Mediated learning in the workplace: Students' perspective on present and future value of knowledge tools

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Work-integrated learning is an essential component of many university degrees. This study examined a range of knowledge tools that are used by students to support their learning during clinical placement. This study showed that expert others in the workplace, print and electronic information sources and to a lesser extent electronic communication tools were utilized by students during their clinical placement to support their learning. The finding support an integration of practice-base learning with learning mediated by information sources to provides further understanding of work-integrated learning

Keywords: workplace learning, mediated learning, knowledge tools, information sources

Introduction

Universities in Australia and internationally have integrated Work-integrated learning (WIL) into programs of study. WIL provides tertiary learners with real world experiences that support the integration of theory with the practice of work (Patrick et al., 2008). This repositioning of learning experiences from university settings into workplaces harnesses the benefits of practice-based models such as communities of practice (Lave & Wenger, 1991) and workplace learning (Billett, 1994, 1995). These models posit that learning occurs through enculturation into practice with a central role afforded to workplace participants who are more experienced, wiser or more knowing, such as 'old timers' and 'more experienced others', sharing their knowledge and experience with learners or 'new comers' during everyday workplace activities. What remains hidden in such models is the importance of other knowledge tools to student learning that occurs in the workplace.

Information sources have an important role in learning. According to Engeström and colleagues (1984) learning "is mediated above all by … knowledge, initially embedded as material tools" (p.140) of information sources. Brookfield (1985) concurs explaining that books and educational broadcasts were "all devised by humans for the purpose of facilitating skill development or knowledge acquisition" (p.7). Across professions seminars, journals and health and medical databases are considered essential tools for learning proving access to new discipline knowledge (Garvey, Lin, Nelson, & Tomita, 1972; Keppell et al., 2001; Shanahan, 2011, 2012). The Internet has also been recognized as an important information source offering immediate access to the most current information through web sites of professional, government, education and commercial organisations (Herrington & Herrington, 2006; Shanahan, Herrington, & Herrington, 2009). Not only local experts sharing their knowledge during workplace activities mediate student learning in the workplace but also there are multiple information sources that similarly could mediate student learning in the workplace. In addition, communication tools such as email provide learners with access to experts and other learners across the world and support knowledge construction through articulation and reflection (D. Jonassen, Howland, Marra, & Crismond, 2008; D. H. Jonassen, 2000). This research sought to examine the perceived importance of workplace experts and information and communication tools to students for their present and future learning. The term knowledge tools is utilized in this study to encompass experts in the workplace sharing their professional knowledge (Eraut, 1994; Higgs & Titchen, 2001; Lave & Wenger, 1991), information sources that disseminate discipline knowledge (Eraut, 1994; Higgs & Titchen, 2001) and communication tools that support knowledge articulation and construction (D. Jonassen et al., 2008; D. H. Jonassen, 2000).

The study

Context

Clinical work placements are an essential component of professional health-related degrees with requirements linked to Program accreditation requirements (Patrick et al., 2008). The health area of the professional degree in this study is Radiography and like other health professions, the clinical placement is an essential element to meet Program accreditation requirements (Australian Institute of Radiography, 2010). The students were in the second year of the Program of study and attended a six-week block of clinical practice.

Research questions

The research questions were:

1. What knowledge tools are utilised by students to support their learning during clinica placement
2. What importance do students' attribute to a range of knowledge tools to support their learning whilst on clinical placement.
3. What value do students' attribute to these knowledge tools for learning as a future health professionals

Methodology

An anonymous questionnaire was distributed to 62 students following completion of their clinical placement. A range of knowledge tools was examined (see Table 1). Descriptive statistics were utilised to determine use of knowledge tools during clinical placement to support learning. A five point likert scale (e.g. 1 *very important –* 5 *not important*) was utilised to collect data on present importance and perceived future value of these knowledge tools for learning in the workplace. The survey data were entered into SPSS 17.0 ® and the Friedman Test (Pett, 1997) was performed to determine student overall ranking of knowledge tools for current and future learning in the workplace. Ethics Approval for this study was granted from RMIT University.

Results and Discussion

Of the 62 surveys distributed, 53 useable surveys were returned. The majority of students (68%, n=36) attended a clinical placement in a metropolitan location. The remaining students attended workplaces in regional (n=7) or rural (n=10) locations. Sixty percent (n=32) of students attended a public sector workplace, with the remaining 21 students undertaking clinical workplaces in the private sector.

Use of knowledge tools during workplace learning

Survey respondents were asked to identify the knowledge tools that they utilised during their work placement to support their learning. Percent and number of respondents that reported using the knowledge tool to support their learning during their clinical placement is displayed in Table 1.

Table 1: Use of knowledge tools to support workplace learning

Knowledge Tool	Percent [a] (No)
Text and reference books	96 (50)
Internet	94 (49)
Workplace experts	92 (48)
University E-resources	80 (40)
Email	72 (36)
Workplace Intranet with learning resources	71 (37)
Electronic journals	50 (26)
Health and medical databases	48 (25)
Print journals	46 (24)
Social discussion forums e.g. Facebook, Twitter	42 (22)
Seminars in the workplace	39 (20)
Journal club	28 (14)
[a] Percentages are based upon number of respondents answering each question	

Students utilised a range of knowledge tools to support their learning during clinical placement. Eighty percent or more students utilised textbooks, Internet, experts in their workplace and University e-resources during clinical placement. Workplace Intranets providing access to clinical guidelines and journal articles were also utilised during clinical placement to support learning. In relation to journals both print and electronic were used by students to support their learning. The students also used email and social discussion forums to support their

learning whilst on clinical placement. These findings highlight the high level of use of expert others as well and digital and non-digital information sources during clinical placement.

Current importance of knowledge tools during workplace learning

Students were asked to rate on a scale from 1 (very important) to 5 (not important) a range of knowledge tools that may be used to support their learning during clinical placement. A Friedman Test was conducted on this data to obtain an overall ranking of the importance students' attribute to these tools for learning. The ordered ranking is presented in Table 2.

Table 2: Current importance of knowledge tools during workplace learning

Knowledge Tool	Mean Rank
Workplace experts	3.16
Text and reference books	3.55
Internet	3.99
Workplace Intranet with learning resources	5.71
University E-resources	5.92
Email	6.87
Seminars in the workplace	7.42
Health and medical databases	7.50
Electronic journals	7.60
Print journals	7.84
Social discussion forums e.g. Facebook, Twitter	9.10
Journal club	9.34

Difference in ranking was observed across the examined mediating knowledge tools. The observed difference in ranking was statistically significant $\left(\chi^2 = 185.643, df = 811 p \leq .001\right)$. Thus indicating that value attributed to the examined knowledge tools for mediating learning during clinical placement was not homogenous. For example, students ranked workplace experts as having the highest importance for learning during clinical placement. This finding is in agreement with practice-based models of learning that posit that learning occurs through expert others sharing their knowledge and experience with learners or 'new comers' during everyday workplace activities (Billett, 1994; Lave & Wenger, 1991). Books, the Internet and workplace Intranets that provide learning resources such as practice guidelines, journal articles and University e-resources were ranked the four next highest respectively for supporting learning in the workplace. This finding indicate that these information sources are also of high importance to students and suggests that students are as Patrick and colleagues (2008) contend integrating theory with the practice of work during their clinical placement. The findings also highlight the importance of people with expert knowledge, digital and non-digital information sources to student learning during workplace practicum. It is also apparent that students place different level of importance to communication tools with email ranked more highly as supporting learning than social discussion forums such as facebook. This may reflect students' differentiating their preferred use of these tools between learning and socialising.

Perceived future value of knowledge tools for workplace learning

Students were asked to rate on a scale from 1 (very valuable) to 5 (not valuable) the future value of the listed knowledge tools to them as future health professionals. A Friedman Test was conducted on this data to obtain an overall ranking of the value students' attribute to these tools for their future learning. The ordered ranking is presented in Table 3.

Table 3: Future value of knowledge tools for workplace learning

Knowledge Tool	Mean Rank
Workplace experts	3.85
Internet	3.98
Text and reference books	4.45
Workplace Intranet with learning resources	5.15
Seminars in the workplace	6.15
University E-resources	7.24
Email	7.49
Electronic journals	6.49
Health and medical databases	7.26
Print journals	7.35
Journal club	8.39
Social discussion forums e.g. Facebook, Twitter	10.20

Difference in ranking was observed across the examined mediating knowledge tools. The observed difference in ranking was statistically significant $\left(\chi^2 = 218.508, df = 11\, p \leq .001\right)$. Thus indicating that perceived future value attributed to the examined knowledge tools for mediating learning as health professionals was not homogenous. Workplace experts, Internet and textbooks were again ranked the top three knowledge tools, although there was some slight reordering of ranking between current importance (Table 2) and future value of these tools. Seminars were ranked fourth highest in value as a knowledge tool for learning as a health professional. This ranking of seminars was higher than it was ranked for current importance (seventh, Table 2) suggesting that students are aware of the importance of seminars to health professionals for their continued learning (Garvey et al., 1972; Keppell et al., 2001; Shanahan, 2012). The recent study by Shanahan (2012) demonstrated that health professionals ranked seminars as the most important information source for updating their professional knowledge. A finding that was in accord with the earlier study by Keppell and colleagues (2001). As only 39% of students attended a seminar whilst on clinical placement, the majority of students may not yet appreciate the important role seminars have in professional learning. It was interesting to observe that University e-resources were still valued by students as knowledge tools for their future learning. Cole (2001) identified that university resources such as journals had become less accessible to health professionals as electronic journals required login access typically restricted to student and staff of the university, whereas print-based journals could be accessed by any health professional who could physically attend the university library. The continued relatively high ranking of university e-resources for future value for learning may reflect a naivety that these resources will still be able to be accessed and used after completing their program of study. The findings also highlight the perceived value students' attribute to people with expert knowledge, digital and non-digital information sources for their future learning as health professionals.

Implications for learning theory

This study examined knowledge tools that support learning during workplace practice. Practice-based models such as communities of practice (Lave & Wenger, 1991) and workplace learning (Billett, 1994, 1995) posit that other participants in the workplace who are more experienced, wiser or more knowing such as 'old timers' and 'more experienced others' are essential to the process of transforming learners from novice to competent practitioners in their field. The findings from this study are supportive that expert others in the workplace do have an important role in facilitating learning during clinical placement.

It is also apparent that information sources have an important role in workplace learning. When learning is theorised as an activity mediated by tools (Vygotsky, 1981), information sources become cognitive tools supporting active, intentional knowledge construction (Hill, Wiley, Nelson, & Han, 2004; D. H. Jonassen, 2000). Information changes learners' knowledge in two ways. Information adds factual knowledge (Todd, 1999, 2006; Tynjala, 1999). This type of learning with information sources was termed in-*form*-ative by Kegan (2009) to denote its role in bringing valuable new content that is essential to ensure mastery in the learners field or discipline. Information sources such as books and journals provide the principles or theories, the 'know why' as well as domain content, the 'know what' of professional knowledge (Eraut, 1994; Tynjala, 1999).

Information can also change the way the learner knows and become what Kegan (2009) calls trans-*form*-ational.. In this case, the information does not just expand an already existing knowledge framework but the framework itself is reconstructed or changed (Illeris, 2009; Kegan, 2009). The process of reconstruction can involve linking previously unconnected concepts (Illeris, 2009; Todd, 1999, 2006) deleting previously held understandings and accepting something that is new or different (Illeris, 2009; Todd, 1999) and thinking about the information such as coherency of facts and bias of authors (Kegan, 2009; Todd, 2006). Whilst informative learning is portrayed in an increase in quantity of knowledge (Kegan, 2009), transformational learning suggests an increase in the quality of knowledge (Dole & Sinatra, 1998). Research differentiating novices' and experts' knowledge has shown that experts' knowledge is more detailed and comprehensive (high quantity) with higher levels of coherence, discrimination, relationships and generalisations (high quality) than novices' knowledge (Barba & Rubba, 1992; Bryce & Blown, 2012; Chi, Feltovich, & Glaser, 1981). Thus both informative and transformative learning with information sources is necessary for developing and maintaining expert knowledge in the learner's discipline area. Learning with information sources is always more than just the individual, it is person-plus (Perkins, 1997). The person-plus may include the individual learner plus the information source and their new understanding. Learning mediated by information sources, from this perspective is conceptualised as an individual mental process, such as in cognitivism (Candy, 1991; Jarvis, Holford, & Griffin, 2003; Merriam & Cafarella, 1999). Alternately, person-plus may expand to many learners, their shared learning opportunities plus the information source. From this conception, learning expands beyond the individual's mind and may include shared learning across participants such as in constructivism (Candy, 1991; Hill et al., 2004; D. H. Jonassen, 2000). In this current research students were shown to engage with information sources both on an individual and shared learning basis. On an individual basis, students read books and journal articles, searched the Internet and health and medical databases for needed information to construct their knowledge. Students also engaged in shared learning activities through discussion with expert others, utilising communication tools and participating in journal clubs. Together these activities provided students with opportunities for accessing new information as well as opportunities for articulating and sharing their learning with others.

Conclusion

Work-integrated learning is an essential component of many university degrees. By examining the knowledge tools that are utilised during this activity, which included expert others, and information sources, this research provides valuable insight. The findings from this research support an integration of practice-base learning, where the focus is on expert others and the role they play in facilitating learning in the workplace (Billett, 1994, 1995, 1999; Lave & Wenger, 1991) with learning mediated by information sources (Hill et al., 2004; D. Jonassen et al., 2008; Shanahan, 2011, 2012). This integrative approach provides further understanding of work-integrated learning by recognising the importance of both expert others and information sources to learning that occurs during clinical placement.

Acknowledgements

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