



Empower Students With Internal Feedback: Unpack the Process of Internal Feedback in Language Classrooms

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Abstract Recent research highlights that external feedback alone does not lead to improvements unless students process and use it internally, emphasising the need to shift from a teacher-centred to a student-centred approach. While previous studies have underscored the importance of students generating feedback for their own use and explored effective pedagogical strategies, the process of internal feedback remains under-explored. The current study addresses this gap by examining how 21 university students in China engaged in the internal feedback process during two assessment-for-learning activities (i.e., peer review and reflection on peers' presentations) in language classrooms. Drawing on (Nicol, 2021) framework of internal feedback, the results identified three stages in the internal feedback process: students generating internal feedback, calibrating it, and then responding to and acting upon it. Comparison emerged as central to all stages, as students compared their work with diverse internal and external sources. Within each stage, teachers' pedagogical activities played a key role in helping students enact internal feedback, highlighting the positive effect of these activities on students' generation, calibration, and use of internal feedback. These findings contribute to the research on student-centred feedback, reinforce the role

of comparison in internal feedback, and offer insights into how pedagogical activities can facilitate students' internal feedback process and feedback literacy.

Keywords Internal feedback · Assessment for learning · Pedagogical practices · Feedback literacy

Introduction

Feedback research has shifted its attention from a teacher transmission approach to a learner-centred view, which emphasises students' active sense-making practice to decipher complex feedback information (Boud & Molloy, 2013; Nicol, 2021; Winstone & Carless, 2019). Such a learner-centred approach brought attention to internal feedback, which optimises students' effective use of external feedback by moving students from seeking to generating feedback information and constructing meaning for future learning (Yan & Carless, 2022). In generating internal feedback, students actively make sense of feedback information or different inputs to upgrade their knowledge and improve the quality of their work (Carless, 2022; Nicol, 2019).

Recent student-centred approaches in assessment emphasised the importance of students' active engagement with feedback information through making judgements and generating feedback for their own use (e.g. Arnold, 2022; Panadero et al., 2019). However, few studies have explicitly investigated the process of internal feedback. Among those that do, the focus has primarily been on strategies to enhance the effectiveness of internal feedback, such as using explicit self-written comments (e.g. Nicol & Kushwah, 2024) or making multiple comparisons with various sources (e.g. Nicol & McCallum, 2022; Panadero & Romero, 2014). Given the need to explore how students implicitly and

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incidentally generate feedback information for themselves (Nicol, 2021; Nicol & Kushwah, 2024), further empirical research is still warranted.

This paper seeks to address this gap by examining the internal feedback process through students' engagement in two assessment-for-learning activities: peer review of student writings and reflection on peers' presentations in a top-tier English-medium university in China.

Theoretical Basis for Internal Feedback

Internal feedback refers to the self-generated information that emerges from the comparison between students' current levels of knowledge and skills against the reference information accessed through interactions with external and internal sources (Nicol, 2021). The working mechanism of internal feedback can be explained by both cognitive learning theory and social constructive theory. From the cognitive learning theory perspective, learners need to construct internal feedback in the internal cognitive process, as all feedback information needs to be interpreted and filtered by students' cognitive system before they act (Yan & Carless, 2022). Meanwhile, the social constructive perspective emphasises that learners engage in meaning-making within a social context by interacting with others and various resources. These include internal resources, such as the knowledge needed to decode information, and external resources, including explicit criteria or standards provided by teachers (Esterhazy & Damşa, 2019). The social constructive perspective emphasises that interactions and access to diverse resources assist students in generating and refining their internal feedback.

Previous assessment studies have addressed the necessity for students to process information internally, although these scholars may not use the term "internal feedback" to describe this process. Arnold (2022) used "internal dialogue" to describe students' inner activities in evaluating their or others' work with self- and peer assessment rubrics. Panadero et al. (2019) proposed the concept of "self-feedback", a formative perspective of self-assessment that emphasises students themselves generating feedback for enhancement purposes.

To develop a systematic understanding of internal feedback, Nicol (2021) proposed a model of internal feedback which demonstrates the interconnection between students' internal mental environment and the external information environment. Central to this model is the comparison process where various sources of information work as references, including both external information (e.g., teachers' comments, peers' work and comments, rubrics, and exemplars) and internal information (e.g., students' intuition and feelings, memory about prior performance, and internal standards shaped by previous tasks) (Nicol, 2021). Through

the comparison between the current progress with both internal and external information, students monitor their learning and become aware of their current performance in relation to expected learning goals (Nicol, 2021; Nicol & Milligan, 2006). The comparison process leads to the reinterpretation of the task, re-formulation of learning goals, and adjustments in tactics or strategies, resulting in modified internal and external products. This framework conceptualised internal feedback as a student-centred process. In particular, it depicts students' internal mental environment where students are actively engaged in comparing their own work with various comparators and generating internal feedback. This framework assists us in understanding how students utilise different sources for internal feedback generation and how teachers could design and implement effective pedagogy activities to facilitate such a process. Hence, the current study adopts Nicol's (2021) framework to analyse students' internal feedback process.

The core of Nicol's (2021) framework, which is the value of making comparisons to help students process information, has been confirmed by various studies. For instance, an empirical study with 218 junior students in Spain showed that those using rubrics for self-assessment outperformed the control group, suggesting that the comparisons between the current performance and clear standards allow students to notice the gap and make improvements (Panadero & Romero, 2014). Similarly, Nicol and McCallum (2022) demonstrated that students generated productive internal feedback by comparing their work with both high-quality and low-quality peers' work, highlighting that exposing students to work of different qualities deepened their understanding of what constitutes quality. Furthermore, Nicol and Selva-retnam's (2022) study involving 23 university students found that comparing their individual work with group answers and dialogues facilitated the generation of internal feedback on content, process, and self-regulation. Finally, Nicol and Kushwah (2024) argued that high-quality student-generated feedback by comparing their own writing and published ones can replace or complement teacher feedback.

The potential to enhance student learning through the internal feedback process may stem from an increase in student feedback literacy—the ability to read, interpret, and use feedback effectively (Sutton, 2012). Carless and Boud (2018) define student feedback literacy as students' "understandings, capacities and dispositions needed to make sense of information and use it to enhance work or learning strategies" (Carless & Boud, 2018, p. 1316). Feedback-literate students are able to appreciate feedback, make judgements of their own and others, manage affect, and act on feedback information. The reciprocal relationship between internal feedback and feedback literacy has been discussed theoretically in the literature (Carless, 2022). Feedback-literate students take active roles in the feedback process to make the

most use of feedback opportunities (Malecka et al., 2022); such an active engagement facilitates the internal feedback process. Additionally, sustained practice of internal feedback through assessment-for-learning activities (e.g., self-assessment) may facilitate the development of student feedback literacy (Yan & Carless, 2022). The current study will focus on this relationship direction, which has been explored less in the existing literature so far.

Pedagogical Strategies Facilitating Internal Feedback Process

The opportunities to generate internal feedback through comparisons are closely related to students' engagement in purposefully designed pedagogical activities, such as self- and peer assessment (Nicol, 2021). Self-assessment involves opportunities for internal feedback generation because it allows students themselves to generate feedback for future learning (Andrade, 2018). Students' repeated practice in making self-evaluation helps them learn to generate internal feedback and enhance their feedback literacy (Carless & Boud, 2018; Hoo et al., 2022). The thematic analysis of Australian university students' self-assessments showed that structured self-assessment practices, such as providing explicit criteria and requiring students to justify their evaluation with specific evidence, created opportunities for reflection, comparison, and self-evaluation (Gladovic et al., 2024). Additionally, Yan et al.'s (2023) meta-analysis concludes that providing students with explicit supplementary information about their performance (e.g., teacher or peer feedback) in self-assessment enhances the effectiveness of self-generated feedback. However, there are conflicting results regarding whether students' self-reflection process should be made explicit. An empirical study with 139 first-year students in the UK showed that the internal feedback was more effective when students immediately wrote down their reflections through guided questions after comparing their work with peers' (e.g., what did you learn from comparing your essay with your peers' work?). More specifically, students were more likely to act on their self-generated feedback, resulting in improved writing performance (Nicol & McCallum, 2022). Despite this, Yan et al. (2023) found no significant moderating effect of explicit self-reflection on students' academic achievement, possibly due to insufficient reports of reflection processes in the reviewed studies. Nevertheless, making internal feedback explicit is still believed to be beneficial for student learning because of easier teacher monitoring and scaffolding in this process (Panadero et al., 2019), and the extent to which such a practice is effective still warrants further studies.

In addition, peer assessment allows students to self-monitor their work and generate internal feedback by comparing their work with peer work or comments (Carless,

2022). Having produced similar work themselves, students are naturally and spontaneously inclined to make these comparisons (Nicol, 2014). When engaging in peer assessment, students play dual roles as feedback givers and receivers, leading to varied learning gains: as feedback givers, students compare their own work with peers', gaining new perspectives, approaches, or a deeper understanding of standards; and as feedback receivers, students analyse their work against peers' comments, pinpointing their weaknesses more easily (Nicol, 2021). To and Panadero's (2019) qualitative study with 11 Chinese first-year undergraduates in Hong Kong highlights that strategies such as requiring students to write peer feedback on forms before discussions or explaining what they have learned from peer feedback promote active engagement in the comparison process. This deepens their understanding of criteria, refines their initial performance judgements, and enhances self-reflection.

The above studies demonstrate how teacher-led pedagogical activities, such as repeated practice, clear rubrics, and explicit self-reflection, affect how students generate feedback for themselves and make informed judgements. Other productive strategies for assisting students' effective comparisons include providing students with exemplars (Carless & Boud, 2018) or grading rubrics (Lipnevich et al., 2014), asking students to engage in their own work before being exposed to sample work (Carless, 2022), and making multiple comparisons with different sources (Nicol & McCallum, 2022). Those examples, although not directly related to generating internal feedback, underscore the role of pedagogical activities in facilitating students in making judgement, generating feedback, and taking responsibility for their own learning.

Despite the importance of internal feedback and the possibility of enhancing students' internal feedback generation through pedagogical strategies, few empirical studies explore students' internal feedback process when participating in purposefully designed activities. The current study intends to unfold this black box by answering the following research question:

Research Question: What is the internal feedback process that emerges when students participate in assessment-for-learning activities?

Methods

Given the exploratory nature of this study, we adopted a qualitative approach to investigate the internal feedback process that emerges from students' engagement in two assessment-for-learning activities.

Context of the Study

The current study was conducted within the context of an English for Academic Purposes course in an English-medium university in China. As part of the course requirements, students were required to deliver a speech and complete a small research project, which included developing a research proposal, writing a research paper, and delivering a research presentation. The course instructor intentionally incorporated a wide range of assessment activities that actively engaged students in providing and acting upon the feedback. The small class size—approximately 25 students per class—further supported student interaction with feedback throughout the course.

Two assessment-for-learning activities were investigated. The first one was peer review. Students participated in five rounds of peer review throughout the semester, on peers' research topics, introductions, literature review drafts, discussions, and abstracts. A peer evaluation sheet with embedded rubrics was designed to scaffold the peer review process. Students were given 15–20 min to complete each review in class. The course instructor facilitated the review by explaining the evaluation criteria and providing support as needed (see Appendix One for a sample peer review worksheet). The *second* activity—self-reflection on peers' presentations, involved students in reflecting on peers' strengths and weaknesses, and writing down strategies to improve their own presentations (see Appendix Two for a student sample). This activity, conducted in two rounds—one for their speech and another for their research presentation—can be seen as a variation of peer review. However, instead of providing direct feedback to peers, students were expected to generate feedback for themselves. Through these purposefully designed activities, students had plenty of chances to make judgements and decisions for their own learning.

Participants and Data Collection

Participants were 21 students (9 males and 12 females) from various majors. The course instructor emailed invitations to all students and then selected 21 students by considering their willingness to participate, major, and their academic performances in the investigated course, in order to achieve maximum variation (Merriam, 2009). Such a process enabled us to collect diverse views regarding different students' internal feedback processes. Written consent was obtained from the participants through email prior to data collection.

Data were collected through semi-structured interviews. The interview protocol covered students' general perceptions towards the assessment tasks, their behaviours in participating in these tasks, and their views on them (see Appendix Three for the Interview Protocol). Each interview lasted 40–60 min. These questions allowed us to elicit responses

regarding how students judged the quality of their work, generated feedback for themselves, and the potential impact of these activities on their generation of internal feedback. Students were encouraged to provide specific examples about the internal feedback they generated (e.g., specific feedback on their essays or presentations), the sources they used to compare their work with (e.g., rubrics and exemplars), and how such feedback helped them monitor or plan next step learning (e.g., setting learning goals or adjusting internal standards). The interviews were audio-recorded and transcribed verbatim by the trained research assistants. Ethical approval was obtained from the ethical committee at the university where the corresponding author was from.

Data Analysis

We used Nicol's (2021) framework to analyse students' internal feedback process. First, two of the authors independently coded one transcript using the framework while remaining open to emerging themes. The two authors then compared and discussed the codes and themes, resolving disagreements by consulting relevant literature on internal feedback. After reaching a consensus on the preliminary coding scheme, the first author used it to code the rest of the transcripts, but still being open-minded to any possible themes that may emerge. Then, the second author went through all the initial codes from both the preliminary coding scheme and newly added ones, and revised them to describe students' participation more precisely. For example, the student's discussion with peers about the internal feedback on how to write an introduction was first labelled as "processing internal feedback" and then revised as "calibrating internal feedback", which more precisely captured the student's adjustment of internal feedback rather than a broad category of behaviours. The codes relevant to internal feedback were further clustered under three top themes related to the internal feedback process: (a) generating internal feedback from multiple comparators, (b) calibrating internal feedback, and (c) responding to and acting upon internal feedback.

Findings

Our findings revealed that students' internal feedback process consists of three stages, namely, generating, calibrating, responding to and acting on it, which are reported below.

Generating Internal Feedback From Multiple Comparators

Sixteen out of 21 students reported the use of multiple sources provided by the course instructor as comparators to generate internal feedback.

Peers' Work as an External Comparator

Reviewing peers' work gave students the opportunity to compare their own work with others. For example, Sam noted that evaluating peers' written work reminded him of the appropriate use of punctuation. Similarly, Shelia reflected on how peers' work served as an external comparator, helping her make judgements and generate internal feedback about what constitutes a clear structure, as shown in the quote below:

When I read my peers' essays, whose structures were pretty clear, I analysed how they developed such a structure. Then, I compared my essay with theirs and figured out where I did poorly. Peer review allowed me to figure out their weakness, but it also allowed me to learn from others' strengths. (Shelia)

A similar process occurred when students reflected on peers' presentations. They reported using internal standards to evaluate peers' presentations and derive internal feedback for their own improvement. For instance, Sara explained how she focused on her specific weakness, structure, to guide her evaluation of peers' presentations and Simon described that observing peers' body language helped him address his own rigid one. Peers' presentations acted as an external comparator, providing tangible examples for students to generate internal feedback that could address their perceived weaknesses.

Peers' Comments as an External Comparator

Comments from peers in peer review activity also served as an external comparator that allowed students to generate internal feedback, as Steve noted:

My peer told me to elaborate on my points. I guessed he did not understand my writing or that my description was too general. Then, I needed to make my logic simple or add more explanations for the technical terms I used. (Steve)

Before Steve acted, he tried to make sense of peer feedback (i.e., making elaboration) and generate internal feedback on how to respond to such feedback (i.e. what did the peer mean by "elaboration" and "what to elaborate"). Students also attempted to have a dialogue with peers when they could not fully make sense of peer feedback:

I tried to explain my ideas to my friends. If I found it hard to explain, I'd realise my writing may be problematic. (Sara)

Negotiating meaning with peers through dialogues facilitated Sara in generating internal feedback that she needed to address the audience's perspectives in writing. Such a

response further confirms that the comparison process encourages students to generate internal feedback and refine their understanding (Nicol & McCallum, 2022).

Worksheet as an External Comparator

The peer evaluation worksheet with rubrics, used in peer review activities, serves as an additional comparator, as Simon noted:

I used the worksheet provided to evaluate peers' performance. I could see from the worksheet what essay structure we should follow or whether students have made a good presentation. (Simon)

Simon's experience demonstrates that rubrics elicited internal feedback by clarifying and reinforcing internal standards of what constitutes quality work, and facilitated him in making judgements on whether his or peers' work was up to standards, which was also evident in Stuart's response below:

I have observed many presentations in the past. I could feel some made a good presentation and others did not. Without guidance, I observed wildly without knowing why they were good or bad. Now, with some guidance, I became more clear about features of good presentations, for example, clear articulation, a better plan [in a research proposal], more hand gestures, and clear slides...I can try to learn from it. (Stuart)

Stuart's experience confirmed that the rubrics on the self-reflection worksheet allowed him to disentangle the concept of quality and make constant judgements, which facilitated him in generating internal feedback and formulating the learning goals.

Calibrating Internal Feedback

After generating initial internal feedback, students actively sought external resources to confirm their judgements or calibrate the internal feedback. At this stage, students not only consulted what the instructor provided but also actively sought comparators from the external environment. This calibration phase is crucial for aligning internal feedback with external standards.

Peer Dialogues as a Channel for Calibrating Internal Feedback

Sharon communicated with peers when her internal feedback conflicted with peers' standards, for instance:

I wrote a brief introduction, but my peer Marry's introduction was very long, and she covered many aspects.

She told me she had no choice; she wanted to include every aspect, like significance and gap for every study... Then I consulted another peer who said a brief introduction reads good for her. Then, I did not make any changes. (Sharon)

Sharon did not generate internal feedback on a one-time basis but kept calibrating or adjusting her internal feedback through dialogues and negotiation with peers. Similarly, Sampson highlighted that dialogues with peers helped him calibrate his understanding of appropriate body movement in a quality presentation. Such responses show that the process of developing an internal standard (e.g., what is good body language) and adopting effective learning strategies is a multifaceted process involving learners' actively seeking, processing, confirming, and using feedback information from others (e.g., more capable peers) and multiple resources (e.g., peers' presentations and classroom instruction). The ongoing practice of making judgements and taking action on feedback information provides students with a valuable chance to foster feedback literacy through appreciating feedback, making judgement, and taking actions.

Course Materials and Online Resources as Comparators for Calibrating Internal Feedback

Evaluation rubrics on the worksheet prepared by the course instructor also served as a source for students to adjust and calibrate their internal feedback. Santo used rubrics as a benchmark to calibrate his internal feedback, ensuring that his understanding aligns with established standards and teachers' expectations:

The judgment is subjective if we just rely on our own perspectives. The guidelines led us to be more objective and more persuasive. (Santo)

Additionally, students like Serena utilised external online resources as comparators for further calibration of their internal feedback:

I learned from peers' presentations how to design slides with clear structure and logic. I took notes on how they structured their presentations and what they included in each part. I then looked up more samples online. (Serena)

Serena's responses show that she was aware that her initial internal feedback might not always be correct. Thus, she held a critical view of the feedback information and used external comparators to calibrate her internal feedback.

Students' Struggles in Calibrating Internal Feedback

The process of calibrating internal feedback, however, was not smooth. The first struggle was related to making judgements about the quality of work:

My peers' work presented different opinions. I was not sure whether their opinions or mine were correct. Such conflicts often ended without a conclusion, and I felt uncomfortable about such results. (Scarlett)

Sibyl agreed that she struggled with what constituted quality and whether she should calibrate her internal feedback. Despite some students being proactive in seeking additional feedback information, others remained frustrated when peer feedback was confronted with their own understandings.

Another challenge in calibrating internal feedback was related to the lack of expert involvement, such as teacher feedback, in the calibration process. Sue explained that while teachers were more authoritative, students were more vulnerable and, thus, she felt hesitant to calibrate her internal feedback:

I really hope my teacher can help me confirm if my peers' comments are correct or not so that I can make progress. (Sue)

Sue's explanation showed students' expectations of teacher scaffolding in the internal feedback process, which could facilitate the calibration process and also the subsequent actions on the use of the feedback information.

Responding to and Acting Upon Internal Feedback

After calibrating internal feedback, students reported a wide range of strategies for responding to and acting upon internal feedback.

Re-formulating Learning Goals Based on Internal Feedback

Serena reported that observing a logic flaw in her peer's work allowed her to re-think her learning goal:

If I find a logical or grammatical issue in others' work, I will check the logic of my own essay. If I find a solid logical connection or a good way of organising ideas, I will learn from it. (Serena)

Similarly, students reported how they adjusted their own learning goals, such as being confident and having good pronunciation, based on the internal feedback generated by comparing their own performance with peers' presentations:

Some aspects can be easily improved, like eye contact and body movements, but others cannot be corrected overnight, for instance, being confident in presentations. I'll keep striving in that direction. (Selina)

I know that improving pronunciation might take time, but when I saw my peer was so good with her British accent, it motivated me to strive for the same. (Shawn)

The internal feedback helped students to understand that improvement might take time; thus, they actively re-formulated goals for future learning instead of showing negative emotions towards the possible delayed effect of feedback information on learning outcomes.

Uptake Internal Feedback to Improve the Current or Future Work

Seventeen out of 21 students reported revising and improving their current or future work based on their internal feedback. For instance, Santo reported that he was able to improve his research paper because of his increased awareness of his own weaknesses after reviewing different sections written by peers (e.g., introduction and abstract). Stanley explicitly reported how he improved his Method section based on his internal feedback:

I remember the teacher used a peer's paper as a model essay. I tried to re-write my method section by learning from his *Participants* section. I guess because we tried to imitate different research papers, it was helpful to see how others wrote their papers. (Stanley)

Stanley selectively paid attention to one part of the model essay based on internal feedback and seemed to be aware that she could learn multiple peers' work for continuous development. Both Santo and Stanley improved their essays based on the internal feedback generated from the peer review process, indicating that students are very likely to act upon the generated internal feedback when they have opportunities to use it immediately in their current work.

While not all internal feedback helped with the current task, many students acknowledged the possibility of utilising internal feedback in future work, such as structuring a clear paragraph (e.g., Shelia) and using advanced sentence structures (e.g., Shawn). Such responses also revealed students' perceived high possibility of utilising internal feedback if they found the chance to incorporate it to improve their work.

Compared with writing, the up-take of internal feedback seemed to become more prominent in the second activity—self-reflection on peers' presentations, which may be because students were asked to explicitly write down the generated internal feedback in the self-reflection worksheet. Fourteen out of 21 students reported that they

utilised internal feedback generated from observing students' presentations in their own ones, as Selina noted:

The first time I presented, I only looked at one place. However, later, I realised that eye contact means occasionally looking at one side and then the other. I used it in my later presentations. (Selina)

Similar to Selina, Serena also improved subsequent performance by addressing internal feedback about areas for improvement, including slide design and eye contact.

Adjusting Internal Standards Based on Internal Feedback

Internal feedback also appeared to be helpful in adjusting students' internal standards, such as their cognitive understanding of what counts as quality. Sara reported how she internalised the criteria of a good presentation and reflected on related strategies:

After reviewing peers' works over the semester, I noticed many have clear structures, which I had neglected before. I'll work more on this part while still being good at language use. (Sara)

Students also used internal feedback to check or reinforce their internal standards, for instance:

I can easily identify my peers' problems if I have made the same mistake before. Such an experience reinforces my understanding and reminds me not to commit the same errors in the future. (Shawn)

Similarly, Stella shared that the internal feedback generated through the reflection activity reinforces her internal standards regarding quality presentations, encouraging her to constantly polish her work through self-experiment.

Discussion

Whereas previous studies identified students' inner activities of generating feedback for themselves internally (Arnold, 2022; Panadero et al., 2019), our findings unpack the complexity of the dialogue by specifying the three iterative stages in this internal feedback process: generating, calibrating, and responding to and acting upon internal feedback, which are facilitated by purposefully designed pedagogical activities/assessments. Our study contributes to a deeper understanding of students' internal feedback processes and provides pedagogical guidance to teachers about how to facilitate students in generating internal feedback through carefully designed activities.

Internal Feedback Process: Generating, Calibrating, and Responding to and Acting Upon Internal Feedback

Our study clearly depicts that the internal feedback process involves multiple stages and is characterised by ongoing development, as students do not create internal feedback in a single instance. When generating initial internal feedback, students constantly compared their performance with external sources (e.g., peers' work, comments, and worksheets) and internal references (e.g., personal standards or previous performance). They then kept calibrating this feedback by seeking external resources, discussing with peers, consulting teachers, and re-comparing it against their internal standards. Finally, students acted on their calibrated feedback by refining learning goals, adjusting internal standards, and improving specific areas such as language use, essay logic, and presentation organisation. These self-generated insights have the potential to shape and enhance future learning (Carless, 2022).

A key contribution of our study is that it provides empirical evidence for Nicol's (2021) internal feedback framework by reinforcing that making comparisons is core to the internal feedback process. Whereas Nicol's (2021) framework focuses mainly on students' internal mental environment in generating internal feedback, our findings further segment such a process into three stages and highlight that the comparison is core to all stages. Our participants constantly compared their work with both external and internal comparators throughout the whole feedback process, where they refined their initial internal feedback about their work or standards through multiple comparisons. This finding aligns with previous studies in that making comparisons allows students to identify the gap and deepen their understanding of what counts as quality (Nicol & McCallum, 2022; Panadero & Romero, 2014). While previous studies explored students' comparison process with one or two particular types of feedback sources (e.g., peer work, Nicol & McCallum, 2022; published articles, Nicol & Kushwah, 2024; group answers and group dialogues, Nicol & Selvaretnam, 2022), we examined this process in a naturalistic setting without controlling the types of comparators, but instead, providing students with sufficient chances for making evaluation. Most importantly, our study highlights that the comparison process will most likely lead to the use of internal feedback information when students are confident in the internal feedback they generate and feel no need for teacher support in this process. Thus, students kept calibrating their internal feedback by seeking external information from diverse sources and either confirming their own internal feedback or making adjustments before taking action, echoing that the internal feedback process results from both cognitive processing and social interaction with various resources (Esterhazy & Damşa, 2019; Yan & Carless, 2022). It is such

ongoing comparisons that inform them of the gap between their current performance and desired goals, and the potential actions they can take (Nicol, 2021).

The internal feedback process could enhance student feedback literacy by enabling students to appreciate external feedback, develop evaluative judgements, and effectively act upon various feedback information. While Carless (2022) argued the reciprocal relationship between internal feedback and feedback literacy, our study provided empirical evidence for the possibility of fostering student feedback literacy through the sustained practice of internal feedback. During the two assessment activities in the current study, peer review and reflection on peers' presentations, students constantly engaged in the internal feedback process by making multiple comparisons, which increased students' appreciation for external information and highlighted the importance of seeking feedback in various forms from diverse sources, thereby, activating the student role and agency in the feedback process (Carless, 2022). Students may also develop their evaluative judgement, because the whole process seems to be highly cognitively engaging and expects them to apply higher-order skills, such as unpacking criteria, applying criteria to make judgements, and making decisions on whether to take action (Nicol, 2021). Additionally, the generated internal feedback for improvements could lead to students' effective use of external feedback information by adjusting or improving learning goals, internal standards, current work, or future work.

Students also encountered challenges, such as uncertainty over the judgement made and lack of expert involvement in the internal feedback process. Such a finding is unsurprising, considering previous studies have reported students' challenges in making judgements, particularly in contexts where teachers play a more authoritative role, such as the Confucian-heritage context (e.g., Han & Xu, 2020; Winstone & Carless, 2019; Xiao & Gu, 2022). Nevertheless, the internal feedback process still provided students with chances to reflect on what constitutes quality and also the quality of one's judgement, which can be a reflective process that benefits students as well.

Pedagogical Strategies that Facilitate the Internal Feedback Process

Our study also affirmed that the above-mentioned stages in the internal feedback process are facilitated by purposefully designed assessment activities and pedagogical strategies. In line with previous studies (Gladovic et al., 2024; Nicol & McCallum, 2022; To & Panadero, 2019), our findings demonstrate that it is those teacher-led pedagogical activities that provided students with opportunities to compare their work with different comparators, negotiate with peers, make informed judgement, and generate feedback information

for themselves. Overall, detailed descriptions collected in this study support that students' internal feedback process is closely related to the sustained assessment opportunities the course instructor provided for them to monitor, evaluate, and regulate their own learning (Carless, 2022; Nicol, 2019).

Resonating with Carless's (2022) conceptualisation article on internal feedback, our study confirms that well-planned assessment tasks with the clear intention to involve students actively and stimulate their reflection facilitate the generation of internal feedback by allowing students to make judgements, negotiate meanings, monitor their own learning, and take action. *First*, constantly exposing students to various feedback information for comparison facilitated students' generation and calibration of internal feedback. Our study provides empirical evidence for Nicol (2021) that a variety of comparators provided information from multiple perspectives: (a) rubrics and worksheets clarified standards and made them tangible; (b) peers' work and sample work enlightened students of new perspectives and approaches; and (c) comments from peers and teachers highlighted the areas for improvement. The comparison process can be further amplified through dialogues when students work in pairs or groups to compare their thinking with others (Nicol, 2021); such a process allows students to keep generating and calibrating their internal feedback, further refining their abilities to make judgements. *Additionally*, students actively generated, calibrated, and took action on the calibrated internal feedback facilitated by the worksheet, which makes the internal feedback process explicit to students. While our study couldn't quantify the impact of explicit self-reflection on students' academic achievement as in Yan et al.'s (2023) meta-analysis, the more prominent of up-taking internal feedback in the second activity (i.e. self-reflection on peers' presentations) indicated students' more active engagement with their internal feedback when it was written in the worksheet, leading to improvements in learning outcomes, goals, and internal standards. This finding concurred with Nicol and McCallum (2022) that students are more likely to use written self-generated feedback, suggesting that asking students to note down their self-reflection is an effective strategy. *Furthermore*, students' up-take of their internal feedback and responses to it can be facilitated by the involvement of teacher feedback, echoing Yan et al.'s (2023) meta-analysis of the positive effect of teacher feedback in facilitating self-assessment practice. The opportunities to incorporate internal feedback into the current or future work should also be provided so that students can effectively use the internal feedback in practice and improve their work.

Although we would not be able to retrieve students' real-time thoughts and only rely on their interview responses, our findings highlighted that purposefully designed assessment activities offered students opportunities to engage with internal feedback by analysing the

external feedback information, negotiating it with peers, and connecting it to their own understanding (Nicol, 2019, 2021). In sum, those pedagogical practices have the following features:

- 1) Diverse reference information as comparators;
- 2) Sustained opportunities for comparison;
- 3) Chances for students to write down explicitly their internal feedback;
- 4) Chances for students to improve based on internal feedback.

Conclusion

As one of the first few studies explicitly exploring the internal feedback process, our study highlights that when students are given chances to engage in assessment activities, they make comparisons all the time and generate, calibrate, and respond to and act upon the feedback information in the internal feedback process. The methodological limitation of the current study is that it attempts to understand the internal feedback process through collecting students' opinions. Further studies may collect more concrete evidence through think-aloud protocols or tracing students' growth over a period of time.

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Data availability Data will be available on request.

Declarations

Competing Interests The authors have no competing interests.

Ethical Approval Ethical approval was gained from the Ethical Committee of The Chinese University of Hong Kong, Shenzhen.

Consent to Participate All participants were briefed about the study and signed the written consent form.

Consent for Publications The authors consent to publish this article in *The Asia Pacific Education Researcher*.

Appendix 1

Peer Review Worksheet

Peer review: Introduction

Work in pairs and read the introduction written by your peer. Evaluate the introduction according to the criteria below. Have a discussion with your peers after peer review.

Criteria	Areas for improvement
1. The introduction sets up a clear background regarding why the topic is important.	
2. Past studies/specific areas for research have been briefly introduced.	
3. The research gap is clearly articulated.	
4. The purpose of the study is clearly articulated.	
5. The purpose of the study is related to the gap.	
6. The introduction is written without grammatical mistakes.	(Please circle the grammatical mistakes)
7. The in-text citations are correctly formatted.	

Appendix 2

Worksheet for Reflection on Peers' Presentations

Name: Session:

Week 13 and 14

Final Research Presentations – Self-reflection Worksheet

Instruction: Self-reflection is an effective strategy for us to improve our own performance. While watching your peers' performance, please think about the following questions: What do you think they did well and what do you think they should improve? What strategies would you like to adopt in your own presentation and what would you like to avoid? Note down *specific strategies* you observed.

I noted from peers' presentation the following effective strategies:

- ① strong logical connection, especially in terms of reasons and results
- ② Good gestures like hands shaking
- ③ Have a good eye contact (Not just with camera or teachers, but with classmates)
- ④ Fluent speaking (What usage)
- ⑤ Interesting topics! (Like correlation analysis between club involvement and psychosocial identity development) (mathematics anxiety)

I may consider avoiding the following weaknesses:

- ① Small words on PPT slides. (I can't see them clearly in class)
- ② Research topic is not that good. Gap is not convincing
- ③ Inconfident when speaking performance
- ④ Avoid pronunciation mistakes.

In my next presentation, I plan to make improvement by adopting the following strategies:

- ① Prepare Q&A well. (Although you don't know which the content of question you can think about it in advance).
- ② Peer review before official presentation.
- ③ (Avoid)* Practice many times and notice my volume & pace.

When you reflect, you can consider the following criteria.

Eye contact and body language	Vocal clarity
- eye contact	- pronunciation & intonation
- hand gesture	- pace, use of pause, and fluency
- movement	- vocal fluctuation
- facial expression	- suitable volume
Content and organization	Grammar & Vocabulary
- follow the convention of a research presentation;	- Grammar range and accuracy
- structure of the presentation is clear and easy to follow;	- Vocabulary range and accuracy
- the content included is academic and formal;	- no significant grammatical errors
- research topic and findings well introduced;	
- implications of the study are well addressed.	

Appendix 3

Interview Protocol

1. In this semester, we have gone through the process of doing research in the EAP course, what do you think about this Research module in general?
2. Thinking back on the process of completing your research project, what helps you most in the whole process?
3. How did you decide on your research topic, and how did you know if it is appropriate?
4. When you were doing your research project, how do you know if you are on the right track?
5. Thinking back on the whole process, what major changes have you made and why?
6. Before you submit your assignment, how would you know if your work has satisfied the expected standard and is ready to submit?
7. Throughout the semester, we have done quite a number of peer review activities. What do you think about the peer review activities in general?

- How do you think about the feedback given by peers?
- Does the peer feedback help you improve your essay and in what way?
- In what way do you think evaluation of peers' work helps with improving your capacity to make a judgement of your own work?
- What do you think is the negative impact of doing peer review?

8. How do you think the reflection worksheets we used in the classroom?
9. What do you like best and what do you like least? Does the reflection worksheet help you improve your presentation and in what way?
10. After receiving your feedback on your homework and assignment, have you had any difficulties with up-taking the teacher's feedback?

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