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Dental students' experience of conscious sedation: a mixed methods assessment of a UK dental school sedation course.

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Key words: conscious sedation, dental student, experience, qualitative

ABSTRACT

Introduction: The UK General Dental Council (GDC), require dental graduates to competently identify, manage and refer patients with dental pain and anxiety. This study aimed to explore sedation training experience quantitatively and qualitatively through individual reflective logs.

Materials and methods: A single-centre mixed-methods evaluation of teaching within a UK university conscious sedation department. Fourth-year dental students undertook lectures and supervised clinical sessions following the undergraduate curriculum. Patient attendance patterns, individual experience and group experience were analysed descriptively. Reflective log sheets were analysed by Thematic Framework Analysis.

Results: Seventy-two students participated. Of 153 booked patients, 79 (51.6%) attended of which 74 (48.4%) were treated by undergraduates. The mean performed inhalation sedation and intravenous sedation cases per student were 1 and 0.8, respectively and 3 students (4%) assisted only. Group experience varied. Three themes arose from reflections: consolidation of theory and learning; confidence through experience; and responding to challenges.

Discussion: Whilst experience quotas were not met, GDC requirements for increasing students' knowledge and confidence within CS were met. Practical experience enhanced learning. 'Hands-on' experience was most valuable for self-reported confidence but learning by proxy also aided development. Students recognised challenges, but not the implications for themselves or their career. Strategies to reduce barriers to experience require research.

Conclusion:

Whilst variable, all students were provided learning opportunities. Physical experience gave the greatest confidence. Opportunities afforded by the undergraduate curriculum allowed students to learn and develop through consolidation of theory, response to challenges, and ultimately the gaining of confidence.

INTRODUCTION

The UK General Dental Council (GDC) expect UK graduates to be able to manage patients' psychological and social needs, including the identification, management and referral of dental pain and anxiety; having a sound knowledge of basic medical sciences; the ability to assess and discuss methods of pain and anxiety management; and the safe delivery of therapeutic agents.¹⁻³ Consequently conscious sedation (CS) is part of the UK dental undergraduate syllabus. The Intercollegiate Advisory Committee for Sedation in Dentistry have recommended ten inhalation sedation (IS), twenty intravenous sedation (IV) and five assessment experiences be completed, recorded, and reflected upon to deem a student competent.⁴

Reported experience levels vary. Whilst competence quotas are consistently not met,⁵⁻⁹ these are a recommendation only and it has been suggested that no number of clinical cases can guarantee competence; increased knowledge and confidence in CS are more important.⁶ Previous mean reported IV and IS cases per student in UK and Ireland dental schools were five and four respectively.⁶ Observation of CS experience in a student group showed 80.4% had sedated more than three IV cases, and 76.1% had sedated more than three cases in total.⁵

Dental students' learning experiences and self-reported confidence have been examined in a range of subdisciplines including restorative, paediatric and surgical procedures.¹⁰⁻¹³ Regarding learning experiences during CS education, hands-on experience is considered more effective than didactic teaching for preparedness, clinical skill development and knowledge acquisition.^{5,7,8,14,15} Where hands-on experience has been negligible, graduates feel inadequately prepared and that their clinical development has been wasted.^{5,16} There is little mention of self-reported confidence during CS learning.^{16,17}

Barriers to increased experience in dental academic environments include class size, stress levels and faculty support.^{9,18,19} Poor patient attendance and lack of internal monitoring may restrict the amount and distribution of CS experience specifically.⁹ Self-assessment and reflection may however, improve such experiences.¹⁹

Qualitative research is a powerful tool for exploring experience through student voice; it gives perspective and insight while protecting varying values, backgrounds, and expectations.^{20,21} Previous examination of CS education seldom employed qualitative research methods, as studies have been survey-based,^{6,9} or focussed on patients or qualified healthcare professionals.²²⁻²⁷ One useful qualitative research method is personal semi-structured reflective logs.^{21,28,29}

The GDC require dental professionals to engage with reflective practice to enhance their clinical practice and professionalism.^{1,2} The need for student training in reflective practice to facilitate life-long learning and continued clinical competency has been highlighted.³ Reflective practise has been recognised as integral to 'good practise' within healthcare education.³⁰⁻³⁷ Limited evidence suggests that reflection improves the quality of care directly through clinical competence but its benefits can enhance care delivery through increased problem-solving, confidence, and communication.^{30,32,38}

This study aimed to establish student experience of CS provision within a UK dental school through novel exploration of students' reflections following treatment. It aimed to understand the amounts of experience gained, what students learn, and the experiences they have to provide information on the process and impact of CS teaching programmes.

METHODOLOGY

This mixed-methods research was undertaken in a single UK dental hospital following ethical approval from Cardiff University Dental School Research Ethics Committee (1830a). Participants were a convenience sample of fourth-year dental students (n=72) undertaking a CS education block (Jan - Jul 2019). Participants undertook a course of 7 lectures and 9-11 supervised practical sessions in groups of 8-10 students, where they were assigned 1 patient per session per pair to assess, observe, assist, or treat using IS or IV. Clinics had adult restorative patients booked for a variety of simple procedures facilitated by CS due to anxiety, excessive gag reflex, or other indicators. Patients had varying attendance patterns.

At the end of each clinical session, students recorded their experience in a personal clinical logbook,³⁹ and on a semi-structured reflective log sheet. Students were randomly allocated a reflection log style via a computer-generated binary tool. Logs were based on either Gibbs'⁴⁰ (Table 1) or Rolfe's⁴¹ (Table 2) Models of Reflection.

Individual experience, group experience and patient attendance data were collected from the log sheets, a record kept by the clinical lead, and patient attendance records. Quantitative data were anonymised and entered into Microsoft Excel for descriptive analysis. The primary author (HC) was trained in NVivo 10 (QSR International Pty Ltd. 2014) and qualitative analysis by the second author (SW). Qualitative data were transcribed and NVivo 10 software was used to assist coding and data management.

Data were analysed using Thematic Framework Analysis, and data collection and analysis occurred concurrently until the point at which no novel results occurred (data saturation) and a Thematic Framework had been developed.⁴² The stages of Framework Analysis were familiarisation, open coding, framework generation from groups of codes, framework application to the data set and theme identification. 'Familiarisation' of the data was carried out during transcription. 'Open coding' involved giving descriptive labels to portions of data that represent a single idea, thought, feeling or experience. These initial codes were reviewed by the second researcher (SW) and compared to further data and codes that arose to create central, or 'axial', codes. This created a coding framework to apply to the data set. Themes that consistently represented the coded data were identified, then reviewed and refined with the second researcher (SW) throughout the research. Themes that best represented the coded data, were subsequently defined and quotes from the anonymised data were selected for illustration.

RESULTS

Quantitative data

The entire cohort participated (n=72). The total number of patients booked to be seen on the sedation clinic was 153, of which 79 (51.6%) attended and 74 (48.4%) were provided treatment by students. Some patients attended multiple times, which created 99 clinical appointment opportunities. Attendance patterns can be seen in Table 3.

Individual experience was low. For IS, 65 (90%) participants operated once, 4 (6%) operated twice and 3 (4%) had no operating experience. For IV, 52 (72%) operated once, 2 (3%) operated twice and 18 (25%) had no operating experience. Mean / modal operating cases per student were 1 / 1 IS, and 0.8 / 1 IV, respectively. All students assisted at least one treatment; 66 (92%) assisted IS at least once, 58 (80%) assisted IV at least once and 3 (4%) assisted only. Group experience varied significantly (Figure 1). The lowest mean operating cases by group were 0.5 IS and 0.2 IV per student. The highest mean operating cases by group was 1.1 for IS and IV.

Qualitative data

Sixty-nine distinct log sheets were analysed. Three key themes under the axial theme of 'gain through experience' were identified: *consolidation of theory and learning*; *confidence through experience*; and *responding to challenges*.

1) Consolidation of theory and learning

Students noted connections between practical experiences and theoretical learning, with improved understanding and reinforcement of theoretical knowledge through its practical application.

'[The appointment] gave me a much better understanding of the [sedation] process' (8g)

'[After operating] I understand the safety checked we had learnt more clearly' (63r)

Some indicated that teaching prior to the sedation block gave a sense of preparation but most were not confident from theory alone. This was implied by students outlining a need for practical experience prior to gaining confidence within their reflections. Reported knowledge gaps from prior teaching related to technical tasks such as performing semi-hypnotic suggestion and cannulation.

'[I feel confident because] we have had appropriate teaching' (4g)

'With practise [operating], I would feel confident' (29g)

'I don't know what to say during hypnotic suggestion' (11g)

Some participants described wider applied learning regarding specific medical histories, where the need to recall knowledge from earlier human disease modules was recognised. Despite this need, students often could not recall or apply such knowledge to the clinical situation. Experiences consolidated current learning but did not always lead to plans to subsequently address identified gaps .

'I learnt about haemophilia A...I will look at a wider range of bleeding disorders and their management' (21r)

'Patient had ventricle device, awaiting transplant, cardiologist recommended antibiotic cover...[Proposed actions following event] Nil' (20r)

Learning by proxy was demonstrated through the provision of critique or praise following observation. Skills learnt through observation included those hard to teach didactically such as behavioural management and clinical manner.

[The supervisor] used the tell-show-do technique...I have picked up on techniques to carry out on my own patient next time' (7r)

'Operator [peer] tried to talk to patient too much, bringing them out of sedation...I would ask less questions to the patient' (10g)

2) Confidence through experience

Only participants using Gibbs' directly commented on confidence, due to the guided framework. Technique confidence was gained by having 'experience' through either operating, assisting, or observing. The ability to build rapport with patients provided confidence for some.

'[I feel confident because] I have operated and am therefore aware I am capable' (69g)

'[I feel confident because] I am comfortable building rapport/trust with the patient' (26g)

The anxious nature of patients, being the first of a group to operate, or not having previous practical experience were suggested reasons for lack of confidence. One student noted a lack of confidence due to fear of the clinical environment.

'I was nervous...it was the first time anyone had done IV sedation' (35g)

'I was scared as the environment frightens me...I will read up more, so I am more prepared and feel more confident' (61r)

The definition of 'experience' varied. Some implied that observation was 'experience' in addition to operating, whereas others implied that only operating was experience. Those who considered observation valuable commented on improved confidence, whereas those who considered it wasted clinical experience did not evidence learning or perceived value from it.

'I observed an anxious patient...I learnt patient relaxation technique...I would now feel confident to manage this patient' (3g)

'Observation of staff member completing procedure...[proposed actions] N/A- no treatment provided by myself' (1r)

All reflections regarding hands-on experience expressed its value in learning. A single operating session provided self-reported confidence for most, while others stated they would require multiple sessions or post-

graduate training to gain full confidence. No comments were made to overtly differentiate confidence from competence.

'I feel confident as I have had operating experience as an undergraduate' (15g)

'After another IV operating session I would feel more confident' (66g)

'I have had experience...however, I am aware I need further training' (34g)

Regarding clinical and patient management, those who reported a positive experience with successful outcomes reported feelings of confidence and satisfaction. Whereas those who reported a negative experience, or unsuccessful outcomes, reported feelings of frustration, anxiety, and lack of confidence.

'[I feel confident as] the patient was compliant and easy to manage' (9g)

'The patient could not lie back, and fatigued easily...[I felt] frustration and impatience' (58r)

3) Responding to challenges

Students reflected on various challenges including personal limitations, provision demands, and organisational issues. Personal limitation included the lack of ability to balance patient communication with treatment efficiency, managing assumptions, and needle phobia. Some suggested short-term strategies to overcome these but few recognised the requirement for validated training prior to postgraduate CS provision.

'I would encourage less talking so the treatment doesn't take as long' (25g)

'I will now not treat all special care patients the same, I will assess their individual needs' (22r)

Reflections demonstrated varying ability to identify and address challenges. In those who could attempt to problem solve, teamwork was often an integral part of the strategy. Others implied complications but did not demonstrate strategies to overcome them.

'Treatment was complex to complete within a short time frame...I can see I need to be more prepared when assisting' (19g)

'The patient was falling asleep/struggling with mouth opening' (14g)

The emotional demand of CS provision was recognised. The reciprocity of positive and negative emotions between patients and students was noted, but few reflected on the consequences.

'I felt uncomfortable observing the patient [receiving treatment] as they were extremely nervous' (6g)

'The patient and clinicians were all calm, which gave a neutral positive feeling' (1r)

'If the session does not go to plan...you must remain calm...most importantly, to put patients at ease' (2r)

The majority of treated patients were anxious, which was recognised by students as a challenge. For some, this was successfully seen as overcome, as evidenced by an anticipated reduction in patient anxiety and sedation need following treatment. However, a minority were unable to successfully manage their patients' anxiety, leading to reduced acceptance of treatment.

'It was good to see the difference hypnotic suggestion made...next time the patient may be suitable for hypnotic suggestion alone' (28r)

'I became frantic and lost the tone of my voice, this snapped the patient out of sedation...I need to talk more to the patient to reduce their anxiety and improve compliance' (41r)

Students described low patient numbers, cancelled clinics, and low staff : student numbers as organisational challenges to their learning and experience. While students could not affect these issues, some suggested changes to improve overall experience, clinic efficiency, and provide greater student support.

'[What do you need?] More appointment time and more supervisors for support... last session took too long...students had their session cancelled' (4g)

'[What do you need?] More clinical time with nervous patients and more supervisors so things run faster' (5g)

DISCUSSION

Participants reported a variety of experience. Individual experience was low and there was significant discrepancy between clinical groups. A minority only assisted, and few were given the opportunity to treat a wide range of cases. Confirming previous literature, recommended quotas for competence were not met.^{5,6,9,43} However, the CS block provided all students with theoretical teaching and practical experience with sedated patients; thereby meeting GDC requirements for increased basic medical knowledge and confidence in assessment and safe delivery of this component of pharmacological anxiety management.¹⁻³

This may not fully address the GDC goal of managing patients' psychological and social needs, including the identification, management and referral of dental pain and anxiety,¹⁻³ These findings for basic IS and IV techniques for anxiety management contribute to achievement of this goal. However, anxiety management, alternative pharmacological and non-pharmacological management would require formal assessment in a similar environment, and combination with the findings of this study to establish if the goal is fully met.

Confirming previous literature, a high non-attendance rate proved a barrier to experience.⁹ Though internal monitoring was conducted by the subject lead here, to facilitate equal distribution of experience. Appointment reminders by short message service (SMS) or telephone call can reduce non-attendance for healthcare appointments, including in dental settings.⁴⁴⁻⁴⁶ This may increase patient attendance and thus, student experience.

The booking pattern of one patient per pair per session due to 4th years current experience likely also restricted experience. The block may be better suited to final 5th year students who have greater confidence and experience. However, previous literature was conducted on 4th year students alike or was not disclosed and still experience was higher due to smaller student groups.^{6,9} Large groups may limit experience, and this study had groups twice the recommended group size of five.⁹

The three themes identified were consistent with previous literature on student reflection within dental academic environments.⁴⁷⁻⁴⁹ 'Consolidation of theory and learning' showed that practical sessions reinforced understanding of other aspects of the dental syllabus as well as the theoretical science and delivery of CS. Kinaesthetic learning has been established as very influential for dental students.⁵⁰ This has been confirmed by increased engagement, satisfaction and confidence with hands-on experience.^{5,51,52} Student reflections still however, appreciated that didactic teaching is an essential component of a synergistic learning experience.^{5,50,51}

In situations where the experience required wider applied learning, there was often no pledge made to address knowledge gaps. This may be due to the compartmentalisation of learning modules which often ill-prepares students for the holistic and generalist care patients require.^{53,54} It may also have been due to lack of motivation; it has been found that dental students rarely access online modules during self-study unless an exam is approaching suggesting an assessment driven mindset.⁵⁵ In this case, students have not yet transitioned to the graduate perspective of self-motivated learning and development hence did not recognise the need for validated post graduate training.

Students' perception of what is deemed 'experience' and the amount of experience required for feelings of confidence differ. Most students only deem hands-on activity to be 'experience', while observing or assisting are of lesser value or entirely wasted clinical experience.⁵ The value of observation for making assessments

and referrals was not generally recognised. Few appreciated that without further CS training, they would more likely be completing these tasks once graduated rather than providing CS. Learning by proxy through observation, was however considered experience for some non-clinical 'soft' skills. The critiquing of others helped to develop reflection skills, self-confidence, and appreciation of others.⁵⁶ Students' written critique was not provided to peers due to collection of the data, though may have had limited usefulness if it had been as faculty feedback is perceived to have greater value.⁵⁷

A discrepancy between those who deem their experience sufficient and those who report additional needs was confirmed.^{26,33-36} Self-reported confidence varied by individual. The physical delivery of CS created the greatest confidence. Reasons for lack of self-reported confidence included fear of the clinical environment and having a negative clinical experience, either technically or with a patient. This highlights a need for greater exposure and experience as those who had a single negative experience may have had their confidence detrimentally effected through no further positive exposure. Under or over-confidence may increase unnecessary reliance on staff, or present a safety risk, respectively.¹⁶ While a weak correlation between academic performance, external competence, and self-reported confidence has been identified, confidence is not a reliable measure of competence.⁵⁸ This study did not quantitatively measure confidence or competence. Further research incorporating the objective structured clinical examination (OSCE) scores from the UK dental hospital the study was conducted in may be useful.

Students expressed their inability to balance all aspects of CS delivery including communication and technical efficiency. Competence by graduation has been researched in various clinical tasks excluding CS. Students are competent and confident in regularly applied clinical skills such as basic restorative procedures but are less so in those they do not regularly apply.^{10-13,16,17,52-54} Given that CS delivery is considered an additional skill which is not regularly practised, it can be inferred that students are not fully competent by graduation and would benefit from further mentoring through structured postgraduate training.^{4,13,16,60,61} The development of confidence in CS provision during undergraduate education and throughout graduates' careers requires research.

When providing CS, students should remain calm, decisive, and purposeful in the face of difficulty.⁴ Students who could identify challenges and suggest improvements to the care they were providing through reflection, showed consideration for their future development. Others did not recognise challenges or the need for teamwork, an attitude which may negatively affect patients, and which supports the need for greater exposure.

Emotional labour is a process of managing feelings and expressions to fulfil the emotional requirements of a paid role.⁶² Such work has been identified in qualified sedation staff who must '*project a benign persona to encourage trust and overcome reticence to treatment*'.²² Students showed awareness of the increased emotional demand during CS provision by describing how verbal and non-verbal communication aided their sedation to improve patient compliance and treatment continuation. Students could recognise that emotional work is essential during undergraduate CS provision to enhance the sedative effect.²² Patient anxiety is a significant stressor for dental students and professionals.⁶³⁻⁶⁶ Anxiety can be transferred by 'emotional contagion': the 'catching' or mimicking of another's emotions while they concurrently respond to your own.^{22,23} This leads to emotional convergence, where parties feel emotionally similar within a situation.⁶⁷ The provision of CS to anxious patients requires emotional coping strategies by the clinician to avoid burnout and manage

patients' emotions positively.²² Despite experiencing emotional demand and transfer, students failed to observe how it might impact their mental state throughout their career.^{22,68}

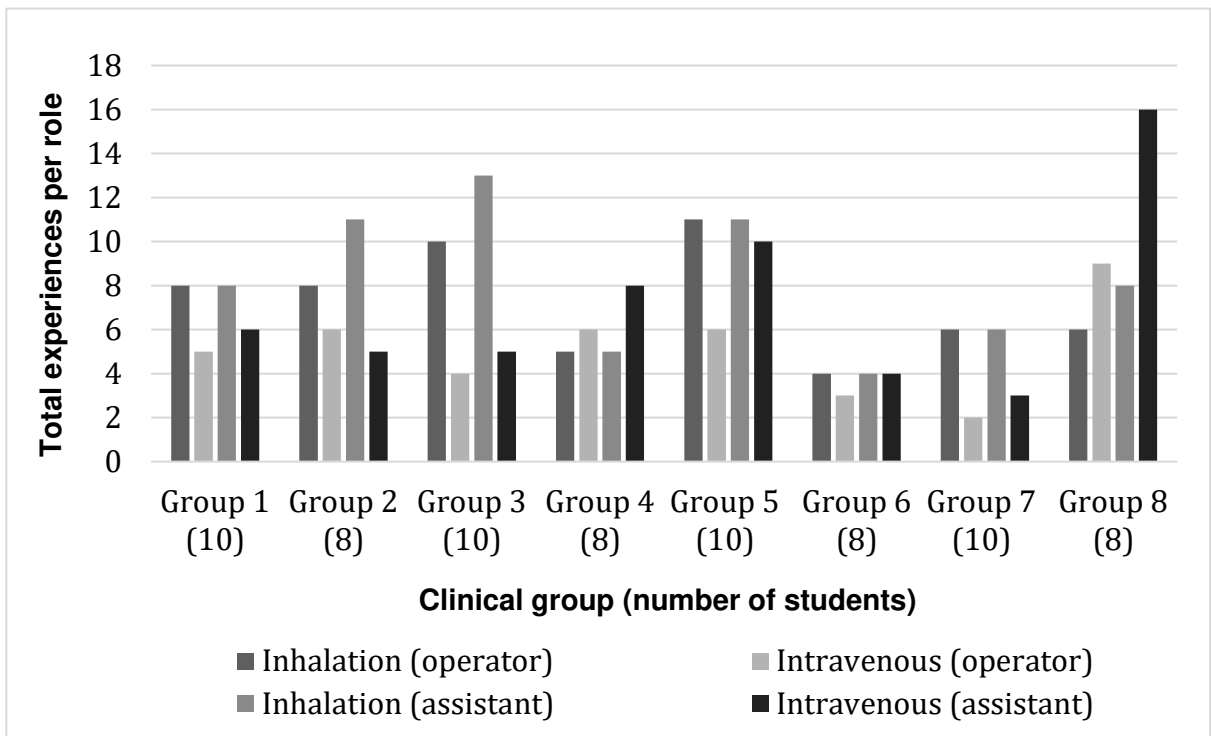
Cancelled clinics with limited maximum exposure, clinic duration and low staff numbers were organisational limitations. Strategies such as greater time spent planning smaller student groups and timetables, timetabling CS to more experienced 5th year students to increase possible patient exposures per session, or increasing staff members, or would require piloting. They may increase the amount and quality of experience gained and may facilitate greater student support. Strategies may ultimately be limited by the prediction of dental anxiety for dental non-attendance.⁶⁹⁻⁷¹

Limitations to data collection included participants forgetting to complete log sheets. Social desirability bias may have limited the depth of data provided despite log anonymity. Researcher subjectivity and bias could have limited data analysis however a reflexive journal ensuring flexibility towards rich and diverse findings was kept according to standard qualitative procedures in healthcare research.⁷² Inter-rater reliability and internal validity were facilitated by multi-researcher coding and triangulation.

CONCLUSION

Experience increases student understanding of CS. Some students learn from any clinical experience, while others learn from hands-on experience only. The direct provision of CS equates to the greatest self-reported confidence. Students can recognise internal and external challenges to CS delivery but cannot always appreciate the implications. Although sedation experiences on undergraduate teaching blocks vary, all students are provided with some form of learning opportunity. Such experiences allow students to learn and develop through consolidation of theory, response to challenge and ultimately to gain confidence in CS delivery.

Figure 1. Student Experience of Conscious Sedation per Clinical Group by Experience Type and Clinical Role



TABLES

Table 1. Semi-structured Framework for Gibbs' Model of Reflection¹

1. Describe the appointment
2. What were you thinking and feeling when the appointment started?
3. What was good / bad about the appointment?
4. The procedure(s) that I performed/observed today helped my understanding of dental sedation because...
5. How would do things differently (if at all) if you had a similar appointment?
6. I feel/do not feel confident that I would be able to manage a similar situation when qualified because...
7. What further information/skills do you think you need?

Table 2. Semi-structured Framework for Rolfe's Model of Reflection²

1. What?	Description of event What did you see/do? what was your role? What did other people see/do? What was good/bad? What feelings did it evoke? Key aspects of the situation
2. So, what	Analysis of the event What did you learn? What could you have done better? What do you now understand? What were the effects of what you did?
3. Now what?	Proposed actions following the event Are changes required? What would you do next time? Consequences if you do not change? What information would you need for next time?

Table 3. Patient Attendance and Subsequent Treatment Patterns

Patients booked to be treated on the sedation clinic within undergraduate clinics	153 (100%)
Patients attended	79 (51.6%)
Patients that did not attend	47 (30.7%)
Patients cancelled by school or patient	27 (17.6%)
Of total booked patients: Treated by undergraduates	74 (48.4%)
Of total booked patients: Not suitable for undergraduate treatment	5 (3.3%)

¹ Adapted from Gibbs, G. (1998) *Learning by Doing: A guide to teaching and learning methods*, Oxford Brookes University.

² Adapted from Rolfe, G. Freshwater, D & Jasper, M. (2001) *Critical reflection for nursing and the helping professions: a user's guide Basingstoke: Palgrave Macmillan*.

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