Student radiographers' perceptions of evidence-based practice during clinical placements: Implications for health professional education

LAURA DI MICHELE[1]
AMANI BELL
KATE THOMSON
MARK MCENTEE
BELINDA KENNY
WARREN REED
University of Sydney, Sydney, Australia

Educating students to become evidence-based practitioners remains a significant challenge in health professional education. Clinical placements form a significant element of curriculum, and the impact of students' work integrated learning experiences on their ability and desire to practice in an evidence-based manner remains largely unexplored. This study used focus groups to explore students' experiences of evidence-based practice (EBP) during clinical placements, the impact of these experiences on their education, and their future EBP tendencies within the profession. Reflexive thematic analysis was utilized to analyze data and three main overarching themes were identified. These themes are education, culture and responsibility and hopes, fears and barriers and they were explored in detail. Improving the teaching of EBP skills within health professional education, which includes the strengthening of the integration of these skills across work-integrated learning curricula, has the potential to enhance the translation of knowledge into practice as these graduates become qualified clinicians within the profession.

Keywords: Education, evidence-based practice, health professional education, clinical placement, radiography

Problem Formulation and Study Aims

Students' work-integrated learning (WIL) experiences during clinical placements form a fundamental element of their education. The structured workplace learning that occurs during a WIL experience allows for theoretical knowledge to be put into practice and for students to enhance the skills relevant to their profession (Martin et al., 2019). WIL is not only accepted but expected in the education of student radiographers. Successful WIL experiences require shared understanding and mutual goals between students, clinical educators and academics (Rowe et al., 2012) with clinical educators and academics working in a complimentary manner in order realize the full potential of the experience (Winchester-Seeto et al., 2016).

Evidence-based practice (EBP) is defined as the integration of current empirical evidence with clinical expertise and patient preferences when making decisions about the care of a patient (Sackett et al., 1996) whilst taking into account the context within which the decision is made. Within academic circles in medical imaging, EBP has been widely accepted as the optimal approach for quite some time (Gambling et al., 2003; Hafslund et al., 2008; Smith, 2008). However, studies note that the translation of EBP within the clinical realm has historically been slow (Ahonen & Liikanen, 2010; Upton & Upton, 2006). In recent years there has been a push towards approaches to better translate evidence into practice within the profession (Brettle, 2020; Di Michele et al., 2020).

[1] Corresponding author: Laura Di Michele, laura.dimichele@sydney.edu.au

Education in the field of medical imaging has undergone a transition in the last 30 years. The predominant model has shifted from a department-based internship to a university degree level qualification and it has been suggested that there is a correlation between the newer generation of radiographers exhibiting more evidence based tendencies than previous generations (Abrantes et al., 2020; Malamateniou, 2009). It remains apparent that there is still a substantial knowledge to practice gap within the profession that needs to be addressed (Ahonen & Liikanen, 2010; Hafslund et al., 2008). A reasoned pedagogical approach to improving the teaching of EBP in medical imaging curricula must therefore be considered.

Evidence-informed health professions education has been gaining momentum in recent years (Maggio et al., 2018; Thomas & Bussières, 2021; Tractenberg & Gordon, 2017) as approaching health professional education (HPE) from an evidence-based perspective helps to ensure effective and efficient teaching practices. There has been considerable research into best practice for teaching EBP to students, however there remains a lack of focus on EBP within radiography education (England & McNulty, 2020). Strong evidence suggests that WIL is an effective approach to enhancing the competencies required for EBP among students (Hallé et al., 2021; Thomas et al., 2011; Young et al., 2014). Little research exists that explores how students' WIL experiences affect their perspective of EBP.

Medical imaging students complete a variety of clinical placements, observing and participating in a range of healthcare settings. As such, the purpose of this study is to explore students' experiences of EBP during clinical placements, the impact of these experiences on their education and their perspective of EBP tendencies in the profession.

METHODS

Qualitative Approach and Research Paradigm

This study was approached from a social constructivist lens whereby knowledge is viewed as being shaped by context and collaboration rather than being fixed (Jones et al., 2014). This lens is consistent with EBP as, "the meaning of research evidence and how it fits with a particular client is, therefore, constructed and interpreted by the clinician who acts as an active problem-solver and constructor of personal knowledge" (Thomas et al., 2011, p.225). What constitutes knowledge is an important consideration in this research; opponents of EBP have long articulated a shortfall in relation to the acceptance and legitimacy of qualitative research. Historically, quantitative approaches have been favored within EBP research and this was indeed echoed within the findings of the focus group itself with participants noting that clinicians are more likely to implement evidence-based changes to their practice in relation to radiation safety as opposed to communication. However, qualitative approaches enable deeper understanding of complex issues and varied perspectives and are therefore appropriate to address the aims of this study.

Context

The study site was a university that offers an accredited diagnostic radiography program at both undergraduate (UG) and graduate entry masters (GEM) levels in Australia. To achieve registration upon graduation to the Medical Radiation Board of Australia, students must demonstrate a depth and breadth of clinical experiences within their clinical program. This means having a range of placement experiences that include rural, metropolitan, private sector and public hospital placements. This places students in the position of observing and participating in clinical practice in a variety of settings.

Sampling Strategy

To be eligible to take part in the study, participants were required to be currently enrolled students in a diagnostic radiography program at the University and must have undertaken a minimum of two clinical placement experiences. Recruitment was initiated by an academic who had no ties to the research team in order to reduce any perceived coercion. Interested participants were directed to email a member of the research team (LDM) to receive additional information. Ethics approval was sought and obtained from the Human Research Ethics Committee at the University of Sydney (2016/769).

Data Collection Methods

Data were collected through a short demographic survey and focus group interviews. The demographic survey allowed the researchers to identify the level of placement experience that the participant had undertaken. Participants were then allocated to one of two focus groups with students with similar levels of placement experience. A semi-structured, open ended focus group interview template was developed to guide the focus group discussion. Examples of questions can be found in Table 1.

TABLE 1: Excerpt from semi-structured focus group guide.

Topic	Question
Students' experiences of EBP on clinical placements	• When you've been out on clinical placement in the past, has the practice that you've seen been informed by evidence? • When you've been out on clinical placement in the past, have you seen practice that isn't informed by evidence?
Students' perspectives on EBP	• What do you think the relationship between evidence and clinical practice should be? • Have you noticed any trends on the type of radiographer that tends to be more evidence based?
Students' ability to implement EBP in practice	• How does the practice that you've seen on placement affect your behavior as a radiographer? • What made it easier (or harder) for you to implement EBP on your clinical placements?

Data Collection Instruments, Technologies, and Processing

The research team developed a semi-structured question guide that explored students' understanding of evidence-based practice and their experiences during clinical placements; this guide was peer reviewed by academic colleagues outside of the research team. A member of the research team (LDM) facilitated both focus groups which were audio-recorded and transcribed verbatim by a third party not connected with the research team. The qualitative analysis software NVivo was used to code the transcribed data.

Participant Characteristics

Two focus groups were conducted; the first of these groups contained nine participants in their third year of a four-year undergraduate program. These participants had each completed three clinical placements of six weeks full time, totaling 18 weeks of clinical experience per student. The second focus group contained eleven participants in their final year of a two-year GEM program. These students had each completed four clinical placements; one of these placements was a seven-week part time placement and three were six-week full time. The students in this focus group totaled twenty-two

weeks full time equivalent of clinical experience per student. Demographic data was collected on students' highest level of educational attainment, these results are presented in Table 2.

Data Analysis

Data were analyzed using reflexive thematic analysis (Braun & Clarke, 2022). Theoretical flexibility is a hallmark of reflexive thematic analysis and has been utilized within this study in a way that aligns with the social constructivist lens through which the study was approached. In social constructivism, knowledge and meaning is developed through interactions between both individuals and their broader context. As such, an inductive approach was undertaken to explore latent meanings of data as this was deemed most appropriate to deeply explore the underlying meaning of the experiences of participants and the impact of these experiences on their education.

The first author (LDM) undertook the process of data familiarization by both listening to audio-recordings and reading through transcripts of the focus groups (Braun & Clarke, 2022). Utilising NVivo, initial codes were systematically generated from data segments and codes were then grouped into themes. Theme development was an iterative process whereby initial themes were generated; the codes, data segments and full transcripts were then revisited to further refine the published themes. Theme generation was inductive and latent whereby data was examined for meaning within the context.

Techniques to Enhance Trustworthiness

During the research process, the first author (LDM) kept a reflexive journal to monitor the reflexivity and assumptions being brought to the analysis of materials and to ensure credibility (Braun & Clarke, 2022; Connelly, 2016). To further enhance the credibility, dependability and authenticity of analysis, peer debriefing was undertaken with other members of the research team through team meetings and discussions (Connelly, 2016).

RESULTS

Synthesis and Interpretation and Links to Empirical Data

A total of twenty participants were recruited from both UG and GEM programs and all recruited participants had undertaken a minimum three clinical placement experiences. Table 2 summarizes the demographic data for each focus group. The groups were relatively homogenous demographically with some minor differentiation in relation to the highest level of qualification attained however each student had a different placement mapping and therefore their clinical placement experiences throughout the course of the degree may have differed significantly. There were a range of genders and cultures represented within the study.

TABLE 2: Demographic data summary.

	Focus group 1 n= 9	Focus group 2 n = 11
Highest level of qualification attained		
High school equivalent	7	0
Certificate/diploma	2	0
Bachelors	0	9
Masters	0	1
PhD	0	1
Degree enrolled		
Bachelor of Applied Science (diagnostic radiography)		
Master of Diagnostic Radiography	9	0
	0	11
How long have you studying for your current degree?		
1-2 years	0	11
2-3 years	9	0
3-4 years	0	0
How many clinical placements have you completed?		
3	9	0
4	0	11

Three overarching themes were developed during data analysis: education, culture and responsibility and hopes, fears, and barriers.

Education

This theme looked at education as the starting point of all practitioners' journey with EBP. It explored students' fundamental understanding of EBP as a concept. It discussed the importance of pedagogy in building EBP skills, comparing the training versus education model. It delved into concepts of lifelong learning, critical thinking and looked strongly at challenging knowledge and assumptions. Further to this, it examined the perceived shortfalls of the education that these students have received. Table 3 provides a summary of quotes representing this theme.

Participants within both focus groups had a consistently narrow definition of EBP that did not align with the more generally accepted definitions. They defined EBP as simply applying research-backed evidence in the clinical setting and most strongly equated their own learnings from university with EBP. Participants widely agreed that there was a strong tendency for clinicians within medical imaging to place higher value on the clinical expertise of practitioners than that of research-based evidence and articulated that they perceived this value to be misplaced. Those participants that did discuss clinical expertise as an asset were quickly shut down by their peers within the focus group. No participants articulated a link between clinical expertise and EBP, preferring to explore them as separate concepts.

Many participants perceived that the pedagogical approaches adopted in their academic subjects did not set them up well for implementing EBP in practice nor did they feel it encouraged them towards becoming evidence-based practitioners upon graduation. The perceived didactic teaching approach was viewed negatively by participants and there was a feeling of their potential being limited by this style of teaching. Participants identified the development of critical thinking, learning to assess the quality of research and adapting this research to the clinical environment as fundamentally important to their education however felt that this wasn't well developed in their academic or clinical education. They described a disconnect between the way in which learning occurred during their academic subjects and the development of the skills required to practice in an evidence-based manner.

TABLE 3: Summary of quotes for education theme.

Category	Description	Quote
Understanding of EBP and shortfalls in students' own education	Participants viewed EBP in a very narrow framework, equating it predominantly with empirical research.	Evidence-based practice is more theoretical practice, where it's a perfect world situation, whereas in a clinical practice you don't always get the perfect results (FG1/UG).
	Individuals need to be taught how to critically think and have their knowledge challenged during education to become EB practitioners.	that idea of having what you think that you know challenged, and thinking about the way that we learn things, rather than what we're actually learning is critical to how we set ourselves up to be evidence-based practitioners. I think in particular, how this sort of stratification of experience in practice… becomes concentrated in this sort of myopic way where there are people that have amassed huge amounts of knowledge but if they're not willing to have their knowledge challenged, if we don't get taught how to have our knowledge challenged by the next generation of practitioners, that's why I think it needs to be built into the way we learn (FG2/GEM).
	University teaching may be out of step with current EBP where many students assume what they are taught at university is "correct".	We had hammered into us things like ALARA [as low as reasonably achievable] and that radiation is bad and the reality is, the research is, that it's open to debate at this point… it's the predominant model, it's the model the guidelines are based on, the conservative model, but it's not necessarily the most evidence based (FG2/GEM).
The link between pedagogy and students' ability to become evidence-based practitioners	The way in which education providers teach will have a strong impact on students' ability to be EB practitioners.	I think that something I find really striking in radiography education is the degree to which it's a really sort of didactic learning model, where we ingest, and we rote learn and there's a huge sort of divergence between the extent of critical thinking that we're expected to employ in different subjects (FG2/GEM).
	There is a tendency within the profession to value clinical experience over relevant research, this is often linked to the model of education experienced by that individual.	Lots of radiographers I've dealt with prefer experience over knowledge (FG1/UG).
Students' experiences of EBP on placement and the relationship between these experiences and future tendencies	Participants reported feeling disempowered to implement EBP on placements due to a wide range of barriers.	I don't know that there's any easy way to do it because as a student you've got to adhere to whatever protocol, whatever radiographer is teaching you for that day, whatever the radiologist may want (FG1/UG).
	Clinical educators' skills and attitudes have a large impact on students' experiences.	When you're out there… over and over in a six-week period, you just literally stoop. You don't want to; you just end up at their level (FG2/GEM).
		It's a lot easier to implement evidence-based practice when you have someone there that encourages you to do it (FG2/GEM).

There was a wide sense of disempowerment that was apparent and consistent across both focus groups when it came to their ability to implement EBP on clinical placement. Participants reported a strong link between the attitudes of their clinical educators and their ability to implement EBP during placement experiences. Participants felt that their ability to implement EBP on placement had a substantial impact on their ability to learn and develop their skills.

Culture and Responsibility

This theme explored participants' perceptions of where responsibility lies for implementing EBP in the clinical setting and reflected on the existing cultures. In order to categorize this further and provide additional structure for analysis this theme was broken down into three sub-themes: individual organizational and professional. Table 4 provides a summary of quotes representing this theme.

Professional

Within this sub-theme participants discussed the role that the profession has on the implementation of EBP. There was a strong sense of hierarchy when it came to the implementation of EBP in the experiences that participants had encountered. Research backed up by a strongly scientific or quantitative foundation was viewed as more important, particularly in relation to radiation dose reduction and paediatric patients. In contrast traditionally qualitative fields were viewed as less important with participants discussing elements such as communication as being a skill that can't be improved with further research. Professional stagnancy received significant attention and participants kept returning to this throughout the discussion. The concept of practitioners continuing to practice in the way in which they were taught was strong and participants noted the ways in which this limits both individual professional development and the advancement of the profession.

Organizational

The barriers to EBP discussed by participants at an organizational level are quite consistent with the barriers reported in other literature. Participants explored both their positive and negative encounters during clinical placement experiences and noted factors that they believed to influence the evidence-based tendencies within departments and wider organizations. There was a very strong sense that for an organisation to have a culture that prioritizes EBP, senior management must be proactive and evidence-based themselves and create structural efforts to support the culture within the department. Participants perceived those organizations that are strong in terms of implementing EBP had a significant advantage over competitors that did not, linking this to cost and efficiency savings.

Participants also described the impact that social forces can have on an individuals' ability to implement EBP. This was again noted in both positive and negative scenarios where participants discussed examples of feeling pressured to implement practice that was not evidence based to conform to the standards of the organisation and alternatively where they were encouraged to explore and implement EBP on their placements.

Individual

There was much debate and little consensus in terms of the ability of an individual to implement EBP in the scenario where an organisation does not prioritize this action. Participants noted a differentiation in the ability of students versus practitioners to implement EBP. Some participants perceived that once the supervision requirements of being a student were lifted and they had the ability to practice independently that they would have more agency to make their own decisions in relation to implementing EBP; other students felt that they were still limited by the organizational priorities in this

respect and that barriers such as time and resources made implementing EBP a continual challenge for individual practitioners.

Participants noted that individuals who are evidence-based in their practice have a competitive advantage when compared with their peers who are not. They felt that individuals who are more evidence-based in their practice were more sought-after employees, were likely to find desirable employment more readily and be able to advance more quickly and work in the areas that they want.

TABLE 4: Summary of quotes for culture and responsibility theme.

Sub-theme AND category	Description	Quote
Professional: Hierarchy of what should be informed by evidence.	Participants noted that there were clear hierarchies in practice when it came to implementing EBP, those ranked more highly were often those that had a more quantitative backing.	What I found in my experience with evidence-based practice was that it was practiced, sort of to the teeth with paediatric patients…but when it strayed away from paediatric patients it just sorts of, you get someone else and then you just completely forget what you just done (FG2/GEM).
Professional stagnancy	Participants noted a strong tendency within professionals to practice in ways the way that they were originally taught rather than in line with EBP and that this limited the ability of the profession to advance.	In some of the places I've just asked senior radiographers 'Why do you do it that way?' and they said 'Well technically one way is better, but we just do it this way because we always have' (FG2/GEM). So, the comment that the field is advancing, that's clear, the technology is improving very quickly, but it feels to me like practice in radiography isn't advancing with the field, because of that attitude of 'Well, we've always done it like that.' Well, if you've always done it like that it means that no matter how far forward the technology gets, you're always going to be practicing it as if it was when you were first taught (FG2/GEM). She was the chief radiographer and she had authority, but everyone respected her and just trusted in her decisions. It just reflects on how the importance of the chief radiographer to implement evidence-based research because she'll also influence the other radiographers too (FG1/UG).
Organizational: Senior managers attitudes affect the whole workplace.	Participants discussed varied experiences in terms of senior management at the placements that they had encountered and how the attitudes of senior management then trickled down through the department.	My impression was, people who had found the position quite a long time ago, secured that position and for want of a better word, stagnated in that position and become senior through that, just longevity, tended to make a less positive working environment which then played on to everybody else being a bit apathetic (FG2/GEM).
Social forces and inbuilt structure	Participants noted the importance of social forces and structural efforts within the department that made it easier or harder to implement EBP.	it also depends on the atmosphere or the attitude of the practice itself to change. At my first placement, I was at a hospital and every two weeks they would have presentations… everyone was friendly… everyone was just chatting about it, they even ask students as well to contribute (FG1/UG).

Competitive advantage for organizations implementing EBP	Participants observed perceived advantages for practices that implemented EBP that allowed them to be stronger than competitors.	I definitely think that evidence-based is important because I had one placement that stood out above the rest, completely because of the fact that they implemented evidence-based on a daily, as a daily routine practice for them. I definitely think that it created a better workflow, everyone agreed with each other, everyone was communicating well (FG2/GEM).
Individual: Individual ability to implement EBP.	There was debate and discussion as to the amount of power that an individual has to implement EBP within their own practice if this is not within the practices' priorities.	you're in control of your own choices and with the SPP [graduate year] year you're in that room by yourself, you can implement your own evidence-base (FG2/GEM). I feel like it goes beyond that, it goes to, if you're not just going to comply with what they want, you lose the job (FG2/GEM).
Competitive advantage for individuals implementing EBP.	Participants felt that individuals who implemented EBP well were a significant asset to the department and noted that they felt this was an advantage when applying for jobs.	to be honest, his knowledge is like the biggest asset they had and if I was like the chief radiographer and I wanted to hire someone I'd grab him straight away because he was just a massive asset to the whole hospital (FG2/GEM).

Hopes Fears and Barriers

This theme explored the participants' hopes and fears. They see themselves as the future of the profession and hope to lead it in a more positive direction however they fear becoming a part of "a cycle of defensiveness about knowledge" (FG2) that they see within the profession. Participants agreed that EBP is fundamentally important to both themselves as professionals and their patients and described a sense of responsibility around implementation and a frustration at the barriers that prevent them from doing so. There was agreement about the early years in the profession being crucial for their development as evidence-based practitioners and they discussed their fears around these formative years, describing a sense of worry around the type of organisation they gain employment at.

Participants passionately articulated their desire to influence change in the profession. They discussed this particularly in relation to professional stagnancy and their view that the culture within the profession needs to change. There was a strong sense of urgency that surrounded this discussion and a sense of impatience from the participants who wanted to see immediate change.

Participants discussed several barriers to their ability to implement EBP on placement which were consistent with the barriers reported in the literature that are faced by professionals within the field of medical imaging. They reported feelings of medical dominance when practicing clinically, time and resource pressure and strong social forces that limited their ability to implement EBP.

TABLE 5: Summary of quotes for hopes, fears, and barriers theme.

Category	Description	Quote
Responsibility around implementing EBP	Participants displayed strongly positive attitudes towards EBP and there was a sense of responsibility among participants to implement EBP.	What we do in the clinical aspect should be based on the evidence. We can't just do whatever we feel like is right. It's got to be based on what's proven to be correct and what's proven to be helpful to the patients (FG1/UG).
Barriers	Participants described feelings of medical dominance which inhibited their ability to practice in their chosen manner.	I feel a lot of it also comes from the radiologists, especially in private practice that you're adhering to. You really have to do what they prefer (FG1/UG).
	Participants described resource shortages that affected their ability to practice in their chosen manner.	Because we're also put under pressure… there's not enough rooms, there's not enough stuff and you just crack and get the patients done (FG2/GEM).
Formative years in the profession are key to ongoing evidence-based tendencies	Participants discussed feeling worried and scared that they will end up like the practitioners that they had seen on placement. They described feeling that the early years in the profession would be integral to their development as evidence-based practitioners.	It depends on where you end up for your SPP [graduate year] and how the people around you practice evidence-based (FG2/GEM).
		you're all like a sponge at the moment, you will take on the characteristics of your environment (FG2/GEM).
Desire to influence change on the profession	Participants discussed with passion their desire to create change within the profession and help resolve the cultural issues that they had seen during their WIL placement experiences.	I found that, when I was challenged more to succeed and improve myself as an individual and actually change my mind set of how radiography should like improve in the future. (FG2/GEM).
		I just feel as if we're being taught here to change the radiography, sort of, landscape in the next five to ten years. But that's the thing, it's going to happen... but you want it to change now. (FG2/GEM).

DISCUSSION

Education is the Genesis

Participants in this study clearly perceived their academic education as foundational to their ability to implement EBP in practice both as students on clinical placements and into their future careers. The importance of developing the skills required to practice in an evidence-based manner during HPE has been extensively explored in the literature to date (Melnyk et al., 2008; Thomas et al., 2011), however there remains no consensus as to the most effective pedagogical approach to teaching EBP (Hallé et al., 2021; Hitch & Nicola-Richmond, 2017; Thomas et al., 2011). Thomas and colleagues (2011) suggest that EBP needs to be well integrated throughout curricula and that approaches that include WIL tend to be most effective. In order to ensure that WIL is effectively reinforcing EBP, it is important to ensure that this common goal is made clear to clinical educators (Rowe et al., 2012). A systematic review of educational interventions for implementing EBP found that there was a lack of high-quality validated instruments to measure EBP education interventions and that interventions reported had a strong

tendency to focus on a single step of EBP education, most commonly critical appraisal (Albarqouni et al., 2018).

There is substantial evidence to suggest that creating a culture of EBP starts with faculty (Amit-Aharon et al., 2020; Fineout-Overholt et al., 2010; Kalb et al., 2015; Melnyk et al., 2008; Milner et al., 2018). Measuring and quantifying the translation of skills in terms of impact on patient outcomes is impossible (Albarqouni et al., 2018) and according to Thomas et al. (2011, p. 263) "teaching interventions have a greater impact on knowledge and skills than they do on sustainable EBP behaviors." Despite this, there is a demonstrated positive association between the skills required for EBP and individuals' perceptions of EBP and likelihood to implement EBP in the future. It could be argued that setting students up well with the skills required to address each of the five elements of EBP, including asking a question, searching for evidence, critically appraising the evidence, implementing the evidence and evaluating the implementation (Johnson, 2008), would afford them the best opportunity to become evidence-based practitioners. WIL contexts provide authentic environments for students to explore and implement these skills and are particularly suited for the final two steps of implementing and evaluating EBP in practice. By emphasizing these final two steps within learning outcomes for clinical placements there is a strong potential to strengthen students' learning and application of knowledge in practice which is a fundamental objective of WIL. Strongly integrating and aligning the concepts of EBP throughout both academic and WIL curricula has the potential to further develop the skills necessary to enact EBP and is vital to producing graduates that will take EBP into their future careers.

Throughout the focus group discussions, participants' definitions of EBP were consistently narrow and focused strongly on the empirical evidence as the epitome of EBP. The other pillars of EBP, clinical expertise patient preferences, and context (Sackett et al., 1996), were discussed less frequently, less directly, later in the discussion and to a poor reception; participants who did discuss clinical expertise as an asset were shut down by their peers who voiced strong contrary opinions and the social nature of focus group discussions meant that these views were then not explored in significant depth. This finding is consistent with that by Hallé et al. (2021) that students tend to have difficulty with the complexity and uncertainty associated with EBP and tend to view the concept in quite a black and white manner. Further to this there was a perception that more typically quantitative research, for example research addressing radiation dose had a higher value than qualitative research.

The differences between generations of clinicians were discussed, with participants coining the term "tech generation" for the older generation of radiographers who were educated in an apprenticeship model of training. These radiographers whilst having significant time in the profession to hone their skills tend to have less positive attitudes towards EBP and self-rate the skills required for EBP as quite low when compared to other allied health professions (Upton & Upton, 2006).

The Impact and Importance of Culture for Implementing EBP

Participants felt that there was a strong link between workplace culture and their ability to practice in an evidence-based manner, both as students and into their future careers. This perception is strongly supported by literature in social science and psychology that indicates that the attitudes of individuals and the social norms of a workplace strongly affect the uptake of EBP in individual workplaces (Glasman & Albarracín, 2006; Kim & Hunter, 2006; Kraus, 1995; Wallace et al., 2005). This highlights the essential need to ensure that WIL experiences provided to students are high quality and that the expectations of academics and supervisors are well aligned in this respect (Rowe et al., 2012). Participants feared completing their clinical placement or being employed in a workplace that does not

value EBP and becoming influenced by the dogma of the department. Those participants that had had experiences during clinical placements at sites that they perceived had positive EBP cultures discussed feelings of empowerment and noted that these sites often had a strategic advantage over other sites in terms of workflow efficiencies, staff retention and patient outcomes which is supported in the literature (Harding et al., 2017). This innately poses an equity issue for WIL experiences that must be addressed by universities to ensure that students are afforded the same opportunities to learn in EBP supportive environments throughout their degrees. They may do this by being more selective about aligning themselves with organizations that prioritize EBP for placement opportunities. In addition, partnership opportunities may be explored whereby universities can play a more substantial role in helping organizations or professional bodies to expand knowledge translation and enhance EBP within the profession more broadly.

Participants placed the responsibility for workplace culture firmly with management within organizations. Feelings of frustration were clear as the group discussed feeling powerless to affect the changes they perceived as necessary to create a supportive environment for EBP. Participants noted the professional culture within medical imaging felt stagnant. There is a strong possibility that the education of the "tech generation" of radiographers played a substantial role in their attitudes towards EBP and that the current historically poor attitudes towards EBP (Ahonen & Liikanen, 2010; Upton & Upton, 2006) can be attributed to this. There has been a call from many authors that the new generation of radiographers must push through the cultural change required in the discipline (Di Michele et al., 2020; Hafslund et al., 2008; Higgins et al., 2015) and the desire of the participants to do this was clear.

Strengths and Limitations

By utilising a qualitative approach to exploring students' experiences on placement, this study has explored an important element of students' EBP education. The use of focus groups allowed the researchers to explore the social elements of this important discussion and observe and report on the group mechanics in terms of social desirability rather than seek to control this element (Smithson, 2000). Throughout the discussion careful moderation was required to ensure that all participants' voices were given equal opportunity as stronger voiced participants attempted to dominate areas of discussion (Litosseliti, 2003). The nature of the focus group environment and the limitations in terms of time meant that exploring individual experiences on a deep level was not possible, rather the collective experience and shared experiences were explored.

Despite participants coming from a very homogenous sample in terms of their educational background, there was diversity of gender, culture, and placement experiences. The authors recognize that the participants reflected a single healthcare discipline only however feel that many of the themes discussed are applicable across a multidisciplinary context.

CONCLUSION

Overall, the students' experiences and perceptions of EBP during WIL were widely varied and inequitable. Whilst participants had a clear and strong desire to implement EBP while on clinical placement they felt limited by poor educational preparation and disempowered by workplace cultures and barriers. In order to improve students' ability to practice in an evidence-based manner, EBP must be taught directly and explicitly, and all five steps addressed in curriculum. The academic and clinical placement units of study must be well aligned and scaffolded across the course of a degree in a way that allows students the opportunity to develop and apply these skills in practice. Universities must address the equity issues within WIL experiences and may do this by selectively partnering with

relevant clinical centers, professional organizations and policy makers. In particular those students with the skills to practice in an evidence-based manner are more likely to do so in their subsequent careers and to have positive attitudes towards EBP thus creating systemic cultural change within the profession. Therefore, it is clear that changes to health professional education and in particular WIL has a significant role to play in this critical future transition and cultural shift to further enhance the uptake of EBP in future.

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About the Journal

The International Journal of Work-Integrated Learning (IJWIL) publishes double-blind peer-reviewed original research and topical issues related to Work-Integrated Learning (WIL). IJWIL first published in 2000 under the name of Asia-Pacific Journal of Cooperative Education (APJCE).

In this Journal, WIL is defined as " *An educational approach involving three parties – the student, educational institution, and an external stakeholder – consisting of authentic work-focused experiences as an intentional component of the curriculum. Students learn through active engagement in purposeful work tasks, which enable the integration of theory with meaningful practice that is relevant to the students' discipline of study and/or professional development"* (Zegwaard et al., 2023, p. 38*). Examples of practice include off-campus workplace immersion activities such as work placements, internships, practicum, service learning, and cooperative education (co-op), and on-campus activities such as work-related projects/competitions, entrepreneurships, student-led enterprise, student consultancies, etc. WIL is related to, and overlaps with, the fields of experiential learning, work-based learning, and vocational education and training.

The Journal's aim is to enable specialists working in WIL to disseminate research findings and share knowledge to the benefit of institutions, students, WIL practitioners, curricular designers, and researchers. The Journal encourages quality research and explorative critical discussion that leads to the advancement of quality practices, development of further understanding of WIL, and promote further research.

The Journal is financially supported by the Work-Integrated Learning New Zealand (WILNZ; www.wilnz.nz), and the University of Waikato, New Zealand, and receives periodic sponsorship from the Australian Collaborative Education Network (ACEN), University of Waterloo, and the World Association of Cooperative Education (WACE).

Types of Manuscripts Sought by the Journal

Types of manuscripts sought by IJWIL is of two forms: 1) *research publications* describing research into aspects of work-integrated learning and, 2) *topical discussion* articles that review relevant literature and provide critical explorative discussion around a topical issue. The journal will, on occasions, consider good practice submissions.

Research publications should contain; an introduction that describes relevant literature and sets the context of the inquiry. A detailed description and justification for the methodology employed. A description of the research findings - tabulated as appropriate, a discussion of the importance of the findings including their significance to current established literature, implications for practitioners and researchers, whilst remaining mindful of the limitations of the data, and a conclusion preferably including suggestions for further research.

Topical discussion articles should contain a clear statement of the topic or issue under discussion, reference to relevant literature, critical and scholarly discussion on the importance of the issues, critical insights to how to advance the issue further, and implications for other researchers and practitioners.

Good practice and program description papers. On occasions, the Journal seeks manuscripts describing a practice of WIL as an example of good practice, however, only if it presents a particularly unique or innovative practice or was situated in an unusual context. There must be a clear contribution of new knowledge to the established literature. Manuscripts describing what is essentially 'typical', 'common' or 'known' practices will be encouraged to rewrite the focus of the manuscript to a significant educational issue or will be encouraged to publish their work via another avenue that seeks such content.

By negotiation with the Editor-in-Chief, the Journal also accepts a small number of *Book Reviews* of relevant and recently published books.

* Zegwaard, K. E., Pretti, T. J., Rowe, A. D., & Ferns, S. J. (2023). Defining work-integrated learning. In K. E. Zegwaard & T. J. Pretti (Eds.), *The Routledge international handbook of work-integrated learning* (3rd ed., pp. 29-48). Routledge.

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