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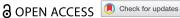
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Advancing pedagogical excellence through reflective teaching practice and adaptation

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ABSTRACT

Reflective Teaching Practice (RTP) emerges as a quintessential consideration and strategic framework aimed at transcending the mere mechanical execution of educational duties in higher education. This research examines how ongoing RTP supports curriculum alignment. Eight lecturers from a school of chemistry participated in semi-structured interviews. Specifically, the study was interested in what, if any, were the RTPs that resulted in changes. Reflective practices are indispensable for educators aspiring to achieve pedagogical excellence, thereby developing employability skills, also known as graduate skills, such as critical thinking skills in students.

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Introduction

Reflective teaching (RT) and reflective teaching practice (RTP) are two interrelated yet distinct concepts that are significant in educational theory and teacher development. Scholars commonly differentiate these terms in terms of their focus, processes, and outcomes regarding the teaching and learning environment.

RT refers to the process by which educators critically analyse and assess their teaching methods, classroom experiences, and interactions with students. According to Zhiyong et al., RT can be considered an ongoing professional development tool that enables educators to identify weaknesses in their methods and strive for continuous improvement. This implies that RT focuses on the broader philosophy of reflection as a pedagogical tool aimed at enhancing educational practice. It encompasses various dimensions, including self-awareness, the evaluation of instructional effectiveness, and the critical examination of teaching philosophies (Dheressa, 2022; Hutauruk & Br Kembaren, 2024). Thus, RT can be viewed as a comprehensive approach to professional development that encourages educators to routinely engage in self-evaluation, the assessment of educational practices, and personal growth (Shaheen et al., 2022).

On the other hand, RTP is more specifically concerned with the implementation of reflective activities and strategies in day-to-day teaching. This can include using journals, peer observations, and group discussions to promote reflection on teaching experiences (Bagaje et al., 2020; Cholifah et al., 2020). Research highlights that effective reflective teaching practices among pre-service teachers involve actively engaging with their experiences in the classroom to adapt and improve their teaching methods (Kılıç, 2022; Menon & Azam, 2021). This emphasises that reflective teaching practice is not just about contemplating past experiences but also involves practical engagement with those experiences to influence teaching strategies and outcomes

Reflective Teaching (RT) has become increasingly important in higher education, especially in diverse and inclusive environments. It involves educators critically analysing their teaching methods to identify successful practices and areas that need improvement (Danielson, 2007a, 2007b). RT is based on continuous selfexamination and thoughtful inquiry, allowing educators to align their teaching beliefs with their actual practices (Koutsouris et al., 2022; Pollard, 2014; Richards & Lockhart, 1994; Schuelka & Engsig, 2022; Stentiford & Koutsouris, 2021, 2022). By engaging in deep and critical reflection, educators can pinpoint opportunities for enhancing their teaching methods and responding to students' learning needs (Bailey, 2021; Zeichner & Liston, 2013). This practice is essential for educators striving for pedagogical excellence as it enables them to recognise their strengths and weaknesses and adapt to the demands of their students (Black & Plowrightb, 2010; Richards, 1990). RT goes beyond simply revisiting past lectures – it involves carefully adjusting strategies to meet the diverse learning needs of students (Li et al., 2023; Xiaoya, 2022). Ultimately, it serves as a resource for strategic development and implementation in education (Cox, 2005; Mccarthy, 2010).

There are two primary dimensions of reflection in education: reflections for teaching and reflections for learning. Educators use reflective techniques to evaluate and improve their teaching practices (Cimer et al., 2013; Cornford, 2002; Kirpalani, 2017; Lamb, 2017), while students engage in reflective cycles to assess their own learning processes (Adeani et al., 2020; Fraser et al., 2024; Machost et al., 2023; Sandars et al., 2024) The current study centres on analysing educators' RTPs by asking how university lecturers' teaching philosophies inform and shape them.

Reflective teaching practice (RTP)

The literature has shown that RTP is instrumental in shaping teachers' professionalism and enhancing student engagement and academic outcomes (Fraser et al., 2024; Sandars et al., 2024). Therefore, lecturers benefit from engaging in reflective practice, as it allows them to evaluate and refine their teaching approaches, potentially leading to improved student learning and academic outcomes (J. Biggs & Tang, 2015; Ratminingsih et al., 2017).

RTP scrutiny is a well-established concept within initial teacher education programmes, which emphasise the cultivation of a reflective praxis among educators (Gravett & Kroon, 2023; Machost et al., 2023). It is posited that such a reflective paradigm should not be circumscribed within the confines of teacher education alone but should be expansively integrated into the teaching ethos across all disciplines within higher education. By embracing a culture of RTP, educators can transcend traditional methodologies, thereby aligning pedagogical strategies with the evolving learning needs of the student body and the requirements of contemporary educational landscapes. RTP is a critical facet of inclusive pedagogy, which is increasingly advocated to accommodate the diverse demographics prevalent in university settings (Koutsouris et al., 2022; Schuelka & Engsig, 2022). RT entails an active, persistent and thorough examination of educators' comprehension and mastery of the subject matter, achieved through attentive and deliberate engagement (Dewey, 1904, 1910, 1933; Walshe & Driver, 2019). This reflective process is essential for fostering pedagogical excellence, as it encourages innovation, strengthens communication and interpersonal skills such as lecturerstudent interactions and promotes the creation of a more inclusive learning environment that effectively addresses the varied needs of students (Fraser et al., 2024; Pollard, 2014; Richards & Lockhart, 1994).

RTP is vital for inclusive pedagogy in its role in promoting continuous improvement in teaching practices. It promotes the continuous improvement of teaching methods, and educators can systematically identify their instructional weaknesses and areas for enhancement, thereby facilitating ongoing professional development. Additionally, RTP encourages educators to critically examine their beliefs and assumptions regarding teaching and learning, which helps create a more responsive and equitable educational environment. Furthermore, RTP significantly influences the assessment of student learning, allowing educators to refine their evaluative strategies to better support the diverse needs of their students.

When lecturers engage in RT, they develop greater awareness, flexibility, and intentionality in their instructional approaches. This process not only enhances their mastery of subject content but also fosters pedagogical excellence, innovation, and stronger communication and interpersonal skills. Ultimately, RT transforms educators into more effective, empathetic, and innovative professionals, creating a richer and more impactful learning experience for their students.

University teaching

The lecture format has historically been one of the predominant teaching strategies in higher education due to its structured nature and capacity to deliver extensive content efficiently. Despite its widespread use, particularly in large-enrolment courses, scholarly discussions increasingly question its effectiveness in fostering student engagement, comprehension, and overall learning outcomes. While lectures provide a systematic means of presenting complex material especially in disciplines such as mathematics and the sciences, where foundational concepts are crucial (Viirman, 2021) research suggests they may not fully engage students or support optimal learning.

Empirical studies highlight the limitations of traditional lectures in promoting active learning. For example, undergraduate students in lecture-based courses are reportedly 1.5 times more likely to fail compared to those in active learning environments (Bajak, 2014). Despite such findings, lectures continue to dominate STEM education (Berrett, 2012; Hussain et al., 2011; Lodish & Rodriguez, 2004; Walker et al., 2008), reflecting their perceived efficiency in content organisation and delivery. However, critics argue that their lecturer-centred nature often fosters passive learning, potentially hindering the development of critical thinking skills and learner autonomy (Sanchez Diaz et al., 2024). Furthermore, while lectures can be effective when characterised by clear presentation and student interaction, they do not inherently create an active learning environment conducive to deep engagement (Rapanta et al., 2020).

Research emphasises that reflective teaching makes educators responsible for identifying and addressing deficiencies in subject content, thereby fostering a more inclusive and effective learning environment (Henderson, 1996). Implementing reflective practices does not necessitate abandoning lectures entirely. Instead, educators can integrate active learning techniques within traditional lecture frameworks to enhance student participation and comprehension.

Beyond content delivery, the lecture approach also influences student satisfaction and the overall educational experience. Research indicates that well-structured and engaging lectures – marked by interaction and clarity – can enhance student satisfaction and improve learning outcomes (Dietrich & Evans, 2022; Nantschev et al., 2020). Consequently, while the lecture format remains an integral component of university teaching, its role must be critically evaluated in the context of contemporary pedagogical advancements and the growing emphasis on interactive and student-centred learning approaches. This shift underscores the necessity of fostering meaningful lecturer-student interactions, which play a crucial role in creating an engaging and dynamic learning environment.

Lecturer-student interaction

The concept of 'interaction' between lecturers and students encompasses a spectrum of activities, ranging from formal instructional methods to informal engagements within ethical considerations (Watanabe et al., 2018). Variability exists among instructors regarding what constitutes effective interaction. Some educators may perceive the inclusion of occasional questions during lectures as sufficient, while others advocate for more immersive and continuous engagement strategies. The quality and depth of these interactions are critical.

A study exploring the quality of lecturer-student interactions found that meaningful engagement, characterised by mutual respect and genuine interest, positively predicts academic achievement and perceived learning (Fitria & Koentjoro, 2022; Terblanche et al., 2021). This suggests that superficial interactions may not yield the same benefits as more substantive, personalised engagements. Numerous studies indicate that the dynamics of lecturer-student interactions have progressed towards fostering productive relationships characterised by micro-affirmations. These positive affirmations have proven to enhance student motivation, significantly influencing both academic outcomes and broader non-academic experiences. Consequently, this shift contributes to a more engaging and meaningful learning environment (Henry & Thorsen, 2018; Munnell et al., 2013).

While incorporating questions into lectures can stimulate critical thinking and maintain student attention, relying solely on this approach may not suffice to create a meaningful learning experience. Effective interaction often requires a more holistic approach, integrating various pedagogical strategies that encourage active participation and deeper cognitive engagement. The ICAP framework categorises student engagement into four modes: Interactive, Constructive, Active, and Passive. This framework posits that learning outcomes improve as students progress from passive reception of information to active and interactive engagement. Therefore, fostering environments where students collaboratively engage in problem-solving and dialogue can lead to more meaningful learning experiences (Chi & Wylie, 2014).

Other strategies for meaningful lecturer-student interaction also include Accessible Office Hours, which encourage students to engage in one-on-one discussions during office hours, providing opportunities for personalised feedback and mentorship. Increase contact time. Prompt and Constructive Feedback - Offer timely feedback on assignments and assessments to guide student learning and demonstrate investment in their academic progress.

Fostering lecturer-student interaction during classroom lectures is, therefore, an effective strategy for understanding and addressing student learning needs. This interaction provides valuable, authentic feedback, complementing real-time verbal or digital feedback, module evaluation scores, and data from the national student survey.

Shifting the focus to lecturer-student interaction requires a framework and commitment from the educator. Implementing this adaptation entails adopting RTP to ensure its effectiveness and alignment with intended learning outcomes and the goal of meeting the increasingly varied needs of the learner population in higher education.

Over recent years, a substantial body of literature has emerged, emphasising the critical role and significance of lecturer-student interactions both within and beyond the classroom (Biggs, 1987; Case, 2015; Farr-Wharton et al., 2018; Soliman, 2023). The scholarly consensus highlights that such interactions are instrumental in shaping various aspects of students' academic journeys, including their self-esteem, academic performance, and the extent to which they feel valued when expressing their perspectives on the content being taught. Leonard et al. (2024) reported that the relationship between lecturers and students constitutes a foundational element of the learning process. Their study demonstrates that this relationship influences numerous factors, including students' engagement and academic outcomes. Notably, the strength of the relationship between lecturers and undergraduates emerges as a means of fostering an authentic and conducive learning journey.

However, contrary findings have been reported in other studies. For instance (Nyadanu et al., 2014), observed that high-achieving students frequently characterise their interactions with lecturers as brief, less reliant, and occasionally contentious. This study suggests that lecturers may prioritise academic instruction at the expense of cultivating overall meaningful learning experiences for students. While this approach can increase academic motivation and success, it may result in weaker relational dynamics. The authors concluded that the observed weak correlation between student-lecturer interactions and both self-esteem and academic outcomes indicates that the relational aspect may not directly influence these outcomes (Nyadanu et al., 2014). However, Joseph and De Silva (2022) found evidence supporting a positive relationship between lecturer-student interactions and undergraduate self-esteem. Their correlation analysis revealed a positive association, suggesting improvements in the quality of lecturer-student relationships positively impact student self-esteem.

Given these findings, educators must recognise that lecturer-student interactions can have positive and negative ramifications for students. The present study positions lecturer-student interaction as a crucial factor with a significantly positive influence on students' learning experiences and lecturers' teaching practice. Consequently, this study advocates for reconsidering teaching approaches, proposing that fostering stronger lecturer-student interactions should be viewed as a vital tool in enhancing educators' RT.

Previous research has indicated that traditional lecture-based instructional methods often lack sufficient lecturer-student interaction (Gehlen-Baum & Weinberger, 2014; Ko et al., 2018; Schmidt et al., 2015; White et al., 2016), However, the development of RT as a framework offers a potential pathway for intentional and sustained interactions within and extending beyond lecture time, thereby positively impacting students' academic outcomes and engagement. Consequently, there is a pressing need to advocate for student-centred teaching approaches that prioritise and facilitate lecturer-student interactions (Kolajo, 2020).

Theoretical framework

Several scholarly-developed techniques are available to support educators in this reflective process, helping them to align their pedagogical beliefs with their actual classroom practices. This study draws its theoretical underpinnings from the seminal contributions of Dewey and Schon (Dewey, 1904, 1933; Schön, 1988, 2017; 1984). Dewey's educational philosophy asserts that authentic learning is experiential. Dewey (1933) articulated a distinction between what he referred to as 'routine action' and 'reflective action'. He posited that routine actions are typically governed by systemic and institutional norms, leading to rigidity and a diminished capacity to adapt to new challenges. In contrast, reflective actions are characterised by continuous self-assessment and growth, enhancing adaptability and responsiveness through iterative

interactions and evaluative processes. Similarly, Schön (1995) reflective model promotes the engagement of individuals in reflective thinking, which deepens their understanding of cognitive, emotional, and behavioural processes (Biggs, 1987; Schön, 1983). This model significantly enriches our knowledge of the process of RT.

Therefore, RT can be understood through three distinct stages of reflection; pre-action, in-action, and post-action. Before teaching (pre-action) – 'Reflection-for-Action' involves planning and designing the lecture with a forward-looking perspective (Cattaneo & Motta, 2021; Schön, 1988; Thorsen & DeVore, 2013). During teaching (in-action) – 'Reflection-in-Action' refers to real-time adjustments and reflections that occur as the lecture unfolds (Yanow & Tsoukas, 2009). After teaching (post-action), 'Reflection-on-Action' involves retrospective analysis of the lecture to inform future practices (Edwards, 2017, Nash & Collins, 2024). When educators systematically engage in these three stages of reflection, they cultivate a comprehensive RT.

Furthermore, the interaction between lecturers and students serves as a crucial component in enhancing and deepening the RT process, offering educators additional opportunities for meaningful engagement and reflection.

Methodology

This study investigates reflective teaching practices within a first-year university chemistry course, focusing on teaching philosophy, lecturer-student interactions, and lecturers' reflections on their teaching. The central inquiry is: How do university lecturers' teaching philosophies inform and shape their RTPs?

The Regional University where the study was conducted is a publicly funded research institution established in 1800. The research took place within the chemistry department, where nine lecturers were tasked with teaching two essential first-year courses: Foundation Chemistry I and Foundation Chemistry II. In the year of data collection, these courses had student cohorts of approximately 420 and 320, respectively. Given the underrepresentation of research on reflective teaching in first-year chemistry education within the region, this study aims to address this gap.

A purposive sampling strategy was employed to include all nine lecturers teaching the core first-year chemistry courses. Eight lecturers volunteered to participate, forming the basis of the study's nested descriptive analysis; exclusion criteria were deemed unnecessary. The head of school introduced participants to the study during a departmental meeting and subsequently received an invitation from the author via email.

Eight interviews were conducted, with each interviewee providing informed consent prior to participation. The selection of eight participants was based on the purposive inclusion of all lecturers teaching the courses and willing to volunteer. This number was deemed sufficient to capture a range of perspectives while maintaining feasibility within the study's timeframe (Guest et al., 2006). The principle of data saturation played a crucial role in determining the number of interviews, with one session per lecturer deemed sufficient to reach meaningful insights (Boddy, 2016).

Semi-structured interviews served as the primary data collection method, allowing for both consistency in questioning and adaptability to participant-driven insights. Interviews were conducted face-to-face, based on participant availability and preferences, and lasted between 55 and 120 minutes - exceeding the initial 30- to 60-minute estimate due to participants' willingness to elaborate on their experiences. The interviews took place in participants' offices to ensure a confidential and comfortable environment. With informed consent, all interviews were audio-recorded and later transcribed verbatim for accurate analysis.

Ethical approval was obtained for this study, which conducted eight interviews in adherence to established protocols. Participants were chosen via personal email invitations following an introduction to the study and an announcement by the head of the school during a staff meeting. To maintain confidentiality, pseudonyms have been allocated to all participants and the university. Please refer to Appendix 2 for more details regarding ethical approval and other information that may not be intended for public disclosure.



Interviews with participants were conducted in the individual offices of lecturers, ensuring auditory privacy. The interviews ranged from 55 to 120 minutes. The interviews were not limited to pre-determined questions; rather, they incorporated follow-up questions that emerged organically in response to participants' answers or were prompted by the participants themselves for further elaboration. This dynamic interview process was adaptively shaped by the individual responses of the participants (Creswell, 2015). Upon analysing the participants' responses to the follow-up questions, the author has reached a critical juncture, prompting the exploration of further insights that can be gleaned from the data. This has led to the current research question: How do university lecturers' teaching philosophies inform and shape their RTPs?

The findings presented are derived from a semi-structured interview protocol focusing on lecturers' teaching philosophies and strategies. The central question posed to lecturers was: What key ideas drive your teaching philosophy and behaviour? This was supplemented with follow-up questions regarding collective teaching practices within the department and individual approaches.

Thematic analysis of the interview transcripts, conducted using NVIVO software, identified 'Teaching Concept' and 'Lecturer-Student Interaction' as key themes. The subsequent reports synthesise the contextual and collected data from the eight lecturers in the school of chemistry at a regional University. To maintain anonymity, the lecturers are referred to by pseudonyms: Ben, Gavin, Joan, Isaac, Stella, Aaron, Denise and Patrick, and the course is identified pseudonymously as Foundational Chemistry I and II.

To ensure the study's trustworthiness and credibility, the researcher adhered to the criteria for qualitative research established by (Lincoln & Guba, 1985) incorporating methods such as direct quotations to enhance reliability. Additionally, confirmability was strengthened through member checking, where participants had the opportunity to review and validate their contributions.

A thematic analysis approach was employed, systematically examining each data point in relation to the research questions. Responses were categorised into key themes, allowing for a structured interpretation of the findings. Interview audio recordings were transcribed verbatim, after which participants were contacted via email for member validation. Based on their feedback, minor revisions were made, particularly in instances where individuals requested that certain comments remain off the record. These statements were excluded from the final dataset to uphold confidentiality and reflect the researcher's commitment to accurately representing participants' perspectives.

To engage with the data deeply, the researcher thoroughly reviewed and re-read the transcripts multiple times, fostering a comprehensive understanding of the participants' viewpoints. Additionally, rigorous confidentiality measures were implemented, including:

- Omitting any real names or identifiable details from the transcripts.
- Conducting transcriptions in a private setting and using headphones to maintain privacy.
- Storing all electronic recordings, notes, and transcripts on a password-protected computer, accessible only to the researcher.
- Destroying any handwritten notes containing participant identifiers once the interviews were completed.

These measures ensured that the study maintained high ethical standards while safeguarding participant anonymity and data security.

Results

The interview data revealed the necessity for an integrated RTP within the culture of higher education and RT to effectively address the diverse needs of learners. Table 1 provides information on the eight lecturers interviewed for this study. This report concentrates on one specific aspect of a broader study: How do university lecturers' teaching philosophies inform and shape their RTP?

Participants information.

Name	Qualifications	Years of Teaching	Module	Age
Stella	B.Sc. (Hons), Ph.D & Postgraduate certificate teaching qualifications.	20	Foundational Chemistry II	40
Ben	BSc (Hons) & PhD	31	Foundational Chemistry I	58
Gavin	BSc (Hons) & PhD	22	Foundational Chemistry I	52
Joan	BSc & MSc	35	Foundational Chemistry II	_
Isaac	B.Sc & Ph.D	35	Foundational Chemistry II	67
Aaron	B.Sc, MA & Ph.D	30	Foundational Chemistry II	_
Denise	B.Sc & Ph.D	6	Foundational Chemistry I	36
Patrick	B.Sc & Ph.D	20	Foundational Chemistry I	_

This inquiry shed light on the dynamics of interactions between lecturers and students. It aimed to explore the nature and characteristics of these engagements, providing insights into how they manifest in educational settings through the lens of the educators' teaching philosophy. This was supplemented with follow-up questions regarding collective teaching practices within the school and individual approaches.

This study offers valuable insight into the suggestive consideration of an RT framework for lecturers. This framework enables lecturers to assess how well their instructional methods match students' learning needs and the overall objectives of their courses through lecturer-student interaction during this reflective process. The experiential learning of the instructors in my study played a significant role in influencing those who actively utilised their experiences to benefit their students. It was not the case that every instructor lacked experiential learning or that such learning could not make a difference; rather, it depended on the level of reflectiveness they exhibited. When instructors understand the principles of reflection, their years of experiential learning can have a profound impact. However, in contexts where this understanding is lacking, the opportunity to fully harness their valuable experiential knowledge is ultimately lost.

The literature indicates that the relationship between lecturers and students is a fundamental aspect of the learning process (Leonard et al. (2024). An analysis of the teaching concepts and lecturerstudent interactions across the eight interviewed lecturers reveals significant differences in the consistency and depth of RT.

The data showed that not all lecturers consistently engaged in reflective practices concerning their teaching methodologies. Consequently, the study cannot definitively assert the presence of a pervasive culture of RT among the educators in question. However, some lecturers demonstrated a clear articulation of their teaching concepts, indicative of reflective practices. These lecturers showed a propensity to adapt their instructional methods based on student feedback, thereby exemplifying a reflective approach to teaching.

Stella articulated a teaching philosophy grounded in five core concepts: the restructuring of instructional methods, the utilisation of a pedagogical toolbox, laying a solid foundational knowledge, scaffolding student learning, and elucidating the relevance of the subject taught to students.

Stella emphasised the importance of adapting her teaching strategies to the specific cohort of students she was instructing. She stated, ' ', highlighting her commitment to customising her approach to inspire students at different stages, particularly those at the foundational stage one.

Stella emphasised the importance of providing students with the essential resources for their success. She described her teaching approach, which includes providing students with information and tools, as well as

motivating them to apply their previous experiences and integrate them with new knowledge within a specific subject area. Stella stated,

Stella's approach to laying a solid foundation involves creating explicit course content informed by assessing students' prior knowledge. She ensures the curriculum addresses the necessary foundational content to support further learning.

Stella linked the concept of scaffolding with the provision of a pedagogical toolbox. She described her method of gradually increasing the complexity of the material from the introductory stage one to the more advanced stage four. This incremental approach supports students' progressive understanding and mastery of the subject.

Stella highlighted the importance of demonstrating the relevance and excitement of a subject like chemistry to her students. She noted that for courses, it is essential to assume no prior formal chemistry background and to engage students by simplifying concepts to make them accessible and intriguing.

Ben's self-assessment during the interview indicated that there are opportunities for enhancing his teaching methodologies. He identified a need for greater incorporation of pedagogical development activities to foster increased student engagement and learning outcomes. During the interview, Ben elaborated on his teaching strategies, noting specific areas for improvement and potential methods for achieving more effective instructional practices.

... I change my notes pretty much every year a little bit; sometimes they're big changes, sometimes they're small changes. I intend to make some small changes in the second semester just from the feedback that I got from the exam. But I'd say that the way I present lectures has been pretty much fixed for a long time now. I tend to give the same lectures in the same order with the same material, at the same rate, tell the same jokes. I haven't got a lot of feedback from the students. Not that I've sought a lot of feedback from the students as to how it works.

Gavin articulated a predominantly content-driven approach to his teaching, placing greater emphasis on delivering comprehensive lecture notes than on fostering students' critical thinking skills. He maintained that well-prepared lecture notes could compensate for less effective lectures, suggesting that:

Students need to be able to take or have a good set of lecture notes.

He argued that the transient nature of lecture retention – 'Even if you give a fantastic lecture, it will only stay in your memory for a short period' - necessitates reliable notes for sustained learning. Gavin asserted that students might learn more from revisiting these notes than from the lectures themselves.

Gavin prioritised comprehensive content coverage in his lectures, emphasising its necessity. He consistently concluded his lectures by presenting learning objectives and directing students to review these in their notes. This approach, he believed, ensured thorough coverage of the course material, aligning with his teaching philosophy:

My other philosophy is to make sure I cover the course content.

Joan aligns her teaching philosophy closely with that of her school, emphasising the importance of treating students with respect:

Our philosophy as a school is that these students must be treated with respect.

Joan's reflection on the module development she teaches reveals her commitment to the course's objectives and the training she provides for laboratory demonstrators. Her intrinsic passion for teaching informs her pedagogical approach, as she believes she is destined for this profession. Her dedication is evident in her comments:

I just like students. I love teaching, and I love being able to see someone who's come in, frightened of the subject, feeling that something that's beyond them, go out with confidence. I've come to think over the years, that some people are born teachers, and you can improve the bad ones, but you can never turn them into good teachers.

Joan recognises that although the course content has stayed consistent, the evolving dynamics of student interactions each year add a distinctive aspect to her teaching. Joan exemplifies effective lecturer-student interaction aimed at enhancing academic outcomes, even within the confines of her designated teaching environment. She implements a highly interactive pedagogical strategy, utilising a sequence of probing questions designed to deepen comprehension and foster active engagement among her students. This approach not only facilitates critical thinking but also encourages collaborative discourse, enriching the overall learning experience. This approach showcases Joan's Reflection-in-Action.

... I try to ask as many questions as possible, and I try to get them to chat with me.

Joan's approach underscores her belief in active student participation and interaction as fundamental to effective teaching and learning.

A central tenet of Isaac's teaching philosophy is comprehension over rote memorisation. He articulated this approach succinctly, stating that his primary goal is:

Getting kids to understand; I'm not interested in facts.

This statement highlights his commitment to fostering deep, conceptual understanding rather than merely accumulating factual knowledge.

Aaron's teaching philosophy strongly believes in the efficacy of the lecture format for transmitting content, which he views as an effective pedagogical method. This perspective, however, suggests a limited focus on student engagement, feedback, or the development of students' critical thinking skills.

... It was clear to me very early on that the reason that traditional disciplines had been so effective pedagogically is that these disciplines typically involve providing an environment in which you can own your critical thinking skills in a particular context. Once you've owned them in one context you can move many of those skills laterally. So, I fought a pitched battle with Jack (the gifted student) for three years to try and force him to apply himself and become a more (amongst other things), critical analytical thinker.

Aaron's teaching philosophy for Foundational Chemistry II encompasses two main conceptions: accessibility and relevance to everyday life. He designed the course to cater to students with varying levels of chemistry background, aiming to provide a course accessible to a diverse audience (Reflection-For-Action). The course was intended for students with a general, non-continuing interest in chemistry, focusing on helping them understand key ideas without expecting to major in chemistry.

Since Aaron failed to specify the criteria he used to assess the effectiveness of his teaching practice, we cannot conclude that Reflection-on-Action was adequately demonstrated and, therefore, his teaching practice should not remain unchanged.

Denise's teaching philosophy centres on two primary concepts – 'convey understanding' and the effective 'use concepts'. She emphasised the importance of students comprehending the material rather than merely memorising facts. Denise articulated that her teaching philosophy is driven by the belief that understanding and applying concepts is more critical than rote knowledge. She stated,

I would have to say that the key ideas that drive my teaching philosophy and behaviour are that it is most important for the students to understand what I am talking about, and to be able to use the concepts that I am teaching them, than it is for them just to know facts, or to know about things. Therefore, I would say that understanding is the key that I am always trying to convey to the students.

Denise promotes student engagement by prompting them to tackle problems before she offers solutions, demonstrating exceptional lecturer-student interaction in the classroom. This approach showcases Denise's active involvement in the Reflection-in-Action stage of the RT protocol. She noted,

There are definite strategies that I take. In my lectures, when I put up questions, I don't straight away give the answers. I say, 'Try this first, and only after you've tried it will I give you the answer'. I give them directions on how to get the answer. If not, you're not learning any critical thinking at all. I encourage the students to try to understand things. I give them the information that they need to do the problems.

Despite her commitment to promoting student engagement, Denise expressed that limitations hinder her from incorporating more interactive and demonstration-based activities into her teaching. She stated,

This is a class of five hundred students without any extra money, TA support, or technical support. However, I found that it took so much of my effort to organise the demonstration that I was not teaching the material.

Denise's decision to discontinue demonstration activities, despite her enjoyment of them, highlights a focus on delivering course content over facilitating student engagement. She remarked,

... while I enjoyed doing that, because we do not have the technical support to do that all the time, I thought, no, I am not going to do that. I am going to focus on teaching.

Patrick has highlighted two essential teaching concepts that shape his approach to teaching: the importance of actively engaging students and the lecturer's responsibility to present information as an invitation to comprehend. Patrick's demonstration of active engagement with students showcases effective lecturer-student interaction. However, he acknowledged that certain aspects of chemistry require students to 'knuckle down and know' and recognise that some 'students just memorise stuff'. This teaching philosophy aligns with the beliefs of Denise, Stella, and Isaac, all of whom emphasise the importance of student engagement and understanding over rote memorisation. As a result, these educators have put the concept of Reflection-For-Action into practice by adopting this approach in their teaching methods. However, Patrick finds it challenging to fully implement his teaching strategies due to the large class sizes he frequently teaches, similar to Denise's experience. He recognises the need to focus his teaching efforts on ensuring students grasp essential knowledge, especially in first-year courses with large enrollments. He describes teaching large classes as a performance and enjoys the dynamic and interactive aspects of engaging a sizable audience:

It's all about, what do you need the students to know? First Year, you've got a big class, which, I enjoy the large class teaching, it's a bit of a performance.

Discussion

Given that RT involves examining core teaching concepts, such as constructivist learning, scaffolding, differentiated instruction, and formative assessment. Through reflection, educators question and refine their understanding of these concepts to enhance student learning. The literature on reflective practice (Brookfield, 1998; Schön, 1983) suggests that teachers should engage in ongoing self-

evaluation to assess how well their conceptual understanding aligns with their actual teaching methods. By doing so, they can identify gaps in their knowledge and make intentional adjustments to their instructional design.

Classroom interaction – both teacher-student and student-student – is a key focus of reflective teaching. Researchers like (Vygotsky & Cole, 1978) emphasise the importance of social interaction in learning, and reflective practice helps teachers assess how effectively they facilitate discussions, encourage student participation, and foster an inclusive classroom environment. Tools such as lecture recordings, peer observations, and student feedback allow educators to reflect on their communicative strategies and questioning techniques. Studies such as (Farrell, 2015) show that teachers who engage in systematic reflection on lecturer-student interactions can adjust their teaching styles to support student engagement and learning better. The data from this study aligns with these findings. Joan and Denise demonstrated strong lecturerstudent interaction in their lectures, effectively fostering social engagement in students. Similarly, Isaac and Stella exhibited interactive teaching approaches that facilitated social learning, reinforcing the importance of structured lecture dialogue. These observations highlight how reflective practice enables educators to critically assess and refine their facilitation of discussions, ultimately supporting a more dynamic and inclusive learning environment.

RT encourages educators to analyse the effectiveness of their teaching activities – curriculum design, group work, hands-on projects, and assessments. Reflection on teaching activities should involve a cycle of planning, acting, observing, and refining. Instructors might use journals, action research, or professional learning communities to evaluate whether their activities meet diverse learning needs (Dewey, 1910; Kolb, 2000).

Therefore, RT acts as a crucial bridge between educational theory and classroom practice, enabling educators to refine teaching concepts, strengthen lecturer-student interactions, and enhance instructional activities through real-time experiences and student feedback. The process is inherently cyclical - educators plan, teach, reflect, and refine - ensuring continuous professional development and improved student learning outcomes.

However, findings from this study indicate that none of the lecturers were explicitly engaged in this structured, cyclical approach to reflective teaching, although Denise and Joan asked questions in the lecture. As a result, their practices appeared fragmented and inconsistent, potentially limiting their effectiveness in fostering an engaging learning environment. To address this gap, lecturers would benefit from developing a shared understanding of reflective practice and adopting a common framework for reflection as a teaching team. This collective approach would promote instructional coherence, enhance student learning experiences, and facilitate a more systematic integration of reflective teaching within the course structure.

The findings of this study propose a systematic reflection model that ensures consistency, aligns pedagogical strategies, and enhances the student learning experience in team-taught degree programs. This model offers a practical approach to integrating reflective teaching within educational settings, marking a significant contribution to the field of chemistry education. Distinct from broader studies on reflective practice, this research presents a chemistry-specific reflective framework that effectively bridges the gap between theoretical concepts and discipline-specific teaching.

Out of the eight lecturers interviewed, six demonstrated Reflection-For-Action in the study. None of them, however, reported on a specific reflection-on-action process. It is worth noting that Denise's reassessment of her teaching methods, particularly her inability to cover the course content while focusing on in-class problem-solving activities and practical demonstrations, indicates that she has engaged in some form of Reflection-in-Action and Reflection-On-Action.

The findings suggest that establishing an RT framework is crucial for facilitating a complete reflection cycle for lecturers. It is also essential for meeting students' learning needs and ensuring that students perceive a positive impact from their interactions with lecturers. Implementing this framework can empower students by amplifying their voices and building trust in the student-lecturer partnership.

Stella's teaching philosophy reflects a holistic and adaptive approach to education, prioritising student engagement, foundational knowledge, and the practical application of learning tools. Her strategies aim to foster a deep, sustained interest in chemistry and to equip students with the skills necessary for academic success. However, Stella did not provide evidence or examples of reflective practice in her teaching methodology beyond the pre-action (Reflection-For-Action).

Aaron's approach to teaching his Foundational Chemistry II course demonstrates a commitment to making the subject matter accessible and relevant to students' everyday lives. His methodology includes using real-life examples in lectures and labs to demystify chemistry and engage students who may lack confidence in mathematics or have limited background knowledge of the subject. Despite this commitment, Aaron's reliance on traditional lecture methods may not effectively foster student engagement or the development of critical thinking skills, as these methods primarily focus on content transmission rather than interactive or reflective learning processes.

Like Stella, Aaron did not provide evidence of engaging in the RT framework that would have demonstrated the implementation of his teaching philosophy. Consequently, he failed to provide metrics demonstrating the impact of his pedagogical approach on student engagement and academic outcomes. There is no indication that he systematically reflects on his teaching methods or participates in a school culture that collectively values and practices reflective teaching. This lack of reported reflective practice suggests a potential area for improvement in the pedagogical strategies employed within his school. Like Aaron, Isaac omitted a comprehensive account of an RT framework that addresses all facets of teaching reflection.

While Denise's teaching philosophy emphasises understanding and applying concepts, the practical constraints she faces limit her ability to fully implement further student engagement and critical thinking strategies in her classroom. Her school's emphasis on content coverage further reinforces this challenge, suggesting a need for structural support such as RT to better align teaching practices with her pedagogical goals.

Patrick's teaching philosophy prioritises student engagement and the fostering of a deep understanding of the material, even within the constraints of large class sizes. His approach emphasises the relevance and applicability of learning to real-life contexts while also addressing the practical challenges associated with teaching large groups.

However, like the other seven lecturers interviewed, Patrick did not discuss or reveal any RT framework during the interview. There was no indication of an adopted framework for reflective teaching at either the individual or school level. Although Stella and Joan mentioned they use student feedback to adjust their teaching, they did not provide specific examples or details about the nature of this feedback or the changes implemented based on it.

Conclusion

Examining the relationship between reflection for action and the study's findings within the context of the theoretical framework reveals key principles that underlie the reflective process – specifically, reflection on action, in action, and for action. This framework serves to evaluate the extent to which participants engaged in reflection and how this engagement influenced their teaching practices. The interactions between lecturers and students are vital for informing lecturers during instruction (reflection in action). These exchanges also allow lecturers to assess students' understanding of the material and to identify activities and strategies that can enhance comprehension and inform assessments (reflection for action and on action). Consequently, it can be concluded that lecturer-student interaction is crucial to the effectiveness of the reflective teaching process.

A critical driver of adopting RT identified in this study was the dynamic interaction between lecturers and students, which is instrumental in cultivating student engagement and critical thinking. The research undertook an in-depth analysis of lecturers' pedagogical philosophies and conceptual frameworks to assess how these elements shaped their ability to promote interactive teaching, thereby advancing the RT framework. Reports from Patrick, Denise, Stella, Isaac, and Joan showcased various instructional methods that actively promoted such interaction. In contrast, Ben's interview indicated a marked absence of such engagement with students. Denise's class quiz emerged as the only instance embodying all three components of RT. Denise's quiz not only provided her with feedback on students' understanding, which she integrated into future lesson planning, but also involved active guidance during the quiz by assisting students with solutions. Despite these examples of lecturer-student interaction, the study highlighted a notable lack of both individual and institutional frameworks necessary for the systematic implementation of RT and RTP. This gap is significant as RTP goes beyond conventional methodologies, aligning pedagogical strategies with the evolving learning needs that allow educators to adopt RT effectively.

To address the research question for this study – How do university lecturers' teaching philosophies inform and shape their RTPs? – the lecturers shared their teaching philosophies, providing insight into their perceptions of their own teaching and practices, as well as their comprehension of the fundamental concepts underlying their instruction. This perspective offered a glimpse into their existing RTP, which was the focus of the study. The findings revealed that, although the lecturers articulated their understanding of their teaching philosophies during the interviews, reflections on pedagogy or previous courses taught did not necessarily evolve into a practical framework that could further inform their teaching practices. However, Denise and Joan, during their interviews, described specific steps that reflected their teaching philosophies in action.

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Notes on contributor

is a dynamic educational researcher and passionate advocate for reflective teaching practice and student Equality, Diversity, and Inclusion (EDI), currently leading impactful initiatives at the University of Kent, UK. Her work focuses on the critical intersection between inclusive teaching practices, student engagement, and dismantling institutional barriers that affect attainment and progression among minoritised student cohorts. With extensive international experience, including roles at Flinders University in Australia, Dr Kolajo is deeply committed to transforming education through innovative, research-led approaches. A Senior Fellow of the Higher Education Academy, her influential research promotes active learning, critical thinking, and equitable educational outcomes.

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