From theory to practice: what did the students learn in an anatomy pedagogy course?

Joy Y. Balta[1], Gerard W. O'Keeffe[2,3], Briony Supple[3]

[1] Division of Anatomy, Department of Biomedical Education & Anatomy, College of Medicine, The Ohio State University, Columbus, Ohio

[2] Department of Anatomy and Neuroscience & Cork Neuroscience Centre, University College Cork, Cork, Ireland

[3] Centre for the Integration of Research, Teaching and Learning (CIRTL), University College Cork, Cork, Ireland

SUMMARY

There is an increasing interest in understanding the educational background of anatomy teachers arising from the reported shortage of such staff. This has led to the development of several anatomy graduate training programs, which provide courses on theoretical and practical teaching training as part of their curricula, to prepare graduates for a career in anatomy education. A recent study has reported the design of such a course as part of a Master's program in Human Anatomy at University College Cork, Ireland. The aim of this study was to investigate the ability of students who were enrolled in this course, to apply conceptual knowledge of teaching and learning, to the practical design and delivery of anatomy teaching, and what challenges this posed. Consent was obtained from the students to analyze their reflective teaching portfolios. Analysis showed that students varied from those who demonstrated superficial understanding of core concepts in the teaching and learning, to those who were able to adapt and apply these concepts to their teaching. Moreover, they reported that a lack of experience in educational theory, and the brevity of their exposure to it, was a challenge. This highlights that it is important to equip future anatomy teachers with the necessary skills to build their identity as teachers, in parallel to developing their content knowledge. This highlights the need to develop their intrinsic motivational factors that will help them balance the dual identity both as teachers of, and researchers in, the discipline of anatomy.

Key words: Anatomy – Education – Evaluation – Curriculum Design – Identity

INTRODUCTION

The definition of the term "anatomy" is to cut into pieces to display or examine the structure and use of parts. The noun "anatomist" describes a dissector of dead bodies and a person skilled in anatomy (Jones, 1997). Anatomy as a discipline is taught to different cohorts of students ranging from the health and life sciences, through to the arts and humanities. With anatomy being an integral part of several professions, the question of who teaches anatomy is an important one.

Corresponding author:
Dr. Joy Y. Balta. Division of Anatomy, Department of Biomedical Education & Anatomy, College of Medicine, The Ohio State University, Columbus, Ohio. E-mail: Joy.Balta@gmail.com

Submitted: September 5, 2021. **Accepted:** December 12, 2021

https://doi.org/10.52083/LOAJ8673

In this context, there has been significant interest in recent years in the question of who teaches anatomy (Balta et al., 2016). This is an important consideration, given that educators shape the identity of scholars in the field. While once most anatomy educators were medically qualified, a recent study has highlighted the diversity that now exists by reporting that of 125 anatomy teachers in Ireland and the UK, 26.4% had a medical degree, while 25.6% had a PhD in non-anatomical sciences, with 19.2% having a PhD in anatomical sciences (Balta et al., 2016). Furthermore, work in the USA has shown that approximately 60% of anatomists teaching at undergraduate level lack any graduate level experience in neuroanatomy, embryology, and histology, regardless of whether they earned a master's or terminal degree (Schaefer et al., 2019). This highlights the issues arising from the changing landscape following the retirement of classically trained anatomists, and the need for them to be replaced with well-trained early-career anatomists (Schaefer et al., 2019).

Both studies show that arguably the discipline of anatomy lacks scholars trained in anatomy that can teach the varied aspects of the anatomical sciences. This lack of anatomy teachers may have a significant impact on the training of medical doctors and allied health professionals, which needed to be addressed. These shortages of qualified anatomy teachers have led to the development of several graduate education programs in Anatomy. Many of these programs are developed in the United Kingdom (UK) and the United States of America (USA) (Schaefer et al., 2019).

In 2016, the first author was appointed as the program development coordinator of a new taught master's program in human anatomy, which was developed to fulfill the need for anatomy educators with a training in human anatomy and pedagogy. One of the courses that was designed as part of this program was an anatomy pedagogy course, the design of which has previously been reported (Balta et al., in 2019). The goal of the anatomy pedagogy course is to help develop two identities: first, the individual's identity as a practitioner *of* the discipline, and second, as an educator/teacher *within* the discipline (Aydeniz and Hodge, 2011). Despite the dual nature of this professional identity, there is often the assumption that once an individual has the required training in disciplinary knowledge, this is sufficient preparation for them to be effective educators of the discipline. This is coupled with the fact that there is a lack of a formal training of disciplinarians establishing their identity as a teacher. Faculty are often hired on the basis of their research track record, with teaching often being an afterthought; leading to a situation described by Randy Bass, where "*we merely have to pray that this young scholar can teach*" (Bass, 1999). However, with the development of formal anatomy training programs, some anatomy education students are now required to deliver different types of teaching sessions as part of their graduate training program, while others do not face this requirement (Svyantek et al., 2015). Developing an identity as an educator is essential to equip aspiring anatomy teachers with the skills required to optimize student learning later in their career. Furthermore, it is important that students gain practical teaching skills as part of their training, which helps in grounding their practice in theoretical knowledge to allow for a responsive and reflective approach to student learning. However, there is often a gap in this informed practice or *praxis* (Korthagen and Kessels, 1999).

It is naive to simply say that we need to help the students apply the theory into practice, as research has indicated that several factors influence an individual's teaching. While theoretical knowledge could be used to inform conscious teaching, several 'immediate teaching situations' are informed by feelings, former similar experiences, values, needs, routines, and role conceptions (Korthagen and Kessels, 1999). Several distinctions have been made to define knowledge. The two that will be the focus for this paper are knowledge as *phronesis* and knowledge as *episteme*.

Knowledge as episteme consists of a set of assertions that can be investigated, explained, and transmitted; here it is defined as educational theoretical knowledge. Meanwhile, knowledge of phronesis is not abstract or theoretical, it is practical knowledge of concrete particulars; here it is defined as practical teaching knowledge.

While the knowledge as episteme is conceptual, the knowledge as phronesis is perceptual (Kessels and Korthagen, 1996). This is illustrated in Figure 1 below, where knowledge is divided into theoretical and practical elements, with influencing factors playing a role in putting the theoretical knowledge into practice in the teaching of anatomy.

Within this context, helping anatomy trainee teachers develop their identity as educators requires investigating the challenges that they will face in phronesis and episteme. To do this, in this study a Scholarship of Teaching and Learning framework was used to investigate the following three questions by capturing data from this multi-faceted, interdisciplinary, student experience in the anatomy pedagogy course from students who are enrolled in the MSc in Human Anatomy at University College Cork, Ireland.

The three research questions that were investigated are:

1. To what extent did students engage with the material taught in this course by applying the concepts learned about teaching and learning to the discipline of anatomy?
2. To what extent were the students able to use the educational theories learned, on this course, in their teaching practice?
3. What are the challenges that students faced as they engage with Teaching and Learning?

MATERIALS AND METHODS

Anatomy Pedagogy Course

The anatomy pedagogy course is a 5-credit course (towards a total of 60 credits) that is taught over the first 2 semesters of the MSc in Human Anatomy and University College Cork in Ireland. The course is divided into 3 elements which are delivered over the first (September to December) and second semesters (January to April). The first element is faculty-led, where students took 16 h of lectures from September to December on foundational topics in the scholarship of teaching and learning. During the faculty-led sessions, students were introduced to the principles of multiple intelligences (MI), mind mapping, assessment for learning and reflective practice

The second element is student-led and the students are asked to deliver a 50-minute interactive teaching session using an anatomical teaching method of their choice. The third element is practical, and the students shadow an anatomy faculty member in delivering a small-group tutorial in anatomy using cadaveric specimens. Students then deliver one of these small-group

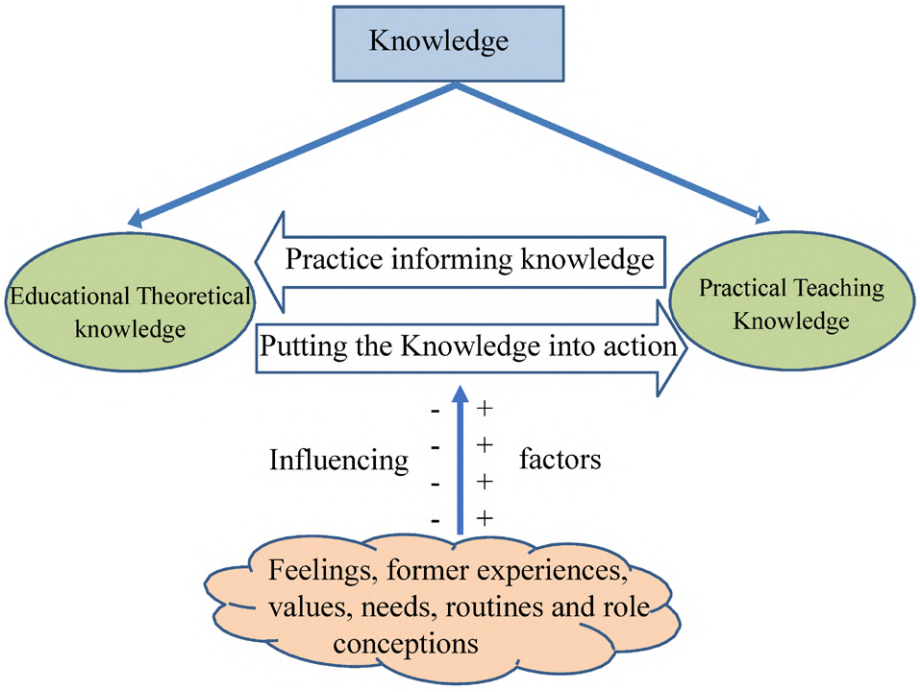

Fig. 1.- The interaction between two different types of knowledge and the influencing factors that affects putting the knowledge into action.

tutorials sessions at a later stage in the course. Students are provided with clear rubrics on how their student-led learning session, teaching portfolio and teaching practice are assessed.

As part of the assessment method on this course, students are required to write a reflective portfolio comprised of four different sections. The first section is a lesson plan that they learned how to prepare in one of the sessions. The second section relates to a teaching or learning incident they experienced, where they were asked to analyze it with reference to the different principles of the Scholarship of Teaching and Learning. Meanwhile, sections three and four are their reflections and analysis of their shadowing and teaching experiences.

Reflective Portfolio

The main aim of this course is to teach the students effective strategies to teach human anatomy. This learning outcome does not fall entirely within the cognitive domain where the students are expected to memorize facts and information. For this reason, reflective portfolios were used to assess two main aspects of learning: 1) whether the students can achieve deeper levels of learning when engaging with a subject (theories of teaching, learning and assessment) which is not directly discipline-specific, and 2) whether students develop their ability to apply the knowledge regarding teaching, learning and assessment, into their practice.

Details pertaining to the portfolio assessment can be seen below:

"Teaching Portfolio: The teaching portfolio will include 4 different parts with total of 30 marks towards the overall course grade. The first part will include the lesson plan for the Student-Led Learning session and is worth 15 pts. The second part will be a 1000-1500 words reflective essay, worth 35 pts. In this section, students will try to identify a clear question of challenge you have found either in your teaching, your students' learning or your own learning. Discuss it in the light of one or more theories which you have encountered over the course. The third and fourth sections are short essays reflecting upon the shadowing and teaching experience, each contributing 25 pts. to the overall mark."

To address the research questions, data were collected from the reflective portfolios of six students who were registered on the MSc in Human Anatomy during the academic year 2017/2018. Ethical approval was granted by the Social Research Ethics Committee of the University on the 20th of November 2018.

Thematic Analysis

To analyze the reflective portfolios, a thematic analysis approach was used to review the data to allow for flexibility in data interpretation. Each portfolio was read multiple times by the primary investigator to search for different viewpoints in the data. Multiple readings included searching for the student experience and how the students demonstrated their understanding of learning theories evidenced using relevant terminology.

A Likert scale was developed to rank the extent to which the students' portfolios reflected the learning theories, with 0= not at all, 1= to a small extent, 2= to some extent, 3= to a moderate extent, 4= to a great extent and 5= to a very great extent. This scale was used to assess the following statements:

- Demonstrated knowledge of teaching and learning theories
- Demonstrated knowledge of teaching and learning terminology
- Was able to use teaching and learning terminology effectively
- Was able to analyze learning experiences using teaching and learning principles
- Was able to use knowledge learned to access literature
- Was able to use knowledge learned to improve on teaching
- Demonstrated passion for teaching

RESULTS

Data Analysis

After reviewing the portfolios several times, some clear observations were made. One of the observations was that there was a wide spectrum in understanding and engaging with the teaching and learning terminology and literature. Below are the different theories that were discussed by students that appeared in their portfolios.

Multiple Intelligences (MI): All 6 students mentioned

MI theory. However, the portfolios could be divided into 3 distinct groups with 2 students in each group who demonstrated a different level of understanding of this theory. For the purpose of analysis, these three groups will be discussed individually.

Group 1 did not name the theory, but they described some of the intelligences in an ambiguous way. One of these two students describes the kinesthetic and the visual intelligences as can be seen in the following comments.

"When the tangible objects were used in the bodily-kinesthetic teaching method, the approach was successful in teaching the subject to the kids."

"So, the real challenge was how to take the control over my mood during learning, I tried to apply the visual-spatial learning style"

Meanwhile, group 2 named the theory and referred to it in their reflections.

"Therefore, as a teacher or lecturer, it is vital to understand the multiple intelligence theory and implement it and utilize it in the classroom."

"From a multiple intelligence point of view, allowing the students to view these video clips, guaranteed that kinesthetic and visual learners got the opportunity to achieve the best education possible on the region of interest."

Group 3 named the MI theory, referred to it in their reflection and were also able to relate it to the discipline. We evidence this by showing in Table 1 part of one of the students' lesson plan that demonstrates an in-depth understanding of the MI theory.

Table 1. Part of a student lesson plan demonstrating an in depth understanding of the MI theory by a student in group 3.

Content	Methodology
Development 4: Nature& Activity **13 minutes**	• I will explain what is meant by Nature in MI. • I will offer an image of the trees and ask the class how this could be used in an anatomy lesson. • I will then show the image that links trees to the lungs and further discuss this. • I will ask somebody to read out extract about lungs/nature. • I will draw an image on the whiteboard like the one in the workbook and ask the students to draw in the flow of blood between the lungs and heart. • This will display how other learning styles can used in collaboration.
Development 5: Linguistic **4 Minutes**	• I will discuss how students studied word roots in their learning of anatomy. • I will compare this to the Latin we see in our learning of anatomy. • I will mention the merits of this shown in the slides. • I will provide examples of this in reference to the lungs. • I will show the image with the origin of the word lungs.
Development 6: Concept Cartoons Interpersonal Visual Literacy Further discussion **5 Minutes**	• I will show the class an image of the cartoon and ask them to review it in their own time. • I will mention the MI that is included in this style. • I will discuss the merits of using this and the literature on this. • We will discuss how this can offer further potential for higher level discussion. • I will ask the class about the merits of this.
Development 7: Interpersonal Donor Program **12 minutes**	• I will elaborate off James Stephens quote • I will ask one of my classmates to read out quote. • I will go through the points about the donor program and the conflict of respecting and dehumanasing the donor. • I will explain the initiative in University of Oklahoma of Medicine. • I will explain the term dethatched concern.
Quote from book **3 Minutes**	• I will ask the audience the talk about how dissection relates to interpersonal skills and what other styles it promotes. • I will refer the audience to the quote in the workbook and have a discussion on this. • I will present the idea about angor animi to show why doctors need interpersonal skills and how this can differ from clinical skills.
Development 8: Intrapersonal **3 Minutes**	• I will define what intrapersonal n anatomy education means. • I will read out the quote from Henry Marsh. • I will explain how this book is prescribed and the quote from a reader who was a doctor.

Learning styles:

The concept of learning styles is contentious and was not taught as part of this program. Despite there being no focus on learning styles in this program, an interesting observation was that students from all 3 groups mentioned learning styles.

Students in Group 1 used the term style interchangeably with intelligence, as demonstrated in the earlier statements, even though learning styles was not a focus of any of the taught teaching and learning theories. Meanwhile, students in Group 3 were able to show some differentiation between the MI theory and the concept of learning styles. A clear demonstration of that is the student having the below methodology as part of his lesson plan:

"I will briefly show the audience the VARK questionnaire and discuss why questions are asked in the style that they are and note why these don't ask students straight out what learning style they prefer"

Other terminology: Students used a mix of other teaching and learning terminology. Some of these were theories, tools and other concepts that are used in educational literature. While some of these were taught in the different sessions within the faculty-led learning section, others were from the literature that the students decided to include in their portfolio. Table 2 summarizes a terminology list and the number of students that used it, if used by more than one student.

Table 2. A list of different terminology used by students along with the number of students that used them.

Terminology	Number of students
Multiple intelligences	6
Learning style	6
Mind mapping	3
Reflective Practice	2
Assessment for learning	2

Some other terminology used by individual students included: theory of constructivism, single/double loop learning, organizational learning, Bloom's taxonomy, differential instructions and Socrative teaching.

Table 3 summarizes the scores that were given to the students for each statement. In the tables, the students are given a letter for convenience of description and divided into 3 groups that were described earlier. It also includes a mean score for each statement. Some of the statements describing the student's passion for teaching include:

"To my surprise, I found the teaching sessions to be a very enjoyable experience"

"Once it started, I felt I was confident and overall, I was delighted with how it went. I was actually disappointed when the final rotation ended, finding myself looking forward to my next teaching session."

"Overall, I found the teaching sessions to be very enjoyable and pleasant experiences. I think they will help and benefit me not only in my own studies and but also in my career in the future."

"My aim was to make the sessions educational, memorable and meaningful and I hope that the students have benefitted from the lab sessions. I will continue to teach with enthusiasm and inspire my students. I hope that I have allowed my students to "find their voice" by allowing them to articulate and activity take part in the discussions."

Table 3. A summary of the score given to each student for the above listed statements with a mean for each statement with (0) being the lost score and (5) being the highest.

	Students						Mean
	Group 1		Group 2		Group 3		
Statements	**A**	**B**	**C**	**D**	**E**	**F**	
Demonstrate knowledge of Teaching and learning theories	0	3	4	2	5	5	3.17
Demonstrate knowledge of Teaching and learning terminology	0	1	3	3	5	4	2.67
Ability to use Teaching and learning terminology effectively	0	1	2	3	4	5	2.50
Ability to analyze learning experiences using Teaching and learning principles	1	1	2	2	4	4	2.33
Ability to use knowledge learned to access literature	0	0	1	2	3	5	1.83
Ability to use knowledge learned to improve on teaching	1	0	2	2	5	4	2.33
Demonstrated passion for teaching	2	0	4	3	4	5	3.00
Overall score per group	0.71		2.5		4.43		

"Overall, I found the teaching to be a very rewarding and enjoyable experience."

Each student portfolio (A, B, C, D, E & F) was scored based on the statements in Table 3 with 0 being the lowest score and 5 being the highest.

DISCUSSION

In relation to the first two research questions *(1) To what extent did students engage with the material taught in this course by applying the concepts learned about teaching and learning to the discipline of anatomy?*; and *(2) To what extent were the students able to use the educational theories learned, on this course, in their teaching practice?,* while it is clear that all students were able to engage with the teaching and learning theories to a certain extent, a few were not able to connect these theories to the discipline of Anatomy. In relation to the third research question –*What are the challenges that science students face as they engage with teaching and learning?*– only a small number of students were able to apply this theory to their teaching practice. This leads to the conclusion that this course was able to provide an introductory-level engagement to students with no specific training in education or approach to teaching and learning, while providing a deeper level of learning for students with previous teaching/educational exposure. Hence the challenges that our students face is the lack of previous experience with educational theory, and the short period of exposure that they have on this course.

Reconnect Teaching to the Discipline

Equipping the next generation of anatomists with enough knowledge of the scholarship of teaching and learning along with the practical training in teaching will help in addressing Lee Shulman's first strategy aimed at reconnecting teaching to the discipline which was to improve the recognition and reward attached to teaching (Shulman, 1993). On the Anatomy Pedagogy course, we are trying to connect and embed foundational educational principles with the discipline of anatomy. Several studies have highlighted the vast differences among disciplines across the humanities, social science and science disciplines. These differences fall into different areas such as the nature of teaching, teaching practices, teaching outcome, assessment and student learning (Neumann, 2001). The teaching staff on this course come from non-anatomical backgrounds. This raises the question whether students attending these sessions can connect these teaching principles to the discipline of anatomy, from the theoretical principles such as signature pedagogies (Shulman, 2005) to the application of practical concepts such as entry points to learning (Gardner, 1999).

Skill and Will

While reading the portfolios, links and trends were made between them which led to the creation of 3 Groups.

Group 1, consisting of 2 students, neither showed an interest in teaching and learning nor demonstrated their ability to understand the topic throughout their reflections. This theme was tagged as 'skill and will' and was very clear in some of the statements made in the portfolio, as one of the students started her teaching portfolio with *"Teaching is not my passion"* and then follows with *"In the class day, I tried to focus more on my strengths and tried to ignore that I don't like teaching".* The other student in the group meanwhile was not able to establish meaningful connections by linking the learned teaching and learning theories to her reflective writing. The portfolios written by students in this group did not express their skill or will to achieve the set of learning outcomes

Meanwhile, Group 2 demonstrated a strong will for learning and expressed a passion for teaching. This group of students just completed a Bachelor's degree before joining this program, and did not have any previous teaching experience. Having said that, both students in this group expressed their interest in teaching and were able to comprehend the educational theories taught, as demonstrated in section 2 of their portfolio. When only considering their portfolios, the group of students were not able to demonstrate deeper level of learning. Perhaps this is because students in this group do not have any previous teaching experience, which meant they possibly found it more difficult to connect the learning theories to the discipline of anatomy.

The third group of students achieved the highest scores in their assessment, which is also arguably an indication that they have also achieved the highest level of learning among their peers. There are several reasons that may have given them an advantage over their colleagues. One of the reasons is the age of the students and their previous experiences that they have accumulated before joining the program. Both students have completed several degrees, which gives them a better understanding of teaching and learning in general and their own learning. Moreover, both have had some experience in teaching, which gives them a better understanding of the process and the challenges faced. Students in group 3 demonstrated a high level of understanding of the educational theories taught, connected the theories taught to the discipline of anatomy and used these theories to improve their teaching. Both students were also able to use what they learned on this course to expand their knowledge by engaging with the teaching and learning literature. This could be an indication that students that have the will and the necessary skills are able to achieve higher scores and hence a higher level of learning.

While analyzing student portfolios was able to reveal some of their understanding of the topic, this methodology does not fully reflect the students' own skill or will as individuals, or their respective potential to be anatomy educators. Developing students' will and skill is our responsibility as educators. As this was a 5-credit course, there is a certain assumption regarding students' pre-acquired knowledge and experience. This is below ideal as this does not allow for equal opportunities for students who do not have those pre-acquired skills for teaching and learning.

It is worth acknowledging that there are several limitations that could limit the findings of this study. While the use of the student portfolios is an effective tool to gather information, the students were not provided with guiding questions that could better address the research question. It would have also been beneficial to use an anonymous questionnaire with open ended questions to ask the students about their own experiences when taking this course.

Now What?

Looking at the three groups enabled an understanding regarding whether the students might achieve the set learning outcomes. Group 3 of students were able to achieve the set learning outcomes and we were able to identify that through the assessment methods devised. This is an indication that there is no need to completely redesign the course, but there is room for improvement.

Helping Group 1 change their attitude towards teaching is one of the major things that could be done to motivate them for learning. This could be done by emphasizing the need for teaching or training in any career. The main motivational issue with a student in Group 1 was that they chose a career in medicine and not teaching. Highlighting the need for teaching skills in medicine, whether it was training new clinicians or engaging with other scholars, would provide an element of motivation (Smesny et al., 2007). While this would promote a better will for learning, improving their skill could be shared with group 2.

The majority of students were able to understand the educational theories taught throughout this course, but the major challenge was connecting it to the discipline. This has also led to their inability to use these theories in their teaching. To help the students in bridging this gap, it is important to schedule an interactive session by an anatomist that enables an integration of theory into the disciplinary context. This will assist the students in connecting the knowledge learned about educational theory to the discipline of anatomy. Students will then learn those skills or way of thinking and will lead to a better application process. It would also be helpful to collect longitudinal data and feedback from different cohorts of students to have more robust conclusions.

CONCLUSION

With the potential shortage of science, technology, engineering, and mathematics (STEM) professionals, it is important to foster the growth of faculty to prepare the upcoming generation of STEM educators. Both identities in this upcoming

generation, as scientists and educators, need to be cultivated to improve teaching and learning. Future studies need to address those challenges faced by STEM educators as they engage with teaching and learning techniques. As the third class of the MSc in Human Anatomy is getting ready for graduation, future research will gather data for the coming three cohorts to provide more robust feedback. While using a reflective portfolio, which was written while the students are immersed in the experience, was extremely beneficial, it would also be helpful to guide those reflection with more specific questions. It would also be beneficial to collect feedback through questionnaires where the students are asked about their opinions and feedback.

REFERENCES

BALTA JY, CRONIN M, CRYAN JF, O'MAHONY SM (2016) The utility of cadaver-based approaches for the teaching of human anatomy: A survey of British and Irish anatomy teachers. *Anat Sci Educ*, 10(2): 137-143.

BALTA JY, O'KEEFFE GW, SUPPLE B (2019) Utilizing the scholarship of teaching and learning to design an Anatomy Pedagogy Couse. *Eur J Anat*, 23(3): 233-240.

BASS R (1999) The scholarship of teaching: What's the problem. *Inventio: Creative thinking about learning and teaching*, 1(1): 1-10.

BRAUN V, CLARKE V (2006) Using thematic analysis in psychology. *Qual Res Psychol*, 3(2): 77-101.

BROWN S (2005) Assessment for learning. *Learn Teach High Educ,* 1: 81-89.

D'ANTONI AV, ZIPP GP, OLSON VG, CAHILL TF (2010) Does the mind map learning strategy facilitate information retrieval and critical thinking in medical students? *BMC Med Educ*, 10: 61-72.

DEELEY SJ (2018) Using technology to facilitate effective assessment for learning and feedback in higher education. *Assess Eval High Educ*, 43(3): 439-448.

DEWEY J (1938) *Experience and education* (6th ed.). MacMillan, New York.

FARRAND P, HUSSAIN F, HENNESSY E (2002) The efficacy of the 'mind map' study technique. *Med Educ*, 36: 426-431.

FARRELL TS (2012) Reflecting on reflective practice: (Re) Visiting Dewey and Schon. *Tesol J*, 3(1): 7-16.

GARDNER HE (1983) Frames of mind: The theory of multiple intelligences. Hachette, UK.

GARDNER H (1999) *Intelligence reframed: Multiple intelligences for the 21st Century*. Basic Books, New York, US.

GARDNER H, HATCH T (1989) Educational implications of the theory of multiple intelligences. *Educ Res J,* 18(8): 4-10.

JONES DG (1997) Anatomy departments and anatomy education: Reflections and Myths. *Clin Anat,* 10(1): 34-40.

KESSELS JP, KORTHAGEN FA (1996) The relationship between theory and practice: Back to the classics. *Educ Res J,* 25(3): 17-22.

KORTHAGEN FAJ, KESSELS JPAM (1999) Linking theory and practice: changing the pedagogy of teacher education. *Educ Res J*, 28(4): 4-17.

NEUMANN R (2001) Disciplinary differences and university teaching. *Stud High Educ*, 26(2): 135-146.

NOVAK JD, CANAS AJ (2006) The theory underlying concept maps and how to construct them. Technical Report IHMC Cmap Tools 2006-01.

SCHAEFER AF, WILSON AB, BARGER JB, AZIM HM, BROKAW JJ, BROOKS WS (2019) What does a modern anatomist look like? Current trends in the training of anatomy educators. *Anat Sci Educ*, 12(3): 225-235.

SCHÖN DA (1987) *Educating the Reflective Practitioner. Toward a New Design for Teaching and Learning in the Professions. The Jossey-Bass Higher Education Series*: ERIC.

SHULMAN LS (1993) Teaching as community property: Putting an end to pedagogical solitude. *Change*, 25(6): 6-7.

SHULMAN LS (2005) Signature pedagogies in the professions. *Daedalus*, 134(3): 52-59.

SMESNY AL, WILLIAMS JS, BRAZEAU GA, WEBER RJ, MATTHEWS HW, DAS S (2007) Barriers to scholarship in dentistry, medicine, nursing, and pharmacy practice faculty. *Am J Pharm Educ*, 71(5): 91.

SVYANTEK MV, KAJFEZ RL, MCNAIR LD (2015) Teaching vs. Research: An approach to understanding graduate students' roles through eportfolio reflection. *Int J ePortfolio*, 5(2): 135-154.

ZIPP G, MAHER C, D'ANTONI A (2015) Mind mapping: Teaching and learning strategy for physical therapy curricula. *J Phys Ther Educ*, 29(1): 43-48.