medical education system consists of the undergraduate and medical professional stages. At the undergraduate stage, medical education students receive material from lectures, clinical tutorials, clinical skills laboratories, and practicums. At this stage of the medical profession, students will gain clinical experience through direct interaction with patients and clinical supervisors [2].

During the first wave of the COVID-19 pandemic, the learning process of medical students at the undergraduate stage Faculty of Medicine, Universitas Sebelas Maret was conducted entirely through online methods. This method helped to reduce the possibility of crowds and minimize the risk of transmitting the virus. This policy was relatively easy to implement. However, this method cannot be fully implemented at the stage of clinical rotation because there has to be enough direct practice for students to have sufficient experience and clinical skills through direct interaction with patients [2, 3].

The methods used during this situation for clinical rotation were online theoretical guidance, online case reports, and direct experience gained during practicums in polyclinics, wards, or operation theaters. Students attended their shifts alternately, a week in and a week off while erasing the night and emergency ward shifts. The selection of these methods affected the knowledge, skills, and experience students could gain in each department. Previous research has shown that implementing online teaching and learning activities makes it easier for students to get practical material without having to make a particular schedule. However, on the other hand, there were unfavorable effects, including a lack of history-taking, empathy, and physical examination experiences. Students tended to be less confident when doing patient care clinical services because they did not practice directly with patients [3, 4].

Through this study, we aimed to determine students' perceptions of the learning system implemented during the first wave of clinical rotation of the COVID-19 pandemic.

1.1 Context of the Study During the Pandemic

When the COVID-19 pandemic hit Indonesia (lockdown in March 2020), the learning system underwent several changes. Because of the urgency of the COVID-19 outbreak in the world of education, academics were forced to consider relevant learning approaches and models to be employed during the COVID-19 pandemic. Accordingly, the government has offered recommendations and support through the Ministry of Education and Culture to adopt online lectures and learning. The Faculty of Medicine, Universitas Sebelas Maret (FK UNS) also implemented a distance learning system via the Internet or online platforms.

During the epidemic, students of the medical professions education at Sebelas Maret University conducted internships (hands-on) directly with patients, taking turns, with a maximum of five junior doctors scheduled for each department once a week. Instructors required students to wear masks and other personal protective equipment (PPE) to prevent transmission. Students were directed to remain away from the wards caring for COVID-19 patients, and the night shift and emergency department duties were eliminated. However, whether or not a patient had COVID-19, residents in the particular education program were still required to enter every shift and engage with them. Residents are considered competent as general practitioners in reducing the risk of COVID-19 transmission among themselves. Residents also play an essential role during a pandemic due to the shortage of doctors to treat many COVID-19 patients at the outbreak's start.

The COVID-19 period's crowd limitations also impacted Indonesia's introduction of general practitioners' competency exams. Typically, this exam process is conducted offline and consists of a theoretical or computer-based test (CBT) and an objective structured clinical examination (OSCE). The medical competency exam committee eliminated the OSCE and exclusively used CBT to evaluate performance to minimize the potential of COVID-19 transmission. Eliminating OSCE was done not without risk; the effect of this policy is that many new general practitioner graduates, regardless of CBT graduation, are less skilled when dealing directly with patients.

Given this circumstance, the competency exam committee held another OSCE in the second year of the pandemic on the condition that the students' COVID-19 swab polymerase chain reaction (PCR) result was negative. With the COVID-19 vaccine capable of suppressing the spread of the virus, the offline learning system and the exam system have been re-implemented. This transition is expected to help general practitioners improve their competence and skills in dealing with actual patients.

2 Methods

This qualitative study was conducted at the Universitas Sebelas Maret affiliated Hospital in March 2021. The subjects of this study were medical professional program students who were still undergoing clinical rotations from March 2020 to February 2021. The total number of subjects was 193 students. Students filled out a survey according to the department they are currently undergoing to determine their perception of the effectiveness of the clinical rotation learning method during the pandemic. This study analyzed learning effectiveness based on the number of diseases and skills with competency level 3 or 4 according to the Indonesian Doctor Competency Standards (SKDI), students' ability to take anamnesis and physical examinations, and the amount of theoretical guidance given during the department. The data obtained were processed as percentage data to assess the effectiveness of learning knowledge and skills according to student perceptions.

During the in-depth interview process, open questions were directed to two student representatives from each department, notably the head and deputy group leaders. This interview took place during the annual evaluation of the educational process between clinical supervisors and clinical rotation student representatives. The interview lasted about 10 min per person and was conducted separately. The following questions were asked: what are the department's strengths and weaknesses? and what input did students provide to the department?

3 Results

The 193 students were divided into 18 departments, including Ophthalmology, Ears, Nose and Throat, Dentistry, Public Health, Pulmonary, Cardiology, Internal Medicine, Surgery, Obstetrics and Gynecology, Pediatrics, Psychiatry, Forensic, Dermatology, Radiology, Neurology, Pharmacy, Anesthesiology, Medical Rehabilitation, with the number of students per department varied (Table 1).

Students were asked to fill out a survey regarding the effectiveness of the learning method on history taking and physical examination skills using a score range of 0 (worst) to 10 (excellent). Most departments had an average score of 7 (very good), and only a few scored 8 (good). Table 2 shows the results. The survey of the effectiveness of teaching methods on the experience of dealing with diseases with competency level 3 or 4 found that an average of 50–75% of skills had been obtained in most departments.

The implementation of theoretical guidance for clinical rotation students during the pandemic can already be carried out in most departments; only in Surgical Department the percentage is less than 5%, and the rest could reach 50%.

The results of in-depth interviews show that, on average, students wanted hands-on experience interacting with patients, as revealed in some of the interviews shared in Table 3.

Table 1 Characteristic of subjects

Department	Entry year (N)		
	≤2019	March–April 2020	September–October 2020
Pediatrics	6	14	5
Anesthesiology	3	5	0
Surgery	2	9	3
Pharmacy	0	5	2
Forensic	3	0	1
Dentistry	0	4	1
Public health	2	8	3
Internal medicine	5	12	3
Cardiology	0	5	1
Dermatology	4	2	1
Ophthalmology	1	3	2
Neurology	1	5	2
Obstetric	3	14	4
Pulmonology	1	10	4
Psychiatrists	1	8	1
Radiology	1	3	1
Medical rehabilitation	0	6	2
Ear, Nose, and Throat	3	6	2

4 Discussions

This research showed a positive side to the learning system for medical professional students who underwent clinical rotations during the first wave of COVID-19. Students could get theoretical guidance more optimally because it does not require a particular time and place which provides more flexibility. This result is similar to previous research, which also stated that the online education system tended to be more flexible in its implementation [5]. However, there were costs for the Internet quotas, and the lack of direct interaction between lecturers and students often bored students and they sometimes needed additional help in understanding the material [3, 5].

Previous studies showed the positive side of the online learning system, including reducing student fatigue levels, facilitating class time management, and reducing the risk of exposure to nosocomial infections in students. However, this made it difficult to trigger student activity, and sometimes student performance assessments needed to be more accurate [6].

In addition, this study indicated that an online education system with a semi-offline combination reduced student interactions with real-life patients. It impacted the lack of experience in cases with competency level 3 or 4 and reduced students'

Table 2 Effectiveness of learning method on the ability to history and physical examination

Departments	N students	History taking experience (Mean score)	N Students	Physical exam experience (Mean score)
Pediatric	25	6,8	25	8,1
Anesthesiology	8	6,8	8	6,8
Surgical	14	6,1	14	6,1
Pharmacology	7	6,7	7	7,3
Forensic	4	7,7	4	7,7
Dental	5	6,6	5	7,8
Public health	13	6,5	13	6,9
Internal medicine	20	6,9	20	7,4
Cardiology	6	7,5	6	7,6
Dermatology	7	7,6	7	8
Ophthalmology	6	7,5	6	8,3
Neurology	8	8,3	8	6,5
Obstetric	21	7,4	21	7
Pulmonary	15	7,3	15	7,2
Psychiatry	10	7	10	7,2
Radiology	5	7,6	5	7,8
Medical rehabilitation	8	6,8	8	6,7
Ear, Nose, and Throat	11	7,5	11	7,6

skills in conducting physical examinations [7–9]. Furthermore, fewer cases were encountered because the number of active days of students also decreased. As a result, students needed to practice the way to do comprehensive history taking, how to show empathy properly, and what it takes to get excellent and correct therapeutic communication [6, 7].

Research in Indonesia from Raja et al. in 2021 [10] stated that precisely when the pandemic was taking place, in six specialist forensic education centers spread across Indonesia, resident forensic skills increased rapidly. This increase is because residents are the backbone of health services during a pandemic. Forensic residents mainly deal with deceased patients, repatriating bodies, dealing with conflicts, and educating families about burial sites separate from residents who did not die of COVID-19. The results of this qualitative study show that students wanted to learn with actual patients, including how to handle COVID-19 patients directly with adequate supervision, so they can also learn to protect themselves. This direct exposure and interaction could improve their clinical abilities significantly [10].

While the clinical rotation learning method was using guided supervision from supervisors, role modeling, and reflective learning techniques, the current health education system calls for a condition that can build clinical skills and establish a professional identity [11, 12]. In this study, the survey results on students have

Table 3 In-depth interview result

Department	Interview results
Neurology	"We want an emergency room shift because until the rotation of this department is almost complete, we still have difficulty identifying patients with headaches, reading spinal x-rays, and initial management of stroke conditions" "It would be great if we could see patients more frequently, as limiting the number of admission days for us would further reduce the opportunity for direct interaction with patients"
Psychiatrists	"I want a departmental rotation schedule at the Mental Hospital to meet and conduct mental status checks directly on patients, but this pandemic makes it difficult for me, and I think my friends would think the same" "We want to gain experience providing mental support to COVID-19 patients because the number of mental disorders is said to have increased during this pandemic"
Public health	"This department's learning process is quite good; we can practice delivering COVID-19 education through online media"
Pulmonology	"Because of the risk of catching COVID-19, we have never performed invasive procedures in this department. We have never seen spirometry performed in this department" "I want to gain experience dealing with COVID-19 patients in the emergency room and learn how to properly and correctly use PPE so I can use it later in my career"
Internal medicine	"This learning method makes study appointments with lecturers easier because we do not need to be face-to-face. We can go online, so the time is more flexible" "I need more confidence later when I graduate later because I rarely meet patients face to face. Especially in the internal medicine department, we should have experience with various cases with a competency level of 4A"

not been compared with the passing performance of students in the national final exam. This needs to be done to see if students' perceptions aligned with the board exam's final results so that further research should be done. While emergency online education is an appropriate short-term option, transformative learning theory can provide a basis for ensuring creative approaches to staff development will continue beyond the pandemic. Through the use of integrated learning strategies, students can compare their current knowledge with new concepts and skills, such as those acquired through using technology (i.e., face-to-face education) [13].

Every student in the medical profession can obtain a competency certificate if they have completed the UKMPPD national exam in the form of a computer-based written exam (CBT UKMPPD) and a practical exam (OSCE UKMPPD). However, during the pandemic, the practical national exam (OSCE UKMPPD) could not be held due to fears that it would increase the transmission of COVID-19. Therefore, OSCE UKMPPD scores were replaced with scores obtained by students attending each department during the clinical rotation period. This practice follows the theory of programmatic assessment, where assessments are conducted continuously during the learning process so that student competencies can be assessed more accurately. In addition, the assessment of clinical skills should require direct observation or

the use of the workplace-based assessment method [14]. Assessment during the departmental rotation better describes student achievement obtained from various assessment sources during the educational process, not only in the final achievement/summative assessment. In performance-based medical education, programmatic assessment has become more common. In this approach, a wide range of short formative assessments is accumulated into a comprehensive, integrated, more excellent summary of the student's performance [15].

5 Conclusions

Students enrolled in clinical rotations found it simpler to acquire theoretical advice due to the teaching strategy used during the COVID-19 pandemic's initial wave. On the other hand, this approach lessened the opportunity for direct patient interaction. The quality of newly graduated general practitioners may have suffered as a result, prompting the use of better techniques, e.g., including the students in direct patient care, in the event of a pandemic when there will be a need to restrict crowds. The application of a scoring system during the educational period as a substitute for final practical exam scores can be implemented to get a more accurate picture of student performance.

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Competing Interest The authors declare that there are no competing interests related to the study.

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Nurhasan Agung Prabowo—developed the research proposal, collected data, and data analysis.
Pepi Budianto—developed the research proposal and collected data.
Siti Munawaroh—developed the research and collected data.
Mora Claramita—editing the results and publication of the manuscript.

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