Dimensions of student-to-student knowledge sharing in universities

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ABSTRACT

As quintessential knowledge organisations, universities need to constantly foster knowledge sharing between their students to enable their academic success and employability. This paper draws on a range of relevant literature to propose the categorisation of the diverse knowledge-sharing activities undertaken by students in university environments along three dimensions: relatedness to curriculum, distance between students and degree of formality. Broader factors that feed into these dimensions such as the advent of online learning, the widespread integration of social media into learning, the effects of national culture and individual student characteristics on knowledge sharing and the move towards the formalisation of peer learning among students are explored in relation to each of these dimensions. Through the use of several practical examples, the paper demonstrates how these dimensions can act as a planning tool that can help university staff develop, revise and compare student-to-student knowledge-sharing activities.

1. Introduction

Knowledge organisations drive the contemporary knowledge economy, where knowledge and intellectual capital are integrated into all stages of the production process (Powell & Snellman, 2004). Knowledge workers, who primarily employ their cognitive skills to perform tasks, are the lifeblood of the modern knowledge organisation, which is dedicated to continuously creating, storing, integrating, tailoring, sharing and making available the right knowledge to the right people at the right time (Arthur et al., 2008; Bennet & Bennet, 2004; Leon, 2011).

Universities play a key role in the knowledge economy through their primary functions of creating knowledge through research and transmitting it through teaching, dissemination of research findings and collaborations with government and industry (Fullwood et al., 2013). Universities themselves are knowledge organisations with multiple layers of knowledge ranging from key knowledge structures driven by senior academic to knowledge possessed by students in different stages of the learning cycle (Bratianu et al., 2011).

Knowledge sharing involves the exchange of experiences, events and ideas between individuals which helps develop their conceptual and practical understanding of various matters and thereby broadens and deepens their learning and capabilities (Eid & Nuhu, 2011; J. Kim & King, 2004). The ability to collaborate and share knowledge with others effectively is a key skill employers take into consideration in hiring decisions (Chong et al., 2014). Hence, knowledge sharing is an important aspect of the graduate skills and employability strategy of universities that operate in an increasingly unstable and competitive environment, where the employability of graduates is a major determinant of an institution’s success (Collet et al., 2015).

The importance of knowledge sharing is also explicitly articulated through various national and regional qualifications frameworks. For instance, according to the Australian Qualifications Framework, an individual with an Australian bachelor degree is expected to possess cognitive skills to critically examine, analyse and amalgamate knowledge; cognitive and technical skills to demonstrate broad knowledge and an in-depth understanding of one or more subject areas that serves as a foundation for lifelong learning; cognitive and creative skills to think critically and independently to identify and solve problems and communication skills to present knowledge and ideas clearly, coherently and independently (AQF, 2013). The Australian Qualifications Framework also stipulates that Australian graduates are expected to apply their knowledge and skills with initiative and judgement for planning, problem-solving and decision-making in the contexts of professional practice and/or scholarship; adapt knowledge and skills to suit different contexts and exercise responsibility and accountability for own learning and professional practice whilst broadly collaborating with others (AQF, 2013). Similarly, the ability to share knowledge and collaborate with others underlies the European Qualifications Framework, which requires individuals...
possessing a bachelor degree to possess advanced skills, demonstrate mastery and innovation, solve complex and unpredictable problems in a specialised field of work or study and take responsibility for the management of complex technical or professional activities or projects, decision-making in unpredictable contexts and managing professional development of individuals and groups (European Commission, 2019).

The bulk of the extant knowledge management literature focuses on knowledge sharing between an organisation’s members or employees, although there is also a sizeable literature that explores knowledge sharing in relation to other stakeholders, especially customers and suppliers (Aisyah et al., 2019; Dyer & Nobeoka, 2000; Erat et al., 2006; Wagner & Buko, 2005). A university environment is unique in that, while its members or employees, made up of both academic and professional staff, constantly create and exchange knowledge amongst themselves as well as with colleagues from other institutions and other stakeholders like government organisations and industries, students are also fundamental actors in the knowledge management process. Given the importance of encouraging knowledge sharing between students for employability and quality assurance, there is a need to undertake dedicated work on the topic to develop a better understanding of the various ways in which student share knowledge with each other in university environments, and understand the myriad of considerations underlying these arrangements.

The extant knowledge management literature distinguishes between different types of knowledge, various channels through which knowledge is shared and the diverse motivations and various organisational and individual factors that shape knowledge sharing in organisations. While these aspects can serve as dimensions for the classification of knowledge-sharing activities between members of an organisation, including the exchange of knowledge between members or staff in educational institutions, knowledge sharing between students is influenced by broader macro and institutional-level considerations that include the unique characteristics of higher education organisations and the varied contexts and arrangements that higher education institutions have in place to enable knowledge sharing between students as well as a range of individual-level factors.

The recent interdisciplinary literature dealing with knowledge sharing between students in higher education environments has looked at aspects such as the individual characteristics of students that influence their willingness to share knowledge with one another, the effects of technology and social media on knowledge sharing and the approaches to learning and instruction that help or hinder students’ ability to share knowledge (see, for instance, Al-Emran & Teo, 2019; Chin Wei et al., 2012; Eid & Nuhu, 2011; Sadiq Sohail & Daud, 2009). However, these studies often look at knowledge-sharing arrangements specific to certain contexts and identified cohorts of students. Attempts to provide a holistic perspective that enables one to systematically understand the differences between the plethora of ways in which students share knowledge in university environments are sparse. Hence, the rationale for this work stems from the need for a unified approach that can delineate the plethora of student-to-student knowledge-sharing activities that take place in university contexts. By drawing on a wide range of literature from the fields of knowledge management and higher education, this paper proposes the following three dimensions along which student-to-student knowledge-sharing activities in a university environment can be categorised: relatedness to curriculum, distance between students and degree of formality.

The paper aims to contribute to the knowledge management literature by focusing on the special aspects of student-to-student knowledge sharing that sets it apart from organisational knowledge-sharing contexts that typically form the subject of studies in the discipline. While knowledge sharing between students shares many similarities with knowledge sharing between members of an organisation, some key points of distinction include the range of opportunities students have for sharing knowledge within, in tandem with and outside of the curriculum, the unique power, trust and motivation dimensions presented by various knowledge-sharing arrangements and the institutional and sector level factors that determine the extent to which knowledge exchanges between students are regulated or managed.

The second contribution of the paper is from a higher education management perspective; the tri-dimensional categorisation presented here could be used as a planning tool when designing new programmes and developing and evaluating an institution’s strategies and policies pertaining to student-to-student knowledge sharing. Furthermore, this approach can act as a point of reference for evaluating the objectives, value and broader implications of various knowledge-sharing activities, which can be valuable for the maturation of the literature on this topic. It is also hoped that the integration of literature from the fields of management, organisational behaviour and education to propose these dimensions and identify and discuss the challenges underpinning them and various knowledge-sharing practices among university students would make this paper of interest to academic and practitioners from all these disciplines.

The paper proceeds as follows: Section 2 develops the three dimensions for categorising knowledge-sharing activities between university student and discusses a range of considerations surrounding each
dimension. Section 3 discusses how these dimensions can collectively be used as a planning tool for auditing, comparing and revising different knowledge-sharing activities by using some common examples that are relevant to higher education environments. Section 4 concludes by discussing prospects for further research in higher education and interdisciplinary spaces in the context of knowledge sharing between students in university environments.

2. The proposed dimensions of student-to-student knowledge-sharing activities

Identifying the sources of knowledge and creating processes for the exchange of knowledge is crucial for the success of any organisation (Zhu et al., 2018). Universities need to develop arrangements that resemble organisational processes for creating and exchanging knowledge in order to ensure that their students possess the skills and competencies to excel in their chosen professions (Astorga-Vargas et al., 2017). Nevertheless, the prevalence of knowledge sharing depends on the willingness among students to exchange knowledge, the nature of the tasks for which students seek collaboration with and support from peers and the manner in which these activities are structured (Havnes et al., 2016).

Knowledge management involves the creation and sharing of both explicit and tacit knowledge (Chen et al., 2018). Explicit or codified knowledge is relatively easy to transmit and articulate meaningfully, while tacit or implicit knowledge is difficult to transmit in a systematic or formal manner, and is often related to specific tasks and the ability to take actions in given situations (Magnier-Watanabe & Benton, 2017). Explicit knowledge can be translated into language and transferred between individuals through artefacts such as records, reports, manuals, procedures, presentations and instruction manuals (Chen et al., 2018). On the other hand, tacit knowledge is grounded in action and is created and shared through activities such as solving problems, experiential and action learning and interactions with communities of practice (Garrick & Chan, 2017). Translating this distinction between the sharing of explicit and tacit knowledge to the context considered in this paper, often knowledge sharing that occurs within the curriculum is explicit in nature while tacit knowledge is likely to be exchanged in extra-curricular contexts. In recent times, universities have integrated knowledge sharing into the student experience in various ways. Collaborative learning has been incorporated into curricula through activities such as group projects and peer assessment to create more opportunities for students to work in groups to share and co-create knowledge through interdependent work that results in the achievement of shared curriculum goals (Chin Wei et al., 2012; Laal & Ghodsi, 2012; Loes et al., 2018). The knowledge that students create and share through such curricular, collaborative activities are directly related to the learning objectives of the unit, programme goals and graduate attributes and are therefore largely explicit. Nonetheless, not all knowledge-sharing activities that occur among students are embedded into curriculum; many of them are co-curricular or extra-curricular. For instance, universities around the world have various co-curricular peer-learning programmes to develop the academic, social and employability skills of students throughout their undergraduate journey (Hilsdon, 2014; M. Lane et al., 2019). While such activities are often aligned to desired graduate attributes, they may have varying degrees of relatedness to the curriculum. Excurricular activities like clubs and societies also serve as fertile grounds for the sharing of knowledge between students and developing a range of other attributes such as self-confidence and sense of civic responsibility, but sit outside the curriculum (Goldner & Golan, 2019). Therefore, a dimension called relatedness to curriculum is proposed to capture these considerations.

Organisations are more productive and successful when individuals within the organisation share knowledge and learn from each other, and knowledge sharing is therefore at the heart of organisational knowledge management (Law et al., 2017). The successful exchange of knowledge in organisations depends primarily on the connections between individuals (Ipe, 2003), and this is aptly captured by the following definition by Jacobson (2011, p. 2):

“Knowledge sharing as used here refers to an exchange of knowledge between two individuals: one who communicates knowledge and one who assimilates it. Knowledge sharing focuses on human capital and the interaction of individuals.”

Thus, examining the behaviours and characteristics of individuals, who are the fundamental constituents in an organisation, is essential for understanding organisational processes (Foss et al., 2010). The sharing of knowledge between individuals is the most fundamental level at which knowledge is exchanged, but it has a significant influence on knowledge sharing at the group, organisational and inter-organisational levels (Ipe, 2003). As such, the characteristics and motivations of individuals can have a marked impact on the effectiveness and outcomes of knowledge sharing. In university environments, students have varying degrees of motivation to share knowledge, and their level of ability and understanding is likely to vary. Furthermore, there could be trust and power aspects that could influence the effectiveness of knowledge exchanges. Collectively, these considerations are
identified as the distance between students dimension in the categorisation presented herein.

Another aspect of knowledge sharing that frequently emerges in the literature is the distinction between the different ways in which knowledge is shared, ranging from formal to informal. In the organisational context, formal knowledge sharing is institutionalised in that the organisation provides the resources required and organises the activities which enable employees to share knowledge with one another (Taminiau et al., 2009). However, there is increasing acknowledgement in the knowledge management literature the bulk of knowledge sharing in organisations occurs through interpersonal interactions and communications that fall outside formal structures or processes (Nirmala & Vemuri, 2009). In the case of universities, collaborative learning activities that are embedded into the curriculum often constitute formal knowledge sharing, while activities that students organise themselves without the direction of educators are informal in nature. The degree of formality dimension captures these considerations.

Figure 1 below presents these three dimensions and the key elements underlying each of them. It is important to note that each dimension proposed here is really a continuum ranging from low to high as opposed to a binary classification. This is because in practice, many knowledge-sharing arrangements lie somewhere in between the high and low ends of each dimension. In order to understand these dimensions better, the remainder of this section describes each dimension at length and discusses examples of knowledge-sharing activities that can be classified at different points along each continuum.

2.1. Relatedness to curriculum

In Figure 1, arrangements with low relevance to the curriculum include groups formed by students who share common extra-curricular, volunteering and recreational interests, such as sports clubs, literary circles, and environmental groups or fraternity and sonority clubs in North American universities. The knowledge and experience students acquire through these activities, whilst not directly related to the material they learn, nonetheless plays an important role in enhancing their cultural capital, which impacts graduate capabilities, employability and consequently,

![Figure 1. Proposed dimensions of student-to-student knowledge sharing.](image-url)
socio-economic advancement (Clegg et al., 2010; Stevenson & Clegg, 2011). These activities are often run with minimal involvement from university staff, usually receive limited or zero funding from the university and membership in them is voluntary.

At the other end of the spectrum are forms of knowledge-sharing such as group projects that are embedded into the curriculum. These activities are often assessed, carefully planned by faculty course design teams and formally endorsed by the university. Unlike in organisational contexts where Xue et al. (2011) note that knowledge sharing is a voluntary act governed by complex human behaviours, it is usually not possible for students to opt-out of group assessment tasks. Group assessment involves a number of students collaborating with each other to deepen their knowledge of subject-related content and the individual and group elements of the work they submit are assessed against pre-determined criteria, which, in terms of knowledge management, involves the exchange of explicit or discipline-specific knowledge. The system of criterion-referenced-assessment enables learning outcomes of such activities to be aligned to graduate attributes described in nationally or internationally recognised qualifications frameworks (Havnes & Proitz, 2016).

Some knowledge-sharing arrangements, whilst seemingly unrelated to curriculum, may nevertheless act as vehicles for sharing of explicit of curricular knowledge sharing, and therefore fall somewhere towards the middle of the relatedness to curriculum spectrum. For instance, societies formed by specific groups of students majoring in particular subjects/disciplines or other special interest groups, such as female students studying engineering subjects, help members gain a better understanding of the discipline and enable them to engage in various activities such as mentoring programmes, career fairs, networking events and guest seminars, which enables students to acquire valuable tacit knowledge that can help them develop their social and cultural capital, develop skills they can transfer to the work context and also realise their altruistic needs (Smith et al., 2010; Thompson et al., 2013). At the same time, membership in such groups can help students acquire explicit knowledge as they are likely to find keen study partners and senior students in the discipline who can informally coach and mentor them. This is further confirmed by studies which show that students engaging in extracurricular activities are more likely to engage in deep learning, work in collaboration with peers, manage their time and prioritise their work efficiently and thereby achieve better academic outcomes (Chan, 2016; Díaz-Iso et al., 2019).

Such extra-curricular knowledge-sharing opportunities that also encourage sharing of knowledge related to the curriculum mimic the dynamic and exponential knowledge interactions in organisational environments where the types of knowledge shared evolves constantly (Astorga-Vargas et al., 2017).

Adding further to the research on the academic effects of extra-curricular activities, Hamilton and Cheng (2017) note that membership in Greek letter societies in US universities improves students’ graduation rates as students who are affiliated with these societies are likely to support each other financially and academically. Nonetheless, there is also evidence in the US context that membership in Greek letter organisations is associated with poorer academic performance (De Donato & Thomas, 2017). These studies show that, although these activities are extracurricular and not being officially related to curriculum, they have an indirect impact on academic outcomes, whether it is in the form of positive or negative peer effects, resulting in them being positioned somewhere between the far left and the middle of the relatedness to curriculum continuum.

Recent advances in technology and the increase in the importance of online and blended approaches to learning and teaching has made possible the design of innovative approaches to knowledge sharing within the curriculum. Educators use a variety of methods such as wiki, instant messaging through a chat feature included in the subject webpage or a dedicated social media page, discussion boards, group emails, announcements, blogging and online learning resources to facilitate collaborative learning and knowledge sharing in technology-enhanced learning environments (Boelens et al., 2017; Soon & Fraser, 2011; Vurdien, 2013). Some types of learning activities and technologies have been consistently identified in the higher education to be more conducive for knowledge sharing than others. For instance, recent studies such as Sultana et al. (2020), Alexiou and Paraskeva (2019), and Chang et al. (2018) show how the use of eportfolios for organising and presenting learning experiences and outcomes encourages better sharing of ideas and artefacts among students. Embedding mobile applications into courses has also been identified as encouraging collaborative learning and better engagement with peers various countries and discipline contexts (Pechenkina, 2017; Shemahonge & Mtebe, 2018; Vázquez-Cano, 2014).

Nonetheless, there are many individual circumstances that can impact students’ engagement with online and social media tools for sharing knowledge. For instance, availability of and familiarity with technology, including factors like Internet speed and quality, hardware and software issues and time constraints can have a major impact on students’ participation in online knowledge-sharing environments (Ong et al., 2011). Furthermore, power differentials and trust issues could also emerge in technology-integrated learning environments and these considerations are discussed in greater detail in the next section.
2.2. Distance between students

In organisational knowledge-sharing contexts, Cummings (2003) notes that there are several factors that can create a distance between parties, which he refers to collectively as the “relational context”. The relational context includes organisational distance (whether interactions occur within structured or ad hoc settings), geographical/physical distance between parties, institutional distance (regulatory and institutional environments and employment systems that affect both national and cross-border knowledge sharing), knowledge distance (gap in knowledge help by the parties involved) and relationship distance (how similar the parties are in terms of social identity, strategic priorities and level of prior experience with transferring knowledge. Delving further into the relational dimension of knowledge sharing, Boer et al. (2011) draw on the four fundamental types of human relations discussed in Fiske’s Relational Models theory (see Fiske, 1991, 1992) to propose a relational framework for knowledge sharing. Within communal sharing relationships, individuals are considered equals and knowledge is shared freely among members of the group based on intimacy and idealism, but not with those outside the group who do not share the communal identity. Within authority ranked relationships, individuals are ranked based on expertise or formal authority and those in higher ranked positions will have greater access to knowledge, leading to knowledge asymmetries. Equality matching relationships entail balancing out knowledge through reciprocity and an implicit understanding that knowledge-sharing efforts should even out over time. In market pricing relationships, knowledge is perceived as a commodity and people share it if they are explicitly rewarded for it within a utility maximising framework rather than expectations of an intellectual reward or future knowledge gains.

Topping (2005) notes that peer learning in higher education environments can involve knowledge sharing between students with similar ability from the same level of study or ones with differing abilities belonging to different levels of study. Such variations in ability and experience lead to knowledge and relational distance between students especially in peer-assisted learning programmes, where senior students often coach, teach or mentor their junior counterparts. Peer mentoring is used in particular to support students in their first year of university navigate the various psychological and social challenges they are likely to face (Honkimäki & Tynjälä, 2018; S. R. Lane, 2018; Yomtov et al., 2017). Peer tutoring, on the other hand, develops academic and discipline-specific skills of students and often takes the form of students teaching or assisting fellow students with subject material and can take the form of more experienced students teaching their junior counterparts or reciprocal peer tutoring arrangements between students at the same level of study (De Backer et al., 2015; M. M. Kim, 2015). The key benefits of using experienced students to assist with learning include improvements in critical thinking, self-efficacy and problem-solving skills of the students receiving help as well as sharpening of knowledge and improved communication and interpersonal skills among those providing help (Carr et al., 2016; Pålsson et al., 2017). Conversely, some studies have shown that mentees/tutees could also experience anxiety and low confidence levels when their work is supervised by senior students (Brannagan et al., 2013).

The experiences of students receiving mentorship or tutoring depend markedly on the power differentials in various knowledge sharing setting. The traditional functionalist view of power in the organisational behaviour literature suggests that individuals can utilise their power to attain improved performance of team (Tost et al., 2013). However, there is also a large volume of organisational behaviour literature that explores how the distribution of power can influence the learning of individuals in any group environment, especially those involving culturally and diverse members (Janssens & Brett, 2006; Van der Vegt et al., 2010). In the organisational context, knowledge itself may be perceived as a source of power, resulting in individuals hoarding knowledge instead of sharing it out of fear of diluting their value to the organisation (Ipe, 2003), and low trust levels, poor communication between individuals and the lack of social networks to drive knowledge sharing can further discourage individuals from sharing knowledge with each other (see Naem & Khan, 2019 and references therein). Hence, it is important to provide appropriate training to mentors or tutors that develop their empathy and approachability to ensure that the value of such programmes for all parties involved is not impaired by such power differentials (Lundmark et al., 2017).

Both extrinsic and intrinsic motivational factors impact knowledge sharing. According to Nguyen et al. (2019), extrinsic motivation involves tangible rewards and reciprocity of knowledge sharing wherein those who donate knowledge to others expect to acquire knowledge from the recipients in return while intrinsic motivation is created by self-efficacy and altruism. Students are likely to have different motivational levels and factors which will cause differentials in their willingness to share knowledge. In general, however, students may be more willing to share knowledge when institutions make a conscious effort to formally recognise knowledge-sharing efforts. A major development in this regard at many Western universities has been the use of the “co-curricular record” as a means of recording and recognising students’ involvement in activities that foster a culture of altruism, self-discovery and purpose (Elias & Drea,
Formal recognition of involvement in knowledge-sharing activities with peers in the form of entries in the co-curricular record and acknowledgement of these activities as credit points or work experience creates extrinsic motivation to share knowledge.

However, it is important to note that only activities that are under the purview of the university can be considered for formal recognition. Effort expended on informal activities arranged amongst students cannot be validated and recognised which might discourage knowledge sharing outside formal channels. It is often an intrinsic motivation that encourages students to engage in extra-curricular activities and also form informal networks such as study groups and coffee clubs. There are many aspects of such informal knowledge-sharing activities that are considered in detail in the next section.

Group assessment tasks present a special case because they often involve students with different levels of motivation and different levels of ability working together. The usual practice of assigning a common mark to all group members motivates high achieving students to appropriate a disproportionate share of the burden of the task onto themselves, whilst simultaneously encouraging group members who are not adequately engaged with the subject to free-ride (Gamlath, 2020; Hannaford, 2017). Given these problems, it is important to reward individual contributions and penalise social loafing behaviours by incorporating mechanisms such as progress report submissions, monitoring workloads and personal contributions, multiple points of feedback and peer evaluations (Hansen, 2006). Furthermore, in such settings where rewards and outcomes achieved by individuals are interdependent, trust is likely to be a critical determinant of individuals’ willingness to overlook risks and share knowledge with one another (Sankowska, 2013). This is confirmed by a number of recent studies such as Han et al. (2020) and Dezdar (2017) which show that students are more likely to engage in knowledge sharing when they trust each other.

Individuals’ values also play an important shaping trust in knowledge-sharing environments. Recent studies reveal that individuals with values such as contentiousness, openness and self-direction are more likely to share their knowledge with others and additionally, individuals’ perceptions about their professional identity, expertise of co-workers and the relationships with the organisation and individuals shape knowledge-sharing actions (Gardiner, 2016; Manaf et al., 2020; Tams et al., 2020). Knowledge-sharing behaviours of individuals in organisations are also influenced by national cultural values (Ardichvili et al., 2006; Liebowitz, 2008; Liu et al., 2019; Wei et al., 2008). In the context of higher education, Ting and Shaheen Majid (2007) and Chin Wei et al. (2012) reveal that the main obstacles to knowledge sharing between undergraduate students in Singapore and Malaysia are competitive attitudes and inadequate connectedness with peers, which are behaviours that may stem from the national cultures of these countries. In multi-national and cross-cultural learning environments, collectivism has been consistently identified as a factor that influences knowledge sharing positively (see, for instance, Aparicio et al., 2016; Luo et al., 2017; Zhang et al., 2014). These findings are of particular interest for countries that host large international student populations, where encouraging knowledge sharing between students with diverse values and perceptions may be challenging. For instance, Campbell and Campbell (2007) show that matching students with mentors of comparable ethnicity in a first-year mentoring programmes led to better grades and completion rates.

Power differences between students can be particularly important in online knowledge-sharing environments, where domination of discussions by certain individuals may deter students with less outgoing personalities from posting something out of fear that their contribution may not be perceived as valuable by other participants (Sharratt & Usoro, 2003). Furthermore, there may be a general feeling of disempowerment when participants feel like they are have to pretend to “like” content posted by members of their online learning group (Hope, 2016). Nonetheless, Moghavvemi et al. (2017) found that perceived knowledge power and status do not have a significant effect on the motivation for students to share knowledge with each other on Facebook.

Gender, age and other factors can also have indirect power effects in online learning environments. For instance, a study by Rambe and Ng’ambi (2014) reveals the presence of gender-based differentials in participation in a Facebook group created to foster knowledge sharing among first-year students in an Information Systems course at a South African university, with females showing preferring private spaces like inbox messaging and males preferring to post content on the wall of the Facebook page where it was visible to all participants. The widespread use of social networking for learning and teaching may also have a discriminatory effect on mature-age students who are often not as familiar with using social media as their younger counterparts (VanDoorn & Eklund, 2013).

Power differentials are also closely related to the widening participation agenda in higher education. For instance, in the Australian context, there has been a particular interest in widening participation among the six key equity groups, which are: students of low socioeconomic status; from regional and rural areas; those with disabilities; students from non-
English speaking families; female students studying in non-traditional disciplines like STEM and ICT and postgraduate courses and indigenous people (McInnis, 2003). There is often a risk that extant societal power relations may be replicated in educational settings, which in turn affects the retention and success of students from such equity groups (Outhred, 2012). The marginalisation of students from disadvantaged backgrounds may be further exacerbated by concerns they may have around fitting in (Scanlon et al., 2019) and the difficulties they often face with participating in extra-curricular activities and peer learning due to additional family and work commitments (Crozier et al., 2008). Hence, there is an onus on universities to widen the participation of equity students in extra and co-curricular knowledge-sharing activities by providing them information about these opportunities and developing flexible arrangements such as after-hours or online peer enabled programmes.

2.3. Degree of formality

The most formal knowledge-sharing mechanisms are built into the structure of the university administration, courses and units and are instigated, planned and managed professionally by staff within the institution. Typical examples of knowledge sharing between students that sit at this end of the formality spectrum include group-based assessments, moderated discussion boards and formal peer learning programmes that are controlled by university staff and administered with the university’s approval and awareness. Participation in some curriculum embedded and assessable activities such as group assessment may be compulsory, while other activities such as peer-assisted study sessions organised for specific subjects are optional. From a knowledge-sharing perspective, such formal arrangements enjoy the advantage of quality assurance and increased visibility as they are openly promoted to students and managed and funded by the university. Hence, the rewards for participation in formal knowledge-sharing activities such as a particular grade for a piece of assessment or completion of a certain number of credit points, are always explicit.

Although peer learning is often portrayed in the education literature as a didactic activity that comes under the purview of educators, a lot of knowledge sharing between students happens informally, both within and outside the classroom (see Havnes, 2008 and references therein). Hence, at the other end of the spectrum, the most informal knowledge-sharing processes are generally unstructured, unmanaged, student-driven, promoted through word-of-mouth and not funded or endorsed by the university. A group of friends planning their study tour applications over coffee is an example of a highly informal knowledge-sharing process. Participation in such processes is entirely voluntary and depends on the characteristics of the individuals involved. Slightly more structured, but still informal knowledge-sharing methods include student-managed Facebook pages and informal peer study groups. The organic nature of these groups ensures that they meet the needs of participants in a timely fashion. However, when compared to formal arrangements, they lack the quality assurance and visibility to the broad student body. As mentioned earlier, students may engage in informal knowledge-sharing activities for altruistic reasons, but activities like study group can also provide explicit rewards in the form of higher grades.

However, informal knowledge sharing can pose certain risks and disadvantages which are less likely to exist in formal knowledge-sharing activities. For instance, Kommalage and Thabrew (2011) show that informal peer learning activities can be heavily focused on assessment, resulting in students easily forgetting the knowledge acquired, and also obtaining incorrect information and concepts from their peers. There is also a risk that students may collaborate informally to engage in dishonest academic behaviours such as contract cheating of assignments which involves getting a third party to complete an assignment, cheating at examinations and colluding with peers to undertake assessment tasks that are assessed individually (Marsden et al., 2005). Often, students engage in academic misconduct in collaborations with peers rather than independently, and a higher prevalence of cheating among peers increases the tendency for students to engage in dishonest behaviours (Scrimshire et al., 2017; Teodorescu & Andrei, 2009). While universities usually have stringent policies relating to academic misconduct and undesirable behaviours on campus, it is possible to introduce formal peer knowledge-sharing activities to counteract them. For instance, a peer mentoring programme to educate students about the perils of drug use could help control the incidence of addiction, while setting up peer-facilitated workshops to develop students’ academic writing and research skills could reduce the risk of plagiarism and other forms of academic misconduct.

There has been increased formalisation of peer-to-peer knowledge-sharing activities in recent years, especially through the introduction of formal peer learning programmes that are either embedded into or complement the curriculum (Boud, 2014). The economic rationale for the widespread popularity and increased formalisation of peer programmes is obvious: training students, in most instances those working on a voluntary basis, to undertake tasks that would otherwise be performed by academic and professional staff is cost-effective, and in the face of cuts in funding to higher education in many countries, this has become a key value addition of these programmes (Keenan, 2014). Institutionalisation of peer learning may also
be an effective solution to the resource constraints that limit the ability to develop study skills and independent learning capabilities of students within the curriculum (Boud et al., 2014, pp. 3–4). Furthermore, Boud (2014) notes that “formalising the informal” enables more students to benefit from peer learning especially considering the increased proportion of students choosing to study via part-time and online modes, and the work and family commitments that restrict students’ ability to share knowledge informally with others outside the classroom.

Official peer learning programmes can be regarded as formal knowledge-sharing arrangements in that they are managed and funded by the university, but the actual exchange of knowledge at the individual level are likely to be informal to the extent that the interactions between peers are not moderated by staff managing these programmes. Hence, they fall somewhere towards the middle of the degree of formality continuum. Considering that knowledge-sharing demands time and effort, establishing suitable reward systems for participants through formal recognition schemes like the co-curricular record is essential for the sustainability of formal knowledge-sharing arrangements such as official peer learning programmes.

However, one of the key challenges that peer programmes face is quality assurance. Especially in peer programmes that depend on student volunteers, imposing quality standards may discourage participation. Generally, initial and ongoing training and constant guidance from staff involved in the management of such programmes could help maintain quality. Another important consideration relating to formal peer learning programmes is the need to adopt a holistic approach to quality management that takes into account the interactions of the students involved with staff members from different functional areas within the university (Srikanthan & Dalrymple, 2002).

3. Using the dimensions as a planning tool

This section illustrates how the proposed dimensions can be used as a planning tool by drawing on some common examples of knowledge-sharing activities that occur frequently in higher education contexts. The first example is the redesign of a subject that consists of a group assessment task. Since this task is assessed, it sits in the high end of the relatedness to curriculum and degree of formality dimensions. However, if students are randomly assigned into groups and all group members are ultimately assigned a common mark, it is likely that there will be variations in ability, motivation and effort as well as various power dynamics and trust issues which means that this activity will be positioned towards the high end of the distance between students dimension too. The left panel of Figure 2 depicts this activity initially in relation to the three dimensions. However, since the assignment of a common mark regardless of effort is likely to be a cause for dissatisfaction among students, certain modifications could be made to reduce this distance. Firstly, the introduction of progress reports whereby team members can report ongoing problems such as low levels of effort expended by certain group members and overly dominant behaviour by certain members to the teaching team may help reduce the intensity of such behaviours (Yook, 2018). Furthermore, introducing a peer review component that accounts for even a relatively small proportion of the marks for the assessment item will deter social loafing and help team members mitigate trust issues (Meijer et al., 2020). If such mechanisms are in place, the distance between students can be reduced, although the degree of formality associated with the activity increases even further due to the additional processes managed by staff. The modified positioning of the activity in relation to the three dimensions after the introduction of the progress reports and peer review components is presented in the right panel of Figure 2.

The next example involves the introduction of a peer mentoring arrangement to support students prepare for an overseas learning experience. Students who have completed an exchange programme overseas act as mentors for those intending to go on exchange by sharing their experiences, providing.

![Figure 2](image-url) Changing the structure and requirements of a group assessment task.
advice and guidance. This activity is rather highly related to the curriculum since students going
on exchange will continue their studies as the overseas institution. There will be a gap in knowledge between
mentors who have already experienced overseas study and mentees, although this is probably a desirable
characteristic in this instance since the intent is for the mentors to utilise their experience to support their
peers. However, the key consideration is whether this needs to be organised as a formal peer programme,
which would entail administration of the programme by university staff, mandatory training for mentors
and potentially, remuneration for them. If this is the case, the positioning of the activity would be as
depicted on the leftward panel of Figure 3 where it would be positioned towards the right end across all
three dimensions. However, an alternative approach could be for staff to simply connect students with
potential mentors and then allow students to continue their mentoring relationship with minimal staff inter-
action. If the programme runs informally, students may feel more comfortable interacting with each other
and relational distances may reduce too, leading to a modified position as presented in the righthand
panel of Figure 3.

The same approach outlined above can be used for benchmarking and comparing different knowledge-
sharing activities that occur within or across universities. For instance, take the case of a student club
dedicated to helping local environmental conservation through activities such as beach clean-ups, working
with local businesses to explore ways to reduce pollution and community events. Being autonomous in its
operations and comprising of a group of students who are passionate about environmental protection, this
activity likely to be positioned at the low end of all three dimensions as shown on the left panel of Figure
4. Simultaneously, assume that discussions are underway to introduce a service-learning component into
a course which entails similar activities to those undertaken by the club which students need to undertake in
groups. Such service-learning components are increasingly incorporated into courses to develop stu-
dents’ community leadership skills and sense of civic responsibility at universities around the world (Furco
& Norvell, 2019; Reed et al., 2019). While both arrangements are likely to be fertile grounds for partici-
pants to learn from each other and collaborate with the local community, the key distinction between
them is that students in the service-learning course get credit towards their studies for undertaking these
activities together under the supervision of teaching staff while those who are members of the club do not
get such formal recognition for their work. The service-learning course is embedded into curriculum and
organised formally and would hence lie towards the high end of both these dimensions. Also, there may be
students who only undertake these tasks to achieve

![Diagram](image1)

**Figure 3.** Two different ways of organising peer mentoring for students travelling overseas for study.

![Diagram](image2)

**Figure 4.** Two approaches to collaborative local environment conservation.
credit towards their studies, leading to potentially low levels of motivation and effort from some participants as well as resulting trust issues, leading to a positioning towards the higher end of the distance between students’ dimension as shown on the right panel of Figure 4. It is interesting then, that despite achieving the same overarching outcome of environmental conservation, the two knowledge-sharing arrangements are very different from one another and such a comparison could enable academics and learning designers to borrow insights from the student club to help improve student engagement in such a service-learning course.

4. Concluding remarks and prospecting for the future

The topic of knowledge sharing between students is of greater importance than ever before given that the ability to share and disseminate knowledge effectively is vital for employability and advances in technology, changes to teaching and learning approaches and new managerial and funding structures in universities have resulted in more students sharing knowledge with one another more frequently. Being knowledge-intensive organisations, universities around the world are deeply committed to enabling and facilitating greater knowledge sharing among their students in order to help them succeed academically and gain a competitive advantage in the job market. However, the extant literature does not provide a systematic approach to understanding the points of distinction between the plethora of student-to-student knowledge-sharing activities that exist in modern university environments that encompass, among others, group projects, formal peer learning programmes, informal peer learning activities organised by students and various extra and co-curricular clubs and societies that foster knowledge sharing between members. As such, this paper draws on knowledge management and higher education literature to propose the categorisation of knowledge-sharing activities among university students along three dimensions: relatedness to curriculum, distance between students and degree of formality.

While the dimensions themselves are quite broad and do not capture all possible factors of relevance to student-to-student knowledge sharing, it is hoped that this approach will serve as a first step towards creating a clearer understanding of the myriad of factors that shape and influence knowledge-sharing activities among students in universities. By drawing on several examples, the paper shows how the above dimensions can be used by university staff as a simple approach for auditing and modifying extant knowledge-sharing activities, planning new ones and benchmarking activities against others within or outside the institution.

Given that this paper is conceptual in nature, a meaningful extension of the work presented herein would involve the empirical investigation of the proposed dimensions. Nevertheless, there are many other external, organisational and individual factors that impact the nature, appeal and reach of knowledge-sharing activities and feed into these dimensions. These include organisational culture, the spread of online and blended technologies and social media for learning and teaching, the broader politico-economic milieu the higher education sector operates in and the plethora of individual characteristics of students that have a bearing on their motivation and openness towards sharing knowledge. In other words, knowledge sharing is a complex process and it is even more so when applied to the context of university students, as they often share knowledge both within and outside of the curriculum in various ways and possess various perceptions about knowledge sharing that are shaped by a range of social, economic and cultural factors. While the paper discusses some of these considerations, there is scope to develop a more elaborate model or framework that incorporates these broader aspects and test it empirically. Given the overarching importance of the topic of student-to-student knowledge sharing for academics, administrators and policymakers, such an exploration would necessitate an interdisciplinary lens that can capture the numerous influences and perspectives that feed into the issue.

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