

# Chapter 16

## Reflection on Teaching Observation for Computer Science and Engineering to Design Effective Teaching Resources in Transnational Higher Education

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### ABSTRACT

*Teaching observation plays an important role in the development of educators in higher education institutions, as this practice facilitates an environment where educators can share and be made aware of good pedagogic practices. This also applies to educators who teach in transnational higher education (TNE) programmes. The work in this article presents a theoretical framework for reflection on educator observations that took place on a semi-structured data and advanced data modelling module delivered to the BSc/MSc computer science programme at Queen Mary University of London. This article also provides an overview of a research methodology for designing and delivering teaching resources based on educational research and theory, as well as personal evaluations of the teaching teams' previous experience. The article illustrates how the approach adopted for the module can be transferrable to TNE programmes.*

DOI: 10.4018/978-1-6684-5226-4.ch016

## **INTRODUCTION**

Learners' expectations and pace require teaching approaches to be altered to suit their needs (Naeem et al., 2022). To ensure that educators have a better understanding of their own teaching methods, they are encouraged to adopt a practice that includes personal reflection, observations with co-workers, reflections in small groups, and university reflections (Brookfield, 1995). One of the primary purposes of teaching observation is to look for educational inequities among different groups of learners. Using this method, educators may identify and seek to eliminate biases in how different groups of learners are treated based on their gender, socioeconomic status, or other differentiating criteria. The purpose of teaching observation is to provide educators and administrators with feedback on current educational practices and to identify pedagogical problems, which could be useful to promote transnational higher education (Wilkins & Annabi, 2021).

Observing learners in the classroom allows educators to think creatively about their own practices (Gill et al., 2023a). Observational tools and interactive reflection may be used to help learners achieve learning objectives and clarify expectations while also offering targeted feedback and a chance to gather information to enhance both teaching and learning in transnational higher education (Bui, & Nguyen, (2014). Introducing evaluation tools and creative reflection into the continuous improvement cycle fosters a feeling of accountability, trust, and collaboration among employees (Gill et al., 2023b). As a result, educators are better able to implement and disseminate best practises in order to help learners achieve their educational goals while learning in transnational higher education (Gill et al., 2022a).

## **Motivation and Contributions**

This paper presents a theoretical framework for transnational higher education through reflection on teaching observations that took place for *Semi-Structured Data and Advanced Data Modelling*, a module taught on the MSc and BSc Computer Science programmes at Queen Mary University of London. A description of a research process for developing and providing good teaching resources that are based on educational research and theory, as well as personal evaluations of prior experience, is also presented. Finally, the data and evaluation outcomes acquired after using this approach in September 2021 are presented to demonstrate its efficacy in transnational and global higher education institutions. This module was taught online to learners in the United Kingdom and other countries in late September through mid-December 2021, demonstrating that it is suited for future Transnational Higher Education (TNE).

The rest of the chapter is structured as follows: the second section presents the review of relevant literature. The third section details a theoretical framework for teaching observation in computer science education. The fourth section gives the methodology for post-observation action. The fifth section shows the preliminary results from the post-observation action. The sixth section offers recommendations for transnational higher education. Finally, the seventh section concludes the chapter.

## **BACKGROUND AND ANALYSIS OF LITERATURE**

More and more colleges and universities are using transnational higher education (TNE) as a means of internationalising their programmes. In higher education, TNE refers to any form of programmes or educational services in which the learners are situated in a nation other than where the granting institution

is located (Gill et al., 2022a). TNE is also known as cross-border, offshore, and borderless higher education in the academic literature (Knight, 2016). University programmes are increasingly being delivered across national borders as a strong indicator of higher education's internationalisation in this century. Many universities are grappling with how to ensure the quality of this innovative form of education.

It has already been shown that TNE provides learners with more flexibility to plan their futures, but it also raises the competition for jobs that need practical abilities and adaptable mindsets (Bolton, & Nie, 2010). As a result of this research, new ideas for TNE models that provide value and are long-term will be generated, as will implications for quality assurance frameworks and research into forging relationships and cultures across borders. Another study (Chapman, & Pyvis, 2012) employs an auto-ethnographic method to improve teaching and learning in transnational programmes that are given in a postcolonial environment (Hong Kong) by a university that is located in the former colonising country (UK). In order to show how TNE programmes may benefit learning and teaching in both the host and home contexts, it is necessary to acknowledge and embrace the complexity such a situation presents. Another study (Trahar, 2015) examines the factors that contribute to high-quality education in the context of Australian universities' global programmes. Using teaching observation and reflection techniques, this research provides universities with concepts for enhancing current frameworks for ensuring the quality of learning and teaching in university off-campus education programmes. Teaching observation and reflection as tools for improving quality in TNE can also provide excellent teaching and learning in university programmes offered abroad.

The above-discussed literature reported that there is a need to design effective teaching resources for providing TNE in an efficient manner (Gill et al., 2022b). It has been also identified that using different types of teaching resources (e.g. Mentimeter quizzes, case studies, animated videos, annotated exemplar and team-based activities) can be used together to design online sessions to offer transnational higher education (Gill et al., 2023a). As Queen Mary University of London (QMUL) is a very diverse university with learners from different cultures, nationalities, educational backgrounds or experiences, ages of learners, ethnicities, races and genders (Gill et al., 2023b), there is a need to utilise group-based activities (think-pair & share and case study based discussions in groups) to deal with diversity while offering TNE. Further, there is a need for different types of feedback and suggestions from tutors, senior colleagues and peers through teaching observations to implement the above-discussed plan. Therefore, there is a need to develop a new framework to design effective teaching resources in TNE, which can be improved through reflection on teaching observation. Further, Bloom's Taxonomy was used in conjunction with all resources in an efficient manner because it is a valuable tool for improving the ability to think critically and tackle real-world issues with innovation, and has been utilized successfully in many disciplines such as science & engineering (Hager et al., 1994), sustainability (Pappas et al., 2013) and music education (Hanna, 2007) to enable a sustainable learning environment. To test the practical applicability of this framework, we applied it to the teaching of *Semi-Structured Data and Advanced Data Modelling* to MSc and BSc Computer Science programmes at Queen Mary University of London. These online teaching sessions were observed while delivering to the learners in the United Kingdom and other countries at same time due to COVID-19 pandemic, demonstrating that it is suited for future transnational higher education. Further, the evaluation data & formative assessments and the Virtual Learning Environment (VLE) analytics will be assessed to analyse its impact both in terms of learner engagement and teaching practices. Finally, various possible challenges will be identified during the implementation of this theoretical framework for TNE for future readers and researchers.

## **A THEORETICAL FRAMEWORK AND METHODOLOGY FOR TEACHING OBSERVATION IN COMPUTER SCIENCE EDUCATION**

A methodology for reflecting on classroom observations in computer science education is discussed in this section, which may be used to create useful teaching materials for transnational higher education institutions. While pursuing a teaching qualification (PGCAP), the notion of active learning was discussed, specifically that it can be used to increase learner engagement and, as a result, teaching abilities were greatly improved (Gill et al., 2022). Additional dynamic learning methodologies were implemented, which were taught to learners throughout the module's first semester of instruction in Jan-April 2020. When it came to online instruction, a blended learning paradigm was adopted (Naeem et al., 2022). A variety of activities were used, including viewing a video clip before an online live session to develop a participant's knowledge, using a problem-solving strategy during the online educational session to encourage learners' involvement, and administering a quiz after the session to assess learners' understanding of the material. This module provides an ideal opportunity to assess new teaching strategies while also having the opportunity to gather helpful feedback from observers. Because of the COVID-19 pandemic, it is extremely difficult to teach a complete module online to more than 100 learners located in various regions (making this approach suitable for TNE) while ensuring that the maximum number of learners participate. The observation session was conducted during a *Semi-structured Data and Advanced Data Modelling* lecture at Queen Mary University of London, which is a compulsory module for learners enrolled in the MSc and BSc Computer Science programmes at the university.

### **Online Teaching Session**

A two-part session on "XML Transformation" was held online, and 250 BSc/MSc Computer Science learners attended both sessions. CSS rules for HTML to XML transformation were the focus of the first session, which addressed "transforming XML using Cascading Style Sheets (CSS)". XSLT templates and stylesheets, as well as default templates, were covered in detail in the second session, which focused on converting XML using XSLT.

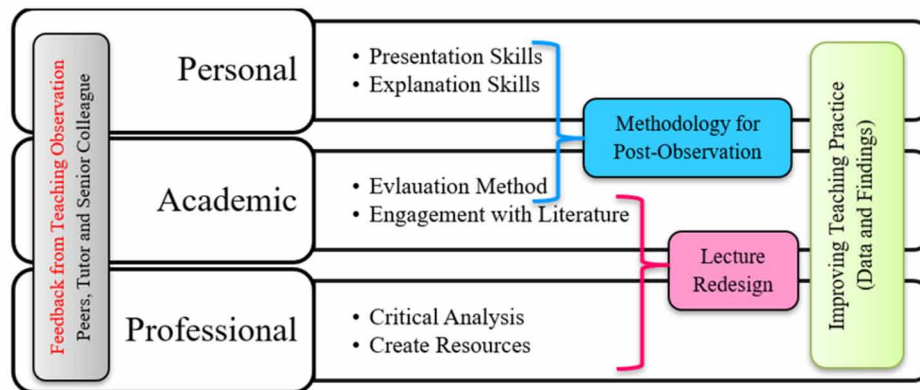
### **Objective**

While conducting classroom observations, the major purpose of this study was to consider numerous ideas made by the tutor, a senior colleague, and other observers. In this task, it was an attempt to discover research ideas for enhancing teaching methods, whether internal or external to the organisation. Six internal areas of improvement for the teaching practise were identified, and these areas have been classified into three separate categories: academic, personal, and professional growth and development. Figure 1 shows a theoretical framework for the development of key teaching skills.

It was also determined which common aspects (lecture design and teaching method) needed to be improved in order to enhance teaching skills which could be useful for TNE. The external environments of both educators and learners can have an impact on the educational experience, which are elements which over we do not have direct control. In addition, a system for coping with these problems in order to improve teaching abilities is discussed in this work.

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Figure 1. Theoretical Framework for the development of key teaching skills



## Teaching Observations

In this section, suggestions given by the tutor, senior colleague and peers during teaching observations are discussed to improve teaching based on the online teaching session delivered to the learners in the United Kingdom and other countries at same time.

### Teaching Observation: By Senior Colleague

Because of the confidentiality agreement, the teaching observation undertaken by the senior colleague from QMUL and the name of the observer is not revealed. Table 1 describes the teaching session which was observed by senior colleague.

Table 1. About the teaching session observed by senior colleague

| Name of Observee  | Dr Sukhpal Singh Gill  |              |     |
|---|--|--------------|-----|
| School/ Institute   | School of Electronic Engineering and Computer Science/QMUL         |              |     |
| Name of Observer  | Anonymous  |              |     |
| Topic of session  | Extensible Stylesheet Language Transformations (XSLT)              |              |     |
| Module/Course/Unit  | Semi-structured Data and Advanced Data Modelling (ECS650U/ECS789P) |              |     |
| Level/Year  | Level: 6/BSc 3 <sup>rd</sup> Year and MSc                          | No. learners | 150 |
| Type of session (synchronous or asynchronous, lecture/seminar/practical...)                                   | Asynchronous   |              |     |
| Date of session   | 7/11/2020  |              |     |
| Time of session   | 10 am (UK time)  |              |     |
| Length of session   | 15 Minutes   |              |     |
| Location (may be online)  | Online   |              |     |
| How should the observer participate? (attend live webinar, watch recording, sit/stand in particular location) | Watch Recording  |              |     |

*continues on following page*

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Table 1. Continued

| Name of Observee  | Dr Sukhpal Singh Gill   |
|---|---|
| <b>1. What is the content and structure of the class you will be teaching?</b>  | “Extensible Stylesheet Language Transformations (XSLT)” is the topic of the first 15 minutes of the two-hour class. There will be simple examples in this session to show how to use XSLT stylesheets and template defaults. There are 70 BSc Computer Science learners and 80 MSc Computer Science learners in this session, all of whom are following the QMUL teaching format. In addition, a live, one-hour Q&A session will be held to address questions from learners.  |
| <b>2. Describe your learners – what is the background or composition of the group?</b>  | There are 70 BSc Computer Science learners and 80 MSc Computer Science learners enrolled in this session. All of the BSc learners have completed their first and second years of computer science at Queen Mary University of London, and they are homogeneous. Although new to the programme, MSc learners come from a different educational qualifications, including bachelor’s degrees in computer science, industrial engineering, information technology, and electronic engineering. All of the BSc learners are full-time students, however some of the MSc learners are enrolled in a part-time programme. Several participants are travelling from the United Kingdom to join this session, while others are staying in their native countries. |
| <b>3. What have learners been asked to do in preparation for the class?</b>   | Before attending this course, learners should be familiar with the concepts of HTML, XML, and CSS and should have some prior expertise. There will be an online quiz on QMPLUS that will be based on Mentimeter to evaluate the participants’ previous knowledge.   |
| <b>4. What are the aims and intended learning outcomes of the session?</b>  | LO1: be familiar with XSLT and its rules.<br>LO2: be familiar with XSLT templates & stylesheets and default templates.<br>LO3: be able to understand the transformation of XML data using XSLT.<br>LO4: be able to transform from HTML to XML using XSLT stylesheets.   |
| <b>5. How do you plan to achieve these?</b>   | This lecture will be introduced with a 5-minute online quiz on QMPLUS, which will assess the learners’ prior understanding of the subject.  |
| <b>6. What would you like the observer to focus on during the observation? Are there particular areas you would like feedback on?</b> | The presentation of material, the teaching approach used when discussing the concepts/examples utilizing highlighter and marker, and the clarity of voice used during interaction are all significant factors.  |

Table 2. Observation feedback and comments given by the senior colleague

| Please comment on the following aspects of the observed session:                         |   |
|--|---|
| <b>1. Clarity of the aims and learning outcomes</b>                                      | The asynchronous video does, in fact, deliver the learning outcomes from the meeting. Maybe this information has already been supplied on the QMPlus. One option is provide an overview of this at the beginning of the video.  |
| <b>2. Clarity and organisation of the session including timekeeping and structure</b>    | The clarity and organisation was excellent, and the material was delivered in an understandable manner.   |
| <b>3. Teaching and learning methods – are they appropriate, are they innovative?</b>     | For an asynchronous session, the teaching and learning approaches are suitable; nevertheless, I suggest consider employing animation to show bullet points, since it would make it easier for learners to process the material. I really believe that Sukhpal might go into further detail on the concerns. |
| <b>4. In-session assessment or review methods – are they appropriate?</b>                | This was not applicable for this session.   |
| <b>5. The form and extent of active learning and learner participation</b>               | I believe this was not obvious, and I urge that Sukhpal start making use of H5P to incorporate interactive questions into his lessons in way to involve his class.  |
| <b>6. Delivery and pace of the session</b>   | The manner in which the session was delivered and the speed at which it proceeded were suitable for this session.   |
| <b>7. Use of learning technologies (if applicable)</b>                                   | N/A   |
| <b>8. Specific areas identified for feedback by observee</b>                             | The voice was really clear; however, I would avoid using the highlighter to underline each bullet point excessively because it might be annoying.   |
| <b>9. What suggestions would you make to build on strengths and/or improve teaching?</b> | <b>Strengths:</b> The quality of the voice and the clarity of the slides were superb.<br><b>Improvements:</b> Animate bullet points (as suggested in the previous remark) and elaborate on topics more.   |

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Table 2 shows the observation feedback and comments given by the senior colleague.

### Teaching Observation: By Colleague (Peer)

Because of the confidentiality agreement, the teaching observation undertaken by the Colleague (Peer) from QMUL and the name of the observer is not revealed. Table 3 shows about the teaching session which was observed by Colleague (Peer).

Table 3. About the teaching session observed by Colleague (Peer)

| Name of Observee   | Dr Sukhpal Singh Gill  |              |     |
|--|--|--------------|-----|
| School/ Institute  | School of Electronic Engineering and Computer Science/QMUL         |              |     |
| Name of Observer   | Anonymous  |              |     |
| Topic of session   | Cascading Style Sheets   |              |     |
| Module/Course/Unit   | Semi-structured Data and Advanced Data Modelling (ECS650U/ECS789P) |              |     |
| Level/Year   | Level: 6/BSc 3 <sup>rd</sup> Year and MSc                          | No. learners | 150 |
| Type of session (synchronous or asynchronous, lecture/seminar/practical...)  | Asynchronous   |              |     |
| Date of session  | 6/11/2020  |              |     |
| Time of session  | 10 am (UK time)  |              |     |
| Length of session  | 10 Minutes   |              |     |
| Location (may be online)   | Online   |              |     |
| How should the observer participate? (attend live webinar, watch recording, sit/stand in particular location)  | Watch Recording  |              |     |
| <p><b>1. What is the content and structure of the class you will be teaching?</b><br/>This is the first 10 minutes of a two-hour session on “Transforming XML Using Cascading Style Sheets”, which will go until the end of the day. In this session, observe explains CSS rules and their importance, as well as provide two tiny examples to illustrate main points. QMUL’s teaching framework is being followed by 70 BSc Computer Science learners and 80 MSc Computer Science learners in current session, which includes both UG and PG learners. Additionally, there will be a live one-hour Q&amp;A session to address any questions from learners.</p>  |  |              |     |
| <p><b>2. Describe your learners – what is the background or composition of the group?</b><br/>The number of undergraduate computer science learners in this session is 70, whereas the number of graduate computer science learners in this session is 80. All of the BSc learners have completed their first and second years of computer science at Queen Mary University of London, and they are homogeneous. Although new to the programme, MSc learners come from a variety of educational backgrounds, including bachelor’s degrees in computer science, industrial engineering, information technology, and electronics engineering. All of the BSc learners are full-time learners, however some of the MSc learners are enrolled in a part-time programme. Many participants are travelling from the United Kingdom to join this session, while the others are staying in their native countries.</p> |  |              |     |
| <p><b>3. What have learners been asked to do in preparation for the class?</b><br/>Before attending this class, learners should be familiar with the concepts of HTML and XML and should have some previous knowledge. To assess the participants’ past knowledge, they will be required to complete a ten-minute online quiz on QMPLUS.</p>   |  |              |     |
| <p><b>4. What are the aims and intended learning outcomes of the session?</b><br/>LO1: be familiar with CSS and its rules.<br/>LO2: be able to understand the transformation of XML data using CSS.<br/>LO3: be able to transform from HTML to XML using CSS stylesheets.</p>  |  |              |     |
| <p><b>5. How do you plan to achieve these?</b><br/>This session will be introduced with a ten-minute online quiz on QMPLUS, which will assess the participants’ prior understanding of the material covered in this session.</p>   |  |              |     |
| <p><b>6. What would you like the observer to focus on during the observation? Are there particular areas you would like feedback on?</b><br/>The presentation of material, the teaching approach used when discussing the concepts/examples utilizing highlighter and marker, and the clarity of voice used during interaction are all significant factors.</p>  |  |              |     |

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Table 4 shows the observation feedback and comments given by the colleague (peer).

Table 4. Observation feedback and comments given by the colleague (peer)

|  | <b>lease comment on the following aspects of the observed session:</b>  |
|--|---|
| <b>1. Clarity of the aims and learning outcomes</b>                                      | The purpose for using CSS is well stated, and the aims and goals of the presentation are explicitly defined in the course of the session.   |
| <b>2. Clarity and organisation of the session including timekeeping and structure</b>    | The pace of the presentation is easy to follow even for non-experts, and the spectator is left anticipating what will happen next.  |
| <b>3. Teaching and learning methods – are they appropriate, are they innovative?</b>     | The techniques of teaching and learning are suitable and fascinating. We gain a true sense of why we should use CSS and how it can be altered to achieve our goal because of the usage of examples throughout the session. What I appreciate about CSS formatting is that there are two stages: the first is the most basic, and the second includes certain rules such as if/then actions and analyzing existing text to append letters. |
| <b>4. In-session assessment or review methods – are they appropriate?</b>                | There is an on-line quiz well before session and it is assumed that all of the participants have finished it prior. Perhaps an introductory statement that emphasises the principles that are intended to be learned prior to the remainder of this course. In other words, “you should be acquainted with defining web pages using html or xml, and you should have finished the on-line quiz...”  |
| <b>5. The form and extent of active learning and learner participation</b>               | This is asynchronous so it is not applicable  |
| <b>6. Delivery and pace of the session</b>   | The rhythm is nice, especially because one can travel back and forth between CSS and XML and the final result to better comprehend the relationship between the two.  |
| <b>7. Use of learning technologies (if applicable)</b>                                   | It is really beneficial to give an example to show each phase of the lecture process. Additionally, the employment of a highlighter to direct the listener’s attention to a particular region of interest is effective since it creates the idea that things are developing up to the final consequence.  |
| <b>8. Specific areas identified for feedback by observee</b>                             | The presentation is well-organized, and the speed is simple to keep up with. The use of highlighters helps to draw the viewer’s attention to the most important idea being covered in the presentation. The illustrations used in the lesson provide a more real sense to the presentation.   |
| <b>9. What suggestions would you make to build on strengths and/or improve teaching?</b> | Just one aspect I will suggest is that you include an introduction slide or line that connects this lecture to what has gone before, such as “we’ve studied X, Y, and Z for establishing the web page structure, now we will show how we can enhance the display of the HTML using CSS...”  |

### Teaching Observation: By Tutor

Because of the confidentiality agreement, the teaching observation undertaken by the Tutor from QMUL and the name of the observer is not revealed. Table 5 shows the observation feedback and comments given by Tutor.

### Teaching Observation: By Attendees (Peers)

Online teaching session was also attended by two peers and their feedback is given in Table 6.



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*Table 5. Observation feedback and comments given by Tutor*

| Criteria  | Description  |
|---|--|
| <b>Critical analysis</b>                          | You provide some context for why motivation and teamwork are important for software engineering, but it would have been better to provide some context for that outside of your own opinion and two YouTube comments, like reference to studies about learners lacking these skills from an employer perspective, or data from learner surveys that describe their experiences as boring. It wasn't clear that organizational complexity was directly responsible for lack of motivation, or how that was addressed in your session plan.  |
| <b>Debating practice</b>                          | You made some references to how you are using the interests of your learner to better connect their learning to real life events, like the application of real work problems to computing, which is very important. You may want to consider how you can connect that with evidence of how authentic assignments increase motivation and participation. I was also a bit confused by the challenges. If the purpose of the activities is to increase teamwork, but teamwork ends up being a challenge to the success of the activity, is the activity effective?   |
| <b>Engagement with scholarship and literature</b> | You clearly link your use of certain activities to Bloom's taxonomy, which is great. You briefly reference work that supports the effectiveness of the activities you're using but it would have been more effective if you had critically engage in that research, being clearer how it supports you, how it does not, and why you consider it relevant to what you're trying to achieve.   |
| <b>Quality of academic writing</b>                | The presentation was clearly signposted, and you engaged with a wide range of sources though not many of them were discussed in detail during the presentation. Next time consider how to better use your time by giving less detailed descriptions of activities and more time to engage in that critical discussion about the connections your activities had to the literature, and to clarifying the challenges and how you'll overcome them.  |
| <b>Any other comments?</b>                        | Sukhpal it's clear that you've put a lot of time and thought into the development of your lesson plan. It's still a bit unclear to me whether one of the intended learning outcomes of the session you describe are to learn teamwork skills, or if the teamwork is in service of learning other software skills. It's not necessarily the goal that every individual lesson engages every level on Bloom's taxonomy, but rather that the levels are represented thoughtfully at different points in a learner's journey through a programme of study. I would encourage you to do a bit more reading into putting Bloom's work into practice. For example, the "evaluate" level does not refer to your evaluation of the learner's learning; it refers whether the learner has developed the skills to themselves evaluate information about a topic (for example, can they evaluate which method is most appropriate for a given situation described in a case study). |

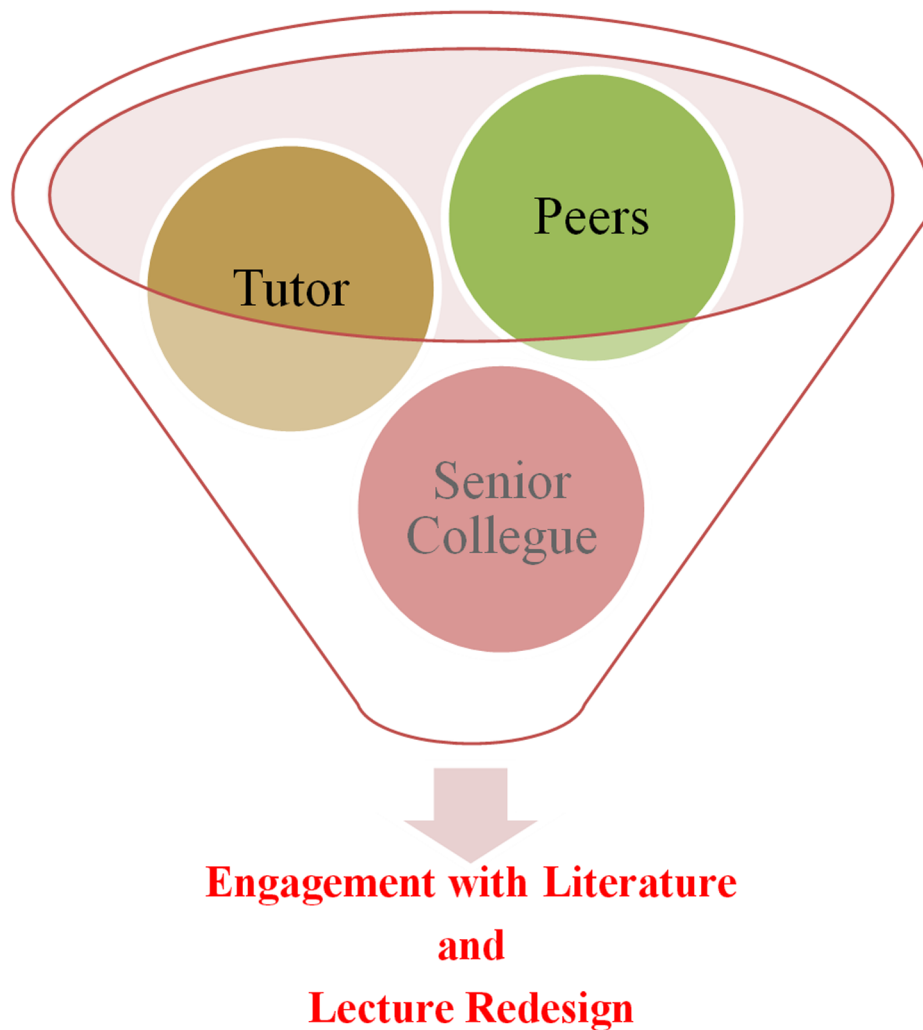
*Table 6. Observation feedback and comments given by Peers*

| Criteria   | Peer 1  | Peer 2  |
|--|---|---|
| Feedback on the resource itself – does it look useful and interesting?   | The resource is rich. Mentimeter and video are used. Kahoot is also used.                 | It's interesting to see the flow of the technique of how to encourage learners to engage with the flow of the lecture with topic to be discussed - with group activity - think pair and share. Mentimeter and kahoot tool used. Feedback survey - Google Forms. |
| Feedback on use of literature and scholarship  | The use of literature is appropriate.   | Bloom's taxonomy is applied but there's a lack of explanation on how the resources are applied in the demonstration, also, there's a lack of justification on how each level of the lecture design is related with the bloom's taxonomy.                        |
| Feedback on debating practice – links to, and learning from, other people's work   | The presenter shows too much about the teaching methods, and also the teaching materials. | References are available but it would be good to show to evidence findings from other people's work on using the teaching and scholarship method.   |
| Feedback on critical analysis – has the person justified why they've made this resource with reference to their context and the needs of key stakeholders? | Yes   | The presenter has mentioned the use of bloom's taxonomy but it would be good to relate this into the work case study scenario.  |
| Any other feedback for the presenter?  | No  | No  |

## **POST-OBSERVATION ACTION**

Based on the constructive feedback given by the tutor, senior colleague and peers, through reflection on various internal issues for improving teaching skills for the future have been identified. Figure 2 shows the common areas (engagement with literature and content management) to improve teaching skills as suggested by a tutor, senior colleague and peers.

*Figure 2. Common areas for the improvement of teaching practice*



## **Revised Lecture**

This section presents the revised lecture after learning various new teaching and learning methodologies from teaching observations. The Higher Education Academy (HEA) provides a framework for final evaluation, teaching, and learning to provide support to learners pursuing higher education in a variety of subjects at different levels (Nurunnabi, 2019). It has assisted instructors in engaging with their academic work, as demonstrated by Brooman's successful implementation and testing in the delivery of legal education (Brooman, 2011).

The "Learning and Teaching" module is an important element of PGCAP at the Queen Mary, and it assists the design of tools for practical learning, teaching, and evaluation in the workplace (Gill et al., 2022a). Educationists can benefit from the current evaluation techniques and feedback experiences in order to build successful curriculum and deliver high-quality education (Qadir et al., 2020). Innovative education boosts learners' learning performance offering a long-term favourable effect on their career to build numerous significant projects for society's advantages (Nerantzi & Hannaford, 2016). However, how can learners learn more successfully during a lecture session? The key concerns that must be addressed in order to provide better advanced learning are always evolving (Toquero, 2020).

The preparation of a session plan assists in delivering the essential information by adhering to the timetable that has been established. For the purpose of encouraging learners to participate with the lecture flow, a variety of activities have been examined (group activity, case study, quiz, and video). The lesson was opened with a quiz to get the learners to use their existing knowledge. After that, a brief video clip was played and used a case study to showcase XML-based projects to the class. In addition, annotated exemplars were used to connect the ideas of XML, XSLT, and CSS rules with real-world applications (Gill et al., 2022b). In addition, a group-based activity (i.e. think-pair-and-share) was used to assess the characteristics of XML-based projects, which motivated learners to interact in order to produce new innovative ideas. When it came to understanding XML ideas, learners drew on their existing knowledge of a variety of disciplines (including Web Technology basics and HTML). Last but not least, feedback was collected using Google forms.

It is critical to begin the session with a strong motivation for the topic, which will ensure that learners are paying attention. According to my observer, the lecture's clear and logical flow is easy to understand and maintains the viewers interest in seeing how things will unfold in the next few minutes. Furthermore, in order to present appealing material, the session's clarity and structure are essential; this was noted by my observer, who expressed appreciation for my efforts: 'The clarity of the speech was superb, and the slides were clear.' Bloom's Taxonomy (Sosniak, 1994) is an effective technique amongst various educational courses for solving real-life problems and developing key skills. It provides effective teaching approaches to solving problems with innovation in science and engineering disciplines, and it is widely used in business and industry (Pappas, 2002; Hager et al., 1994). It is interesting to see Bloom's Taxonomy being successfully used in the teaching of sustainability (Pappas et al., 2013).

As a result, although sustainability is a separate field, the same teaching method was adopted. It has been discovered that the updated Bloom's Taxonomy was applied in music education by Hanna (2010), who demonstrated that it encourages inventive thinking to enhance cognitive learning, which has a favourable influence on learning music education. As a result, a session was created in which multiple Bloom's taxonomy levels were applied to describe the utilisation of diverse resources to generate new ideas in an XML-based project, as seen in Table 7.

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*Table 7. Application of Bloom's levels to describe the use of various resources to create innovative ideas in XML-based project after teaching observations by tutor, senior colleague and peers*

| Bloom's Level     | Resource  | Component   |
|-------------------|---|---|
| <b>Remember</b>   | Mentimeter Quiz   | <b>Recall</b> the basic concepts of XML, XSLT.<br><b>Recognize</b> the rules of CSS.  |
| <b>Understand</b> | <ul style="list-style-type: none"> <li>• Case Study</li> <li>• Video</li> </ul> | <b>Discuss</b> the XML based projects.<br><b>Explain</b> XML based projects with a case study.  |
| <b>Apply</b>      | Presentation on real world problems (Annotated Exemplar)                        | <b>Demonstrate</b> the use of XML, XSLT and CSS for the development of famous software engineering projects.<br><b>Illustrate</b> the application of XML, XSLT and CSS on real world problems based projects.       |
| <b>Analyse</b>    | Think Pair and Share (Team based activity)                                      | <b>Analyze</b> the features of XML based Projects<br><b>Classify</b> the web services provided in these projects.   |
| <b>Evaluate</b>   | Think Pair and Share (Team based activity)                                      | <b>Compare</b> different XML based Projects based on latest development tools & techniques, certification and quality standards.<br><b>Choose</b> the best XML project based on quality standard and certification. |
| <b>Create</b>     | Ideation  | <b>Generate</b> new ideas for future XML based Projects.<br><b>Develop</b> problem solving and logical thinking skills.   |

As a result of the COVID-19 epidemic, it has become difficult to teach a complete module online to a large number of learners (Singhal et al., 2020). Unfortunately, online education has devolved into a passive mode of information transfer, with involvement and discussion confined to a few select participants (Sonia, 2017). When there is no real teaching environment present, it is difficult to hold a learner's attention during a lesson. It is necessary to use a variety of materials to increase learner involvement, but it is difficult to manage these resources while teaching online. As a result, a lecture was created based on Bloom's Taxonomy to ensure that resources were used efficiently; the comments from my observers reflected this. The input from the observer revealed that there is a need to adequately explain how each lecture design level is connected to Bloom's taxonomy. Another observer pointed out that teaching and scholarly technique was not used to demonstrate evidence results from other people's work, which was something that needs to be done. Given the limited time available for the first presentation, several primary sources were referenced and presented a teaching style that utilised a variety of resources to help the learners understand the content. Fortunately, teaching observations provided with a wonderful opportunity to discuss the interaction with literature from other fields and to explain the thorough teaching methods using a case-study scenario, all while commenting on a number of different findings. Consequently, the necessary explanation (Table 7) for each level of Bloom's taxonomy was revised.

One observer and tutor both commented that employing all of Bloom's taxonomy levels in a single session is a difficult undertaking to accomplish. However, this method was used for teaching practise to more efficiently arrange all of the resources. Mayhew (2019) discovered that a brief quiz may be used to kick-start the session and engage learners' existing knowledge. This method has been successfully tested in the Political Science field, resulting in improved teaching and learning outcomes. As a result, the lesson was started with a Mentimeter quiz to ensure that learners can retain and recognise the XML principles (Remember). The usage of H5P in the future, according to one of the observers, should include interactive questions to increase learner involvement while teaching in an asynchronous mode. In general, the concepts were conveyed verbally and merely highlighted the most important ele-

ments on the slides. According to one of the observers, animation should be used to show bullet points in the PowerPoint presentation, which would make the presentation more dynamic and assist learners in focussing on the specific issue being discussed at any given time. To raise attention using advanced technology, the image(s) or animation will be utilized to elaborate essential topics in future sessions, as Holzl (1997) noted in his research “twelve suggestions for effective presentations” to increase attention using advanced technology.

A study conducted by Hobgood et al. (2010) discovered that educating nursing and medical learners through real-life case studies can boost learners’ learning while also encouraging collaboration. In another study, researchers discovered that video-based education is a valuable teaching tool for better analysis, and they used World War II footage to teach history (Yousef et al., 2014). A short movie was played and discussed as case study to teach the XML, XSL, and CSS ideas, which was quite effective (Understand). Annotated exemplars are another active learning technique that may be used to get a true sense of what is being taught. Based on the findings, it appears to boost nursing learners’ academic performance while also explaining the ideas through the use of real-life scenarios (Carter et al., 2019). As a result, two annotated exemplars (XML-based web services for software businesses) were used to demonstrate how XML is being used to solve real-world issues in practise (Apply). Using efficient teaching and evaluation methodologies, Junco (2012) discovered that naive learners might learn fundamental collaborative abilities that could be transferred to software experts working for international corporations such as Facebook or Google. Another research of healthcare workers discovered that learners lacked cooperation skills from the perspective of their employers, and it indicated that group-based learning activities such as “think-pair-share” activities might help learners enhance their teamwork abilities (Fox et al., 2018). Using creative problem solving and mathematical reasoning, Kashefi et al. (2012) discovered that cooperation is a key skill for multivariable calculus learning. To enhance active learning, the technique “Think-pair-and-share”, was included which divided the large group into smaller groups for improved interaction. Then a variety of scenario-based assignments were designed and asked learners to assess the qualities of software businesses and categorise them depending on the services they provide (Analyze).

In the online session, the Bloom’s Taxonomy’s evaluation level was not described in detail, which was reviewed with tutor and colleague in order to fix. In order to make selections about the finest XML project, learners should consider quality standards and certifications, among other factors (Evaluate). According to (Hoegl & Parboteeah, 2007), teamwork-based learning may assist learners in instilling team spirit while also motivating them to think rationally in order to generate new ideas. Learners develop their creative abilities in order to handle software projects at this level (Create). Finally, problems were solved and teaching practises evaluated with some recommendations and feedback from learners provided using Google forms. Much of the feedback received was positive, which demonstrates that acquiring software skills through cooperation and the use of Bloom’s Taxonomy is effective. When identifying the challenges, tutor pointed out one error in using the erroneous word “Teamwork Willingness”, when actually the phrase “how to instil team spirit among participants” (which was mentioned as one of the external obstacles) would have been more appropriate.

## **PRELIMINARY RESULTS: DATA ANALYSIS AND FINDINGS**

In this section, some conclusions and findings are highlighted in the form of formative assessments and feedback.

## Formative Assessments

For formative assessments, a Mentimeter quiz was used during online session and every quiz contains five MCQs or T/F questions. The main aim of the quizzes was to check learners' prior knowledge and review learners' understanding. There were 250 learners studying *Semi-Structured Data and Advanced Data Modelling* for the year 2021-2022 at QMUL. Figure 3 shows the Mentimeter based weekly online quizzes (MCQs and T/F) during online sessions (Formative assessment). Figure 3 shows that 205 learners out of 250 have participated in the Mentimeter quiz in the first week's online session, which clearly shows that using web-based tools increase learner engagement during online learning. It is noted, however, that the number of participants decreased with time for some weeks, which could be due to learners maybe being busy with assignments and coursework for other modules.

Figure 3. Mentimeter Based Weekly online quizzes (MCQs and T/F) during online session (Formative)

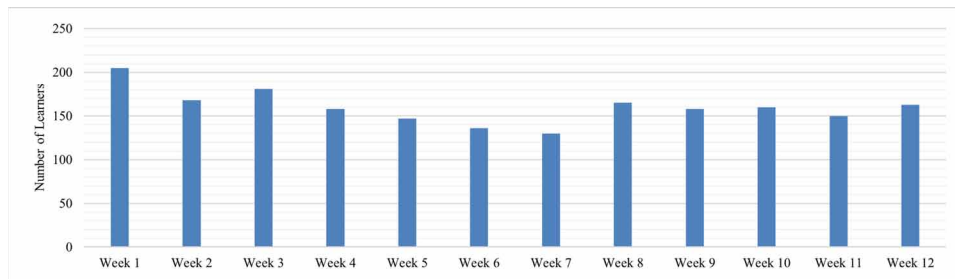
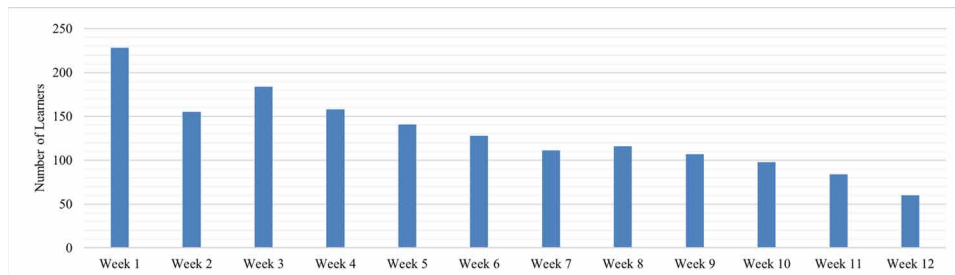


Figure 4 shows the H5P-based videos interaction before online session which learners need to watch to understand the basics of particular topic which will be covered in the online session. H5P-based videos also activates the prior knowledge about the topic which could be tested with Mentimeter based online quiz.

Figure 4. H5P-based videos interaction before online session (Formative)



## Feedback

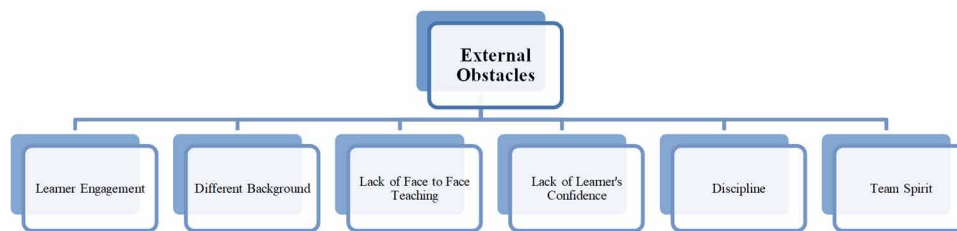
The feedback of students was quite positive and students are happy with the teaching arrangement and organization of the module. It clearly shows that students found teaching material very useful for their career. Further, students feedback clearly shows that the teaching arrangements, delivery of module and teaching practices has been improved after reflecting on teaching observations. Furthermore, students found this module is well organized and interactive labs with different practical tasks and lecturers with Mentimeter quizzes.

The above-discussed feedback and formative assessments is clearly showing that the changes made after teaching observations were successful both in terms of student engagement and teaching practices.

## RECOMMENDATIONS FOR FUTURE TRANSNATIONAL HIGHER EDUCATION

The development of this action plan occurred in response to a variety of new ideas which were learned from this module of PGCAP and a variety of sources which will assist in future academic practises (Gill et al., 2022b). The proposed teaching practice can be applied to TNE, which would be more useful for various universities around the globe. Finally, a number of external impediments have been identified when this will be implemented to TNE using online teaching (Figure 5).

*Figure 5. External obstacles for delivering transnational higher education using online teaching*



All of the observers shared a variety of beneficial ideas for keeping learners' attention while participating in online education, which could be useful for offering TNE. Furthermore, it is important to present and explain a certain topic to learners. It is critical to their interest and active involvement, especially for those who are attending these online sessions from different countries and geographical locations. As seen by the observer's response, illustrating the topic using real-life examples and relevant case studies can aid learners in comprehending the subject clearly and effectively. A small number of MSc learners come from a variety of BSc backgrounds (such as computer technology or electrical engineering), and hence require additional encouragement to work in a group to enable TNE. Demonstrations of similar historical projects can assist learners in forming a suitable team and learning the skills, technology, and tools necessary to execute the group project successfully while working from different geographical locations. Additionally, it is critical to connect with learners on a frequent basis in order to grasp their point of view when working in a group and sustaining their confidence.

## **Reflection on Teaching Observation for Computer Science and Engineering to Design Effective Teaching**

Furthermore, active involvement with learners aids is key to the identification of learners who lack team spirit and who are less likely to participate in group-based activities. It is critical to monitor the progress of the learners working in a group to complete the assignment. It is also necessary to conduct constant evaluations in order to verify that all learners from different geographical locations in the group are fully engaged in the completion of their project to measure the success related of TNE.

It can be difficult to overcome external hurdles at times, but creativity and practise can assist in overcoming these difficulties for TNE. There is a need for active participation in various peer observation programmes in order to develop teaching and increase learner involvement in the classroom during online teaching to implement TNE into practice. The small focus groups from various locations/countries can be selected to receive more thorough input on these particular internal and external difficulties, which can help to evaluate the revised teaching practises for TNE in terms of learner engagement and active involvement.

## **CONCLUSION**

This chapter has reflected on the use of teaching observation and reflection in the developing for lectures teaching Semi-Structured Data and Advanced Data Modelling to MSc and BSc Computer Science programmes at Queen Mary University of London. By implementing various pieces of feedback collected from observations from tutors, senior colleague and peers of session taught online, a framework has been developed and evaluated using student feedback and data from formative assessments and VLE analytics. This chapter has aimed to apply this framework to challenges that persist to success delivery of transitional higher education and it is our assertion that this methodology provides a roadmap to improving the experience of both students and educators in this increasingly important mode of delivery.

## **ACKNOWLEDGMENT**

We are thankful to faculty members and colleagues who have given their valuable comments to improve the quality of this work. We declare that this work has been submitted as an **Assignment for Learning and Teaching in the Discipline module** in partial fulfilment of the requirements for the award of the degree of **Postgraduate Certificate Academic Practice (PGCAP) – UK Teaching Qualification** submitted in **QM Academy** of Queen Mary University of London, UK is an authentic record of research work carried out by **Sukhpal Singh Gill (First Author)** under the supervision of **Danielle Thibodeau (Second Author)** and refers other researcher's work which is duly listed in the reference section. This **Assignment** has been checked using Turnitin at Queen Mary University of London, UK and the submitted assignment has been stored in the repository for university record.

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### **KEY TERMS AND DEFINITIONS**

**Learner:** This word is used interchangeably with “learner” and “participant”.

**Transnational Higher Education (TNE):** Teaching in a country other than the one in which the granting institution has its headquarters is known as TNE.

**Think-Pair-Share:** Learners work together to solve an issue or answer a question on a text they've been assigned.

**Formative Assessment:** Monitor learner learning to offer feedback that may be utilized by instructors to enhance their instruction as well as the learner's learning, the purpose of formative assessment.

**QMPLUS:** It is the online learning environment (OLE) used across the university (Queen Mary University of London) and is based on Moodle.

**Educator Observation:** It refers to the act of observing, learning from, and reflecting on a lesson being taught by another educator.