Is reflective practice a threshold concept in Work-Based Learning?

Mary Hanson

Institute of Science and the Environment, University of Worcester, Henwick Grove, Worcester, WR26AJ.

Abstract

Reflection on experience is often considered central to learning progress in work-based learning environments. In a biological science work experience module a bimodal grade distribution suggested the performance of some students is restricted and feedback indicated reflective practice could be a threshold concept. Here, anticipated threshold concepts in this subject were examined using a questionnaire to gain the perspectives of the students and educators with the responses examined for emergent and preset themes. The nature of reflection was further examined in student journals to determine whether reflective practice fulfils the criteria of a threshold concept. The questionnaires revealed a disparity between student and staff expectations of learning on work placements and also demonstrated the limiting nature of reflection for some. The journals displayed a range of reflective depth, with exerts demonstrating that reflection can fit criteria of a threshold concept. Additionally, it was identified that students may also assess their professional experiences emotionally rather than reflectively yet still be satisfied with their learning on placement.

Introduction

Threshold concepts within education are considered as concepts beyond which the student cannot progress without understanding. There is currently no defined method for identifying what forms a threshold concept (Tight, 2014; Rowbottom, 2007) and the majority of attempts to provide definition have been within subjects such as science, mathematics and engineering (Stamboulis et al. 2012, Quinlan et al 2013; Psycharis, 2016).

Within a healthcare setting, threshold concepts have been assessed in the context of work-based learning (WBL) and it is within the disciplines of health and education that most WBL occurs. There is little research on WBL in other disciplines at undergraduate level. Here, in a work experience module in Biological Sciences, it has been observed that grades obtained by undergraduate students appear to follow a bimodal distribution, with the highest frequency of results being A and B grades or D grades and fails. There may be several reasons for this, such as student engagement and reasons for module selection, however from class observations it appears that students who perform well are those who demonstrate reflective practice.

It has been reported that science and mathematics students are less likely to have had previous exposure to reflective practice than social sciences and humanities students which has implications for students undertaking WBL in these fields. The level at which they may be able to translate experience into future workplace practice will depend on their ability to convert theory into practice and identify their own learning within that. Given that students from all disciplines have reported some difficulties when learning about reflective practice for the first time, the question can be whether reflective practice is a threshold concept for WBL? Key literature underpinning threshold concepts are the works of Meyer and Land (2003, 2005; 2006) and a threshold concept is widely perceived to be a concept beyond which students cannot advance. It is often cited as a case of transformative knowledge, which may be troublesome to acquire (Meyer and Land, 2006). There are issues with the definition of what forms a threshold concept (Tight, 2014; Rowbottom, 2007), largely due to a lack of empirical data with which to provide definition or measure attainment. Meyer and Land (2006) characterise a threshold concept as transformative, irreversible, integrative, as well as being possibly bounded and troublesome.

There is the concern that key/core concepts of a programme of learning could be mistaken for threshold concepts (Davies, 2012 as cited in Meyer 2016) and much discussion has revolved about how to define threshold concepts. There is a substantial role of language and terminology in providing definition and it has been demonstrated that humanities concepts, such as signification, can be useful tools to define threshold concepts in sciences (Green et al. 2017). It is likely that the importance of language will be even more significant when encouraging students to adopt responsibility for their own experiential learning, especially in students to whom reflection does not come naturally, or whose subjects do not normally demand it. Encouraging the students to adopt a reflective/reflexive approach to their own learning has been shown support overcoming threshold concepts (Ward and Meyer, 2010) but the question remains whether reflection is a threshold concept in its own right. Barradell (2013) discussed the opportunities that may exist from engaging the broader community with the definition of threshold concepts; this is particularly relevant to threshold concepts in work-based learning, although it is expected that there would remain a presumption towards subject specific matters rather than the nature of learning itself, as indeed was apparent in Hodge et al's (2016) consideration of a threshold concept approach to vocational training.

In this WBL module the reflective elements of assessment have an 80% weighing (20% for a reflective diary and 60% for a reflective presentation). Current grade descriptors allow sufficient marks to obtain a passing grade (D-) without clear evidence of reflection, while higher grades are achieved through varying degrees of demonstration and evaluation of reflective practice. Several different models of reflection are covered during formal teaching sessions to provide students with the tools to evaluate their experiences, such as the models of Gibbs (1988), Driscoll (1994) and Atkins and Murphy (1993).

The students' conversion of this reflective knowledge into reflective practice is the target of module assessment however, as highlighted in Griggs et al (2016), there is little empirical evidence within the literature to evaluate this conversion of knowledge into practice. In their study, Griggs et al (2016) found that some students struggled with reflection as it was a new concept to them and while generally there was not a conversion from reflective knowledge to practice, there was evidence of some reflexivity and a degree of simple reflection. Relevant to work based learning, it has been shown that students will place professional practice above their own opinions (Whitaker and Reimer, 2017). This could provide a hurdle to becoming a reflexive practitioner as, although it provides a different context to an experience, the student may not evaluate the context fully by accepting the professional practice without considering the wider situation and their place in it. Despite this, it has been shown that students will preferentially choose reflexive assignments over reflective (Hibbert and Cuncliffe, 2015), suggesting that once reflection is learnt it can be developed upon with students favouring to progress their skills.

Here, all core concepts covered in a WBL module were approached equally and identification of threshold concepts performed from within them as well as from an interpretive perspective of the overall experience. The aim of this project was to investigate anticipated threshold concepts in WBL in biological sciences and determine whether reflective practice fulfils the criteria of a threshold concept as defined by Meyer and Land (2006). To achieve this student and staff expectations of WBL were compared and findings were drawn from reflective pieces of student work.

Methods

Participants

Students were recruited from a level 5 and 6 'Work experience in Biological Sciences' module undertaken as part of several BSc. degrees within a Science and Environment department. Out of 20 students, ten agreed to participate (50.0%). Staff members with tutor responsibilities for these students were also recruited with eight agreeing to participate out of 21 (38.1%).

Anticipated threshold concepts

Staff were posed an anonymous online questionnaire that inquired about expectations of student learning from a workplace environment and whether threshold concepts could be identified from within the course content. The core concepts covered in the module include goal setting and action planning, learning styles and reflection. The value of reflection as a measure of student performance/learning was also queried. Similar questions were put to students to establish student expectations of their learning on placement and engagement with the assessment rubrics (Tables 2 and 3). The questionnaires were designed to show how students perceive reflection in their WBL.

Table 1. Questions posed to staff in an anonymous questionnaire regarding their expectations of student learning in a work experience module

Question	
1	What do you expect students to gain from a work experience placement in a biological discipline?
2	How would you expect students to evidence their learning during work-based learning?
3	What part of this module would you find most challenging?
4	Do you think there are any difficult concepts (troublesome knowledge) that the students face within the area of work-based learning?
5	What concepts do you think are easy for students within the area of placement-based learning?
6	If you were a student, what methods would you use to evaluate your learning on your placement (not including grades obtained for the module)?

Table 2. Questions posed to previous students in an anonymous questionnaire regarding their expectations of student learning in a work experience module

Question	
1	What did you expect to gain from the work experience module?
2	How did you evaluate your learning during your placement (not including grades for the module)?
3	What key concepts covered within the module did you find most challenging/troublesome?
4	What key concepts covered within the module did you find easiest?
5	What was most important to you about your work experience and overall module?
6	What was least important to you about your work experience and overall module?
7	How did you overcome challenging parts of the module?

Table 3. Questions posed to current students in an anonymous questionnaire regarding their expectations of student learning in a work experience module

Question	

1	What do you expect to gain from the work experience module?	
2	How will you evaluate your learning during your placement (not including grades for the module)?	
3	What key concepts covered within the module do you find most challenging/troublesome?	
4	What key concepts covered within the module do you find easiest?	
5	What is most important to you about your work experience and overall module?	
6	What is least important to you about your work experience and overall module?	
	How do you expect to overcome challenging parts of the module?	
	Have you used the reflective handbook and, if so, did you find it useful to your learning?	
	What did you find most useful about it?	
	Which of the following best describes your understanding of reflection? a) I know about reflective practice b) I comprehend what reflective practice is c) I can apply reflective practice to my studies d) I can analyse my reflective practice in context of my learning e) I can critique my own use of reflection and the overall theory behind reflective practice f) I can develop my own reflective practice and construct what I believe is the best system of reflection, based on the theories of others and my own ideas.	

Reflection as a threshold concept

A reflective journal forms part of the assessment for the Work Experience in Biological Sciences module. Insights were gathered from these to determine whether reflective practice can be considered a threshold concept in WBL. Where students had reflected on either critical incidents or the overall experience, statements were examined for positive or negative relationships with the following threshold criteria as defined by Meyer and Land (2006); transformative, irreversible, integrative, bounded and troublesome.

Data analysis

All participants were provided an information sheet detailing the purpose of the study and the data to be gathered and all gave consent to be enrolled in the study. Data was analysed by a mixed-methods approach. Due to the specific nature of the investigation within a designated group of students, a framework analysis approach was applied to qualitative data with embedded quantitative analysis. The first steps in coding/indexing themes investigated preset categories from both closed and open-ended questions. The closed questions asked participants to rank responses in order of preference and open-ended questions were analysed for preset and emergent categories. As part of the analysis structure, the data gathered from the staff questionnaire was analysed first to establish important themes. Subsequently, student responses were investigated prior to an examination of their work; this was to ensure that *what students think* was assessed before considering *what students do*.

Initially the three themes that emerged from the preset and emergent analysis were triangulated and presented graphically, with each vertex representing one theme. The participant numbers where then grouped at the vertex containing the most appropriate theme for their response. Further analysis resulted in this visualisation being amended to incorporate two additional themes – thus forming a pentagon. Participant numbers were again recorded at the relevant vertex.

Evaluation

Anticipated threshold concepts

Preset themes identified were based on reflective practice as a threshold concept and other key areas of WBL. Academic staff ranked how they expected students to evidence their learning across three areas; meeting workplace competencies, completing learning agreement tasks and reflecting, the responses showed that most staff ranked completing tasks as the main way they would expect students to evidence learning, followed by meeting competencies and reflection. From a further three themes (goal-setting, action planning and reflection) 75% of staff believed reflection was the topic that students would find most difficult in this WBL module however, when asked to rank four areas that they thought posed the main challenges for students, the results showed that finding a placement was considered more difficult for students than evaluating their learning or applying theories covered in lectures. Most staff believed that completing 80 hours on placement would be the least challenging of these four areas. The majority of staff believed students would base their performance on the grades they achieved while 'reflecting on their experience' and 'the amount of new skills they gained' were equal second. Several participants thought that students would base their performance on how well they got on with their colleagues and no participants thought that the students wouldn't evaluate their learning in some way.

Open ended questions about staff expectations of student learning and potential threshold concepts in the module revealed nine key themes of importance which were further refined into three distinct categories (table 4) based on skills, practicalities and consideration. Most staff thought that students would develop skills and gain real-world experience from their placements. Only two members of staff identified areas where students would consider themselves in the workplace as expected outcomes of a placement.

Table 4. Preset and Emergent themes identified

Skill	Considerative	Practical
developing new skills	Reflection	real-world experience
interpersonal skills	evaluating performance	applying theoretical knowledge
cv development	Planning	evidence-based learning

Responsibility was one theme that was not easy to categorise within the three main areas, it would appear to bridge the skill and considerative categories because it could be perceived as an interpersonal skill or a skill that requires consideration of ones' own actions within the workplace. Participant 4 included responsibility alongside interpersonal skills, while Participant 8 combined it with obtaining confidence and clearly distinguished it from gaining study related skills (figure 1).
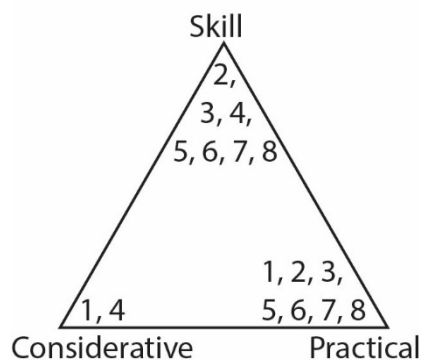
Figure 1. Staff participant categorisation in response to "What do you expect students to gain from a work experience placement in a biological discipline?" (Numbers represent participants)

Most staff placed considerative concepts as the most likely to form thresholds to student-learning in this module (figure 2). One participant thought areas from all themes could be threshold concepts while two members of staff did not identify any areas from these themes. Beyond the confines of these themes Participant 4 thought that some students would struggle to understand the responsibility they would have both in the workplace and as a representative of the university, while engagement with the module was highlighted by Participant 2 as a potential threshold.
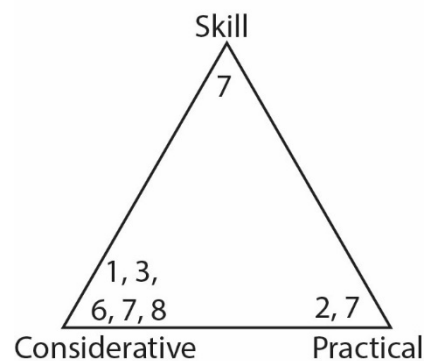
Skill

7

1, 3,
6, 7, 8   2, 7
Considerative   Practical

Figure 2. Staff participant categorisation in response to "Do you think there are any threshold concepts that students have to comprehend in order to maximise their learning from this module, if so, what?" (Numbers represent participants)

A questionnaire with a similar structure was put to previous students, with two respondents. Both students identified practicality based concepts as what they expected to gain from their placements, but in response to what was most important to them about their placements they expanded their answers to include skills such as communication. One student highlighted areas from all three of the key themes. Interestingly one student felt reflection was the most challenging part of the module while the other found it the easiest. Both students obtained good grades in the two reflective assessment components of the module (A+ and A- for their reflective journals; B- and A+ for their presentations) and achieved an A+ and a B as their overall module grades, so the student who experienced difficulty with reflection was clearly able to overcome this for assessment purposes.

When current students were asked what they expected to gain as an open-ended question, their responses fell into the same themes as the staff expectations (figure 3). However, students placed much less emphasis on expecting to develop skills while on placement than staff did and were also more likely to have outcomes within one key theme rather than across several.
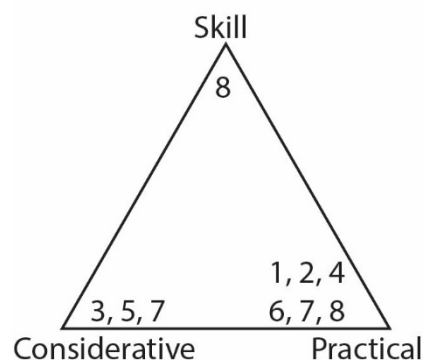
Skill

8

                    1, 2, 4
3, 5, 7   6, 7, 8
Considerative   Practical

Figure 3. Student participant categorisation in response to "What do you expect to gain from the work experience module?" (Numbers represent participants)

When questioned about how they would evaluate their learning on placement (except for by grades) the students' answers also fell largely within the same themes (figure 4). One student did not respond to this question and another specified the module tutor thus invalidating their answer. Another answered '*Am I better off than I was before the placement*' which could be interpreted in different ways. A follow-up question would have been useful here to explore the depth behind this answer. Student 3 also identified confidence as a measure of evaluating their learning; this had also been identified by one of the staff participants as something they would expect students to gain from their placement. The categorisation of confidence could be debated within the themes identified here – is it a skill or would it warrant a separate category, perhaps behavioural? Further to this, examining the student responses highlighted an important aspect which had not been apparent from staff expectations of the module. When asked 'What is most important to you about your work experience and overall module?' several students provided responses based on emotion, for example '*To enjoy it*' and '*….Learning something new and worthwhile*'. An emotional categorisation had not been included in the analysis prior to this, so the triangulation of skill-based, considerative and practicality-based themes was amended to encompass emotional and behavioural categories as well (figure 5).
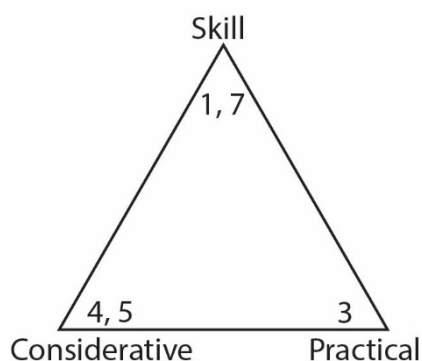

Figure 4. Student participant categorisation in response to "How will you evaluate your learning during your placement (not including grades for the module)?" (Numbers represent participants)
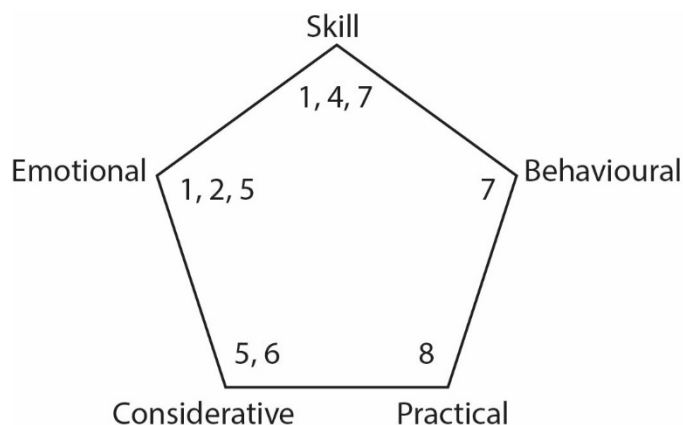

Figure 5. Student participant categorisation in response to "What is most important to you about your work experience and overall module?" (Numbers represent participants)

When students were asked about what areas they found most and least challenging concepts, reflection scored highest in for both questions suggesting that there is a clear discrepancy within the student group. When asked to rate their understanding of reflection, with A demonstrating the least understanding and F representing the highest reflective ability, in a question structured around Blooms taxonomy (Bloom 1956), five students rated themselves as displaying the higher cognitive levels.

Reflection as a threshold concept
The most insightful material for reflective learning as a threshold concept was provided by student journals. Referring back to the five characteristics of a threshold concept (Meyer and Land 2006), reflective practice during work experience can be considered to be **transformative** and potentially **irreversible**;

 "this reflective diary has helped me to reflect about what I have learnt during the work placement, not only about...how to work in a laboratory, but also about how I learnt and how I assimilate the new knowledge...I conclude I learnt more about experience than from lectures or exams, as after the exams I forgot everything I had studied but now I think I will remember what I have done in this work placement for the next years [sic]" (Student A)

It can also be **integrative**, allowing consideration of previously unseen relationships;

"Throughout my placement, I noticed many times that my academic knowledge was inadequate for the knowledge that I required in my work placement... I was able to quickly discover what I didn't know and could therefore specifically target my learning in order to develop as much knowledge as I could in the time I had..... This enabled me to spend time discussing with staff with different areas of expertise and learn as much as possible from them before applying it to the next appropriate situation" (Student B)

It can also be **bounded**. Students who obtained lower grades for their reflective diaries demonstrated little or basic reflective practice and showed evidence in their writing that they considered priorities within the practicality and skill-based themes;

"I found my placement very useful. I met all of my goals from my action plan and learnt a lot" (Student C)

"This experience had given me a good insight into the industry" (Student C)

"I think it was absolutely a good experience gave [sic] me lots of new real world skills actually relevant to the kind of work I'd like to do" (Student D)

And it can also be identified as **troublesome**, with three out of eight students identifying it as the most troublesome/challenging aspect of the module and three students rating themselves against the lower cognitive levels of Blooms taxonomy.

Conclusions

Anticipated threshold concepts
A clear distinction between student and staff expectations of WBL outcomes was observed, with students prioritising a broader range of outcomes. Visualisation of the theme of each participant response geometrically (triangles and pentagon) provided a quick comparison between staff and student expectations of their experiences. Staff responses clearly indicated that they expected students to gains skills and practical experience with 'consideration of their experiences' a possible threshold, while students valued practical experience most highly and introduced emotional outcomes. The open-questions gave a greater insight into troublesome areas and the student work itself (particularly the reflective journals) gave the greatest indication of transformation of knowledge through reflection. Students' engagement with reflective practice varies

when they enter the module so capturing their reflective ability before, during and after work placement would allow any changes in reflective practice to be observed.

Students expressed importance of emotional and behavioural themes in their expectations from their placement while staff did not; this may demonstrate disparity that can exist within the student, workplace and staff relationship. The staff were not asked what they considered most important for student learning, which was the question that prompted the most emotional responses from students. Instead they were asked what they expected students to gain from their placements. This could have contributed to the disparity and would need further evaluation. When students are looking for a placement they often have criteria to which the placement must conform; Nutrition students often value what they perceive as the ethical status of a company while Biology students may value being able to work in a laboratory. These are generally reasonable assumptions from the students, as their reasoning suggests these are the areas they want to seek future employment in, however these pre-conceptions can be a source of conflict when the student does not experience what they envisaged. In these scenarios, having reflective ability, whether innate or taught, prompts the student to question their preconceived ideas about their career prospects. This could be considered one of the most valuable contributions of WBL placements to student learning. Previous students have expressed deep gratitude at having the opportunity to experience what they thought would their dream career only to find that it wasn't what they expected.

Including both academic staff and students in this study gave more scope for analysis of responses from the position of the educators and students. It may have been advantageous to quantitatively analyse the questionnaire data to provide statistical value to the identification of threshold concepts, however the sample sizes were not sufficient to determine significance. This lack of empirical evidence is intrinsic to threshold concept identification. Tight (2014) provides discussion on two relevant questions, that is the issues of definition and the question of where it will lead too in the future. He concludes that threshold concepts are a useful theory within higher education but its success will depend on how well it sits with other frameworks or in comparison against them. The lack of a structured definition to threshold concepts was tackled by Rowbottom (2007) who strongly argued that there is little means to identify what forms a threshold concept and no measure of their effectiveness. While the theory of threshold concepts can be interpreted across the disciplines, empirical evidence would a useful adjunct to evaluate the effectiveness of the theory.

Reflection as a threshold concept

From this study it has become apparent that reflective practice may be considered as a threshold concept for work-based learning, although students may assess their experience on work placement emotionally rather than reflectively and still be satisfied with their learning. In WBL in biological sciences considering reflective practice as a threshold concept is a useful as an adjunct to curriculum design. It highlights that the student majority could face this threshold within their professional experiences and this can then be addressed in the learning and teaching strategy to support their development as reflective practitioners. If threshold concepts must be capable of transforming; 1) our understanding of knowledge and 2) how knowledge influences our perception of context, then in order to identify what forms a threshold concept, reflection on the subject and consideration of the reflexive praxis is also required. When we provide students with the tools to reflect on their experiences, we encourage the movement from a level of no/little reflection through to critical reflection. There is also the potential for a third consideration; that of both students and staff becoming reflexive practitioners.

Reflexivity has been described by Cunliffe (2016) as;
"Questioning what we, and others, might be taking for granted—what is being said and not said—and examining the impact this has or might have."

Discussions with colleagues raised this concept, and in order for this research to take a reflexive approach we must constantly consider the previously unknown. In their appraisal of threshold concept research methods Quinlan et al. (2013) highlight how it is possible for the researcher to affect the research, and this is also applicable to acting as an educator in WBL. Cunliffe (2016) separates self-reflexivity, which would encompass these considerations, with critical reflexivity which would include consideration of contextual influences, such as organisational policy and societal influences, thus demonstrating the need for consideration of institutions and workplaces as well. In a case study by Collier and Lawless (2016), scholarly engagement with a social capacity building initiative was appraised in a critically reflexive manner. This offers interesting parallels for reflection on the relationships between academics and employment scenarios. The theoretical approaches to critical reflexivity used in the case study, such as; dialogic engagement between parties, and consideration of economic, societal and political contexts could easily be transferable to the workplace. For example, Collier and Lawless (2016) found their critically reflexive dialogues did not alleviate tensions arising from participants with diverse positions. A comparison could be drawn to a scenario whereby the expected relationship between the student, workplace and academics is different between parties, perhaps in relation to learning outcomes, performance/knowledge or task completion and so on. This echoes the importance of engaging the wider (professional) community in the identification of threshold concepts (Barradell, 2013).

Future work shall look to expand on the data collected by providing a more reflexive approach to data collection and analysis. Data could be obtained before, during and after the work placement and assignments with greater consideration given to critical praxis and the role of the researcher. A reflective instrument, such as that of Kember et al (2000) could be used to evaluate students' reflective practice and would be a measure towards addressing concerns regarding the lack of empirical data (Rowbottom, 2007). A wider consideration of the influence of professional practice should also be incorporated into the identification of threshold concepts in this subject.

References

Atkins, S. and Murphy, K., 1993. Reflection: a review of the literature. *Journal of advanced nursing*, *18*(8), pp.1188-1192.

Barradell, S. 2013, "The identification of threshold concepts: A review of theoretical complexities and methodological challenges", *Higher Education,* vol. 65, no. 2, pp. 265-276

Bloom, B. S. (Ed.). Englehart, M. D., Furst, E. J., Hill, W. H., and Krathwohl, D. R. (1956). Taxonomy of educational objectives. Handbook I: Cognitive domain. New York, David McKay.

Collier, M.J. and Lawless, B., 2016. Critically reflexive dialogue and praxis: Academic/practitioner reflections throughout a formative evaluation of Circles® USA. *Journal of Applied Communication Research*, *44*(2), pp.156-173.

Cunliffe, A.L., 2016. Republication of "On Becoming a Critically Reflexive Practitioner". *Journal of management education*, *40* (6), pp.747-768.

Driscoll J. (1994) Reflective practice for practise. *Senior Nurse.* Vol.13 Jan/Feb. 47 -50

Gibbs G (1988) Learning by Doing: *A guide to teaching and learning methods*. Further Education Unit. Oxford Polytechnic: Oxford

Green, D.A., Loertscher, J., Minderhout, V. & Lewis, J.E. 2017, "For want of a better word: unlocking threshold concepts in natural sciences with a key from the humanities?", *Higher Education Research & Development,* vol. 36, no. 7, pp. 1401-1417

Griggs, V., Holden, R., Lawless, A. and Rae, J., 2016. From reflective learning to reflective practice: assessing transfer. *Studies in Higher Education*, pp.1-12.

Hodge, S., Atkins, L. & Simons, M. 2016, "Towards an epistemically neutral curriculum model for vocational education: from competencies to threshold concepts and practices", *International Journal of Training Research,* vol. 14, no. 3, pp. 230-243

Hibbert, P. & Cunliffe, A. 2015, "Responsible Management: Engaging Moral Reflexive Practice Through Threshold Concepts", *Journal of Business Ethics,* vol. 127, no. 1, pp. 177-188.

Kember, D., Leung, D.Y., Jones, A., Loke, A.Y., McKay, J., Sinclair, K., Tse, H., Webb, C., Yuet Wong, F.K., Wong, M. and Yeung, E., 2000. Development of a questionnaire to measure the level of reflective thinking. *Assessment & evaluation in higher education*, *25*(4), pp.381-395.

Meyer, J. and Land, R., 2003. *Threshold concepts and troublesome knowledge: Linkages to ways of thinking and practising within the disciplines* (pp. 412-424). Edinburgh: University of Edinburgh.

Meyer, J.H. and Land, R., 2005. Threshold concepts and troublesome knowledge (2): Epistemological considerations and a conceptual framework for teaching and learning. *Higher education*, *49*(3), pp.373-388.

Meyer, J. and Land, R., 2006. *Overcoming barriers to student understanding: Threshold concepts and troublesome knowledge*. Routledge.

Quinlan, K.M., Male, S., Baillie, C., Stamboulis, A., Fill, J. and Jaffer, Z., 2013. Methodological challenges in researching threshold concepts: A comparative analysis of three projects. *Higher Education*, *66*(5), pp.585-601.

Psycharis, S., 2016. Inquiry based-computational experiment, acquisition of threshold concepts and argumentation in science and mathematics education. *Journal of Educational Technology & Society*, *19*(3), p.282.

Rowbottom, D.P., 2007. Demystifying threshold concepts. *Journal of Philosophy of Education*, *41*(2), pp.263-270.

Stamboulis, A.; Jaffer, Z. and Baillie, C. (2012) 'Uncovering threshold values in first year engineering courses and implications for curriculum design' OER.

Tight, M., 2014. Theory development and application in higher education research: The case of threshold concepts. In *Theory and Method in Higher Education Research II* (pp. 249-267). Emerald Group Publishing Limited.

Ward, S.C. & Meyer, J.H.F. 2010, "Metalearning capacity and threshold concept engagement", *Innovations in Education and Teaching International,* vol. 47, no. 4, pp. 369-378

Whitaker, L. & Reimer, E. 2017, "Students' conceptualisations of critical reflection", *Social Work Education,* vol. 36, no. 8, pp. 946