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Is there feedback fatigue? Medical teachers' views on cognitive and affective factors in providing written feedback

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ABSTRACT

Extended reality (XR) has become one of the most promising tools for supporting learning and practice in medicine, especially in countries with limited resources such as Indonesia. This study assessed medical lecturers' and students' awareness, perceptions, and readiness to implement XR in Indonesian medical education. We conducted a cross-sectional study of multiple medical schools across Indonesia from April to May 2021. Our respondents were lecturers and students from the undergraduate and postgraduate stages of medical faculty. Respondents were asked to complete a self-constructed questionnaire with 40 questions for lecturers and 31 for students. A total of 415 respondents, comprising 246 undergraduates, 96 postgraduates, and 73 medical lecturers from 34 medical faculties and 28 provinces in Indonesia, participated in the survey. Most medical lecturers and students were aware of the XR system, with Virtual Reality (VR) being the most common type of XR reported (72–76%). However, most students and lecturers had no experience utilising XR technology (58–65%). The use of VR was the highest among all types of XR technology (29–37%), while MR was the lowest (2–3%). Most respondents reported an interest in medical training using XR facilities (89–97%). However, they also expressed concerns about potential adverse effects and a lack of confidence that the Indonesian medical faculty was ready for XR implementation. The results showed positive awareness and perceptions of XR in Indonesian medical education. Further studies are required to fully assess the need for the XR system across different stages of medical education.

Keywords: *extended reality, medical education, awareness, perceptions, readiness*

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INTRODUCTION

Feedback was initially defined as "information provided by an agent (e.g., teacher, peer, book, parent, self, and experience) regarding aspects of one's performance" (1). However, the definition of feedback has since been broadened to describe how feedback is a two-way communication process (2) and an ongoing process of improvement undergone by teachers and students (3). Feedback processes and conversations are complex dynamic interpersonal encounters and are considered effective when they trigger learner self-assessment (4). Feedback has been associated with students' competency attainment, progress, and improved learning in medical education (5). However, the use of feedback remains challenging as it involves many factors, including institutional culture, teachers' skills, and students' responses to feedback (4,6). Institutional culture is known to influence the quality of and receptivity towards feedback; in polite cultures, honest feedback might be prevented from being delivered (7). Specifically in the Asian setting, based on a recent scoping review (8), several cultural features influence feedback practices, including a preference for group feedback and feedback with summative consequences. Students tend to not seek feedback directly and still consider that feedback coming from more authoritative figures is more useful.

Despite extensive studies of feedback in medical education and the use of both verbal/feedback dialogue and narrative/written feedback being reported equally (9), further research on written feedback is needed, especially to examine its role in facilitating students' professional growth and self-reflection, promoting behavioral change, and ultimately inspiring excellence among students (10). Written feedback is defined as "information about student performance conveyed by prose—through email, letters, reports, notes on documents, and other means of production" (11). It is often provided in a predetermined form, sometimes preceded by a scoring sheet or a checklist (11). Written feedback can be documented and revisited; however, the restrictive nature of written feedback does not allow students to respond and, thus, tends to result in one-way communication and is more prone to misinterpretation given the lack of non-verbal cues (11,12). Thus, the provision of written feedback is deemed to be more challenging.

Written feedback has an important function in medical education, for example, in the Mini Clinical Evaluation Exercise (Mini-CEX), a workplace-based assessment tool with feedback as one of its key characteristics. Soemantri et al. (13) found that most written feedback provided in 1427 Mini-CEX forms was general feedback. The feedback did not conform to the highest level of feedback according to Holmboe et al. (14), which is feedback that targets students' self-regulation of learning. Other studies by Canavan et al. (15), Shaughness et al. (16), and Desjardins et al. (17) also similarly revealed that written feedback is of low quality and less effective. One way to improve the effectiveness of feedback is to ensure that it facilitates students' reflection (4). For written feedback to stimulate students' reflection on their learning, it needs to have a positive tone and take the form of a question rather than a statement. The focus of the feedback should also correspond to the level of reflection of students (18).

A study by Yu et al. (19) in the setting of general higher education examined the emotions of teachers when providing feedback, which influenced their behavior when writing feedback for

students' assignments. Based on their analysis of previous studies, Yu et al. (19) summarized that providing written feedback is often regarded as a demanding and exhausting task, partly due to the large number of written students' tasks and limited time to provide elaborate and constructive feedback. Moreover, students' resistance to feedback and their inability to take action for improvement based on the feedback also contribute to teachers' frustration in writing feedback. In the medical education setting also, cognition and emotions are known to influence assessment judgments made by examiners (20). When providing assessment scores, assessors or examiners utilize their cognition, especially regarding students' expected performance, observe students' performance, and then decide whether there is evidence of the students' ability and how this evidence will inform the judgment. Emotions are added into the equation since they are inherent to the decision-making or judging process; this can result either in biased or valid results (20). A similar mechanism applies to the process of feedback provision. Providing written feedback is not only a cognitive learning process involving a certain thought process, that is, knowing the content, focus, and format of feedback (18), but also an affective learning process that involves emotion. Affective learning is the way people emotionally process information and stimuli (21). Information and stimuli (e.g., students' resistance to feedback, a large number of students, and limited time, as described above) become the source of emotions, either positive or negative (19), and eventually, both cognitive and affective factors shape behavior in providing written feedback. Given the importance of written feedback to support medical students' learning, the current study aimed to explore the cognitive and affective factors influencing the provision of written feedback in medical education. Understanding how medical teachers regulate their cognitive and affective processes when providing written feedback will enable medical education institutions to appropriately support better written feedback practice.

METHODS

Context

This study was conducted in the Faculty of Medicine Universitas Indonesia (FMUI). FMUI has an undergraduate medicine program (5.5 years) and postgraduate residency programs between 4 and 5 years. Throughout the program, students engage in diverse learning activities, both in the classroom and the hospital setting. Both basic science and clinical teachers are involved in case-based discussion (e.g., problem-based learning [PBL] for preclinical undergraduate students, case-based learning, and evidence-based case reports in clinical clerkships or residency programs) and research supervision for undergraduate or postgraduate students. Furthermore, clinical teachers are engaged in workplace-based assessments. These learning opportunities are designed to provide students with feedback, including in written form, aided by assessment rubrics. The school regularly holds faculty development sessions regarding the different roles and tasks of medical teachers, including feedback provision. Pinasthika and Findyartini (22) reported consistent findings regarding the influence of hierarchical and collectivist culture on feedback conversation in final-year undergraduate students in this particular study setting.

Design and Study Participants

This study used a qualitative descriptive design (23). Medical teachers' perspectives on providing written feedback were explored through focus groups (FGs) with faculty members involved in the teaching and learning process. The 33 medical teachers involved in this study were purposively selected using the maximum variety sampling technique, taking into account

their department representative status, gender, length of teaching, and teaching/learning involvement in undergraduate and postgraduate medicine program modules (those who were involved in group discussions, workplace-based assessments, final research supervision, and other closely monitored/small group teaching activities were preferred).

Data Collection

Data were collected from August to December 2022 using online FGs. A total of four FGs were held with groups of 8-12 medical teachers moderated by the authors through the Zoom Meeting platform. The groups comprised two groups of basic science teachers and two groups of clinical teachers. FG guidelines were created to explore medical teachers' knowledge about written feedback provision, its relevance in medical education, perceptions towards narrative feedback, and challenges faced and expectations in providing narrative feedback (Table 1). The FGs were moderated by two authors (DS and NG), and notes were taken by a third (AP). DS and NG are medical educationalists also involved in providing written feedback to students, especially in preclinical undergraduate modules and postgraduate (master) programs, while AP is a junior medical educationalist who is not involved in the undergraduate or residency programs. All participants signed electronic consent forms prior to their involvement in the FGs. All research data were stored by the researchers on a secure digital platform, accessible only to the research team.

Table 1: Interview Guide

	Questions
Opening questions	How was your experience in providing narrative feedback to students (under/postgraduate)?
Main questions	1. What kinds of written feedback did you provide? a. What was the feedback format (questions/statements)? b. What was the focus of the feedback (addressing performance/stimulating students' reflection)? c. What was the tone of the feedback? (positive/negative feedback) d. How detail did you provide the feedback? How much time did it cost you? e. Are there certain structures you used when you provided written feedback? 2. What did you consider when you are about to provide written feedback? 3. How did you feel when providing written feedback? What were the influencing factors? What did you do towards those emotions/feelings? 4. What are the influencing factors on the quality and quantity of the written feedback you provided to students? (i.e. culture, student factors) 5. What are the challenges in providing written feedback to students? 6. What kind of support do you need in providing written feedback to students? 7. How was the impact of providing written feedback to students? 8. What are your expectations to students after you provided them with written feedback?
Closing questions	Is there anything else you would like to say in order to increase the quantity and

quality of written feedback on student performance?

Data Analysis

The FGs were video-recorded and transcribed verbatim. Data-driven thematic analysis was used to analyze the data obtained from all FGs, in line with the qualitative descriptive design, while concurrently considering the existing theoretical concepts previously elaborated in the introduction (24). Each author worked on one transcript independently to generate codes and themes from it, allowing different authors to analyze FGs moderated by another author. The identified codes and themes were then discussed by all authors and documented before they were applied in subsequent analyses. New codes and themes that emerged were added in an iterative manner (24). Any disagreement was resolved by discussion among authors.

RESULTS

The study findings showed how written feedback provision was influenced by cognitive and affective elements in the form of four components, especially during the observation and interpretation processes. Furthermore, this study highlighted how the institutional feedback culture and system invigorates teachers to provide written feedback. All these elements determined the frequency, form or structure, modality, content, engagement, and quality of the written feedback delivered by medical teachers. Each component is elaborated on below, along with representative quotes (DA = basic sciences teachers, DK = clinical teachers - FG number - participant initials).

We identified four main components involved in providing written feedback consisting of teachers, students' tasks/performance, the impact of feedback, and institutional culture and policies. Each of these components influences the process of written feedback provision through cognitive and affective factors (Figure 1). Each factor is elaborated on below, along with representative quotes (DA = basic sciences teachers, DK = clinical teachers - FG number - participant initials).

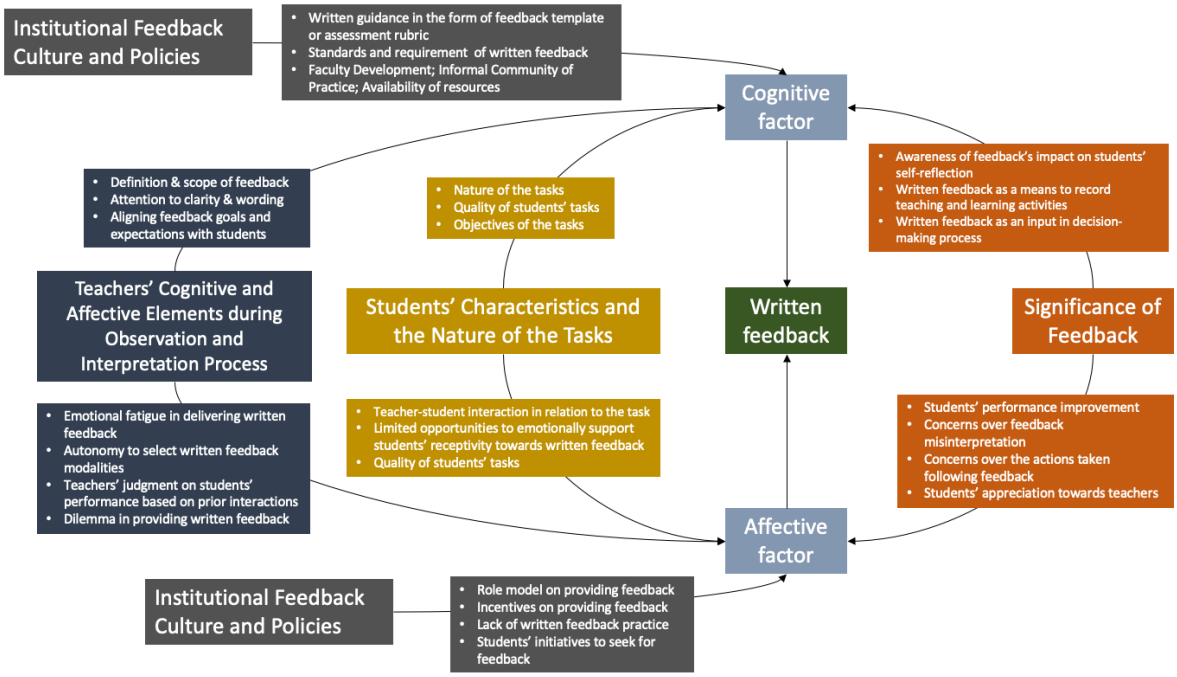

Figure 1: Emerging themes reflecting how different cognitive and affective factors influence the provision of written feedback

Teachers' Cognitive and Affective Elements during the Observation and Interpretation Process

Our findings showed that cognitive and affective elements influenced written feedback provision. The cognitive elements identified included the perception of the definition and scope of written feedback, attention to clarity and wording, and alignment with students regarding the goals and expectations of feedback. The emotional elements involved in providing written feedback included the need to observe students' reactions to feedback, concerns about the misinterpretation of written feedback, effort in using positive language, emotional fatigue in delivering feedback due to the large number of students and the repetitive process, and the emotional dilemma in providing written feedback.

Some teachers perceived more cognitive burden when they had to provide written feedback as they needed to pay attention to clarity and wording. Providing written feedback requires extra effort in constructing comprehensible and effective sentences, as long sentences are more susceptible to misinterpretation, while overly short sentences are non-descriptive. Moreover, the teachers faced an emotional dilemma in terms of realizing the importance of providing written feedback but feeling emotionally exhausted in delivering it.

> "We need more effort and a longer time to give written feedback. Thinking of feedback in the form of texts and sentences is more difficult than verbal feedback, right? It is very challenging to deliver sentences that students can understand, with effective written language, and [selecting words that] do not negatively affect students' motivation." -DA2-WS

> "There's this dilemma [in selecting assignments for which to give written feedback], as it can be exhausting and overwhelming with the high numbers of assignments to be graded. I feel that the quality of written feedback I

> provide for the first and the last half of the group is different because my concentration decreases along the way." -DA1-PE

The definition and scope of written feedback were perceived differently among medical teachers. Some teachers regarded examination scores as a form of feedback, while others mentioned that written feedback provision sometimes went unnoticed as it was, to some extent, not as standardized as providing scores; this increased their cognitive load in providing written feedback.

> "Written feedback is usually provided in the form of grades written in the rubric or assessment form" -DK2-RSA

> "The content of the written feedback can be very different among teachers, which creates confusion among students [on acting on the feedback]; therefore, I think guidelines for the content of the written feedback [in each particular learning context] could be helpful for standardizing the contents." -DA1-RY

Most of the respondents underscored the importance of providing written feedback for developing students' performance; however, they also mentioned several supporting factors, as well as challenges that hindered them from providing such feedback. Autonomy to use different modalities in providing feedback supported teachers' motivation to provide written feedback. However, teachers dealt with emotional fatigue as they felt that giving feedback was a repetitive process. Teachers' well-being was also one of the internal factors that inhibited written feedback provision.

> "My department provides autonomy on [what modalities are used for] interacting with the residents. Personally, for providing feedback, I prefer giving written to verbal feedback, as I forget easily. I can use Whatsapp chat or email, as typing in Whatsapp is tiring." -DK2-HMN

> "In the context of WBA [workplace-based assessment], teachers usually provide verbal feedback, and then we have to give written feedback in the form, which is good as it is easily tracked. However, it feels like we have just finished giving feedback, yet we have to write the same thing down. It takes determination and energy to do that." -DK2-RSA

> "I think it is important to come up with an effective way to provide meaningful feedback to the students that is still delightful for us" -DA1-PE

Teachers also highlighted that their judgment of students' performance based on their prior interactions impacted their expectations of students. These expectations further impacted teachers' attitudes towards the students, as well as the written feedback content. Therefore, as some teachers noticed the impact of these expectations, they provided opportunities to directly discuss and align the feedback expectations before providing written feedback. Furthermore, some teachers provided opportunities for discussion with students to clarify the written feedback following its provision.

> "I set my expectations for each student; for example, I have previously observed a particular student with below-average skills, so I do not expect a high-quality performance. However, if I observe this student showing some improvement, it shows me that I can expect more from him." -DK1-SMA

> "Combination with face-to-face meetings is needed in written feedback provision to confirm the expected results, usually at the beginning of a task. Besides, when I see that students still make the same mistakes after I previously provided written feedback, I think it is then easier to have a direct discussion than providing another written feedback so I can clarify my previous written feedback." -DA1-HN

Students' Characteristics and the Nature of the Tasks

Differences in the nature of the tasks cognitively impacted the form of written feedback delivered by teachers. In written assignments, teachers used comments, strikethrough, or track changes to provide written feedback, especially for essays and writing assignments. The written feedback provided could be in the form of corrections, recommended references, instructions, or questions. In clinical education occurring in the workplace, written feedback was provided through digital communication platforms as a form of supervising students/residents.

> "Students usually send me the written assignments and I give my feedback using track changes and strikethrough so that I don't remove the original sentence, and also give comments" -DK1-MF

> "Residents and consultants aren't always in the same locations, so when we have to supervise and provide feedback, WhatsApp chat text is really facilitating." -DK1-AK

Teachers were aware that the learning objectives of some tasks were to develop students' critical thinking ability (i.e., PBL individual learning report). Therefore, feedback in the form of questions was given to further develop students' critical thinking.

> "[The form of written feedback] depends [on the tasks]. It can be in the form of questions so that we invite the students to rethink. But I think it really depends on the [form of assignments] and the purpose." -DA2-WS

As fewer expressions and less dialogue were involved in written feedback, verbal feedback was given following the written feedback provision, especially for written assignments, to support students' receptivity towards the written feedback.

> "In providing written feedback, I sometimes worry that the students don't understand what I really mean. Because, unlike verbal feedback in which I can still show pleasant expressions while delivering negative feedback, written feedback can be [interpreted] differently." -DA2-II

> "One thing that hinders me from providing written feedback is that I don't have opportunities for live discussions where I can see the students' immediate reactions and they can therefore emotionally feel how I provide guidance." -DK1-AK

Furthermore, teachers mentioned the need to always incorporate their appreciation for students' performance in the written feedback and use language that is harmless for students' motivation. This highlights the teachers' attempt to maintain the student-teacher relationship in daily interactions during and after task completion, which affectively shaped their written feedback. The level of interaction in task completion varied depending on students' educational stage. The more exposure and attachment of the students (i.e., residency programs or thesis

supervision, which allows longitudinal supervision), the more eager the teachers were to provide written feedback as they had more opportunities to observe students' progress.

> "I try to use positive sentences in order to maintain students' motivation. Sometimes, there are certain students who are easily demotivated." -DA2-II

> "Providing written feedback for residents [tasks or performance] is somewhat more possible as the students actively seek it and I can observe their progress. It is very different for undergraduate students, with their great numbers and lack of long-term engagements." -DA1-RY

The quality of students' tasks also affected teachers' engagement in providing written feedback, especially when a high number of student assignments were awaiting feedback. Therefore, teachers highlighted how students' quality of tasks impacted the form of written feedback they gave.

> "There were so many mistakes that I had to directly correct the sentences." -DK1-SMA

> "What I found demotivating in providing written feedback is when I saw a messy student's assignment, with untidy layouts and unclear sentences. So I asked the student to fix it first without reading much further." -DK2-SDE

Significance of Feedback

Teachers highlighted that one purpose of providing feedback, both verbal and written, was to provoke students' reflection and critical thinking ability. Therefore, some teachers tried their best to incorporate reflective prompt questions when providing written feedback. However, teachers perceived that some students showed a lack of critical analysis in responding to the written feedback.

> "In a written assignment with very detailed contents such as in the PBL individual learning report, I asked the students to add their reflections with regard to whether they can comprehend what they wrote, the comprehensiveness and language used. So, my feedback is answering or adding to their reflection." -DA2-AF

Despite teachers' attempts to incorporate reflective questions into their written feedback, they reported that sometimes, students just accepted the feedback as it was, without any attempt to analyze, argue about, or question it.

> "As teachers, we expect that students thoroughly think in response to our written feedback. We want them to have a little defense, not just accepting [all of our feedback] without further analysis." -DK2-MN

Written feedback was considered useful information for students and teachers. Teachers regarded written feedback as a means of documentation to track their feedback whenever needed. Written feedback also helped teachers to further evaluate whether the students understood and acted upon the feedback.

> "It is certain that written feedback is easily seen again compared to verbal feedback, which is likely to go in one ear and out the other." -DK1-MF

> "Personally, I prefer written feedback because it is evident for my teaching and is a record of my response so that I can check later whether the students catch what I mean. I can also track students' improvement according to my previous feedback." -DK2-HMN

This documentation of written feedback was regarded as motivating for teachers, especially when teachers observed some improvement or maintained positive performance in students.

> "Seeing the same students that we facilitated in their early years in medical school and seeing that they still maintain the habits that we advised them earlier [through written feedback] or seeing that their abilities are more advanced compared to their friends, are such a positive experience." -DA1-SCN

Teachers found appreciation from students while receiving written feedback motivating them to provide more written feedback in the future.

> "I have never received appreciation for verbal feedback like I got for providing written feedback. Students are grateful when receiving written feedback." -DA1-SCN

However, there were concerns about feedback misinterpretation and students' follow-up actions, which, to some extent, discouraged teachers from providing written feedback.

> "In providing feedback, I sometimes worry about being negatively labeled by students, although I have good intentions to help them improve, but misinterpretation by students is sometimes uncontrollable" -DK1-AK

> "We [teachers] have to be careful in providing written feedback; as it is documented, it can be a boomerang [for teachers]" -DK1-SB

Furthermore, teachers highlighted that written feedback, especially from clinical teachers in clinical placements, was also considered an input in the decision-making process, especially in longitudinal assessment and program evaluation.

> "I think that as written feedback is a good documentation, it is useful for further 'handling' students, especially if there is a problem identified [from the previous written feedback the student obtained]." -DK1-SB

Institutional Feedback Culture and Policies

The respondents of this study highlighted that, apart from the aforementioned elements, institutional cultures play important roles in written feedback provision.

In the current setting where verbal feedback is more commonly used, resources provided by the suprasystem in terms of flexibility in scheduling, formal, dedicated time for feedback, and institutional policies that incentivize written feedback practice were also mentioned as supporting written feedback provision.

> "No matter how often we are taught to provide constructive feedback, without proper time allocation and attention to our workload, it is difficult [to provide written feedback]. Without attention to our workload, our

> emotional status impacts the feedback delivered. It is important to not only provide a conducive environment to teach but also provide allocated time to teach conducively." -DK2-SRA

Institutions should also empower students to show initiative in seeking written feedback since it affects teachers' emotional responses, which externally motivates teachers to provide written feedback.

> "What I feel is really encouraging [to provide written feedback] before the deadline is students' questions about whether we have checked their work. It really makes me guilty when I cannot provide the feedback on time." -DA1-MN

Teachers mentioned that educational programs, both in academic and clinical settings, have provided assessment rubrics that facilitate written feedback provision and build the feedback culture in the institution. However, some teachers found it difficult to construct general written feedback in the commentary section provided at the end of the rubrics. Therefore, teachers suggested the use of more analytical rubrics that were self-explanatory or holistic rubrics that were equipped with guided commentary/open-ended questions for each assessed item to assist them in constructing written feedback for students' performance.

> "Most of the rubrics are in the form of checklists and quantitative rubrics, with no open-ended section. I think this open-ended section at the end of the checklist items could help us in providing more detailed written feedback." -DK2-LB

However, despite the availability of rubrics, teachers also mentioned variations in written feedback content between teachers, which creates confusion for students.

> "The content of the written feedback can be very different between teachers, which creates confusion among students [on acting on the feedback]; therefore, I think guidelines for the content of the written feedback [in each particular learning context] could be helpful for standardizing the contents." -DA1-RY

Therefore, teachers highlighted the need for institutions to continuously elucidate the expected standards, rules and regulations, as well as the requirements for written feedback provision among all faculty members through a formal faculty development program.

> "In my opinion, we really have certain things that really need to be mandatory. I think it is necessary for the module team or medical education unit to provide a written regulation that it is mandatory to provide written feedback for further evaluation" -DA1-SA

Engaging junior faculty members with senior ones as role models as a means to develop informal communities of practice in providing written feedback was also mentioned by respondents as effectively promoting written feedback provision.

> "Teacher self-development is not only in the form of teacher training, but also through interactions that must be made intentionally. ...I feel that if I know more about what happens to my colleagues through chatting or informal meetings or sort of like orientation or sharing sessions about

> students' testimony [in receiving written feedback] at the beginning of the module, I believe it can make an impact." -DA1-SCN

DISCUSSION

The current study identifies factors influencing the provision of written feedback. Our findings advance our understanding of the process of written feedback provision and demonstrate that the process of providing written feedback is complex and involves not only cognitive factors but also affective or emotional factors (19). We also elaborate on how the dynamics of these two factors influence written feedback in terms of each of its components, that is, teachers' cognitive and affective elements during the observation and interpretation process, students' characteristics and the nature of the tasks, the significance of feedback, and institutional culture and policies. Previous studies focused on written feedback methods and their technicalities; for example, Dekker et al. (18) examined the format, focus, and tone of written feedback, whereas Zhang and Zheng (25) categorized written feedback into three types. However, to the best of our knowledge, no previous studies comprehensively explored how the dynamics of cognitive and affective factors influence the decision to deliver written feedback and the process thereof in the context of medical education. The results of the current study also resonate with the framework developed by Gomez-Garibello and Young (20), according to which both cognitive and affective factors impact the rater-based assessment process, including in written feedback provision.

This study shows teachers' need to cognitively understand the definition and scope of feedback, pay attention to the wording and clarity of sentences, and align their expectations with those of students when providing written feedback. These findings are in line with the work of Agius and Wilkinson (26), who reported that both students' expectations and teachers' views of written feedback, among others, affect the balance of positive and negative feedback, linguistic clarity, timeliness, and focus of the feedback. For example, students preferred detailed feedback, but teachers had problems providing it due to time limitations and large class sizes. Furthermore, written feedback should be grammatically correct and written in a formal style to overcome problems of students' difficulty in deciphering its meaning (27).

Some participants in the current study revealed that some teachers still regard examination scores as feedback, which could demotivate teachers in providing narrative feedback since students are more interested in the scores than feedback (26). Furthermore, emotionally, the participants in our study felt fatigued in giving written feedback, which culminated in an emotional dilemma regarding written feedback provision. An awareness of the importance of written feedback was present, but writing feedback for numerous student tasks was considered very tiring due to the increased cognitive load required to provide written feedback, given that teachers have to carefully craft the wording. This result echoes the reports of Tuck (28) and Yu et al. (19) that providing written feedback is often a burdensome task.

In spite of its demanding nature, which triggered teachers' emotions, teachers were fully aware of the usefulness and richness of information provided by written feedback. The convenience of using written feedback to track students' past performance and current progress further affected teachers' motivation to provide more written feedback, especially when they observed improvement and received appreciation from students. This was in line with several previous findings highlighting that interaction with motivated students, recognition from students for their teaching, and the satisfaction of supporting students' learning and development incentivize teachers and stimulate their motivation to teach (29,30). Another cognitive factor

driving teachers to provide written feedback is its benefit for documentation and future decision-making processes, as corroborated by Gulbas et al. (27).

In contrast, some teachers also expressed dissatisfaction when giving written feedback because they could not observe how students reacted to the feedback, which deterred them from elaborating on their written feedback. This relates to the need for teachers to observe students' progress on tasks based on their feedback, which can lead to satisfaction and fulfillment; as found by Yu et al. (19), student engagement with feedback increased teachers' positive emotions in providing written feedback (19). Therefore, these results highlight the importance of longitudinal relationships as a mediating factor in feedback provision (7). Thus, using learning opportunities in which students and teachers work closely with each other over a sufficient period to observe progress should be considered while developing medical curricula.

Based on the nature of the tasks, teachers could opt to provide written feedback in different forms. These are in line with the types of written feedback on students' written assignments described by Zhang and Zheng (25), who divided written feedback into referential, expressive, and directive types. The current study shows that teachers account for the tasks' objectives when choosing the form of feedback. However, not only do the tasks mediate the provision of written feedback cognitively but teachers' emotions are also triggered. For example, when there are many mistakes early in the assignment, teachers tend to be discouraged from continuing to provide feedback. This might be related to the psychological phenomenon known as projection, which explains how teachers' teaching self-efficacy would affect their perceptions of their students' performance (31). A teacher with high teaching self-efficacy would first focus on students' strengths, despite any observed weaknesses. On the contrary, teachers with low teaching self-efficacy would become indifferent and refrain from providing feedback for improvement when they observed too many weaknesses in students. Therefore, institutional initiatives to enhance teachers' self-efficacy in teaching and delivering meaningful written feedback would enhance their ability to focus on students' strengths instead of weaknesses and further engage them in providing more written feedback.

However, concerns about feedback misinterpretation and the fear of being negatively labeled by students were also mentioned as negative aspects of written feedback that hindered teachers from providing it. The nature of written feedback limits the possibility for teachers to clarify it and ensure the appropriate responses. Therefore, these findings strengthen the notion that providing feedback is not only a cognitive process but also one that is emotionally laden. The study participants often used question-type feedback to prompt and stimulate students' reflective thinking, which aligns with the findings from Dekker et al. (18). However, this needs to be done carefully since students may prefer more explicit, direct, and clear instructions on what they should do (25).

Institutional culture and policies are important factors known to influence the provision of written feedback (7,26,28). Our study further reinforces this since the participants demanded written guidance, standards, and clear requirements for written feedback. Not only can guidance be developed for teachers, but it can also be specifically created for students since the similarity of perceptions and expectations of feedback between teachers and students is crucial (26). Providing feedback is one of a teacher's skills; thus, as with any other teaching skill, it can be taught and learned. The study participants highlighted two important cognitive factors from the system perspective, namely the availability of faculty development programs and a community of practice. This resonates with Steinert's (32) recommendation to equip teachers with necessary skills, including feedback skills. As students' performance affects teachers' motivation to provide written feedback, faculty development programs on written feedback

provision could benefit from incorporating training to develop teachers' ability to identify students' competencies and align their written feedback accordingly to further increase the quality of the feedback (31).

The current study also elaborated on how the institutional system emotionally influences teachers' provision of written feedback. Without sufficient incentives for feedback practice in the form of alleviating teachers' workloads to provide ample time for feedback provision, teachers are emotionally discouraged from giving written feedback. The lack of institutional support and reward systems becomes a source of negative emotion, which may deter teachers from providing adequate written feedback (19). A lack of sufficient recognition, including recognition of the time allocated for providing written feedback, especially with a myriad of competing priorities, remains a barrier to teaching, including providing written feedback (30). Furthermore, our findings echoed that written feedback practice should be a part of institutional culture (7). When feedback becomes part of a culture, students are more empowered to ask for it. These findings show that students' initiative to seek feedback can trigger teachers' guilty feelings and further encourage them to give written feedback. This is particularly important in Asian medical education settings, in which students tend to be reluctant and hesitant to ask for feedback (8)

Our study reveals the complexity of written feedback practice, which involves both cognitive and affective factors. Thus, we argue for the importance of the educational institution to be fully aware of the challenges faced by teachers in written feedback practice, both cognitively and affectively, and arrange appropriate support systems. Based on the study findings, we propose several measures to improve written feedback practice. First, educational institutions should create a system that facilitates written feedback practice (e.g., guidelines, standards, feedback templates, reward systems, and workload arrangement), including systems enabling teachers to follow up with students and support their responses to provided feedback and subsequent action. Second, students need to be empowered to actively seek feedback and engage with delivered feedback in a safe space. Students' feedback-seeking behavior is influenced by many factors, which include perceived benefits and student-teacher relationships (33). Students should be regularly reminded of the nature and benefits of feedback for them to properly respond to it and make actionable plans. Furthermore, teachers should also engage students in a psychologically safe learning environment to promote learning and encourage students' feedback-seeking behavior (34). Third, the awareness that providing written feedback involves increased cognitive load and various emotional considerations should lead medical teachers to self-regulate their teaching. We argue that self-regulated teachers who proactively use appropriate strategies to reach their teaching goals (35) will improve written feedback practice. Teachers who practice self-regulation in teaching would try their best to manage expectations, regulate emotions and motivation, manage their cognition and metacognition (i.e., use items in assessment rubrics as covered items in the feedback, acknowledging biases when having prior negative experiences with particular students), and engage with formal and informal teacher communities.

Given the specific local context of the study setting described above, the current study's findings may be directly applicable to other educational institutions with similar dominant cultural values, that is, collectivist and hierarchical. The transferability of the findings to settings with different cultural characteristics needs to be carefully considered. Nevertheless, we argue that our current study sheds light on the conduction of written feedback practice and its intricate influencing factors, not only at the cognitive level but also at the affective level, in both academic and clinical settings. Written feedback is a part of a larger feedback discourse, yet it is understudied. Hence, we believe our findings will benefit medical education institutions in

improving written feedback practice by attending to the institutional feedback culture and policies, students' feedback-seeking behavior, and teachers' self-regulating ability. Future studies may delve into formulating the ideal written feedback model for both undergraduate and postgraduate settings, fit for students' needs and teachers' expectations.

CONCLUSION

Written feedback provision is an intricate process, involving four components, namely teachers, students' tasks, the impact of feedback, and institutional culture and policies, which are influenced by the cognitive and affective factors of medical teachers. Similar to verbal feedback, written feedback should be a part of institutional culture. Therefore, support from institutions in the form of incentives, teachers' workload arrangement, and appropriate assessment rubrics is necessary to reduce teachers' cognitive load and further promote written feedback culture. Furthermore, opportunities for students and teachers to engage in dialogue over the written feedback provided and reach an understanding can be incorporated into the process of written feedback provision to alleviate teachers' emotional fatigue and dilemmas in providing written feedback. Empowering students to be more active in seeking feedback while simultaneously nurturing teachers' self-regulating ability can overcome the limitations of written feedback and optimize its practice.

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